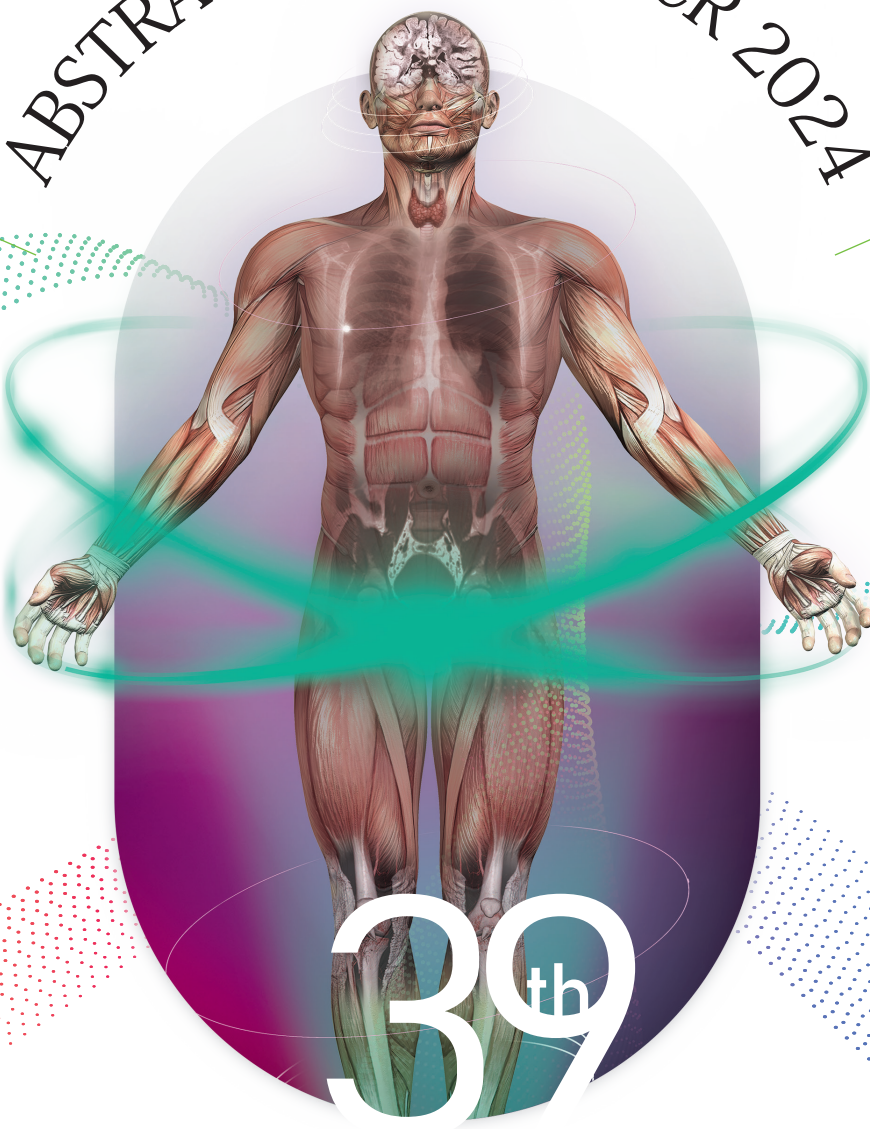


ABSTRACT BOOK OF ICR 2024



7-10 May 2024
Olympic Hotel / Tehran - Iran

**IRANIAN
CONGRESS OF
RADIOLOGY**

21st IRANIAN CONGRESS OF
RADIOGRAPHIC
SCIENCES ASSOCIATION

General Information

Venue.
Olympic Hotel, Tehran, Iran
Organizer:
39th Iranian Congress of Radiology (ICR 2024) is organized by the Iranian Society of Radiology.
Date:
May 7-10, 2024
Language
The language of the congress is English and Persian
Secretariat Registration
Registration fee includes: • Admission to scientific sessions and commercial exhibition
Scientific Program Secretarial
Assistance and information regarding the scientific program will be provided by secretariat at conference center lobby.
Speaker Ready Room
The slide preview room is located in lobby at the Class #2. Lecturers are requested to submit their presentations at least 30 minutes before their session. The presentation should be in Power Point format. The files should be in portable media format supplied in flash-disk or CD.
Electronic Posters
This year we only accept posters in electronic format. All posters should be prepared in PowerPoint format similar to a regular lecture presentation but with more description to let them be used stand-alone. Posters will be displayed in a specific site at lobby on several workstations.
Workshop Registration
Workshops need separate registration. workshop schedule will be available at www.isr.org.ir .
Meals
Coffee break will be available daily at 10:30-11:00, 16:00-16:30 and lunch at 13:00-14:00.
Technical Exhibition
A technical exhibition will take place at the Conference Center, sufficient time during intermissions is reserved for visiting the booths of leading sponsors (Medical Engineering Companies), which present their latest achievements and give you ample expert information.
Society Booth
The Iranian Society of Radiology booth is located on ground floor. Application forms and general information for membership are available. It provides membership services, information and an opportunity to pay annual dues for the society.
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Invited Speaker Abstracts

Role of Organizational Ethics in The Field of Clinical Imaging

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According to accepted rules of organizational ethics design of an organization structure, mission, vision, norms, beliefs and values is determined authoritatively from top management, so, imaging centers as an organization, should be ruled by ethical leader who promotes ethical behavior and if you find an organization unethical, undoubtedly the leader of such organization is unethical. Role modeling of leaders and policy makers is important and vital, as Imam Ali (peace be upon him) said: "People's similarity to their rulers is more than their similarity to their fathers". "Tuhaf Al Uqoul, narration 57". To reduce pays for imaging, some strategies have been taken by several countries as enforcing rulings and legislative trends, including reducing physician payments when multiple images are taken during the same visit, establishing a cap on payments for certain imaging services, and imposing an anti-markup rule on diagnostic tests by CMS at USA as price limitation for diagnostic services (technical and

professional components) that are ordered by a physician or supplier and provided by a third party, also barring certain per-service or per-click leasing arrangements, and prohibiting medical professionals from owning facilities that provide services to benefactors that then bill for them under arrangements and above all, establishing an ethical organization is mandatory. In the imaging centers clinical ethics and business ethics together form organizational ethics which deal with business decisions, ethical marketing, role of stakeholders, reimbursement mechanisms along with patients' well being and rights. The most relevant standards of organizational ethics has been presented by joint commission on accreditation of health care organization in 1995, that can be a proper model for implanting organizational ethics in imaging facilities.

Conflict Of Interests And Medical Imaging; Let's Not Let Angels Become Devils

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The old view of the medical imaging professionals as a physician who solely performs sonographic studies , interventional therapies and interprets X-Ray in a dark room and reports Ct-Scan and MRI images is outdated. The new roles have expanded to include taking into account the health care funding, economic and political requirements along with patient safety in the professional practices, promoting value based radiology and increasing need to use information technology. Imaging modalities have been growing rapidly and there is a tendency for increased utilization of imaging services instead of full clinical examinations and when referring physicians have ownership interest in the imaging facilities, there is more tendency to refer patients due to conflict of interest situations. At the state level, compilation and implementation of a fair , justifiable and real medical tariffs and legislations laws and regulations to reduce conflict of interest issues as requiring disclosure of certain payments to

physicians to laws restricting or prohibiting certain relationships and establishing sanctions for those who practice unethically. Stark laws of USA are outstanding examples to control conflict of interests and similar laws should be implemented in other countries because ethical recommendations without the support of the law may be less effective. At academic level there is a lack of comprehensive training courses of ethics for radiologists and also residents, focusing on conflict of interest issues as fee splitting. Professional societies as Iranian society of radiology that has composed and edited code of ethics for radiologists , has should improve their policies and codes of professional conduct to support ethical recommendations and take action if there is a deviation from professional conduct by its' members. The most important action to promote medical ethics from organizational ethics perspective is employing ethical leaders, ministers and managers.

Imaging Findings Of Local Recurrence In Lumpectomy Bed (A Case Based Review)

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The objectives of this article are to emphasize the imaging features of tumor recurrence

after conserving breast surgery and radiation therapy. Early diagnosis of local recurrence

by means of close clinical and imaging follow-up is an important component of a breast-conserving strategy, as it may improve survival. There are some specific limitations in the imaging of treated breast because of its limited compressibility and the challenge of overlapping benign and malignant features due to post-treatment alterations. After breast conservative surgery and radiation therapy, mammographic findings such as skin and trabecular thickening, fluid collections, architectural distortion, and calcifications have characteristic courses of evolution toward stability. After achievement of stability any changes in the imaging findings including developing asymmetry, an enlarging mass, increasing edema or skin thickening, and the development of suspicious calcifications within or near the post-surgical markers in comparison with base line imaging, should concern the radiologist to possible tumor

recurrence. When mammography or sonography are indeterminate, MRI as a problem-solving tool may play a vital role in decision making. After a patient has undergone conservative breast surgery, various MRI findings are expected in the lumpectomy site including edematous changes, skin thickening, seroma, fat necrosis, a small focal area of non-masslike enhancement (NMLE), and thin linear NME. All post-treatment MRI findings decrease progressively, but may persist especially in women with fat necrosis. In contrast, mass enhancement or NME of ductal or segmental distribution can indicate recurrence. Therefore, at MR imaging of the post-BCT breast, it is important to identify lesions that are appropriate for short-interval imaging surveillance to minimize unnecessary intervention, as well as to discern suspicious lesions and optimize the diagnosis of recurrence.

The Role Of MRU And CTU In Evaluation Of The Urinary System

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Computed Tomography Urography (CTU) is defined as an abdominal multiphase CT examination optimized for imaging kidneys, ureter, and bladder, including post-contrast excretory phase imaging - Clinical Indications for CTU : Micro and/or macrohematuria suspicious for urologic malignancy, Staging and follow-up for urothelial malignancy, Iatrogenic or traumatic injuries, Congenital abnormalities, Urinary tract obstruction, Infiltration by pelvic and abdominal tumors, Pre-operative assessment of kidney donors - CTU acquisition protocols and Technique: Triple phase (conventional single-energy CT);

1. Non-enhanced phase
2. Intravenous contrast agent injection as a single bolus
3. Corticomedullary phase (optional) 30–40 s after bolus
4. Nephrogenic phase (80–120 s after bolus)
5. Excretory phase (5–15 min after bolus)

-MR urography has evolved into a comprehensive evaluation of the urinary tract that combines anatomical imaging with functional evaluation in a single test without ionizing radiation - describes the advantages and disadvantages of MRU - Indications: to demonstrate the urinary system or the level

of obstruction in a poorly functioning kidney or urinary system obstruction, congenital abnormalities of the urinary system, characterization of renal masses, the diagnosis and local staging of bladder cancer - two types of MR urography:

1. static fluid-sensitive urography that is heavily T2-weighted to image the fluid-filled urinary system
2. excretory MR urography that is T1-weighted that image the urinary system after intravenous gadolinium administration

Twins Growth Discordance

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The incidence of multiple pregnancy is rising, mainly due to delayed childbirth and advanced maternal age at conception and the resultant widespread use of assisted reproduction techniques. Twin pregnancy is associated with a high risk of perinatal mortality and morbidity. Ultrasound assessment of fetal biometry, anatomy, Doppler velocimetry and amniotic fluid volume is used to identify and monitor twin pregnancies at risk of adverse outcomes such as twin-to-twin transfusion syndrome (TTTS) and fetal growth restriction (FGR). As in singletons, impaired fetal growth can be assessed in twins by comparing biometry and Doppler velocimetry parameters against standards for uncomplicated pregnancy. Although not all small babies are truly growth restricted, the fetus that struggles to reach its full growth potential is at substantial risk of fetal and neonatal complications, even more so if not identified antenatally. In FGR in multiples, as in singleton pregnancies, simply

being small for gestational age is not a guarantee of adverse perinatal outcomes. Unlike singletons, multiples, especially monochorionic twins, come with a built in control. The difference between twins can help to discriminate between well small babies and pregnancies affected by growth restriction. Although twins are rarely identical in size, significant growth discrepancies are associated with poor perinatal outcomes in a continuous fashion and may be more important in relation to perinatal outcome than the absolute size of individual babies. While sFGR in DC pregnancies is similar to placental insufficiency in singleton pregnancies, sFGR in MC pregnancies relates not to placental dysfunction but primarily to discordance in placental share. The greater the discrepancy in placental share in MC pregnancies, the greater the growth discordance that should be observed.

The Role Of Imaging In Bladder Mass Lesions

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Bladder cancer is the most common cancer involving the urinary system. The muscle-invasive bladder cancer (MIBC) form (20–30%) is typically characterized by a poor prognosis, due to the rapid infiltration of the different layers of the bladder wall and outside the bladder. The non-muscle-invasive bladder cancer (NMIBC) form is more frequent (70–80%). The evolution in imaging has had an increasing role in the diagnosis, staging and follow-up of bladder cancer. Conventional cystoscopy is crucial in the diagnosis of bladder cancer. An ultrasound of the urinary tract can help assess the size of a bladder tumor and whether bladder cancer has spread. Ultrasound can differentiate between fluid-filled cysts and solid tumors, however, it cannot determine if a tumor is cancerous. MRI can distinguish muscle-invasive from non-muscle-invasive tumors with accurate local staging. The Vesical Imaging-Reporting and Data System (VI-RADS) score is a new diagnostic

modality used for the prediction of tumor aggressiveness and therapeutic response. High-Resolution T2-Weighted Imaging (T2WI) T2WI is the imaging modality of choice for bladder cancer staging, due to its ability to detect the depth of the tumor infiltration. Superficial tumors display intermediate to high SI on T2WI with an intact adherent hypointense muscle wall. Functional assessment using diffusion-weighted imaging (DWI) and dynamic contrast-enhanced (DCE), can add further data about tumor invasiveness and infiltration to the surrounding structures, especially in distinguishing MIBC from non-MIBC. The morphologic criteria of LN involvement include a rounded configuration, the loss of hilar fat, in addition to contour irregularities Vesical imaging-reporting and data system score (VI-RADS) is a scoring system useful to standardize the approach to multiparametric-MRI interpretation, and reporting for bladder cancer.

Endovascular Treatment Of Chronic Mesenteric Ischemia

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Mesenteric arterial ischemia is an uncommon condition associated with high morbidity and mortality. Acute ischemia has a reported mortality rate of at least 50% and the chronic form will eventually lead to death from intestinal infarction or starvation if left untreated. Surgery

is still the method of choice in the acute setting, especially if signs indicating bowel infarction are present. In chronic cases, however, percutaneous transluminal angioplasty (PTA) of stenotic mesenteric arteries has become an option. We will discuss the related diagnostic

procedures, indications, contraindications, the equipment needed, technical aspects, outcomes, complications, and follow-up of such procedures. A few cases will also be presented,

and controversies on different issues related to chronic bowel ischemia are also planned to be open to discussion among the audience.

Application Of AI In Head And Neck

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This talk will focus on the innovative ways in which Artificial Intelligence (AI) is being utilized to advance the diagnosis, treatment, and management of conditions affecting the head and neck region. This presentation will delve into the specific applications of AI in areas such as medical imaging analysis, pathology interpretation, treatment planning, and outcome prediction for head and neck disorders. Furthermore, this presentation will highlight how AI algorithms are being harnessed to analyze complex imaging data from modalities such as MRI, CT scans, and PET scans to aid in the early detection of head and neck pathologies, including tumors and other abnormalities. Additionally, the talk explores how AI is

contributing to the development of personalized treatment strategies, risk assessment models, and prognostic tools for patients with head and neck conditions. Moreover, this presentation addresses the challenges and opportunities associated with integrating AI into clinical practice in the head and neck specialty, including considerations related to data privacy, ethical implications, and the need for validation and standardization of AI-based tools. Overall, the talk on "Application of AI in Head and Neck" provides a glimpse into how AI is reshaping diagnostic radiology, empowering clinicians with advanced tools and software to expedite diagnoses, and enhance the overall quality of head and neck imaging and interpretation.

Radial Artery Access for Peripheral Interventions

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Radial access is being accepted in Peripheral procedures after becoming the standard access in cardiac interventions. Radial access has been proven to be safer and the preferred access route by most patients with lower rates of vascular complications and better patient comfort. There is limited data in the literature regarding radial access in peripheral endovascular procedures but there are several advantages of radial artery access

over transfemoral techniques including reduced duration of postprocedure bed rest and length of stay, enhancing patient comfort; lower incidence of access site complications, including bleeding, pseudoaneurysm, and arteriovenous fistulas.

Keywords: radial access, Peripheral angiography, complications, interventional radiology

Imaging Of Intracranial Vascular Emergencies (Hemorrhage And Venous Sinus Thrombosis)

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Intracranial hemorrhage is common and is caused by diverse pathology, including trauma, hypertension, cerebral amyloid angiopathy, hemorrhagic conversion of ischemic infarction, cerebral aneurysms, cerebral arteriovenous malformations, dural arteriovenous fistula, vasculitis, and venous sinus thrombosis, among other causes. Neuroimaging is essential for the treating physician to identify the cause of

hemorrhage and to understand the location and severity of hemorrhage, the risk of impending cerebral injury, and to guide often emergent patient treatment. We review CT and MRI evaluation of intracranial hemorrhage with the goal of providing a broad overview of the diverse causes and varied appearances of intracranial hemorrhage.

3D Analysis And Modeling Of Medical Images Using Mimics Software for Artificial Intelligence Applications

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Recently, there has been a strong desire among researchers, physicians, and engineers (mechanical-biomechanical, sports, medical, etc.) to use models designed from medical images for computational analyses and to use 3D printers to implement 3D models of biological body organs. 3D printers could be used for a variety of tasks, including the diagnosis of functional disorders, the design of specific implants, the production of orthoses and prosthetics, and the prediction and simulation of surgical procedures. Additionally, surgical plates, surgical guides, specific surgical meshes, etc. are made using these models. Consequently, medical image analysis—which involves segmenting medical images, preparing

and meshing the surface and volume of the desired organ geometry, and finally performing medical calculations and analyses—becomes significantly important when creating 3D models. This lecture discusses the use of Mimics (Mimics Innovation Suite - Research v.20), a specialized software developed by Materialize for biological design. Mimics is licensed by CE, FDA, and ISO 9001 to process medical images and create accurate 3D models of soft tissues, vessels, nerves, and bones. It is used in medical fields like orthopedics, cardiac and blood vessels, lung and breathing, skull and jaw, and face.

Challenges And Pitfalls In Mammography

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Mammography is still the imaging modality of choice in screening the women with average risk of breast cancer and is also used with MRI, in screening the high risk population. Early detection remains the primary way to prevent the development of life-threatening breast cancer and increase a more favorable prognosis. As diagnostic imaging, mammography is also the first imaging modality performed in each ≤ 40 years old lady. Despite the advances in mammography techniques and 3D tomography, it still has a number of limitations. It is estimated that about 10 to 25% of lesions are overlooked in mammograms out of which about two thirds are detected retrospectively. Possible causes for missed breast cancers include dense parenchyma obscuring a lesion, poor positioning or technique, incorrect interpretation of a suspect

finding, subtle features of malignancy. The most commonly missed and misinterpreted lesions are stable lesions, benign appearing masses, one-view findings, developing asymmetries, subtle calcifications, and architectural distortion. In this presentation it has been tried to emphasis on the importance of the positioning and technical errors, using additional views and comparison with prior studies as well as using a classic reading approach and always remember to finish a case by asking at least one question, such as: Did I check my blind spots? Could I be missing something? Did I compare the current imaging findings with those seen on images obtained at least 5 years previously? Could I be wrong. Some of the cases are based on the RSNA 2020 and RSNA 2003 and many are of our real cases in private practice.

Multi-disciplinary Management Of Breast Cases

Seyed Amin Astani

MD

The management of breast pathology extends beyond the confines of a single specialty, necessitating a comprehensive, multi-disciplinary approach to ensure optimal patient outcomes. "Multi-disciplinary Management Of Breast Cases" is a dynamic exploration of the collaborative efforts required in the diagnosis, treatment, and management of breast diseases. This session brings together specialists from various fields, including radiology, pathology, radiation oncology, medical oncology, and breast surgery, to discuss a variety of breast pathologic cases. Through a series of case studies, participants

will gain insights into the complexities of breast case management from multiple professional perspectives. Each specialist will contribute their unique expertise, shedding light on the intricacies of their respective roles in the patient care continuum. The session will highlight the importance of seamless integration across disciplines, showcasing how collaborative decision-making can lead to more accurate diagnoses, tailored treatment plans, and improved patient care outcomes. The interactive nature of this session will provide an opportunity for attendees to observe and engage in the multi-disciplinary decision-making process,

fostering a deeper understanding of the various factors that influence management strategies in breast pathology. By examining the roles and responsibilities of each specialty involved, the

session aims to emphasize the value of a united approach in the face of complex breast health issues, ultimately enhancing the quality of care provided to patients with breast conditions.

From Image to Insight: The Art Of Radiologic-Pathologic Correlation In Breast Cases

Seyed Amin Astani MD

In the realm of breast diagnostics, the synergy between radiologic findings and pathologic outcomes is paramount for accurate disease characterization and management. We will explore the intricate relationship between breast imaging and pathology results. This exploration includes a series of breast cases, tracing the journey from initial screening to diagnostic imaging, and culminating in biopsy procedures. A diverse array of cases will be presented, meticulously selected to demonstrate the spectrum of imaging findings and their potential correlations with pathology. An in-depth analysis of each case will scrutinize the concordance or discordance between imaging presentations

and pathological outcomes. This examination will highlight the accuracy and challenges of diagnostic processes and underscore the clinical implications of radiologic-pathologic correlation in formulating patient management strategies. The emphasis on interactive learning will foster a deeper understanding of how imaging findings align or deviate from pathologic diagnoses. Through this comprehensive exploration, the aim is to enhance the diagnostic acumen, equipping professionals with the knowledge and skills to effectively navigate the complexities of breast imaging and pathology correlation, ultimately advancing patient care in the field of breast diagnostics.

Advances And Frontiers Of Breast Imaging

Seyed Amin Astani

Exploring the latest advancements and pioneering techniques in breast imaging, this work provides a comprehensive overview of current trends and future directions in the field. It examines automated breast ultrasound, highlighting its enhanced detection capabilities through automation, and discusses the efficacy of abbreviated breast MRI as a quicker alternative to conventional methods. The nuances of ultrafast breast MRI are analyzed, showcasing its ability to

reduce scan time without compromising image quality, alongside non-contrast screening MRI, an emerging modality that avoids contrast use while maintaining diagnostic accuracy. The exploration extends to contrast-enhanced mammography, combining the benefits of mammography and contrast imaging for improved lesion detection, and evaluates the roles of molecular breast imaging and breast CT in enhancing diagnostic precision and patient outcomes. Innovations

in Optical breast imaging and optoacoustic imaging are presented, revealing their potential in providing additional functional and molecular information. The impact of radiomics and artificial intelligence in the realm of breast imaging is addressed, demonstrating their ability to analyze vast amounts of image data for improved decision-making and personalized patient care. Furthermore, breast cryoablation

is introduced as an emerging, minimally invasive treatment option for breast cancer. The work concludes with a discussion on the latest updates in breast cancer classification, focusing on new pathology nomenclature to refine diagnostic accuracy and treatment planning. This exploration aims to equip professionals with the knowledge to effectively navigate the

Contrast Enhanced Mammography, An Overview And Case Presentation

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Contrast enhanced mammography (CEM), utilizes IV contrast to detect tumour neovascularity. This functional imaging modality, enables detection of enhancing lesions in the breast, with dual energy digital mammography, including a pair of images for each view. A low energy image which is a standard mammogram and a high energy image for detection of contrast uptake. Then these two images are combined, and glandular tissue subtracted, highlighting contrast uptake, improving cancer detection comparing with mammography and ultrasound.

CEM, has also demonstrated to have comparable sensitivity, but higher positive predictive value in cancer detection in comparison with MRI. Therefore, it could be used in staging of patients with breast cancer, response to treatment post neoadjuvant treatment and screening women at increased risk of breast cancer. CEM is more cost effective and efficient test comparing with MRI, but involves injection of iodinated contrast, more radiation than mammography, which is still within acceptable limits.

Basic And Advanced Interventional Procedures In Entrapment Neuropathies: Our Role In Diagnosis And Treatment

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Peripheral nerves are susceptible to pressure-induced injury as they travel along different anatomical structures resulting in entrapment neuropathy. Pressure-induced injury can result

from mechanical compression, constriction, overstretching, or edema. Entrapment can occur at various sites in the body, such as between muscles or bones, around blood

vessels, across joints, and through tunnels or fascial penetration sites. The most common sites for entrapment are the median nerve at the wrist, carpal tunnel syndrome (CTS) and the ulnar nerve at the elbow, cubital tunnel syndrome (CuTS). Other less common sites include the lateral femoral cutaneous nerve, lateral antebrachial cutaneous nerve, and medial superior cluneal nerves. Entrapment can lead to sensory and/or motor dysfunction, causing neuropathic pain, discomfort, and weakness. There are various treatment options available for entrapment neuropathy. If conservative measures are ineffective, surgical decompression or reconstruction may be necessary. High-resolution ultrasound is currently used for the diagnosis of entrapment neuropathy and can also guide injections of various substances,

such as normal saline, corticosteroids, local anesthetics, dextrose, and platelet-rich plasma (PRP). This procedure, known as hydrodissection or perineural injection, not only mechanically releases and decompresses the entrapped nerves but also provides a pharmacological effect that relieves pain and promotes recovery through multiple mechanisms. In this study, we focused on the role of ultrasound in the diagnosis and treatment of carpal tunnel syndrome (CTS). In an effort to decrease postoperative pain and disability, several groups of researchers have developed ultrasound-guided techniques for carpal tunnel release that are even less invasive than endoscopic techniques and have been associated with earlier return to hand function. We will discuss these available ultrasound-guided release techniques for CTS in detail.

The Role Of Medical Physicist In CT Image And Dose Optimization In Collaboration with Radiologist And Technologist

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Introduction: Medical physicist is an applied physics specialist who focuses on accurate diagnosis, dose optimization and maintenance of equipment like CT machines. The aim of this presentation is to evaluate and delineate the role of medical physicist, while working in close collaboration with radiologists and technologist in Computed Tomography (CT). **Materials and methods:** This requires a multidisciplinary team. The role of the medical physicist in CT department must mainly include defining protocols for improved image quality and patient dose reduction. Other roles can be collaboration with the design team for shielding and installation design of new or modified CT rooms, preparing equipment specifications

and purchase recommendation of equipment, specifying the basic standards to be applied for acceptance of CT system and its commissioning, Quality management of the physical and technical aspects. In establishing the necessary facilities the medical physicist must ensure that the staff which includes doctors, nurses, technologists, supporting personal and the patients care giver must be protected adequately. These are also IAEA's criteria. **Results:** The appropriate responsibilities of the radiologist, technologist and medical physicist team in CT department must lead to safe and effective delivery of radiation to achieve a diagnostic result of the prescribed CT. **Conclusion:** The primary role of this multidisciplinary team is to optimize

the use of radiation to ensure the safety and quality of diagnostic procedures such as CT, establish policies, guidelines and measurement

techniques for the determination of patient dose. Key words: Medical Physicist, Computed Tomography, dose optimization

3D Analysis And Modeling Of Medical Images Using Mimics Software for Artificial Intelligence Applications

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Recently, there has been a strong desire among researchers, physicians, and engineers (mechanical-biomechanical, sports, medical, etc.) to use models designed from medical images for computational analyses and to use 3D printers to implement 3D models of biological body organs. 3D printers could be used for a variety of tasks, including the diagnosis of functional disorders, the design of specific implants, the production of orthoses and prosthetics, and the prediction and simulation of surgical procedures. Additionally, surgical plates, surgical guides, specific surgical meshes, etc. are made using these models. Consequently, medical image analysis—which

involves segmenting medical images, preparing and meshing the surface and volume of the desired organ geometry, and finally performing medical calculations and analyses—becomes significantly important when creating 3D models. This lecture discusses the use of Mimics (Mimics Innovation Suite - Research v.20), a specialized software developed by Materialize for biological design. Mimics is licensed by CE, FDA, and ISO 9001 to process medical images and create accurate 3D models of soft tissues, vessels, nerves, and bones. It is used in medical fields like orthopedics, cardiac and blood vessels, lung and breathing, skull and jaw, and face.

Uterine Fibroid Ablation

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Uterine Fibroid is the most common benign pelvic tumor in women of childbearing age. Considering the high proportion of undiagnosed Fibroids, an accurate assessment of Fibroid prevalence is difficult. Depending on the population and diagnostic method, the estimated prevalence ranges from 5.4 to 77%. Uterine Fibroids are generally asymptomatic but can be associated with significant symptoms in approximately 30% of patients. These symptoms include menorrhagia,

dysmenorrhea, subfertility, secondary anemia symptoms, back pain, and decreased quality of life. Currently, treatment choices are surveillance (for asymptomatic Fibroids), medical therapy, surgery (myomectomy and hysterectomy), and minimally invasive procedures. In recent years minimally invasive or non-invasive therapies have gained popularity due to organ preservation, rapid symptom alleviation, and low risk of complication. Minimally invasive treatments include uterine

artery embolization (UAE), high-intensity focused ultrasound (HIFU) ablation, radiofrequency ablation (RFA), and microwave ablation (MWA). Although UAE is the most widely used minimally invasive alternative, its adverse effects such as post-embolization syndrome, and lack of detailed

data regarding long-term pregnancy outcomes, have limited its usage. The present study aims to evaluate clinical effectiveness, feasibility, and potential adverse events of MWA in the treatment of uterine Fibroids

Paediatric Non-traumatic Abdomen Emergencies (Case- Based Presentation)

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Non-traumatic abdominal emergencies are common complain in pediatric population. The diagnosis usually depends on a clinical examination ,laboratory findings and appropriate imaging. Often, ultrasound is used as the main imaging method in examining children's abdominal emergencies. The most common

causes of pediatric acute abdomen include acute appendicitis ,mesenteric adenitis ,meckel's diverticle, intussusception , bowel obstruction, hypertrophic pyloric stenosis , midgut volvulus and ovarian pathology. in this presentation, I review the imaging of these pathologies.

The Role Of Imaging In Prostate Mass Lesions

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Prostate cancer is one of the most common malignancies among men. Increasing mortality rates due to prostate cancer have been observed worldwide. Multi parametric MRI of prostate is a novel imaging method and the imaging modality of choice for evaluation of prostate and shows superb ability in detection of prostate cancer within the prostate gland. Targeting the suspicious foci for cancer in prostate gland and precise mapping of the suspicious areas of prostate paves the way for another novel modality; targeted MRI-TRUS Fusion biopsy of prostate. Formerly the routine modality for detection of prostate cancer in men suspected

to have prostate cancer was systematic biopsy of prostate that is obtaining biopsy samples randomly from different parts of prostate gland. In new biopsy method, the information achieved by Multiparametric MRI of prostate and mapping the suspicious areas for cancer is used for targeted biopsy of prostate directly from those suspicious areas within the prostate gland that yield to higher detection rate of prostate cancer and lesser complications and discomforts for patients and also eliminates many unnecessary biopsies. This novel biopsy method is based on mapping the suspicious foci for cancer in prostate gland and the fusion of

MRI images with real time TRUS and obtaining biopsy samples exactly from suspicious foci. Treatment of prostate cancer in the early stage is very effective and prevents serious morbidities and complications of late detection of prostate cancer, which makes its diagnosis a national interest in all countries. Late stages of prostate

cancer usually don't show suitable response to treatment modalities which in turn yields to many complications for patients, including death. Furthermore, late detection of prostate cancer carries social and economic implications, as it strains the healthcare budget allocated by the government for treatment expenses.

The Usefulness Of Chest Ultrasound During FAST

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thoracic ultrasonography (US) is an alternative imaging modality that can be readily performed in real time at the patient's bedside to help diagnose many thoracic diseases manifesting acutely and in the trauma setting. Advantages of US include availability, relatively low cost, and lack of ionizing radiation. Emergency thoracic US consists of two main parts, lung and pleura US and focused cardiac US, which are closely related. Acoustic mismatches among aerated lungs, pleura, chest wall, and pathologic conditions produce artifacts useful for diagnosis of pneumothorax and pulmonary edema and help in detection of subpleural, pleural, and chest wall pathologic conditions such as pneumonia,

pleural effusion, and fractures. Visual assessment of cardiac contractility and detection of right ventricular dilatation and pericardial effusion at focused cardiac US are critical in patients presenting with acute dyspnea and trauma. Additional US examinations of the inferior vena cava for noninvasive volume assessment and of the groin areas for detection of deep venous thrombosis are often performed at the same time. This multiorgan US approach can provide valuable information for emergency treatment of both traumatic and nontraumatic thoracic diseases involving the lungs, pleura, chest wall, heart, and vascular system.

Imaging In Acute Aortic Syndrome

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Acute aortic syndrome (AAS) is classically attributed to three underlying pathologic conditions—aortic dissection (AD), intramural hematoma (IMH), and penetrating atherosclerotic ulcer (PAU). In the majority of cases, the basics of image interpretation

are not difficult and have been extensively reviewed in the literature. It has been well documented that AAS is caused not only by an AD but by a spectrum of lesions that often have overlap in imaging features and are not clearly distinguishable. Specifically, phase of contrast

enhancement, flow artifacts, and flapless AD equivalents can complicate diagnosis and are discussed. While the A/B dichotomy of the Stanford system is still used, the authors subsequently emphasize the Society for Vascular Surgery's new guidelines for the description of acute aortic pathologic conditions given the expanded use of endovascular techniques used in aortic repair. In the final section, atypical aortic rupture and pitfalls are described. As examples

of pericardial and shared sheath rupture become more prevalent in the literature, it is important to recognize contrast material third-spacing and mediastinal blood as potential mimics. By understanding these factors related to difficult cases of AAS, the diagnostic radiologist will be able to accurately refine CT interpretation and thus provide information that is best suited to directing management.

Imaging In Adult Congenital Heart Disease

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People can live into adulthood with undiagnosed congenital heart disease (CHD). Shortness of breath, palpitation, fatigue or mild cyanosis are among non-specific symptoms and signs which are sometimes ignored or misdiagnosed. It is not infrequent situation that CHD is diagnosed for first time in imaging

studies performing for other non-cardiovascular studies. Considering the importance of proper diagnosis, general radiologists need to be familiar with alarming findings of adult CHD. This presentation provides a case based discussion on popular CHD among adult population.

Placental Abruption, Placenta Previa, Vasa Previa

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Placental problems are one of the most important causes of obstetric emergencies and ultrasound plays a major role in their diagnosis. Placental abruption is seen in 0.5 percent of pregnancies. although placental abruption remains a clinical diagnosis, ultrasound can play an important role by showing the retroplacental hemorrhage or placental thickening. Placenta previa is a condition in which the placenta covers or reaches the internal cervical os and is

best diagnosed by ultrasound especially if done vaginally. Vasa previa is the passage of umbilical vessels within a membrane over the endocervix. Failure of prenatal diagnosis of vasa previa would be associated with increased fetal and maternal morbidity and mortality

Application Of AI In GI

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This talk explores how Artificial Intelligence (AI) is entering the world of radiology, causing major changes in healthcare. The main emphasis of this talk is to highlight the applications of AI in gastrointestinal radiology, detailing their critical functions in image segmentation, computer-assisted diagnosis, predictive analytics, and enhancing workflow efficiency. The discussion

will acknowledge that integrating AI into radiology comes with its set of hurdles. The challenges that come with the use of AI in radiology will be addressed, such as latecomers of abdominal imaging to the field of artificial intelligence, data quality concerns, the 'black box' dilemma, infrastructural and technical complexities, and ethical issues.

More Aggressive Intervention In Necrotizing Pancreatitis

Alireza Sattar

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Acute pancreatitis usually resolves without complications but in a number of cases necrosis of the pancreas or extrapancreatic tissues occurs. patients with necrotizing pancreatitis are in risk of developing infected necrosis, which significantly worsens the prognosis and should be drained. Also pressure symptoms in the abdomen and organ failures in the presence of collections are indications for drainage. Percutaneous, endoscopic, and minimally invasive surgical drainage represents the various methods of drainage. Percutaneous catheter drainage is

often the method of choice in early stages of disease. Any of the acute peripancreatic fluid collections and acute necrotic collections (≤ 4 wk) and pseudocysts and walled off necrosis (> 4 w) can be infected and should be drained. Image guided percutaneous drainage is usually done by 8-16 F catheters which sometimes are not helpful and drainage and evacuation of necrotic tissue may require larger bore catheters up to 32 F using more aggressive approach through image guided percutaneous technique.

Imaging Of Spinal Infection

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Spinal infections manifest in various forms, one of which is spondylodiscitis, affecting adjacent vertebral bodies and discs. Early detection and accurate diagnosis are crucial. Radiologic evaluation plays a pivotal role in

diagnosis, with MRI being the most effective modality, offering high sensitivity and specificity. Typical findings include hyperintense vertebral bodies and discs on T2-weighted (T2W) images. On T1-weighted (T1W) sequences, affected

vertebral bodies appear hypointense. Other signs include obliteration of the intranuclear cleft, endplate erosion, and the presence of soft tissue phlegmon or abscess. Atypical MRI patterns pose diagnostic challenges, including the involvement of two vertebral bodies without the adjacent disc, or involvement of only one vertebral body or disc, vertebral body isointensity on both T1W and T2W sequences without endplate erosion. Familiarity with these patterns is essential to prevent delays in diagnosis. In uncertain cases, MRI with contrast, follow-up MRI, and correlating clinical and laboratory data can provide additional insights. During the course of treatment, improvements in imaging findings might include reductions in paravertebral soft

tissue inflammation, marrow edema, canal compression, and disc T2 signal, along with a reduction in the enhancement of infected areas. Clinical improvement associated with persistent enhancement does not necessarily indicate treatment failure. Certain MRI features can also suggest specific types of spinal infections. For example, large paraspinal abscesses with smooth walls, skip lesions, subligamentous spread to three or more levels, multiple vertebral body involvement, and paraspinal calcifications suggest tuberculosis spondylitis. Spinal infections can mimic other conditions on imaging, such as Modic type 1 degeneration, acute Schmorl's node, SAPHO syndrome, and neuropathic spine, complicating diagnosis.

NT And First Trimester Anomaly Scan In Fetal Ultrasound

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In general population, incidence rate of major congenital abnormalities at birth is 2–3%, yet the reported rate of perinatal deaths due to these anomalies accounts for 20–25% and even higher percentage of perinatal morbidity. Ultrasound is the widely used method for screening and diagnosis of congenital structural abnormalities. The detailed examination routinely includes measurement of NT and a scan for anatomical defects can help diagnose some of the fatal anomalies in the first trimester. Nuchal translucency (NT) is the sonographic appearance of a collection of fluid under the skin behind the fetal neck in the first-trimester of pregnancy. The term translucency is used, irrespective of whether it is septated or not and whether it is confined to the neck or envelopes the whole fetus. In fetuses with chromosomal abnormalities, cardiac defects and many genetic

syndromes the NT thickness is increased. Screening by NT can detect about 80% of fetuses with trisomy 21 and other major aneuploidies for a false positive rate of 5%. The combination of NT and maternal serum free β -hCG and PAPP-A improves the detection to 90%. There is now evidence that the detection rate can increase to about 95% and the false positive rate can be reduced to 3% by also examining the nasal bone, ductus venosus flow and tricuspid flow. Thickening of the nuchal translucency can be associated with a number of anomalies, including: aneuploidy, trisomies (including Down syndrome), Turner syndrome, congenital heart disease, Noonan syndrome, congenital diaphragmatic herniation, omphalocele, skeletal dysplasias, Smith-Lemli-Opitz syndrome, VACTERL association, miscarriage or fetal demise, intrauterine infections: Parvovirus B19

Imaging In Gynecologic Emergencies (Case Based)

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Acute abdominal pain related to gynecologic emergencies has various etiologies that result from adnexal and uterine disorders. Adnexal disorders can be classified into three main categories: disorders that cause hemorrhage (hemorrhagic ovarian cysts and ectopic pregnancies), disorders related to adnexal tumors (adnexal torsion and rupture of ovarian tumors), and disorders related to infection and inflammation, such as tubo-ovarian abscesses. Uterine disorders that may cause gynecologic emergencies can be classified into two main categories: acute complications of fibroids (red degeneration of a uterine leiomyoma, torsion of subserosal myomas, and torsion of the uterus), and etiologies of acute uterine bleeding (retained products of conception and uterine arteriovenous malformations). Some gynecologic emergencies, if left untreated, can

cause infertility or life-threatening bleeding or infection, so, prompt and accurate diagnosis is important for appropriate life-saving treatment and for the preservation of fertility. The symptoms and physical examination findings are often nonspecific and it can be difficult to distinguish gynecological from gastrointestinal or urinary emergencies, therefore imaging plays an important role in diagnosis and correct management. Ultrasonography is usually the first line imaging modality as it is highly sensitive, fast and easy to access; however, when a definitive diagnosis cannot be established, computed tomography (CT) and magnetic resonance (MR) imaging may help to narrow the differential diagnosis. In this presentation we will have a case based discussion about imaging pearls in diagnosis of common and uncommon gynecologic emergencies.

Predicting Ventricular Function, Myocardial T2*, And Liver Parameters In Thalassemia Patients Via Machine Learning from MRI Images

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This research presents a technique aimed at foreseeing iron-related heart issues in individuals with thalassemia major. Detecting this condition early is crucial as delayed diagnosis could result in severe outcomes. Our

aim is to forecast various cardiac parameters, including left ventricular function, myocardial, and liver T2*, by employing machine learning algorithms on MRI data from thalassemia major patients. We examined 300 patients diagnosed

with thalassemia major who underwent cardiac MR imaging to evaluate their cardiac health. Inclusion criteria comprised individuals with a left ventricular ejection fraction (LVEF) exceeding 55%, cardiac iron deposition ($T2^*$) below 20 ms, and liver deposition ($T2^*$) less than 11.4 ms as determined by CMR. After an 18-month interval, CMR was repeated, and individuals exhibiting $LVEF < 55\%$, heart $T2^* < 20$ ms, and liver $T2^* < 11.4$ ms were chosen for comparative analysis. Three feature selection techniques (LASSO, MRMR, and NCA) along with seven diverse classifiers were employed for predictive modeling. 495 radiomics features were extracted individually

for both end systole and end diastole from the images. Additionally, a collection of features for the liver, as well as a combined set for end systole, diastole, and liver, were utilized alongside clinical factors like age and gender for feature selection and modeling. Notably, features derived from GLCM (Gray level co matrix), as well as haaralick and tamura features, exhibited significant distinctions between groups displaying deteriorated cardiac function and those that did not. In conclusion, this research underscores the potential of machine learning techniques in stratifying the risk of iron overload in thalassemia major patients using MRI images

Evaluating Myocardial Viability Post ST-Elevation Myocardial Infarction: A Comparative Study Of T1 And T2 Mapping With Late Gadolinium Enhancement

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The burden of ischemic heart disease has increased, highlighting the necessity for effective imaging methods. Our study delves into the potential of T1 and T2 mapping techniques in identifying viable myocardium, which is crucial for making treatment decisions. Ninety-five patients with acute ST segment elevation myocardial infarction participated, undergoing cardiac magnetic resonance imaging (CMR) with contrast agents. T1 and T2 mapping techniques were utilized to evaluate myocardial viability. CMR imaging was conducted following a standardized protocol, with image analysis performed by experienced radiologists. Viability assessment was based on scar transmural scale and vascular territory analysis. T1 and

T2 mapping values demonstrated an increase from viable to non-viable segments. In the left anterior descending artery (LAD) territory, non-viable segments exhibit significantly higher T1 and T2 values. Notably, T2 values are higher in non-viable segments in the left circumflex artery (LCX) and right coronary artery (RCA) territory. Area under the curve (AUC) analysis reveals comparable predictive accuracy between T1 and T2 mappings for LAD, RCA, and LCX territories. Optimal cutoff points for T1 and T2 values aid in classifying values, offering notable specificity for assessing arterial territories. In conclusion, T1 and T2 mapping techniques demonstrate promise in evaluating myocardial viability without the use of contrast agents, providing accurate

predictions and significant mean differences between viable and non-viable segments. These findings highlight the potential of T1 and T2 mapping as viable alternatives for viability

assessment in patients with renal insufficiency or contraindications to contrast agents, potentially leading to improved patient management and prognosis evaluation in ischemic heart disease

Imaging Findings Of Nonvascular, Nontraumatic Mediastinal Emergencies In Adults

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Mediastinal emergencies are as a result of external trauma, vascular condition and nonvascular, nontraumatic mediastinal entities. Although the last group is less common in clinical practice but they can be source of important morbidity and mortality in the patients. Etiology of nonvascular, nontraumatic mediastinal emergencies are including acute

mediastinitis, esophageal emergencies, spontaneous mediastinal hematoma, tension pneumomediastinum, tension pneumopericardium and tamponade. We aimed to review imaging findings of these entities for making an accurate and timely diagnosis and appropriate patient management

Localization Of Non-Palpable Breast Lesions

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Screening mammography and improvements in imaging have increased detection of non-palpable clinically occult breast lesions, which require preoperative localization. In females with non-palpable breast cancer, various randomized trials showed that BCS is the treatment of choice. The main challenge when resecting non-palpable tumors is to obtain clear margins while minimizing resection of healthy breast tissue with associated good cosmetic outcomes. Pre-operative localization techniques:

- Wire localization
- Wireless localization
- Magnetic seed
- Radar / reflector
- Radioactive seed
- Radiofrequency ID (RFID)

Limitations of

wire-guided localization • Scheduling and OR efficiency • Late OR starts • Placement accuracy • Wire migration; Limited far posterior/anterior targeting • Limited localization approach • Limited surgical approach • Wire location can limit the dissection the surgeon can take • Patient comfort/satisfaction • Less flexible scheduling; Protruding wire; Vasovagal Targeted Axillary Dissection • SLN FNR 12.6% after neoadjuvant • FNR 2% if also remove positive "clipped" node

Imaging Findings Of Grade 3 Breast Cancers: A Multi-Modality Case-Based Review

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Abstract:

High-grade breast cancers have been shown to have unique imaging features which can make their diagnosis challenging and result in a delay in diagnosis. Low-grade cancers usually show higher desmoplastic reaction and thus have spiculated margins, conversely high-grade cancers will show less desmoplastic reaction and thus may appear well-circumscribed on mammogram. High-grade breast cancers are known to have higher cellularity and necrosis which results in increased through transmission on ultrasound and T2 hyperintensity on MRI. Features such as round, oval, or lobular shape and increased through transmission can lead to radiologists mistakenly assessing high-grade tumors as benign. Given the aggressive nature of these tumors, early diagnosis is imperative, so radiologists must be aware of the unique imaging features associated with high-grade tumors to avoid delays in diagnosis. On mammography high-grade breast cancer most often presents as a hyperdense mass with/without calcifications. On

ultrasound high-grade breast cancers most often present as oval or irregular masses calcifications. High-grade invasive ductal carcinoma may mimic benign masses such as cysts on ultrasound and show enhanced through transmission. They may be hypoechoic or mixed hyperechoic-hypoechoic, diffusely increased vascularity is also associated with high histological grade. On MRI Intra-tumoral T2 hyperintensity may indicate intra-tumoral necrosis and suggests high histological grade. Rim enhancement also suggests a high histological grade. Therefore, the following rules can help avoid mistaking them for benign masses: 1- any new or enlarging mass should be biopsied, 2-high-density masses on mammogram should be biopsied, 3- any indistinct or angulated margins should prompt biopsy, 4- diffusely increased vascularity should prompt biopsy and 5- increased through transmission associated with a solid mass should raise suspicion for high histological grade.

Tips And Tricks Of Ultrasound In The Mesenteric And Gastrointestinal Tract Trauma

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Gastrointestinal tract and mesenteric traumatic injuries account for up to 5% of blunt abdominal traumatic insults. Although uncommon, prompt identification is essential, as complications related to delayed diagnosis can significantly increase mortality and morbidity. Early complications such

as peritonitis and sepsis and late complications such as short bowel syndrome are potentially harmful. Thus, early detection and treatment is of critical importance. Although abdominopelvic CT scan is introduced as the gold standard imaging modality for detecting traumatic injuries, bedside

ultrasonography can be helpful in detecting injuries of mesentery and hollow viscera, especially in unstable patients who cannot undergo CT scan. Some of the sonographic signs that may indicate GI tract or mesenteric injuries are as follows: -Free intraperitoneal fluid, in the absence of solid organ injuries -Signs of bowel perforation: Free intraperitoneal air which can be seen as bright echogenic line of air with

posterior ring - down artifact, located beneath the anterior abdominal wall, or collections of air adjacent to bowel loops -Focal or segmental bowel wall thickening, with or without focal discontinuity of the wall -Increased echogenicity of mesenteric fat, adjacent to thickened bowel segment -Mesenteric hematoma, as an irregular shaped hypoechoic avascular mesenteric mass -Bowel wall hematoma

Ultrasound In Adenomyosis Types Severity Patterns DDx

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Radiologist

Adenomyosis is a benign gynecological disease, described in the last century by the presence of endometrial glands and stroma within the myometrium. However, in recent years adenomyosis has turned from a histopathological entity into a clinical condition, diagnosed by imaging techniques, independently of surgical treatment. In the last decade, imaging technologies, such as magnetic resonance imaging (MRI) and transvaginal ultrasound (TVUS), have become widely available and accessible. US is now the primary imaging modality for the diagnosis of adenomyosis, and its widespread use has allowed for a better

understanding of the scope of adenomyosis in pausal women of all ages. Transvaginal US can be used to confidently diagnose adenomyosis in a majority of cases, particularly if multiple US findings manifest. Specific histologic-based criteria aid in the US interpretation and include findings related to the ectopic endometrial glands and stroma, myometrial hyperplasia/hypertrophy, and increased vascularity. Advanced US techniques, including obtaining 2D and 3D coronal reformatted images and cine clips and performing SIS, can be used to corroborate standard US findings, especially when coexisting leiomyomas or endometriosis manifest.

Imaging Evaluation Of Neoadjuvant Therapy Response In Breast Cancer Patients - Reporting Standards, Prediction, Tips And Tricks

Nahid Sadighi

TUMS ADIR

Neoadjuvant Chemotherapy (NACT):
» Locally advanced breast cancer » Inflammatory breast cancer » Early-stage breast cancer (TNBC and HER2+) » Downstage the tumor » Breast

conservation surgery » Reduce the extent of axillary surgery -Evaluation of effectiveness of the selected chemotherapy. Change treatment if tumor is not responding » Prognostic information

» Treats micro-metastatic disease up-front » Prognostic indicator for long term survival (HER2+, TNB) NAC: Assessment of treatment response: »No established guidelines to assess tumor response to NAC » Lack of consensus regarding the optimal imaging interval to assess treatment response »Mammogram can overestimate residual disease »Background dense breast tissue obscures true margins of residual tumor »Extent of calcifications after NAC has lower correlation with pCR »Calcifications can be stable, decrease or increase »Indeterminate or residual calcifications

require surgical excision regardless of MRI findings Ultrasound »Accuracy: 79% * »More accurate than mammography »Operator dependent »Treatment fibrosis is difficult to differentiate from viable tumor »Accuracy varies by receptor status. Higher on TNBC. Breast MRI: »Most accurate and reproducible method to monitor breast cancer response to NAC »Correlates with pathologic size after NAC »First MRI: before the start of chemotherapy »Second MRI: half way through treatment course »Third MRI: at the end of chemotherapy

Interesting Cases In Thyroid And Neck Ultrasound

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Ultrasound is the most accurate and convenient method for assessing the thyroid and neck masses. The quality of an ultrasound depends on the skill and experience of the operator. In this workshop, we present interesting and informative cases along with ultrasound images to provide a better understanding and

practical approach to performing thyroid and neck ultrasound. We cover various benign and malignant masses along with parathyroid and thyroid parenchymal diseases. Normal variations and key technical and practical points will be discussed in this workshop.

Metastatic Breast Disease In Intramammary And Axillary Lymph Nodes Accompanied By Imaging Staging Of Axillary In Newly Diagnosed Breast Cancer

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The nodal status often determines the need for systemic therapy, the extent of surgery, reconstruction options, and the need for radiation therapy after mastectomy. Sentinel

nodes are the specific LNs that drain the breast first, followed by drainage to the remaining nodal basin. Axillary imaging: -Mammography: Axillary level I LNs are visible at routine mammography

in 50% of patients. Microcalcifications are better visible on mammography. -US and US-guided biopsy. US is the primary imaging modality used for nodal staging. The main advantage of US is its ability to guide biopsy and localization. -MRI; is often performed for breast cancer tumor extent evaluation, as well as assessing treatment following NACT, and the axilla is usually included in the field of view. Evaluation of CUP and IMLN chain. The advantage over US is a more global

view, enhancing and comparison of the bilateral axillae irrespective of patient body habitus, less operator dependent. -Chest CT or PET/CT; Cross-sectional imaging (CT, PET/CT, and MRI) allow superior visualization of regional LNs located in the apex or outside the axilla and overcome the limitations of US evaluation, which is often limited to axillary level I and II staging with axillary US or MRI cannot replace surgical staging at this time.

Pediatric Focused Assessment with Sonography for Trauma (FAST)

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Trauma remains the leading cause of childhood death and disability in children older than 1 year of age. Missed abdominal injuries are a common cause of mortality in these patients. Particularly in polytrauma scenarios, it can be difficult for children to locate the exact area of pain and assessing for abdominal injury can be challenging. FAST is a rapid ultrasound

examination of 4 locations with the primary objective of detecting free fluid within the abdomen, pelvic cavity, and pericardial sac. The role of FAST in the hemodynamically stable child after blunt abdominal trauma is nuanced. In this lecture we talk about the importance and utilization of FAST in pediatric population.

Multimodality Approach to Imaging Of Liver And Biliary Injuries And Their Complications

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The imaging features of traumatic and iatrogenic bile leaks as seen at various imaging modalities are reviewed, and the capabilities and limitations of these modalities in diagnosis and treatment of biliary injury are discussed. Although traumatic and iatrogenic bile leaks are rare, they have become more prevalent in recent

years due to an increased propensity toward nonsurgical management of patients with liver trauma and an overall increase in the number of hepatobiliary surgeries being performed. Because clinical signs and symptoms of bile leaks are nonspecific and delay in the recognition of bile leaks is associated with high morbidity

and mortality rates, imaging is crucial for establishing an early diagnosis and guiding the treatment algorithm. At computed tomography or ultrasonography, free or contained peri- or intrahepatic low-attenuation (low-density) fluid in the setting of recent trauma or hepatobiliary surgery should raise suspicion for a bile leak. Hepatobiliary scintigraphy and magnetic resonance (MR) cholangiopancreatography with hepatobiliary contrast agents can help detect active or contained bile leaks. MR cholangiopancreatography with hepatobiliary

contrast agents has the added advantage of being able to help localize the bile leak, which in turn can help determine if endoscopic management is sufficient or if surgical management is warranted. Endoscopic retrograde cholangiopancreatography may provide diagnostic confirmation and concurrent therapy when nonsurgical management is pursued. A multimodality imaging approach is helpful in diagnosing traumatic or iatrogenic biliary injuries, accurately localizing a bile leak, and determining appropriate treatment.

Practical Points And Pitfalls During Focused Assessment with Sonography In Trauma (FAST) Ultrasound

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Traumatic injury is the most frequent cause of death in patients under 45 years. Focused assessment with sonography in trauma (FAST) and extended FAST(eFAST) are quick, easy, noninvasive, safe and reproducible methods to identify free fluid indicative of hemoperitoneum, hemothorax, and hemopericardium, along with pneumothorax, and atelectasis. Prior to FAST, invasive procedures such as diagnostic peritoneal lavage (DPL), and exploratory laparotomy were commonly utilized to diagnose intra-abdominal injury and FAST has decreased time to surgical intervention, patient length of hospitalization, and rates of CT and DPL. The FAST exam should include views of right upper quadrant (RUQ), subxiphoid view (pericardial window), left upper quadrant (LUQ) and suprapubic view. bilateral

hemi thoraces and the upper anterior chest wall should also be evaluated in eFAST. The RUQ view is the most sensitive view for detection of free peritoneal fluid. Detection of mesenteric, bowel, diaphragmatic, and retroperitoneal injuries by FAST can be difficult. ascites, peritoneal dialysate, ventriculoperitoneal shunt outflow, ruptured ovarian cysts and ovarian hyper stimulation can lead to false positive FAST while presence of clot or free air can cause false negative results. In this presentation, we will shortly discuss correct positioning and ultrasound technique for performing FAST besides its limitations, imaging pitfalls and how to avoid them.

Pitfalls In Breast MRI

Khadijeh Bakhtavar

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Breast MRI is the most sensitive modality for the detection of breast cancer. However, despite the benefits of breast MRI in the detection of cancer, pitfalls may also occur which is included false negative and false positive examinations. Pitfalls can be considered as technical or non technical. Technical factors including motion artifact, inadequate intravenous contrast material injection, and tumor location at or beyond the field of view. Non technical pitfalls are misinterpretation of imaging findings in the absence of technical factors. The most common reasons for false-positive diagnoses are misinterpretation of artefacts, confusion between normal enhancing structures and tumors and insufficient use of BIRADS lexicon, whereas false-negative diagnoses are made as a result of missed tiny enhancement, a background-enhancing breast, or enhancement interpreted as benign rather than malignant or nonenhancement of the tumor. Perceptual errors occur when an abnormality is not

prospectively identified, yet the examination is technically adequate. Careful development of thorough search patterns is critical to avoid these errors. Cognitive errors occur when an abnormality is identified but misinterpreted as benign. The radiologist may avoid these errors by utilizing all available prior examinations for comparison, viewing images in all planes to better assess the margins and shapes of abnormalities, and appropriately integrating all available information from the contrast-enhanced, T2-weighted, and T1-weighted images as well as the clinical history. Despite this, false-negative cases are inevitable, as certain subtypes of breast cancer, including DCIS, ILC, and certain well-differentiated invasive cancers, may demonstrate little to no enhancement at MRI, owing to differences in angiogenesis and neovascularity. MRI is a valuable diagnostic tool in breast imaging. However, MRI should continue to be used as a complementary modality, with mammography and US.

Bariatric Arterial Embolization (BAE) for The Treatment Of Obesity: Tips And Tricks

Mohammad Momeni

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Obesity is a significant global health concern that leads to increased morbidity, mortality, and quality of life decrement and can lead to several comorbid diseases. Several therapies for obesity includes lifestyle modifications, medical management and bariatric surgery. Bariatric embolization of arteries for the treatment

of obesity (BEAT obesity) is a new method to treat patients with obesity. This method is a minimally invasive technique performed by interventional radiologists as an image guided modality. In this procedure the left gastric artery (LGA) and the gastroepiploic artery (GEA) arteries are embolized, so ghrelin-producing

cells destroy by ischemia in the gastric fundus and decreasing ghrelin production, resulting in decreasing appetite and loss of body weight as a result. Bariatric embolization is has minimal

post procedural complication, and the safety and efficacy of BAE for obesity have been verified by several studies.

Measurement In Pediatric Musculoskeletal Imaging

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The practice of pediatric musculoskeletal radiology relies on the adequate knowledge of anatomy, physiology, pathology, and background genetics of the child and adolescent, but also, like any other discipline of pediatric imaging, on a good dose of training and experience. In the context of evidence-based medicine, the focus of imaging is shifting from simple description

towards quantification, with measurements becoming more important to make the diagnosis and distinguish the normal from the pathological. In pediatrics, most measurements change over time and are dependent on development and gender. This presentation is about some measurements in pediatric lower limb and take about 30 minutes. Thank you Dr Hajalioghli

Imaging Of Pelvic Vasculature In Traumatic Patients

Arash Khameneh Bagheri

Assistant Professor
of Shahid Beheshti University of Medical Sciences

Pelvic vascular injuries are typically caused by high-energy trauma. The majority of these injuries are caused by motor vehicle collisions, and the rest are caused by falls and industrial or crush injuries. Pelvic vascular injuries are frequently associated with pelvic ring disruption and have a high mortality rate due to shock as a result of pelvic bleeding. Morbidity and mortality resulting from pelvic vascular injury are due to pelvic hemorrhage and resultant exsanguination, which is potentially treatable and reversible if it is diagnosed early with multidetector CT and treated promptly. The pelvic bleeding source can be arterial, venous, or osseous, and differentiating an arterial (high-pressure) bleed from a venous-osseous (low-pressure) bleed is

of paramount importance in stratification for treatment. Low-pressure venous and osseous bleeds are initially treated with a pelvic binder or external fixation, while high-pressure arterial bleeds require angioembolization or surgical pelvic packing. Definitive treatment of the pelvic ring disruption includes open or closed reduction and internal fixation. Multidetector CT is important in the trauma setting to assess and characterize pelvic vascular injuries with multiphasic acquisition in the arterial and venous phases, which allows differentiation of the common vascular injury patterns.

Carotid Blowout Tumors And Other Catastrophes Treatment

Arash Khameneh Bagheri

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Carotid blowout syndrome (CBS) refers to a fatal hemorrhagic complication of cervical carotid arteries that occurs due to rupture of the extracranial carotid artery or one of its major branches in patients treated for head and neck malignancy. Its reported incidence is 3% to 4% in patients with neck dissection, with a 7.6-fold increased risk in the setting of additional radiation therapy. CBS involves compromise of the carotid artery and/or its branches and can present as transoral or transcervical hemorrhage. When associated with open surgical treatment, high mortality (40%) and neurologic morbidity (60%) have been reported. As such, multiple endovascular options have been developed and are divided into either deconstructive or reconstructive techniques. Deconstructive techniques have been described involving permanent occlusion of carotid vasculature

through use of coils, liquid embolic agents, detachable balloons, and Amplatzer Vascular Plugs. Deconstructive techniques are typically used when the external carotid artery (ECA) is involved as neurologic sequelae would be unusual and unexpected. In the setting of common carotid artery (CCA) or internal carotid artery (ICA) involvement, a balloon occlusion test (BOT) is typically performed for clinical assessment of adequate contralateral cerebral circulation. If the patient tolerates BOT without transitional neurologic deficit, then permanent vessel occlusion may be pursued. On the other hand, reconstructive techniques maintain vascular patency through use of covered stent. Depending on the institution, this may or may not represent first-line treatment in the setting of CBS.

Imaging Of Non-Traumatic Urinary Emergencies (Stone, Infection, Etc.)

Sara Besharat

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Labbafi nejad Hospital, Shahid Beheshti University
of Medical Sciences

Emergent urinary diseases require accurate and rapid diagnosis to minimize patient morbidity and mortality. These conditions include nephrolithiasis, infectious processes such as pyelonephritis, vascular insults such as hemorrhage, infarcts and thrombosis. Familiarity with the various conditions of the urinary system

is important for the diagnosis of common clinical entities presenting to the emergency department.

Common Pitfalls And Practical Points In MRCP

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Department of Radiology,
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Sciences

Magnetic resonance

cholangiopancreatography (MRCP) is widely applied for the evaluation of pancreaticobiliary disorders. Some pitfalls in MRCP may mimic an abnormality or even mask a true pathology.

This could be secondary to either an incomplete imaging technique or lack of

experience. Both source and MIP reconstructed images must be carefully reviewed to overcome these pitfalls. The radiologist should be aware of them when interpreting MRCP images. In this talk, we will discuss these challenges in a case-based review with a panel of experts.

Interactive Case Review In Oral Cavity And Tongue Disorders/Interactive Case Review In Larynx And Hypo - pharynx Masses

Fahimeh Aziznik

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Tehran University of Medical Sciences, Iran

Squamous cell carcinomas (SCCs) represent the vast majority of lesions in the oral cavity, larynx and hypopharynx. Laryngeal carcinoma is a disastrous malignancy that affects patients' quality of life, with compromise of ability to talk, breathe, and swallow. Imaging can assess the submucosal extent of the tumor, cartilage invasion, and extra-laryngeal spread. More than 90% of malignant tumors diagnosed in the oral cavity are Oral Squamous Cell Carcinomas (OSCC). Therefore, the imaging appearance of these cancers and practical points for structural

reporting will be discussed, and a few of the other uncommon interesting lesions also will be reviewed. As well as, in this session the cross-sectional anatomy of the oral cavity and tongue, larynx and hypopharynx will be discussed. Various interesting cases of our academic tertiary head and neck center about oral cavity and tongue, larynx and hypopharynx will also be presented for residents and radiologists.

Invasive Sinusitis, Approach And Complications

Fahimeh Azizinik, MD

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Sinusitis is a common disorder that adversely affects quality of life. Invasive sinusitis can cause further morbidity and mortality through its impact on comorbid disorders, progression of inflammation, and extension of infection. It is complicated by orbital infections, such as pre- or post-septal cellulitis, and by intracranial infections, including abscesses of the epidural and subdural spaces. Fungal and non-fungal sinusitis could present with invasive features. There are three subtypes of invasive fungal sinusitis (IFS): acute invasive rhinosinusitis (AIRS), chronic invasive rhinosinusitis (CIRS), and granulomatous invasive sinusitis (GIFS).

To accurately diagnose fungal sinusitis, a physician must take into account several variables, including patient history and clinical presentation, imaging, endoscopic biopsy with histopathology. Differentiation according to clinical point of view and differentiation according to radiological point of view are discussed. Treatment of these complications often requires coordinated multidisciplinary care. This presentation and panel also highlight the imaging features in complications of Invasive sinusitis and clinical significance in emergency situations.

A Simple Approach to Pelvic Floor Ultrasonography

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The pelvic floor is a complex system consist of the interaction among the bones, muscles, ligaments, and organs. The ligaments, muscle, and fascia constitute a musculoelastic system that provide support for and assist in the function of the pelvic organs. The support structures form three layers from the superior to inferior aspects: the endopelvic fascia, pelvic diaphragm, and urogenital diaphragm. The levator ani and coccygeus muscles form the muscular floor of the pelvis, which is also known as the pelvic diaphragm. The pelvic floor comprises three compartments: the anterior compartment, which contains the bladder and urethra; the middle compartment, which contains the uterus

and vagina; and the posterior compartment, which contains the anal canal, rectum, and sigmoid colon. Dysfunction and weakening of support structures may manifest as organ prolapse, urinary or fecal incontinence (FI), pelvic pain or chronic constipation. The risk factors are complex and multifactorial; however, vaginal delivery is considered a major predisposing factor. Pelvic floor dysfunction is estimated to affect as many as 50% of women over the age of 50 years. Ultrasound has several important advantages over other imaging modalities, including the absence of radiation, relative ease of use, minimal discomfort, cost-effectiveness, relatively short time required, wide availability

and dynamic assessment after Valsalva maneuver. Sonographic evaluation of the pelvic floor is often performed via the translabial approach (TLUS) and provides excellent evaluation of the urethra and bladder neck, the rectum and

anorectal junction, the integrity of the levator ani muscles and visualization of mid-urethral slings. TLUS can serve as the first line imaging technique for pre-operative and post-operative assessment of pelvic floor prolapse.

Approach to Pediatric Respiratory Distress In Imaging: Case-based Discussion

Zahra Ghomi Avili

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Shahid Behetshti University of Medical Sciences,
Mofid Children's Hospital

Respiratory distress is considered as one of the most common complaints in pediatric emergency departments. Imaging plays a pivotal role in the diagnostic approach and management of a child with respiratory distress, therefore every radiologist needs to be familiar

with common diagnostic challenges in this regard. In this case-based presentation, we review the common and important cause of respiratory distress in the pediatric population, with emphasis on the imaging approach to the diagnosis in the emergency setting.

A Simple Guide to Imaging Screening for Placenta Accreta Spectrum for Improving Detection And Evaluation Of Consensus on New Sonographic Features

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Ultrasound is the primary modality for screening patients at high risk of placenta accreta spectrum (PAS) disorders at birth and multiple ultrasound features have been described. A recent Delphi survey reached strong agreement on seven of the 11 classic standardized transabdominal sonographic signs associated with PAS at birth. The prevalence of PAS is increasing, following the worldwide rise in cesarean section rates over the last two decades. The risk of PAS is highest in patients presenting with an anterior low-lying placenta/placenta

previa and one or more prior cesarean section. Placenta accreta spectrum is a pregnancy complication associated with severe morbidity and maternal mortality especially when not suspected prenatally. Accurate prenatal imaging has an important role in better outcomes because it allows adequate preparation and an appropriate management approach. This presentation provides imaging features aimed at guiding clinicians and sonographers with minimal experience in placental accreta spectrum in order to decrease complications.

Bone Reporting And Data System (Bone-RADS)

Seyed Hassan Mostafavi

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The purpose of this article is to present algorithms for the diagnostic management of solitary bone lesions incidentally found on computed tomography (CT) and magnetic resonance (MRI) in adults. The committee of the Society of Skeletal Radiology (SSR) proposes four possible diagnostic management recommendations (Bone-RADS1, leave alone; Bone-RADS2, perform different imaging modality; Bone-RADS3, perform follow-up

imaging; Bone-RADS4, biopsy and/or oncologic referral) including two algorithms for CT and two for MRI. Two other newly presented algorithms (2021) named osseous Tumor Reporting and Data System (OT-RADS) and solitary bone tumor imaging reporting and data system (BTI-RADS) are also presented which designed to stratify benign and malignant bone lesions and to communicate them in a systematic and standardized way.

Acute Abdominal Pain Imaging: A Focus on the Basics

Mozhdeh Gheisari

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acute abdominal pain is a common acute presentation in clinical practice. it encompasses a very broad range of possible etiologies and diagnoses, and imaging is routinely employed as the primary investigative tool in its modern management. CT of the abdomen and pelvic is

the first line investigation for many presentations of acute abdominal pain. traditionally, the plain abdominal radiograph was the initial investigation but has fallen out of favor due to its poor sensitivity and specificity for many of the causes of abdominal pain.

Autoimmune Pancreatitis: Imaging Findings

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Autoimmune pancreatitis (AIP) is a form of chronic pancreatitis and accounts for 10 percent of them. It constitutes two distinct types, both of which are characterized by an immunologic response against the pancreas. Type one includes

about 90 percent of cases and is part of a systemic disease known as IgG4 related disease. Type 2 is less common and is usually not associated with a systemic disease. Both of them have similar imaging findings in terms of pancreatic

involvement with some differences in their clinical presentation and pathologic findings. Due to tumefactive characteristic of AIP and presence of inflammation, it could mimic other types of pancreatitis and also pancreatic cancer. Meanwhile, AIP shows a dramatic response to steroid therapy. On the other hand, biopsy is not always diagnostic and up to 32 percent of them could be false positive for carcinoma. On top of them, AIP has some specific imaging features and patterns which have pivotal role in reaching accurate diagnosis. The purpose of this pictorial presentation is to familiarize

radiologists with typical imaging findings and clues to the diagnosis of this challenging disease. IgG4 related disease is found to affect virtually any organ in the body and numerous extrapancreatic organs may also be involved, either synchronously or metachronously. These are also discussed and the differential diagnosis in potentially affected organs will be addressed. Finally, role of imaging in disease surveillance and posttherapy monitoring and use of functional imaging with PET CT will be described. Keywords: Autoimmune pancreatitis, IgG4 related disease, pancreatic pseudotumors

Ectopic Pregnancy

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Ectopic pregnancy (EP) is defined as a pregnancy implanted outside of the endometrial cavity. EP is a significant cause of morbidity and death in women of child-bearing years, especially in countries or areas with poor prenatal care. Risk factors include history of pelvic inflammatory disease, cigarette smoking, fallopian tube surgery, previous ectopic pregnancy, and infertility. Approximately 95% of EPs are located within the fallopian tube. Other types of ectopic pregnancy include interstitial, cornual, ovarian, cervical, scar, intraabdominal, and heterotopic pregnancy. Ectopic pregnancy should be considered in any patient presenting early in pregnancy with vaginal bleeding or lower abdominal pain in whom intrauterine pregnancy has not yet been established. More often, patient symptoms combined with serial ultrasonography and trends in beta human chorionic gonadotropin levels are used to make the diagnosis. Currently

over 90% of ectopic pregnancies can be visualized on Transvaginal ultrasound. This means that early ectopic pregnancies can often be detected in asymptomatic women. The definitive diagnosis of ectopic pregnancy can be made with ultrasonography when a yolk sac and/or embryo is seen in the adnexa. Systemic administration of methotrexate (MTX) is the most commonly used first-line therapy in clinical practice. Transvaginal ultrasound-guided local injection of MTX or potassium chloride (KCl) in tubal, cornual, cervical and ovarian ectopic pregnancies has been reported as a possible alternative to surgery and systemic medical treatment. In this presentation we explain the ultrasound diagnostic clues of ectopic pregnancy. Key words: Ectopic Pregnancy, Ultrasound, Diagnosis

Imaging Of Neoplastic Emergencies (Pre And Post-operative)

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Neurosurgery emergencies, especially in denovo or metastatic brain tumors, are always challenging. Radiologic interpretation is always a promising method for fast and accurate diagnosis in patients who need emergent surgery or are complicated after surgery and need emergent treatment. CT scans and MRIs are widely used methods for this purpose. In this presentation, we discuss radiologic features caused by brain tumors that prompt us to take further emergent actions. Types of cerebral

edema, hydrocephalus, mass effect, increased intracranial pressure, acute hemorrhage (ITH), spinal cord compression, pituitary apoplexy, CNS infections, and post-surgical hematoma are discussed with real cases. We also talk about complications after brain tumor surgeries that require immediate action. The essential knowledge of radiologists that we learn here is a key to appropriate life-saving diagnosis and a helping hand for neurosurgeons.

Imaging Of Acute Complications Of Kidney Transplant

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Complications following renal transplantation can be categorized based on the timing since surgery or by disease type, such as rejection, surgical, vascular, urinary, infectious, and neoplastic complications. Kidney transplantation is the most common solid organ transplant, with advancements in surgical methods, immunosuppressive treatments, and diagnostic tools leading to longer graft survival. Despite the growing demand for kidneys exceeding the available supply, efforts are being made to utilize kidneys from donors with higher-risk profiles. This underscores the importance of assessing both donor and recipient risk factors in renal transplant patients. Radiologists play a crucial role in the multidisciplinary care team throughout the transplant process. Duplex ultrasound is preferred for immediate postoperative evaluation of the renal allograft,

establishing a baseline for future surveillance. Advanced imaging modalities like MRI or contrast-enhanced ultrasound can aid in diagnosing allograft dysfunction and ruling out non-rejection causes. When a pathological diagnosis is required for treatment guidance, ultrasound-guided biopsy is a safe procedure. The unique location of the renal allograft in the iliac fossa predisposes it to specific complications. Given that imaging findings for infection or malignancy can be nonspecific, understanding the patient's risk factors and time since transplantation can help determine the likelihood of certain diagnoses and guide further diagnostic evaluation. Knowledge of vascular anatomy variations, surgical techniques, and individual donor and recipient risk factors is crucial for accurate diagnosis and appropriate treatment initiation.

Skull Base Fracture Imaging

Mahyar Mohammadi Fard

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Skull base fracture (SBF) is one of the features occur in traumatic brain injury (TBI). Due to different patterns of TBI, it is necessary to review the characteristics of SBF, clinical manifestations,

cerebrospinal fluid leakage, and complications. Radiologists should be familiar with the clinical signs, appropriate imaging and guidelines for referral to neurosurgery.

That Mimic Abdominopelvic Abscesses Requiring Image-guided Drainage

Mahyar Mohammadi Fard

Professor of Radiology,
Fellowship of Intervention

Radiologically guided percutaneous abscess drainage (PAD) procedure not only has applications in nearly every organ of the body but also contributed to improved success rates, with concurrent minimization of procedure-related complications. The advantages of PAD include simple, rapid ; feasibility of intensive care unit (ICU) performance; safety; avoidance

of general anesthesia; and well-documented efficacy. PAD is the most significant improvement in the treatment of abscesses in the past century. Many problems mimic drainable abscesses. This causes misdiagnosis of them , unnecessary percutaneous placement of a catheter, other complications, and delay in appropriate treatment of the patient

The Role Of Imaging In Adrenal Mass Lesions

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Diverse and atypical presentations of adrenal lesions can be a diagnostic challenge. Adrenal Mass lesions can originate whether from the cortex or medulla of the adrenal gland ranging from benign to malignant. Adrenal adenoma is the most common benign adrenal tumor that arises from the cortex, however adrenocortical carcinoma (ACC) is a rare malignant tumor of the cortex. Pheochromocytoma is a rare neuroendocrine tumor of the adrenal medulla.

Other benign adrenal lesions are adrenal cysts and myelolipomas characterized by their fluid and fat content, respectively. Metastases to the adrenal glands are the most common malignant adrenal tumors. Substantial overlap between benign and malignant lesions makes it a real challenge to differentiate these conditions from each other. Lipid-poor adenomas; macroscopic fat-containing adenomas, hemorrhage, and/or iron deposition are considered atypical

manifestations of adrenal adenoma. They may show heterogeneity, large size or growth. Heterogeneous adrenal adenomas may mimic ACC, metastasis, or pheochromocytoma, particularly when they are 4 cm or larger, whereas smaller versions of ACC, metastasis, and pheochromocytoma and those with washout greater than 60% may mimic adenoma.

Because of its nonenhanced CT attenuation of less than or equal to 10 HU, a lipid-rich adrenal adenoma may be mimicked by a benign adrenal cyst, or it may be mimicked by a tumor with central cystic and/or necrotic change such as ACC, pheochromocytoma, or metastasis. Here we will review Key lessons to aid in diagnosis and further guide appropriate management.

Common Pitfalls In Interpreting Abdominal CT Scan Of Trauma

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Multidetector CT (MDCT) is the gold standard imaging modality in the triage of blunt abdominal injury. However, as with any other imaging procedures, there are multiple pitfalls and causes for error in interpretation that can lead to serious diagnostic mistakes. An understanding of the diagnostic limitations of MDCT in the evaluation for blunt abdominal trauma, and an awareness of potential imaging pitfalls and blind spots, are imperative for radiologists to avoid false-positive and false-negative interpretations that may result in increased morbidity and potentially devastating patient outcomes. These pitfalls and errors in interpretation may occur as a result of inadequately performed CT

examinations (improper technique); poor image quality resulting from imaging artifacts or patient-related factors, such as extreme body habitus, low cardiac output, or patient motion; anatomic variants that may mimic true injuries; findings associated with significant injuries, which are either physiologic or not caused by the traumatic event (secondary to preexistent conditions); and subtle or uncommon findings that can be easily overlooked if not specifically looked for with a methodical search pattern (true missed injuries). This presentation, will cover some of the most common pitfalls and potential causes for errors that may be encountered when interpreting CT examinations of blunt abdominal trauma.

Use Of Color Doppler And Doppler Velocimetry In Obstetrics (Fetal Growth Restriction)

Seyed Mohammad Hosein Alamolhodaei

Radiologist,
Medical University of Mashhad

The rationale behind the application of Doppler velocimetry in fetal growth assessment is that it can identify uteroplacental function through

evaluation of the uterine and umbilical arteries. Uteroplacental insufficiency is putatively mediated through spiral artery maladaptation

and alterations in the villous vascular tree. On the fetal side, Doppler velocimetry allows evaluation of the middle cerebral artery (MCA) and ductus venosus as fetal cardiovascular adaptation progresses from hypoxia to acidemia. Doppler

velocimetry plays a central role in identification, surveillance and management of FGR, because it allows for the identification of uteroplacental insufficiency and/or fetal cardiovascular adaptation to hypoxemia.

Ultrasound Of Lower Extremity Superficial Venous System

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There are various approaches and sequencing options that can be used for superficial (saphenous) examination. For the sonographer new to reflux testing, a checklist of images and measurements can become a useful guide until routine and habits develop. There are two aspects of this protocol; the first is describing sequences

for performing the examination and acquiring the information. The second is communication of results, which in CVI duplex typically includes a diagrammatic “vein map” to help illustrate findings. The diagram, or vein map, will greatly assist in planning the therapeutic intervention.

Imaging Of Genitourinary Trauma

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Injury to the genitourinary tract is a frequent type of trauma and represents 10%–18% of all abdominal traumas. Radiologic imaging plays a critical role both in diagnosing these injuries and in determining the management. The kidney is the most commonly injured organ. Contrast-enhanced CT is the modality of choice in hemodynamically stable patients. It is important to recognize the imaging features of contusion, hematomas, lacerations, and vascular and collecting system injuries. The grading of renal trauma is done according to these findings. Ureteral injuries are rare and tend to be iatrogenic. Delayed phase contrast-enhanced CT is the most

important modality to help diagnose a ureteral lesion and demonstrates extravasation of contrast media into the abdominal cavity. Bladder trauma is frequently associated with pelvic fractures or a sudden rise in intravesical pressure, and CT cystography is the modality of choice to depict these findings. Ruptures are the most important kind of injury to depict and can occur outside or into the peritoneal cavity. The most frequent type is extraperitoneal rupture, in most cases associated with pelvic fractures and frequently treated with catheter drainage. Intraperitoneal ruptures are more often associated with a sudden rise of intravesical pressure and are commonly

treated surgically. Differentiating intraperitoneal from extraperitoneal rupture is essential for management and prognosis. Injuries to the male urethra are divided into posterior (prostatic and membranous urethra, mostly associated with pelvic fractures) and anterior (bulbar and penile urethra, commonly caused by direct blunt

or penetrating trauma) injuries. Retrograde urethrography is the standard diagnostic investigation, but contrast-enhanced CT is also important to delineate associated injuries. Penile injuries are a heterogeneous group of lesions including blunt or penetrating trauma. US is the modality of choice for blunt trauma.

Ultrasound In Evaluation Of Pelvic Floor Dysfunction

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Female pelvic floor dysfunction encompasses a number of prevalent conditions and includes pelvic organ prolapse, urinary and fecal incontinence, obstructed defecation, and sexual dysfunction. Imaging has great potential to enhance both research and clinical management capabilities, and to date this potential is underutilized. Of the available techniques such as x-ray, computed tomography, magnetic resonance imaging, and ultrasound, the latter is generally superior for pelvic floor imaging. Ultrasound imaging is rapidly replacing radiological methods in the investigation of pelvic floor disorders. Transrectal, transvaginal/introital and transperineal/translabial methods are

being employed, with the latter probably the most widespread due to ease of use and availability of equipment. Position and mobility of the bladder neck, bladder wall thickness, urethral height and funneling, periurethral lesions, posterior compartment and pelvic floor dyssynergy, pelvic floor muscle activity, levator hiatus measurement and pelvic organs prolapse can be quantified, and color Doppler may be used to document stress urinary incontinence. Ultrasound imaging has simplified audit activities and enhanced our understanding of the effects and complications of incontinence and prolapse surgery, such as the new synthetic suburethral slings.

Color Doppler Assessment Of Ischemic Limb

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Shahid Beheshti Medicine University

Duplex Ultrasound Technique, Classification of Disease, Normal and Abnormal flow patterns, Definitive diagnosis and planning of treatment

Duplex ultrasound evaluation of the lower extremity arteries with B-mode imaging, color flow Doppler, and Doppler spectral waveform analysis is a useful adjunct to the indirect

physiologic assessment of arterial disease. This approach can establish the anatomic location and severity of arterial lesions and serve as the basis for initial clinical decisions regarding the need for additional diagnostic imaging or the most appropriate arterial intervention.

Non Vascular Intervention (Case Selection Approach And Access)

Tayeb Hoseini

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Shahid Beheshti Medicine University

fine needle aspiration for thyroid, breast biopsy, liver biopsy, kidney biopsy, visceral catheterization

Getting to know the basic principles that biopsy is necessary for radiologist to increase its quality. Also, knowing these points will

reduce complications caused by biopsy. In this presentation, radiologists are trained how to use the needle and the ultrasound prop at the same time. At the end, the correct way of placing the sample in the correct containers and slide are explained.

More Than Just Gynecomastia; Spectrum Of Male Breast Pathologies

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Male breast imaging is mostly based on physical examination and is required for the complaints of palpable mass, breast enlargement, tenderness, nipple discharge, and nipple-skin changes. The majority of the male breast lumps are benign and the most common reason is gynecomastia. Although it is difficult to exclude malignancy in some cases, gynecomastia often has distinguishable imaging features. Pseudogynecomastia is another differential diagnosis that may be confused with gynecomastia. The distinction is important for the treatment plan. Imaging of the symptomatic male breast begins with a diagnostic mammogram in a patient ≥ 25 years and targeted ultrasound in a patient < 25 years. If the breast finding is incompletely imaged or occult at mammography, targeted ultrasound must be performed. Similarly, if the breast finding is suspicious at targeted

ultrasound in a younger patient, mammography must be performed. After a complete diagnostic evaluation, suspicious findings require biopsy because of overlap in clinical and imaging features of benign and malignant pathologies. Benign breast neoplasms that may occur in men include angioliipoma, schwannoma, intraductal papilloma, and lipoma. Benign nonneoplastic entities that may occur in the male breast include intramammary lymph node, sebaceous cyst, diabetic mastopathy, hematoma, fat necrosis, subareolar abscess, breast augmentation, venous malformation, secondary syphilis, and nodular fasciitis. Familiarity with the salient features of the classic benign male breast conditions will allow accurate imaging interpretation and avoid unnecessary and often invasive treatment.

Venous Mapping In Varicose Veins

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Doppler US Evaluation Protocols, Patterns, and Pitfalls

Venous insufficiency is a cause of substantial morbidity and medical expenditures. Diagnostic US evaluation of venous insufficiency requires a thorough understanding of the venous anatomy, including the deep, superficial, and perforator veins. The highly variable venous anatomy requires that operators use sound judgment to expand on protocol images and thus avoid missing important sources of reflux. The US examination requires specific patient positioning and use of provocative maneuvers. A basic understanding of the pathophysiology of venous insufficiency and the various treatment methods helps to identify key observations so that ineffective treatment methods are not pursued. The examination reports should have greater detail than those for the more common lower extremity deep venous thrombosis evaluation, requiring numeric and narrative descriptions

of deep and superficial venous patency, reflux, diameter, and pathways. Potential pitfalls include not recognizing or detecting deep venous reflux, misidentifying common femoral vein reflux as deep venous reflux when the reflux is isolated or related to saphenofemoral insufficiency, not recognizing anterior accessory great saphenous vein (AAGSV) involvement in saphenofemoral insufficiency, not recognizing or reporting great saphenous vein or AAGSV superficialization, not suspecting central venous obstruction, and not realizing when provocative maneuvers were ineffective. With knowledge of the lower extremity venous anatomy, venous insufficiency pathophysiology, basic treatment strategies, protocol best practices, patterns of observation, and diagnostic pitfalls, those who interpret venous insufficiency US studies can perform examinations and deliver reports that help patients receive appropriate treatment.

Radiologic Approach To Pancreatic Cystic Lesions

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Pancreatic cystic lesions are detected increasingly with an increasing number of cross-sectional imaging performed for unrelated purposes with a prevalence of about 2-38%. Pseudocyst is the most common pancreatic cystic lesion (PCL), constituting 75-80% of PCL. It usually is present as a unilocular cyst, without septa or calcification, central scar, or mural nodule. History of acute pancreatitis

episodes or findings suggestive of recent or chronic pancreatitis is in favor of pseudocysts. Primary pancreatic cystic neoplasms include Serous Cystic Neoplasm (SCN), Mucinous Cystic Neoplasm (MCN), and Intraductal Papillary Mucinous Neoplasm (IPMN) with a risk of malignant transformation for mucinous neoplasms from 10-17% for MCN to 19-30% in Side-branch IPMN and 35-68% in main-duct

IPMN. Uncommon pancreatic cystic neoplasms are tumors such as Solid Pseudopapillary Epithelial Neoplasms (SPEN) or Neuroendocrine Tumors (NET) or rarely pancreatic adenocarcinoma with cystic degeneration. Despite the low risk of malignancy in PCLs, discriminating those with a risk of malignancy from those with a benign course necessitates guidelines for management. Several guidelines have been developed in this regard the most important are European

evidence-based guidelines on pancreatic cystic neoplasms, International consensus Fukuoka guidelines for IPMN, the recent revision of it as international evidence-based Kyoto Guideline for the management of IPMN, and ACR white paper for incidental pancreatic cysts. In this lecture, we explain the imaging features of common pancreatic cystic lesions and their management focusing on European evidence-based guidelines.

Common Mistakes In Gynecologic Ultrasound (Case-based)

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The use of ultrasound in the field of gynecology has become widespread. Ultrasound imaging is vulnerable to pitfalls related to technical and interpretative mistakes and normal variations. A spectrum of findings may be normal or abnormal depending on the age of the patient, previous surgery, parity, medications, and the stage of the menstrual cycle. Gynecologic conditions can often manifest as subtle or non-specific findings and additional clinical information is important

for radiologists to make the most efficient and accurate diagnosis. One must consider pathologic processes with similar appearances and those in adjacent non-gynecologic organs and large gynecologic abnormalities with extension out of the pelvis. In the setting of inconclusive findings in ultrasound scan, further imaging (usually MRI) should be recommended. The aim of this lecture is to review some of common mistakes encountered in gynecologic ultrasound.

Colostomy on CT And Fluoroscopy: What The Radiologist Needs to Know

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Colostomies which are artificial opening created by anastomosing the colon to the anterior abdominal wall are seen commonly as a part of colorectal surgery and It is important for the radiologist to be able to know the types of ostomies, their indications and proper

radiological techniques for their evaluation. The two most common indications for a colostomy are: decompression of obstructed colon (which is most commonly due to colon cancer or complicated diverticulitis) and diversion of the fecal stream to protect a distal anastomosis

at risk for leak. They may be temporary or permanent, depending on the indication for surgery and the clinical context. On the other hand, there are several complications related to ostomies which radiologists need to know and recognize them; as infection, ischemia and mucocutaneous separation at the first month of post operation period as early; and parastomal hernia, skin complications, stenosis, prolapse,

lymphoid hyperplasia, and varices occurring after the first month, as late complications. Fluoroscopy and multi-detector CT scan have a valuable role in diagnosing ostomy types and complications and aid the surgeons in timely and appropriate treatment. At this paper, it is reviewed colostomy's types and indications, radiographic technique of colostomy study, its complications and associated risk factors.

Diagnostic Imaging Approach to Hemoptysis

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Hemoptysis is the expectoration of blood from the lower respiratory tract as a fearsome sign of a variety of differential diagnosis. Systemic bronchial, non-bronchial and pulmonary vasculature can be responsible for hemoptysis in the background of several different diseases including primary vascular lesions or vascular injuries secondary to parenchymal or airway tract pathologies. Bronchial arteries are the most common source of bleeding accounting for about 90% of cases. However, chest x-ray, multidetector computed tomographic angiography (MDCTA) and bronchoscopy are the main tools for diagnosis and guidance for appropriate treatment. MDCTA can help localize the bleeding vessels as well as detection of abnormal findings routinely found in non-contrast chest CT scan and should be performed in systemic arterial phase. We should look for any indirect and direct signs of hemoptysis in chest CT scan. Indirect signs are evidence of pulmonary hemorrhage, aspiration of blood, increased size and number of feeding vessels and pleural thickening. Direct signs indicate

the causative factors including primary or secondary vascular mechanism. Parenchymal infiltration as alveolar hemorrhage, infarction, contusion, infection or neoplastic processes and also airway injury due to tumoral lesions, broncholiths, foreign bodies or trauma may be detected. Then, primary vascular causes should be evaluated as chronic systemic vascular hypertrophy, pulmonary pseudoaneurysm, pulmonary AVM, dysplastic lung parenchyma with systemic arterial supply. According to the imaging findings and clinical course, the appropriate management and decision for vascular intervention should be considered. Cryptogenic hemoptysis is defined as when no identifiable causative factor for the hemoptysis is found during MDCTA and bronchoscopy evaluation and only indirect parenchymal signs can be observed in CT evaluation. Understanding this approach can be very insightful for direction of patient management.

Imaging Approach to Pediatric Benign Bone Tumors

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Benign bone tumors are more common than malignancies in pediatric populations and radiographs are the first-line imaging modality to evaluate bone lesions which can assess the biologic behavior and probable histologic diagnosis. Cross sectional imaging is helpful for evaluation of extension of the lesion and staging. The most common pediatric benign bone tumors include non-ossifying fibroma (NOF), osteochondroma, osteoid osteoma, aneurysmal bone cyst (ABC) and unicameral bone cyst (UBC). The most important clues to narrow differential diagnosis of benign bone tumors include patient age, number of lesions, location of the lesion, margin features, type of matrix and presence of periosteal reaction and extraosseous extension. Sharply demarcated tumor margin which can

easily be drawn around with a pencil suggests benignity. Smooth, uninterrupted periosteal reaction is seen in non-aggressive, benign tumors. The internal composition of a bone tumor (chondroid and osteoid) can help narrow the differential diagnosis. Bone tumors often involves certain locations within the bone, which can narrow the differential diagnosis, UBC and enchondromas are typically located centrally in the bone. ABCs are typically eccentric, but in small bones like fibula can be central. Eccentric lesions include NOF and osteoid osteoma is a cortically based lesion. Generally, a systemic imaging approach should be utilized to reach the diagnosis and help clinicians in management and avoid unnecessary medical intervention

The Role Of Intervention In Treating Thyroid Nodules

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The role of intervention in treating thyroid nodules, particularly the use of new therapies like radiofrequency ablation (RFA) and microwave ablation (MWA), is witnessing significant global expansion in the management of both benign and malignant thyroid nodules. Considering the adoption of these new therapeutic approaches in the current year's guidelines of the American Thyroid Association, there is an anticipation of an increased demand for innovative methods in the field of thyroid interventions. This presentation

aims to share our experiences in delivering novel and low-risk techniques, as well as making informed patient selections, to the best of our abilities in serving you, our esteemed audience.

Post-Thrombotic Syndrome

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Post-thrombotic syndrome (PTS) has the highest clinical significance as a long-term sequela of deep venous thrombosis (DVT). PTS is associated with high morbidity and decreased quality of life for affected patients. Patients with PTS present with edema, chronic leg pain, swelling, skin changes, and heaviness of the limb previously affected by DVT. The symptoms from PTS result from impaired venous blood

return secondary to damaged venous valves and obstructive disease caused by a prior DVT event. The annual incidence of venous thromboembolism is estimated at 1/1,000 persons per year and studies have shown that 20% to 50% of these patients develop PTS as a long-term sequela. PTS treatment can be divided into non-interventional and interventional treatment approaches.

Management & intervention In cholangiocarcinoma:

Hazhir Saberi

Radiologist

Cholangiocarcinoma is classified into: intrahepatic, perihilar (Klatskin tumor) and distal extrahepatic. These types differ in their biological behavior and management. Perihilar cholangiocarcinoma is the most common type.

The prognosis of this malignancy is dismal owing to it's silent clinical character, difficulties to early diagnosis and limited therapeutic

approaches. Surgical management is the only potentially curative treatment but is limited to early stage disease.

Therefore, staging is very important. In non-resectable cholangiocarcinoma based on the location we could consider different methods to increase the survival rate.

Biliary Intervention In Side Effect Of Bariatric Surgery:

Prof. Hazhir Saberi

Radiologist

In bariatric surgery less food passes through the duodenum which may be the reason for the stenosis of the ampulae.

In this study we performed PTBD and ballooning for patients which had history of

bariatric surgery reffered for abnormal narrowing in ampula, dilatation of intra & extrahepatic bile ducts and also abnormal LFT.

Imaging Of Toxic, Metabolic And Anoxic Neurological Emergencies

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Imaging plays a critical role in diagnosing the etiology of brain disorder in emergency department. Toxic and metabolic etiologies are one of important disorders that affect the central nervous system. Common exogeneous causes of toxic leukoencephalopathy include drugs of abuse (heroin and cocaine), alcohol, CO poisoning, neurotoxic medications (methotrexate, metronidazole, etc.); endogenous causes include

hyper- and hypoglycemia, hyperammonemia, hyponatremia, and uremia. In the emergency department which the history is not available or not reliable, it is necessary to develop a diagnosis based off of the radiologic findings. In this presentation we discuss the classic imaging features of common toxic and metabolic leukoencephalopathies.

Role Of Digital Breast Tomosynthesis In Breast Cancer Diagnosis

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With organized screening programs as well as individual procedures, together with improved treatment strategies, the morbidity and mortality of breast cancer have decreased. Technical progress has been made recently with the use of new techniques notably three-dimensional mammography, also called tomosynthesis. Tomosynthesis is an automated technique that yields multiple low-dose angular projections of the breast during a single breast

compression event, hence enabling 3D breast reconstruction and provides both conventional 2D- as well as 3D-information. Multiple studies have shown that the increased cancer detection and reduction in screening recall associated with DBT is achieved across all breast densities.

Application Of AI In GYN

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Artificial intelligence (AI) is a field of computer science where computers mimic human intelligence and attempt to perform certain tasks that normally require human cognition, such as problem-solving and decision-making. With the widespread application of AI in medical imaging during recent years, radiomics and AI models are now being actively evaluated for diagnostic accuracy. In this modern era, the involvement of AI in gynecology is increased drastically. Currently,

many studies have been conducted in the field of using artificial intelligence in the diagnosis of gynecological diseases. AI technology is used in gynecology for risk assessment in disease prevention, disease diagnosis, predicting treatment success, monitoring patients, and managing treatment complications. AI applications enable personalized diagnostic and treatment algorithms in clinical gynecology.

Anomalies Of Placenta And Cord

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A wide range of pregnancy complications result from abnormal placental development, including preeclampsia, fetal growth restriction (FGR), and abruption. Placental and umbilical cord abnormalities, such as placenta previa, placenta invasion, or vasa previa, may cause major maternal and fetal complications. Especially if they are not diagnosed before delivery. Timely

recognition of these abnormalities can lead to improved management of pregnancy and delivery. Evaluation of the placenta in routine pregnancy ultrasounds is very important and should be checked routinely.

Introducing The Newest Advancements And Technologies In Magnetic Resonance Imaging (MRI)

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Advancements in MRI have been a focal point in the medical field, with rapid developments in technology and visualization techniques. The integration of Artificial Intelligence (AI) and enhanced imaging technologies has significantly improved the accuracy of results, leading to better diagnoses and treatment options for patients. AI algorithms have improved the accuracy of lesion detection in MR images. The AIR Recon DL is a new deep learning-based MRI reconstruction pipeline that produces high-resolution images, allowing for better detection of small lesions in difficult areas of the brain. Recent improvements in MR hardware, such as low Field scanners, flexible radiofrequency coils, helium-free magnets, and wireless patient monitoring accessories, have revolutionized MRI performance and workflow efficiency. Furthermore, there has been a surge in the development of MRI techniques with diverse applications. These advancements

have expanded the utility of MRI beyond neuro applications to include body imaging, such as free-breathing techniques for abdominal scans and pulse sequences for detecting liver fat volume. In this workshop, we will explore the latest AI applications, including reducing the need for contrast media in contrast-enhanced MRI and enhancing image quality through AI-powered reconstruction techniques. Additionally, we will delve into innovations like Blue Sealed magnets to address helium scarcity, super flex coils for improved accessibility and performance, and MR-compatible wireless patient monitoring for enhanced flexibility during scans. We will also review cutting-edge pulse sequences like CEST MRI for molecular imaging, synthetic MRI for generating contrast-weighted images based on tissue properties, Zero TE imaging for visualizing short-T2 tissues, fat quantification techniques for liver health assessment, and free-breathing MRI for challenging patient scenarios.

Emerging Therapies In Acute Ischemic Stroke Title:

Mohammad Gharib Salehi

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Associate Professor of Radiology

Thrombolysis and mechanical thrombectomy have revolutionized the care of patients with acute ischemic stroke. The number of patients who can benefit from these treatments continues to increase as new studies demonstrate that not just time since stroke onset but also collateral circulation influences outcome. Technologies

such as telestroke, mobile stroke units, and artificial intelligence are playing an increasing role in identifying and treating stroke. Stroke-systems-of-care models continue to streamline the delivery of definitive revascularization in the age of mechanical thrombectomy.

Spleen And Pancreas Trauma Imaging

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The spleen is one of the organs most frequently injured in blunt abdominal trauma, accounting for up to 49% of all visceral injuries. Pancreatic injury, although uncommon in the setting of abdominal trauma, is associated with high morbidity and mortality and is often overlooked in cases with extensive multiorgan trauma. Physical examination and laboratory data are often nonspecific in the diagnosis of splenic and pancreatic injury. Imaging plays an important role in diagnosis of spleen and pancreatic injuries. Initial radiological examination in a traumatized patient, called focused assessment with sonography for trauma (FAST), is commonly performed by US. FAST is performed mainly to detect any free fluid in the abdominal cavity. However, US examination is limited in most cases, for several reasons (subcutaneous emphysema/ foreign body, bowel gas and chaotic emergency room). Contrast-

enhanced computed tomography (CT) scanning is currently the diagnostic imaging tool of choice for the assessment of hemodynamically stable patients with spleen or pancreas injury due to its speed, widespread availability, diagnostic accuracy, and relatively noninvasive nature, while magnetic resonance imaging (MRI) with magnetic resonance cholangiopancreatography is used as a problem-solving tool in pancreatic trauma. The CT features of spleen injury include lacerations, subcapsular or parenchymal hematomas, active hemorrhage, and vascular injuries. The most evident findings of pancreatic injury are post-traumatic pancreatitis with blood, edema, and soft tissue infiltration of the anterior pararenal space. We will summarize multimodality imaging approach for effectively diagnosing spleen and pancreas trauma, ultimately improving patient management.

Pitfalls In MRI Of The Developing Pediatric Ankle

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Normal skeletal development in the pediatric ankle is dynamic and often produces variable imaging appearances that are subject to misinterpretation. This is especially true as the use of MRI in the evaluation of musculoskeletal trauma and growing popularity of and level of competition in organized sports, among the pediatric population increases the demand for clinical assessment of acute and overuse-type athletic injuries. Pre ossification and secondary ossification centers in the ankle may be inconsistent in morphology, MRI signal

intensity, and number and imaging pitfalls of normal physeal development such as Kump bump, a normal physeal undulation, or focal periphyseal edema (FOPE) can be misinterpreted as physeal injury or bar formation. Because of the high fluid like T2-weighted signal intensity of pre-ossification centers, their enhancement, and rounded morphology, they can be misinterpreted as cysts, abscesses, or neoplasms and distinguishing features include absence of associated soft-tissue, cartilaginous, or bone marrow edema about the pre-ossification

centers and Their characteristic location, within the cartilage precursor, without extension into bone or the physis. Follow-up imaging, which is rarely necessary, shows the eventual disappearance of the pre-ossification centers as they become replaced by secondary ossification centers. Primary Ossification Centers refer to

the ossification masses of the tibial and fibular diaphysis and of the hind foot tarsal bones (referred to the talus and calcaneus bones). This ossification centers are partially ossified in the prenatal period and Therefore, these centers are visualized radiographically from birth. Key words: MRI, Pediatric, Ankle, Ossification Centers

Imaging Of Chest Trauma: Diaphragm

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Traumatic diaphragmatic injury has been found in 3%–8% of patients undergoing surgical exploration after blunt trauma and in 10-15% of patients with penetrating trauma. The rate of initially missed diagnoses on computed tomography (CT) ranges from 12% to 63%. A missed diagnosis can later present as intrathoracic visceral herniation and strangulation with a mortality rate of 30%–60%. Various imaging modalities including chest radiographs, ultrasonography,

CT, and magnetic resonance imaging have been used in the diagnosis of diaphragmatic rupture. Multidetector CT (MDCT) is the modality of choice for the detection of diaphragmatic injury. Imaging findings in Diaphragmatic trauma (MDCT signs) are including “Focal defect” or “Discontinuous diaphragm” sign, “Thickening of the diaphragm”, “Dangling” diaphragm sign, “Collar” sign, “Dependent viscera” sign, “contiguous injury on both sides of the diaphragm”.

Imaging In Uterine Vascular Abnormalities (Case Based)

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Uterine vascular abnormalities, including AVMs (arteriovenous malformations), molar pregnancies, EMV (enhanced myometrial abnormalities) and pseudoaneurysms present significant challenges in diagnosis and treatment due to their nature and potential complications. Imaging plays a crucial role in the identification

and evaluation of these abnormalities. AVMs are abnormal connections between arteries and veins in uterus, which can lead to severe bleeding and other complications. The terms AVM and EMV continue to be used interchangeably leading to confusion as to the pathophysiology of these two different entities and, more importantly, their

management. Enhanced myometrial vascularity is not considered a true AVM. Instead, it is considered to represent either normal peritrophoblastic flow of spiral arteries or placental bed involution (or subinvolution). Pseudoaneurysm is a localized dilatation of vessels after pregnancy-induced procedures or other types of trauma. Color Doppler US is often used to detect it which demonstrates to-and-fro waveform with ying-

yang sign. A hydatidiform mole can either be complete or partial. The absence or presence of a fetus or embryo is used to distinguish the complete from partial moles. These moles can occur in a pregnant woman of any age, but the rate of occurrence is higher in pregnant women in their teens or between the ages of 40-50 years. In this presentation, some cases of above-mentioned pathologies will be discussed.

Overview Of FAST, E-FAST And RUSH: Technique And Interpretation

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PoCUS (Point of care ultrasound) means sonography at the bedside and is not limited to evaluations of individual organs, body regions, or functional anatomical systems. FAST or extended FAST examination is equivalent to PoCUS in trauma. The FAST exam evaluates the pericardium and three potential spaces within the peritoneal cavity for pathologic fluid. The E-component of E-FAST searches for

free air in the pleural cavity as evidence of an acute traumatic pneumothorax. Structures to be identified during a chest examination are: pleural line (visceral plus parietal pleura), costal arcs and pulmonary parenchyma. RUSH (Rapid Ultrasound for Shock and Hypotension) evaluates heart, IVC, aorta and deep venous system in shock state.

Fetal Echocardiography: Review Of Normal Anatomy & Guidelines

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Fetal echocardiography is a non-invasive and safe method for evaluating structure and function of the fetal heart to detect any potential congenital heart defects in unborn babies. Early detection of these defects help healthcare providers plan for intrauterine interventions, appropriate treatment and care

as soon as the baby is born, or terminate the pregnancy legally when there are very complex heart abnormalities. The procedure is similar to a regular ultrasound exam, but it focuses specifically on the fetal heart. The images captured during the procedure provide detailed information about the structure and function

of the fetal heart. Fetal echocardiography is typically recommended for pregnant women who are at a higher risk of having a baby with congenital heart defects. This includes women with a family history of heart defects, certain genetic disorders, those who have had a previous child with a heart abnormality, etc. This presentation will delve into the standard planes that are obtained during fetal echocardiography, emphasizing the important anatomical structures that should be assessed in

each plane. Furthermore, it will discuss potential abnormalities that may be observed in these planes, as well as provide valuable insights into evaluating fetal heart function during fetal echocardiography. Additionally, this presentation will showcase some compelling cases from my everyday clinical practice in the field of fetal echocardiography. These cases encompass rare and complex conditions, offering valuable insights into the intricacies involved in diagnosing fetal cardiac abnormalities.

Endovascular Varicose Vein Ablation

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There are three types of endovenous therapy for superficial axial veins: RF ablation, laser ablation, and ultrasound-guided sclerotherapy. Endovenous ablation requires minimal pre-procedure preparation. Acute Occlusive DVT is an absolute contraindication to endovenous ablation, while a chronically recanalized DVT is a relative contraindication. Radiofrequency ablation and laser energy deliver two types of energy to the vein lumen. Radiofrequency heat is delivered at a temperature of 120°C. Laser catheters vary; some have a slow continuous pullback, while others require a segmental pullback. Gray-scale ultrasound images can often detect stream bubbles generated by the laser fiber. The choice of whether to use RFA or laser as the energy source for Venous ablation procedures remains a matter of physician preference. Randomized prospective studies comparing the two techniques have detected very few differences. Patients treated with laser ablation tended to experience more discomfort in

the very early post-procedural period. However, all other outcome variables were similar. During laser treatment and radiofrequency ablation procedures, Tumescence anesthesia performs three functions: 1. anesthesia provides coverage over a large area, 2. vein compression around the therapeutic catheter, and 3. creation of protective barriers to prevent heating of non-target tissues, including skin, nerves, arteries, and deep veins. Post-procedural instructions vary. Usually, the patient's extremity is wrapped in a layered compression dressing, or a 20-30 mmHg compression stocking is applied. The patient is advised to walk every hour until bedtime. Regular activity, except for vigorous cardiovascular exercise, can be resumed the following day. After a satisfactory post-procedural duplex, all activity restrictions are lifted.

Emergency Imaging Assessment Of Acute, Nontraumatic Conditions Of The Head And Neck

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There are various infectious ,inflammatory or neoplastic head and neck conditions leading the patients to emergency department, many of which can be accurately diagnosed by CT scan. knowledge of the imaging findings of common acute conditions of the head and neck is essential to ensure an accurate diagnosis of these potentially life-threatening conditions, which include oral cavity infections, tonsillitis and peritonsillar abscess, sialadenitis,

parotiditis, diskitis, thrombophlebitis ,periorbital and orbital cellulitis, and infectious cervical lymphadenopathy. CT is the first-line imaging modality in the emergency setting; however, magnetic resonance imaging plays an important secondary role. Familiarity with these conditions enables the radiologist to make a prompt diagnosis, assess the extent of disease, and evaluate for potential complications

Clinical Application Of Advanced MRI Techniques In Neuro-Oncology; Opportunities And Challenges

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Advanced MRI techniques, including Diffusion Tensor Imaging (DTI), Perfusion imaging, and Magnetic Resonance Spectroscopy (MRS), have revolutionized the field of Neuro-Oncology by providing intricate insights into the structural, functional, and metabolic characteristics of brain tumors. Advanced MRI techniques such as DTI, perfusion imaging, and MRS play a crucial role in neuro-oncology by providing detailed insights into brain tumor microstructure, vascularity, and metabolism. These advanced techniques offer a deeper understanding of tumor characteristics, aiding in diagnosis, treatment planning, and response assessment. advanced MRI helps clinicians tailor personalized treatment strategies for patients. Despite their significant

clinical utility, challenges and limitations exist in implementing these advanced MRI techniques in neuro-oncology practice. Advanced MRI techniques, such as DTI, PWI, and MRS have transformed the field of Neuro-Oncology by providing detailed insights into the structural, functional, and metabolic features of brain tumors. These advanced techniques play a vital role in neuro-oncology by offering a deeper understanding of tumor characteristics, aiding in diagnosis, treatment planning, and response assessment. By uncovering the intricacies of tumor microstructure, blood flow patterns, and metabolic processes, advanced MRI enables clinicians to customize personalized treatment approaches for patients. Despite their significant

clinical value, challenges and limitations exist in the integration of these advanced MRI techniques into neuro-oncology practice. This article explores the clinical applications of advanced MRI techniques in Neuro-Oncology, highlighting the opportunities for enhanced

tumor evaluation, treatment planning, and monitoring. Additionally, it addresses the obstacles and constraints associated with implementing these techniques in clinical settings, while also discussing future directions and emerging.

Traumatic Brain Injury

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Radiologists play a critical role in the diagnosis of complications of traumatic brain injury and should understand injury patterns and secondary injuries that can occur because of mass effect and herniation. While the diagnosis of traumatic brain injury (TBI) is a clinical decision, neuroimaging remains vital for guiding management on the basis of identification of intracranial pathologic conditions. CT is the mainstay of imaging of acute TBI for both initial triage and follow-up, as it is fast and accurate in detecting both primary and secondary injuries that require neurosurgical intervention. MRI

is more sensitive for the detection of certain intracranial injuries (eg, axonal injuries) and blood products 24–48 hours after injury, but it has limitations (eg, speed, accessibility, sensitivity to motion, and cost). The evidence primarily supports the use of MRI when CT findings are normal and there are persistent unexplained neurologic findings or at subacute and chronic periods. Radiologists should understand the role and optimal imaging modality to use, in addition to patterns of primary brain injury and their influence on the risk of developing secondary brain injuries related to herniation.

Imaging Of Spinal Cord Compression (Discopathy, Tumor, Other SOLs)

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Acute compressive myelopathy in the setting of nontrauma is a medical emergency for which timely intervention is essential to minimize irreversible loss of neurologic function. Decompression of the spinal cord within the first

24 hours after the onset of myelopathy has been shown to improve neurologic outcomes. As a result, MRI of the spine is frequently performed on an emergent basis, including after hours, to assess suspected cord compression. Thus,

it is imperative that emergency department radiologists have a good understanding of the common differential diagnoses of acute myelopathy and be able to differentiate the compressive versus noncompressive causes. Etiology of spinal cord compression including: degenerative disease (disk herniation), vascular, metabolic, inflammatory or infectious process and neoplastic (primary or metastasis) causes.

Use of a compartmental spinal MRI approach in patients with suspected nontraumatic spinal cord injury helps to localize the abnormality to an epidural, intradural extramedullary, or intramedullary space, and when combined with clinical and laboratory findings, aids in refining the diagnosis and determining the appropriate surgical or nonsurgical management.

Imaging Of Acute Pancreatitis

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Abstract Acute pancreatitis is a common potentially life-threatening disease. This acute condition is classified into two distinct subtypes, necrotizing pancreatitis and interstitial edematous pancreatitis, respectively and the severity of disease is classified into three categories (mild, moderate & severe) based on clinical and morphologic findings. Early diagnosis of severe disease could be important to identify at risk patients with the highest morbidity for the best management. So radiologic investigations

play an important role in the management of the acute pancreatitis and would help to determine the diagnosis, complications and severity of disease. Thus this lecture reviews the common classification and recent advances in the radiologic features of the acute pancreatitis with an emphasis on key findings & the standardized radiologic nomenclatures for acute pancreatitis on CT scan that may improve clinical evaluations & treatment plan. Key words: acute pancreatitis; complication; Computed tomography

Imaging After Bariatric Surgeries Normal Findings And Complications

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Obesity is a disease that has reached epidemic proportions around the world. Obesity-associated conditions lead to morbidity and mortality proportional to the degree of excess weight. Bariatric procedures are indicated for morbidly obese adults (BMI > 40) or obese

adults (BMI > 35) with an obesity related medical condition(s), who have failed behavioral and medical treatment. With the increasing prevalence of surgical procedures for obese and morbidly obese patients, bariatric and computed tomographic (CT) imaging and fluoroscopic

barium studies are becoming common in day-to-day radiology practice, and a basic understanding of normal post-operative imaging and the unique problems that bariatric patients pose to the imaging community is crucial in any setting.

In this talk we discuss about various types of gastric restrictive and bypass procedures, related normal postoperative findings and also findings of related possible complications in barium studies and CT scan examinations.

Practical Points, Missed And Errors In Cardiac Imaging

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Iran University of Medical Sciences

The article discusses the main normal cardiac anatomic variants, cardiac pseudotumors, lipomatous hypertrophy of the interatrial septum, focal hypertrophic cardiomyopathy, cardiac outpouchings, ventricular crypts, sinus

Valsalva aneurysm, interventricular septal aneurysm, coronary artery anatomic variations, coronary artery lesions and pseudo lesions, coronary imaging artifacts, overestimation and underestimation of coronary stenosis.

Acute Aortic Syndrome, A Spectrum Of Overlapping Findings And Complications

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Acute aortic syndrome (AAS) mainly includes aortic dissection (AD), intramural hematoma(IMH), and penetrating atherosclerotic ulcers (PAU). AAS requires a tear in the aortic intima, separating the intima from the media or adventitia. AAS is caused by various lesions that often have indistinguishable imaging features. Some factors including flow artifacts, phase of the postcontrast examination, and AD equivalents can make it difficult to diagnose. This article emphasized the types of intimal tears, new guidelines, shared sheath rupture, atypical aortic rupture, mimics and pitfalls in

diagnosis, contrast media in third-spacing, and mediastinal hemorrhage. By clarifying these factors and declaring challenging cases of AAS, the radiologist, cardiologist, and surgeons can accurately purify CT interpretation for the best patient management.

Role Of Imaging At Pediatric Brain Emergencies

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Role of imaging in pediatric brain emergencies could be varied according to accessible modality and clinical indications : Skull radiography may be used for suspected child abuse .Ultrasound could be performed portably in the NICU for evaluation of hemorrhage,SOL,hydrocephalus or midline shift of neonate regarding limited view for peripheral structures and limited sensitivity for ischemia.CT is a rapid sensitive modality in setting of trauma for depicting skull fractures , pneumocephalus ,acute intraaxial -extraxial hemorrhage and herniation.It can also be used as imaging triage of decreased consciousness ,

seizure or focal neurological deficit with expense of ionizing radiation risks particularly in sensitive pediatric age group. MRI is the modality of choice for majority of clinical indications in most children such as ischemia,hemorrhage ,encephalitis ,epilepsy, tumor ,....one major disadvantage for this imaging modality is the long duration of time needed for data acquisition. Therefore, sedation or general anesthesia of children ,especially between 6 months to 4 years of age, is required inevitably. Some routine , challenging or interesting cases will present in this session.

Small-bowel Obstruction And Ischemia Imaging

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Small-bowel obstruction (SBO) is an important cause of morbidity and mortality in the world. Abdominal radiography is usually the initial imaging modality in patients suspected of having SBO. Multi-detector CT has been proven to be the single best imaging tool for evaluating patients suspected of having SBO. The hallmark of SBO is dilated small bowel loops proximal to the site of obstruction with decompressed distal bowel. The main cause of SBO is adhesions. The next two most frequent causes are hernias and malignancies. After diagnosis of the suspected

SBO, its site, cause and presence or absence of complications such as ischemia or perforation should be determined. Ischemia is the complication that increases the morbidity and mortality associated with SBO. It is important to search carefully for evidence of volvulus and closed- loop obstruction, because these conditions are associated with strangulation and place patients at risk for ischemia.

Imaging Approach In Pediatric Limping

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Three major factors cause limping in a child including pain, weakness, structural and mechanical abnormalities of spine, pelvis and lower extremities. For determining the location and etiology of limping attention to history, physical examination and investigation results are important. Hip pathology is one of the important causes and the main scope of this presentation. Different hip pathologies may present with hip pain or limping. The differential diagnosis can be narrowed down according to age. Infectious and traumatic lesions are important causes seen in all age groups and should be diagnosed early for proper treatment. Bone tumors are uncommon but important. Imaging approach is based on the general condition and the age of the child. In a sick child with fever and increased inflammatory markers regardless of age hip ultrasound is the first imaging modality to rule out effusion and septic arthritis. In suspected osteomyelitis, MRI is choice and used for early detection and also for

complications. Radiographs aren't sensitive and done for excluding other differential diagnoses such as trauma or tumors. In children younger than 10 years old without history of trauma transient synovitis is the most common cause of hip pain which is self-limiting so in not sick child between 2 to 10 years old with symptoms less than 5 days imaging is not necessary. In all other cases hip ultrasound and pelvic radiograph should be performed. Young children may have difficulty communicating the problem, it may be necessary to image the entire extremity. In a well-baby child younger than 2 years old leg radiograph is the first imaging modality for rule out toddler fractures. Hip ultrasound and pelvic radiograph are the second line of imaging. In children older than 10 years old pelvic X-ray is the first line because sport injuries are the most common etiologies. In difficult cases and in persistent unexplained complains MRI is indicated for all ages.

Traumatic Cardiovascular Thoracic Emergencies Imaging

Hussein Soleimantabar

Shahid Beheshti Medical University

Cardiac injuries can occur in the context of both blunt and penetrating trauma, leading to significant clinical consequences. While clinical presentations vary, computed tomographic (CT) imaging is rarely performed specifically to evaluate cardiac injury. However, recognizing CT findings related to cardiac trauma in thoracic trauma scans is crucial to avoid misdiagnosis and guide potentially life-saving interventions. In cases of blunt trauma, mechanisms of

cardiac injury include direct precordial impact, crush injury from compression between the sternum and spine, deceleration or torsion, hydraulic effects, and blast injury. Penetrating cardiac trauma, such as stab wounds, gunshot wounds, and sternal fractures, also has serious implications. The clinical presentation may range from nonspecific symptoms (chest pain, dyspnea, and cardiac arrhythmia) to more complex scenarios. Physical examination

findings, such as chest wall deformities or subcutaneous emphysema, may raise suspicion of cardiac injury. CT imaging, when performed for thoracic trauma, provides essential insights into cardiac and great vessel injuries. It allows for accurate assessment of vascular damage, a significant cause of morbidity and mortality in thoracic trauma. Contrast-enhanced CT scans are

particularly valuable, unless contraindicated due to allergy or renal failure, as they enhance the visualization of vascular structures. In summary, understanding the CT findings associated with cardiac and great vessel injuries is critical for timely diagnosis and appropriate management in patients with thoracic trauma.

Imaging In Noncardiovascular Thoracic Emergencies

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In the context of non-cardiovascular thoracic emergencies, diagnostic imaging plays a crucial role in assessing and managing patients presenting with symptoms such as chest pain, dyspnea, cough, hemoptysis, and hematemesis. While cardiovascular conditions are common, a subset of patients may have underlying non-cardiovascular causes for their symptoms. Here are some key points regarding imaging in non-cardiovascular thoracic emergencies: Chest Pain Evaluation: Chest pain is a common reason for emergency department visits. Imaging, including chest X-rays and computed tomography (CT), helps evaluate pleuropulmonary causes of chest pain, such as pneumothorax, pneumohemothorax, and pneumomediastinum. Role of Radiography and CT: Radiography and CT are valuable tools for diagnosing and differentiating noncardiovascular

thoracic diseases. They aid in identifying specific conditions, such as asthma, oesophagitis, and other pleuroparenchymal abnormalities. Clinical Presentations and Imaging Features: Although clinical presentations may vary, there are similarities in symptoms across different conditions. Imaging features help differentiate between various etiologies, including pulmonary, mediastinal, and esophageal causes. Specific Conditions: Radiography and CT assist in evaluating conditions like pneumothorax, pneumomediastinum, and oesophagitis. Understanding the imaging findings is essential for timely diagnosis and appropriate management. In summary, imaging plays a vital role in identifying non-cardiovascular thoracic emergencies, aiding clinicians in making accurate diagnoses and providing timely care.

Bowel And Mesenteric Trauma Imaging

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Diagnosing bowel and mesenteric trauma has a consequential role in imaging reports that immediate laparotomy, timely and accurate

management may save life nevertheless considerable prevalence. Delayed diagnosis and treatment are associated with increased

morbidity and mortality. Bowel and mesenteric injuries are among the most frequently overlooked injuries on trauma abdominal computed tomography (CT), with up to 40% of confirmed surgical bowel and mesenteric injuries not reported prior to operative treatment. Computed tomography (CT) has been shown to be accurate for the diagnosis of bowel and mesenteric injuries and is the diagnostic test of choice in the evaluation of blunt abdominal trauma in hemodynamically stable patients. Specific CT findings of bowel and mesenteric injuries include bowel wall defect, intraperitoneal

and mesenteric air, intraperitoneal extraluminal contrast material, extravasation of contrast material from mesenteric vessels, and evidence of bowel infarct. High percentage of falsely negative preoperative diagnoses may be due to several factors, including the relative rarity of these injuries, subtle and non-specific appearances on CT, and limited awareness of the injuries among radiologists. Enhanced diagnostic imaging awareness will improve the preoperative diagnostic yield, which will save time, money, and lives

CSP Related Pathologies

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Different fetal brain pathologies manifest with Cavum septum pellucidum (CSP) abnormalities such as agenesis of corpus callosum (ACC), holoprosencephaly, optic nerve or chiasma hypoplasia (SOD), Absent SP... Anomalies of the CSP are disorders of prosencephalic midline development, which are often associated with other brain abnormalities or a syndrome. One of the main indirect US signs of complete ACC is

absent CSP. MRI can visualize the size of the optic nerves and chiasma (mostly in late pregnancy) to search for SOD and to demonstrate possible associated cortical malformation (in favor of SOD-plus). The severity of Absent SP varies in the clinic. Children with isolated Absent SP have a favorable outcome, but 18% of these fetuses are at risk for SOD.

Fetal Skeletal Dysplasia

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Ultrasound (US) assessment of the fetal musculoskeletal fetal apparatus requires a global approach to the fetal body, given that skeletal dysplasias and neuromuscular diseases involve more or all anatomic regions. The only exceptions are reduction defects of the limbs, congenital or

acquired (amniotic band syndrome), which are regional by definition. Therefore, unlike other systems, assessment of the fetal musculoskeletal apparatus requires a multistep total body US approach, which should include assessment of the following: • Limbs: long bones and

extremities; • Spine and thorax; • Fetal head: calvarium, central nervous system (CNS), and splanchnocranium; • Bone mineralization; • Any joint contractures and joint dislocations. Each of these five points should be addressed with separate views at different degrees of magnification, which makes the evaluation of the musculoskeletal apparatus rather time-

consuming and challenging. In the following sections, the diagnostic approach to the various anomalies of bones and muscles will be dealt with the help of different diagnostic flowcharts, based on the main abnormal US finding, with the intention of making the very difficult and challenging issue of differential US diagnosis easier.

Approach to Pediatric Malignant Bone Tumors (Cased-based Presentation)

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Background: Osteosarcoma, Ewing sarcoma, chondrosarcoma, and primary bone lymphoma account for greater than 95% of all primary bone tumors occurring in the first 50 years of life. These diseases are the primary focus of this review. **Methods:** Radiography remains the primary imaging modality for diagnosis of bone tumors and tumor like lesions, and a structured approach to evaluation is based on lesion location, density, matrix, margins, number, periosteal reaction, cortical involvement, and soft-tissue components in accordance with patient age. **Learning objectives:** -To provide an

educational and pictorial review of malignant bone tumors at conventional radiography -To review their differential diagnosis -To propose a systematic approach to diagnosis of malignant bone tumors based on radiographic and cross sectional imaging features **Conclusions:** By paying attention to the age of patient, location of the lesion, and radiographics characteristics, the radiologists can narrow the differential diagnosis, which helps to guide clinical management, preventing unnecessary patient anxiety and medical intervention.

Pediatric Hematologic And Metabolic Bone Diseases

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Abstract Metabolic bone diseases in children are many and varied which include a wide range of systemic disorders. Some of the most important hematological disorders involving

the skeletal system are avascular necrosis, osteopetrosis, hemochromatosis, hemophilia, hereditary spherocytosis, leukemia, sickle cell anemia, thalassemia. Some clinical and imaging

manifestations of these diseases in children and adults are similar, while others are different and have specific findings. In imaging, they create different findings that overlap in many cases. In order to diagnose these diseases more accurately, we need a complete history and examination of the patient, as well as adequate imaging. The first imaging step is plane radiography but sometimes we have to use several imaging

modalities such as CT scan, MRI and nuclear medicine for better diagnosis. Correct and timely diagnosis of these diseases can help to improve the treatment process and reduce the side effects of the skeletal system effects, especially in the group of children who are at growth age. Keywords: Hematologic disease, Metabolic disorder, Radiography, Imaging

Key Points And Pitfalls In Inflammatory Spondylodiscitis Imaging

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There are different types of spondylodiscitis which can be diagnosed at early stages by MRI. Magnetic resonance imaging is valuable in defining the type of spondylodiscitis, the extent of involvement and detection of complications which is helpful in prompt initiation of medical or surgical treatment. The most famous types of spondylodiscitis are pyogenic ones with rapid progression and tuberculous/brucellar forms with more indolent process. Imaging presentation of these three categories are well known by radiologists, however there are some uncommon pathogens like fungal species which cause infective spondylodiscitis with less

specific and little known imaging presentations. Additionally there are some noninfectious mimickers of spondylodiscitis such as modic process, spondyloarthropathies, neuropathic arthropathy, SAPHO and also amyloidosis which treatment is completely different and leading to diagnostic challenge. So early diagnosis of underlying process causing spondylodiscitis with imaging modalities specially MRI is mandatory for health care professionals to provide appropriate patient's treatment and follow up. There are some valuable hints for early detection of the cause and complications of spondylodiscitis in imaging which are mentioned in this lecture.

Endoleaks Uncovered: Navigating the Complexities In EVAR Management

Seyed Amin Astani

In the realm of endovascular aneurysm repair (EVAR), the management of endoleaks presents a significant challenge, demanding a nuanced

understanding and strategic approach. This session delves into the intricacies of endoleaks, providing a comprehensive exploration of their

nature, classification, and clinical implications.

The journey begins with a foundational explanation of endoleaks, leading to an in-depth analysis of their types and the significance of each in the clinical setting. The discussion extends to the etiology and epidemiology of endoleaks, equipping participants with insights into their prevalence and impact following EVAR procedures.

A critical examination of treatment strategies is a cornerstone of this session, where various management options are scrutinized for their efficacy, associated risks, and appropriateness for different endoleak categories and patient conditions. The narrative is enriched with the latest research findings and data, enhancing the depth of the exploration.

Illustrative case studies are interwoven throughout, highlighting practical challenges and decision-making processes in endoleak management. These cases serve to connect theoretical knowledge with real-world application, fostering a deeper understanding of the subject matter.

The session culminates with a glimpse into the future, touching on emerging trends and innovations in endoleak management. This forward-looking perspective aims to equip specialists with the knowledge and tools to adeptly navigate the evolving landscape of EVAR management, emphasizing the dynamic and complex nature of endoleak treatment in vascular and interventional radiology.

Endovascular Management Of Acute GI Bleeding

Hadi Rokni Yazdi

Acute gastrointestinal bleeding (GIB) can lead to significant morbidity and mortality without appropriate treatment.

Computed tomography angiography and nuclear scintigraphy can localize the source of bleeding and provide essential information for the interventional radiologist to guide therapeutic management with endovascular angiography and transcatheter embolization.

Interventional radiology (IR) can play a key

role in the management of gastrointestinal (GI) bleeding, especially when endoscopy fails or if the patient is a poor surgical candidate.

A distinction should be made between variceal and non-variceal bleeding sources as arterial interventions on the former would not be applicable.

In this presentation, we discuss different cases of acute GI bleeding with different intervention techniques.

Emergency Neuroimaging Of Intracranial Infection, Inflammation And Demyelination

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There are numerous conditions causing by infective and inflammatory pathologies involving

CNS that require immediate medical attention. Imaging techniques like CT scan and MRI play

a crucial role in diagnosis and evaluation of these situations. Mentioned modalities provide detailed information to help differentiate between CNS infection and inflammation, although imaging findings alone can not definitively diagnose a specific infectious agent, certain patterns and characteristics observed in imaging can provide clues that aid in narrowing down the potential causative organisms. Some examples of CNS infection emergencies are : meningitis, encephalitis and brain spinal epidural abscess. In addition to infections,

there are also inflammatory emergencies that can affect the CNS, such as: ADEM, multiple sclerosis, transverse myelitis and central pontine myelinolysis. In neuroradiology emergency conditions CT scan and MRI can contribute for detection of structural abnormalities, differentiation of infections from inflammatory causes, assessment of complications, evaluation of response to treatment and surgical planning. There are some useful clues in this era that mentioned in this lecture.

Role Of Imaging In Non-traumatic Genitourinary Emergencies In pediatric cases

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Non-traumatic genitourinary emergencies include a spectrum of acute conditions affecting the kidneys, urinary tract, and reproductive organs in pediatric cases. Unlike traumatic injuries, which often present with some signs and symptoms, nontraumatic emergencies in the genitourinary system can pose diagnostic challenges due to their different non-specific clinical presentations. Recognizing imaging features of these emergent conditions is important to prevent complications, preserve organ function, and optimize outcomes in pediatric patients. In this review, we provide an overview of the most common nontraumatic genitourinary emergencies seen in pediatric practice, emphasizing their clinical significance, and diagnostic imaging features. By understanding the unique characteristics of these conditions pediatric radiologists and pediatrician can enhance their ability to provide opportunely and sufficient diagnosis and care of pediatric patients presenting with

genitourinary emergencies. Throughout this review, we will assess the pictorial diagnostic clue of nontraumatic genitourinary emergencies in children, including urinary tract infections (UTIs), obstructive uropathy by stone or thrombus or necrotic papilla, testicular torsion, ovarian torsion, inguinal hernia and other less common but some life-threatening conditions such as arterial or venous renal thrombosis. Ultrasound (US) is the modality of choice for the initial evaluation due to its diagnostic value and absence of ionizing radiation. In some abdominal and pelvic cases, computed tomography (CT) should be prearranged for some cases such as renal stones while magnetic resonance imaging (MRI) is a potential alternative to CT. However, the expense and availability of MRI are the significant limitations.

Management of Cesarean Scar Pregnancy

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Introduction: Cesarean scar pregnancy (CSP) is a rare condition, posing a significant maternal morbidity risk, necessitating careful management and surveillance. The overall incidence is believed to be rising, now representing up to 6% of ectopic pregnancies in patients with a history of cesarean section. This trend is likely influenced by the global rise in cesarean section rates. Poor healing following a cesarean section can lead to focal thinning of the scar, making it susceptible to the implantation of the gestational sac at this point rather than in the endometrial cavity.

Diagnosis: CSP often presents challenges in early detection, frequently being discovered incidentally during transvaginal ultrasonography (TVUS), with the gestational sac appearing below the mid-sagittal line. Patients experiencing first-trimester pain and bleeding who have had a previous cesarean section should be considered for CSP in the differential diagnosis. Diagnosis typically involves transvaginal ultrasound, with magnetic resonance imaging assisting in surgical planning.

Treatment: Management of CSP necessitates a multidisciplinary approach, taking into account factors such as CSP type, gestational age, hemodynamic stability, and patient's fertility desires. Treatment options encompass expectant, surgical, and medical approaches, with a tendency to combine modalities. Expectant management, although feasible, carries high risks and is generally avoided unless

spontaneous resolution occurs without fetal cardiac activity. Early termination of pregnancy is often advised due to the risks associated with continuing the pregnancy, notably uterine rupture and life-threatening hemorrhage. The Society of Fetal and Maternal Medicine currently advises against expectant management but may be considered for CSP without fetal cardiac activity, particularly with evidence of spontaneous resolution. Termination options include medical (methotrexate, local injection, uterine artery embolization, high-intensity focused ultrasound) or surgical (laparoscopy, laparotomy, hysteroscopy, curettage, suction evacuation) methods. Decisions regarding termination should be individualized, considering patient factors and fertility desires, and involve a multidisciplinary team consensus.

Conclusion: CSP stands out from other ectopic pregnancies due to its potential for severe maternal morbidity despite its rarity. Its incidence is rising globally, largely due to increased cesarean section rates. While its precise causes remain unclear, early detection is crucial and requires experienced sonographers and a high index of suspicion. Management should involve collaboration among various specialties, including minimal invasive surgeons, the accreta team, and interventional radiologists.

Imaging Modalities for Pelvic Floor Disorders

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Pelvic floor disorders as pelvic organs prolapse, voiding, defecatory and sexual dysfunctions, urinary or anal incontinences, chronic pelvic pain can develop after obstetric trauma, pelvic surgery, aging, and hormonal changes and frequently coexist.

Pelvic floor dysfunction is a common morbidity with a negative impact on quality of life. These disorders include multiple clinical conditions which range from urinary and defecatory disorders to sexual disorders, affecting 24% of women. Since the pelvic floor is one of the most complex regions in the human body, in order to perform an accurate diagnosis, it is important to combine history taking, physical examination and imaging. While in the past, diagnosis of pelvic floor dysfunction was done using history taking and physical examination alone, it had been recognized the need for imaging as well. In the last decades different imaging modalities have been in use, including magnetic resonance

imaging and computerized tomography scanning and, nowadays, the use of ultrasonography is gaining popularity.

Physical examination is the predominant method for evaluating pelvic floor defects. Physical examination is often unable to detect the anatomical damages in the “complex” pelvis.

Imaging plays an important role in the diagnosis of pelvic floor disorders to visualize abnormalities difficult to assess at the physical examination and/or to correlate symptoms with clinical findings.

Magnetic Resonance Imaging (MRI) is a radiological technique useful to identify the underlying defects of pelvic floor structures.

Technological innovations have improved the diagnostic accuracy of imaging modalities.

In the assessment of pelvic floor disorders, the integration of imaging techniques provides both anatomical and functional information for the optimal management of these conditions.

Peripheral Artery Disease (PAD)

Mohammad Momen Gharib Vand

Peripheral artery disease (PAD) refers to progressive narrowing of the aorta and the major arteries of the extremities and organs, essentially the body's entire circulation except the brain and heart. PAD is almost always due to atherosclerosis, which is cholesterol and inflammatory cell buildup in the vessel wall. While less common, other causes of PAD include emboli, extrinsic compression, trauma,

adventitial cystic disease, peripheral aneurysms, and vasculitis.

As atherosclerosis is a systemic condition, patients with PAD also commonly have coronary artery and cerebrovascular disease. The long-term cardiovascular morbidity and mortality in these patients is high, and much of the medical management strategy is centered around reducing overall cardiovascular risk.

The most commonly affected vessels in PAD are those of the lower extremity, with nearly half of all PAD patients experiencing

symptoms from the disease. Management of the symptomatic PAD patient differs from that of the asymptomatic patient.

Orbital Fracture

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Employing a systematic approach to evaluate and manage orbital trauma is crucial for minimizing the long-term impact on both function and aesthetics. While a multitude of specialists including Ophthalmologists and orbital surgeons, Radiologists, Otolaryngologists, Neurosurgeons and Maxillofacial surgeons may be involved in the care of trauma patients, meticulous attention is required to assess the extent of ocular and periorbital injuries and to prevent or rectify any vision impairment. This discussion, led by a panel of experts, encompasses a comprehensive exploration of orbit-related injuries, ranging from blunt and penetrating trauma to orbital hemorrhage, optic neuropathy, foreign body entrapment, and fractures.

A thorough understanding of orbital and periorbital anatomy forms the cornerstone of evaluating and devising treatment strategies for orbital trauma. Bounded posteriorly by contiguous bony structures and anteriorly by the fibrous septum, the orbit constitutes a confined space with limited expansibility. The onset of orbital compartment syndrome arises from a swiftly evolving intraorbital process, such as hemorrhage, air (pneumo-orbitum),

retrobulbar injection, inflammation, tumor, or abscess, resulting in an acute elevation in orbital pressure.

Orbital fractures can be categorized into the isolated fractures involving the floor, medial, lateral, and roof walls, and combined fractures including Naso-Orbito-Ethmoid Fractures, Zygomaticoorbital Fractures, Maxillary Fractures, and Frontobasilar Fractures.

Radiological imaging plays a pivotal role in the diagnosis and management of orbital fractures, foreign bodies, orbital hemorrhage, and optic neuropathy. High-resolution CT scans serve as the primary imaging modality for evaluating orbital fractures, identifying gross ocular disruptions, intracranial and sinus abnormalities, and foreign bodies.

MRI of the orbit has limited utility in trauma settings and should only be considered after plain-film radiography or CT scans have been performed to exclude metallic foreign bodies. It may be beneficial for assessing optic nerve injuries or other soft tissue damage within the orbit, as well as any adjacent brain injuries.

Understanding PET/CT Scan: Mechanisms, Risks And Benefits

Marzieh Nejabat

PhD. MSC

Positron Emission Tomography combined with Computed Tomography (PET/CT) has become an invaluable tool in modern radiology and nuclear medicine, providing multiple insights into physiological and pathological processes. This lecture aims to elucidate the intricate workings of PET/CT imaging, including its principles, methods, associated risks and clinical benefits.

The session will begin with an overview of the basic principles of PET/CT, elucidating the fundamental physics of positron emission and the subsequent generation of tomographic images. Participants will gain a comprehensive understanding of the fusion of metabolic and anatomical data facilitated by the integration of PET and CT technologies, allowing precise localisation and characterisation of lesions.

Emphasis will also be placed on the clinical utility of PET/CT in various medical contexts, ranging from oncology to neurology, cardiology

and beyond. Case studies will be presented to highlight the diagnostic and prognostic value of PET/CT in disease staging, treatment response assessment and surveillance, providing radiologists with evidence-based insights for optimal patient management.

In addition to exploring the diagnostic potential of PET/CT, attention will be drawn to the risks and safety considerations associated with the imaging modality. Radiation exposure, contrast administration and patient-specific factors influencing risk assessment will be discussed to promote a comprehensive understanding of the balance between diagnostic efficacy and safety.

Ultimately, this lecture aims to provide radiologists with a nuanced understanding of PET/CT imaging, enabling them to effectively use this advanced modality in clinical practice while ensuring patient safety and optimal healthcare outcomes.

Presentation Topic: Radiation Protection In the Cath Labs

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Introduction: With advancements in percutaneous transcatheter interventions, complex procedures can become prolonged with increased radiation exposure to the proceduralist and his/her team.

All IR procedures should be performed with the goal of acquiring the necessary clinical information while keeping radiation doses as

low as reasonably achievable and minimizing exposure to health care workers.

The current practice requires all members of the IR team wear personal protective equipment with at least lead body aprons and thyroid shields. Some operators also use leaded skull covering, leaded eyeglasses, and arm shields. Conventional lead aprons are now being

replaced with newer aprons made of lighter materials that include aluminum, antimony, barium, bismuth, tungsten, tin, and titanium. Some of these materials may reduce personal protective apron weight by 20% to 40%.

Every cath lab should have a ceiling-mounted, movable upper-body shield and lower-body shield mounted on the side of the patient table. A ceiling-suspended screen and a curtain shield under the table reduce scatter radiation by approximately 80% to 90%.

In this lecture we will discuss about several topics related to radiation safety in IR units:

- Health care workers at highest radiation exposure risk:
personnel at risk include not only the patient and primary operators but also radiology technicians, nursing staff, ancillary physicians such as anesthesiologists and device representatives. The positions of these team members around the x-ray table often determine the exposure risk
- Radiation monitoring: All CCL staff should have their radiation exposure monitored with a dosimeter.
- Laboratory equipment modifications to reduce exposure: Newer generation angiography systems utilize low-dose

imaging technologies.

- Operator techniques to reduce radiation exposure dose:
 1. Reduce fluoroscopy time
 2. Minimize fluoroscopy and cine frame rates
 3. Optimize magnification and collimation
 4. Employ best techniques for distance, angulation and table position
- Radiation exposure with radial versus femoral intervention
- Novel methods for radiation protection including:
 1. Thyroid shielding.
 2. Eye protection.
 3. Brain protection
 4. Patient-applied radiation shields.
- Novel radiation shielding for a “lead-free” environment: Lastly, specific arrangements of shielding that surround the patient and tube now permit operators to work without personal protective equipment. Some of these units are:
The Zero-Gravity system
The EggNest-XR system
The Protego Radiation Protection System

Radio Frequency Ablation Of Abdominal Wall Endometriosis

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We aim to investigate Radiofrequency ablation (RFA) as a treatment method for abdominal wall endometriosis (AWE).

Materials and Methods: After measuring the AWE lesions with ultrasound, the patients received general anesthesia and had their

AWE lesions sectioned into 1cc sections. Each of these sections underwent RFA treatment. Follow-up included outpatient visits, including an ultrasound examination at 1, 3, and 6 months after the treatment to assess lesion sizes. Moreover, patients' pain levels were evaluated

by visual analogue scale (VAS) before and immediately after the procedure and at each outpatient visit.

Results: Treatment sessions were 100% effective as all the lesions' sizes significantly decreased after one treatment session for each patient. Furthermore, the complete response was 94% of patients reported a reduction of pain with their VAS scores being reduced to 0 or 1; the other two patients' VAS scores were reduced but had not reached the optimal level. None of

the patients experienced adverse effects related to RFA treatment.

Conclusion: This study shows promising results for RFA as a minimally invasive treatment option for AWE. However, further studies with larger sample sizes and more extended follow-up periods are required to better understand the extent of efficacy of this method.

Key Words: RFA, Endometriosis, Ablation

Urinary Tract Intervention

Fariba Zarei MD

Interventional radiologists must be completely familiar with the anatomy of the renal system, understanding the procedural indications, techniques, risks and complications, and clinical management.

Renal interventions are commonly divided into two groups: Catheter-based interventions and percutaneous.

Percutaneous nephrostomy can be used to treat a variety of conditions including pyonephrosis, distal urinary tract obstruction, ureteral trauma, ureteral fistula and access for percutaneous lithotripsy or stone removal.

Catheter-based interventions play an important role in the treatment of renal pathology, including vascular abnormalities such as renal artery aneurysm, renal arteriovenous fistulas, arteriovenous malformations and renal

tumors.

Renal procedures can be categorized into low, moderate, and high risk of bleeding. Each category has specific recommendations based on lab data and patient condition. Common lab data includes international normalized ratio/prothrombin time, activated partial thromboplastin time, platelet count, and Hb level. Some medications that need to be held: warfarin, aspirin, unfractionated heparin, low molecular weight heparin, and others including factor Xa inhibitors. Endovascular procedures such as embolization, stent placement, and angioplasty have a moderate risk of bleeding.

Radiologist-Technologist CT & MR Teamwork: What We Need To Know?

Orders, Preparation, Safety, Positioning, Planning, Image Optimization And Contrast Media Timing And Dose

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The teamwork between radiologists and technologists in CT and MR imaging is crucial for the success and accuracy of imaging procedures. This collaboration starts with understanding imaging requests and ensuring the correct protocol is followed for each patient. From the initial orders and preparation to the execution of scans, maintaining seamless collaboration between radiologists and technologists is essential for optimal patient care. This article explores key aspects of this teamwork, including understanding imaging requests, ensuring patient safety, employing proper positioning techniques, coordinating imaging plans, optimizing image quality, and managing contrast media administration. Technologists

must prioritize patient safety by adhering to proper positioning techniques and verifying patient information before proceeding with the scan. By focusing on these areas, healthcare professionals can enhance the efficiency and effectiveness of CT and MR imaging processes. Overall, teamwork between radiologists and technologists is fundamental to successful CT and MR imaging. By emphasizing communication, coordination, and attention to detail, healthcare professionals can improve the efficiency and effectiveness of imaging procedures, ultimately leading to better patient outcomes. Keywords: contrast agents, teamwork, MRI, optimizing, pulse sequence

Scientific Oral Accepted Abstract ICR2024

Sonographic Classification Of Cervical Adenopathy (A-RADS)

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Introduction: Cervical lymph nodes can be involved in various processes. We classified cervical adenopathies using ultrasound with the reporting and data system method (RADS). This study aimed to evaluate the ultrasound classification of cervical adenopathy (A-RADS) to choose the appropriate approach.

Materials and methods: This cross-sectional study was conducted among 294 patients with cervical adenopathy at Mashhad University of Medical Sciences during 2020-2021. The data of the long axis diameter, short axis diameter, shape, border, vascular pattern, presence of calcification and changes in cyst/necrosis, cortical echogenicity, hilum visibility, and location of involved lymph nodes were extracted. Lymph nodes were classified into four normal, reactive, suspicious & lymphoid disorders, and metastatic groups, based on ultrasound appearance (Adenopathy-reporting and data system). Diagnostic methods included follow-up, core needle biopsy (CNB), and fine needle aspiration (FNA), and surgical results. After determining the final diagnosis, demographic, sonographic, and

pathological data were analyzed at a significance level of $p < 0.05$.

Results: Of 294 patients, 185 were benign, and 109 were malignant. There were no significant differences in the location, long axis diameter, shape, cystic or necrotic changes, calcification, and margins of the lymph nodes between the benign and malignant groups. The enlarged short axis diameter > 10 mm in the jugulodigastric area, invisible hilum and isoechoic cortex, and non-hilar vascularity were significantly higher in the malignant group ($p < 0.001$). The malignancy rate was 8.7% in reactive cases, 48.5% in suspicious/lymphoid disorders, and 90% in metastatic nodes.

Conclusion: The results of this study show that cervical lymph nodes can be classified based on short axis diameter, cortex and hilum echo-texture, and vascular pattern into normal, reactive, suspicious & lymphoid disorders, and metastatic, which have a high concordance with pathologic results.

Predicting Complications Of Percutaneous Transhepatic Biliary Stenting Using Machine Learning: A CT Imaging And Clinical Characteristics-based Approach

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Background: Malignant biliary obstruction, predominantly observed in the elderly and caused by inoperable tumors such as primary hepatobiliary, pancreatic, or papillary cancers, significantly impairs quality of life due to symptoms like pruritus, pain, and jaundice. With late-stage diagnosis common and radical surgeries often unfeasible, focus shifts to palliative treatments like biliary drainage. Despite various methods like ERCP, EUS-BD, and PTBD, complications remain a challenge, underscoring the need for improved prediction and management strategies.

Purpose: This study aimed to develop a machine learning predictive model using CT imaging features and patient clinical characteristics to assess complications following Percutaneous Trans hepatic Biliary Stenting (PTBS) with Self-Expanding Metallic Stents (SEMS) in patients with malignant biliary obstruction. Additionally, the safety and efficacy of PTBS with SEMS as palliative treatment for malignant biliary obstruction were investigated, while enhancing clinical decision-making and risk

stratification through machine learning insights.

Methods and Materials: The retrospective study involved 320 consecutive patients who underwent PTBS between April 2009 and March 2022. Inclusion criteria encompassed patients aged ≥ 18 years with obstructive jaundice due to non-resectable malignant tumors. Two predictive models were developed: Model ILC, which combined CT imaging features (such as Length of obstruction, Tumor density, Shape, Bismuth type) with laboratory and clinical data; and Model LC, based solely on laboratory and clinical data such as age, etiology of Biliary Obstruction. Feature selection for both models was conducted through Variance Thresholding and Recursive Feature Elimination (RFE) with cross-validation. Machine learning using logistic regression with a balanced class weight approach was employed for model construction, while standard metrics evaluated model performance.

Results: Among 264 patients with malignant biliary obstruction undergoing PTBS, cholangiocarcinoma (n=156) and pancreatic adenocarcinoma (n=68) were the most common

The Predictive Value Of Cardiac MRI Strain Parameters In Hypertrophic Cardiomyopathy Patients with Preserved Left Ventricular Ejection Fraction And A Low Fibrosis Burden: A Retrospective Cohort Study

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Introduction: Prompt interventions prevent adverse events (AE) in hypertrophic cardiomyopathy (HCM). We evaluated the pattern and the predictive role of feature tracking (FT)-cardiac magnetic resonance (CMR) imaging parameters in an HCM population with a normal left ventricular ejection fraction (LVEF) and a low fibrosis burden.

Materials and Methods: The CMR and clinical data of 170 patients, consisting of 142 HCM (45 ± 15.7 years, 62.7% male) and 28 healthy (42.2 ± 11.26 years, 50% male) subjects, who were enrolled from 2015 to 2020, were evaluated. HCM patients had a normal LVEF with a late gadolinium enhancement (LGE) percentage below 15%. Between-group differences were described, and the potent predictors of AE were determined. A P-value below 0.05 was considered significant.

Result: LV global longitudinal, circumferential,

and radial strains (GLS, GCS, and GRS, respectively) and the LV myocardial mass index (MMI) were different between the healthy and HCM cases (all $P_s < 0.05$). Strains were significantly impaired in the HCM patients with a normal MMI. A progressive decrease in LVGLS and a distinct fall in LVGCS were noted with a rise in MMI. AE were predicted by LVGLS, LVGCS, and the LGE percentage, and LVGCS was the single robust predictor (HR, 1.144; 95% CI, 1.080–1.212; $P = 0.001$). An LVGCS below 16.2% predicted AE with 77% specificity and 58% sensitivity.

Conclusion: LV strains were impaired in HCM patients with a normal EF and a low fibrosis burden, even in the presence of a normal MMI. CMR parameters, especially FT-CMR values, predicted AE in our HCM patients.

Keywords: hypertrophic cardiomyopathy (HCM), feature tracking

Computed Tomography-Based Coronary Artery Calcium Score Calculation At A Reduced Tube Voltage Utilizing Iterative Reconstruction And Threshold Modification Techniques: A Feasibility Study

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Introduction: The coronary artery calcium score (CACS) indicates cardiovascular health. A concern in this regard is the ionizing radiation from computed tomography (CT). Recent studies have tried to introduce low-dose CT techniques to assess CACS. We aimed to investigate the accuracy of iterative reconstruction (IR) and threshold modification while applying low tube voltage in coronary artery calcium imaging.

Materials and Methods: The study population consisted of 107 patients. Each subject underwent an electrocardiogram-gated CT twice, once with a standard voltage of 120 kVp and then a reduced voltage of 80 kVp. The standard filtered back projection (FBP) reconstruction was applied in both voltages. Considering Hounsfield unit (HU) thresholds other than 130 (150, 170, and 190), CACS was calculated using the FBP-reconstructed 80 kVp images. Moreover, the 80 kVp images were reconstructed utilizing IR at different strength

levels. CACS was measured in each set of images. The intraclass correlation coefficient (ICC) was used to compare the CACSs.

Result: A 64% reduction in the effective dose was observed in the 80 kVp protocol compared to the 120 kVp protocol. Excellent agreement existed between CACS at high-level (strength level = 5) IR in low-kVp images and the standard CACS protocol in scores ≥ 11 ($ICC > 0.9$ and $p < 0.05$). Increasing the threshold density to 190 HU in FBP-reconstructed low-kVp images yielded excellent agreement with the standard protocol in scores ≥ 11 ($ICC > 0.9$ and $p < 0.05$) and good agreement in score zero ($ICC = 0.84$ and $p = 0.02$).

Conclusion: The modification of the density threshold and IR provides an accurate calculation of CACS in low-voltage CT with the potential to decrease patient radiation exposure.

Keywords: CACS, effective dose; iterative reconstruction

Evaluating the Association Between Placental Location And the Development Of Pre-eclampsia In Primigravid Women

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Introduction: Pre-eclampsia affects a significant proportion of pregnancies, ranging from 3% to 7%, and represents a leading cause of maternal mortality worldwide. In light of this, our study aimed to explore the correlation between the location of the placenta and the occurrence of preeclampsia in pregnant women.

Materials and Methods: This is a case-control study that was performed in 2021-2022 on primigravid patients who underwent routine ultrasound for pre-eclampsia in Shahid Beheshti Hospital in Isfahan. A total of 206 patients entered the study based on our criteria and were divided into two groups: case (n = 106) and control (n = 100). The primary outcome measurement of this research was the correlation between placenta location and the incidence of pre-eclampsia. The secondary outcomes of the outcome measurement were the correlation between age, BMI, and family history of preeclampsia and the incidence of pre-eclampsia. In all analyses, a P-value of less than 0.05 was considered significant

Result: Two hundred and six primigravid

women with an average age of 30.02 ± 7.01 years and a gestational age (GA) of 34.15 ± 4.36 weeks were evaluated. The incidence rate of pre-eclampsia in the lateral placenta was significantly lower than in the other placenta locations. The highest incidence of pre-eclampsia was in patients with an anterior placenta location ($P < 0.05$). Also, our data demonstrated that an increase in maternal age significantly increased the chance of pre-eclampsia ($P < 0.05$).

Conclusion: Our study reveals that the incidence of pre-eclampsia was significantly higher among women with an anterior placenta compared to other placenta locations. Additionally, we discovered a noteworthy correlation between advanced maternal age and an increased risk of developing pre-eclampsia.

Keywords: pre-eclampsia, placenta location, primigravidity

Prevalence Of Clinically Significant Prostate Cancer In PI-RADS v2.1 Score Of 4 And 5 – Insights From A Single-center Clinical Practice

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Introduction: Multiparametric magnetic resonance imaging (mp-MRI) has significantly enhanced the detection and risk stratification of clinically significant prostate cancer (csPCa). The Prostate Imaging Reporting and Data System version 2.1 (PI-RADS v2.1) was established to standardize the acquisition and interpretation of mp-MRI, demonstrating good overall performance in diagnosing csPCa, particularly in higher categories. This study aimed to determine the csPCa detection rate (DR) among patients with PI-RADS v2.1 scores of 4 and 5.

Materials and Methods: From March 2020 to September 2022, we enrolled 76 biopsy naïve individuals (109 lesions) who received cognitive targeted biopsy (cog-MRGB) accompanied by

systematic biopsy due to target lesions with PI-RADS scores of 4 and 5 in prebiopsy mp-MRI. We compared participants' baseline characteristics and pathological findings between individuals with and without csPCa and those with PI-RADS scores 4 and 5. Moreover, we determined the overall DR of prostate cancer (PCa) and csPCa, reporting these rates for each PI-RADS category and prostate zone.

Result: The study comprised 35 patients (46.10%) (51 lesions) with a PI-RADS score of 4 and 41 patients (53.90%) (58 lesions) with a PI-RADS score of 5. The mean age of the study population was 68.74 (standard deviation [SD] 8.83). Furthermore, the median of prostate-specific antigen (PSA) and prostate volume was

9.47 ng/ml (interquartile range [IQR] 6.20-19.79) and 45.50 (IQR 35.00-76.00) ml, respectively. Compared to patients without csPCa, those with csPCa exhibited higher PSA levels, greater PI-RADS scores, smaller prostates, larger lesions, and more lesions located at the prostate peripheral zone (PZ). (All p-values < 0.05) The overall DR was 57.90% for PCa (44 patients) and 44.70% for csPCa (34 patients). Additionally, csPCa DR was 17.10% in PI-RADS 4, 68.30% in PI-RADS 5, 54.90% in the PZ, and 34.30% in the prostate transition zone (TZ).

Conclusion: Integrating PI-RADS v2.1 with cog-MRGB accompanied by systematic biopsy in a clinical setting provided an acceptable overall DR for PCa and csPCa, especially among patients with PI-RADS score of 5 and involvement of the prostate PZ. Nevertheless, our findings highlighted a significant limitation in patients with PI-RADS score of 4 and involvement of the prostate TZ.

Keywords: csPCa PIRADSv2.1 detection rate

Determining Cut-Off Points Of Ultrasound Quantitative Indexes for Arterial Stenosis In Patients with Diabetic Foot Ulcer: A Knowledge Gap

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Introduction: Diabetic foot ulcer patients may frequently need vascular examination for wound management. Therefore, using noninvasive diagnostic techniques that are non-complicated, cost-effective, and reliable is a serious challenge for clinicians. On the other hand, reliable noninvasive methods can be used in the early stages of the study, and based on their results, angiography can be performed for patients in the last stage before angioplasty. Therefore, determining the DUS cut-off points for angiography will greatly help clinicians.

In this study, cut-off points of ultrasound hemodynamic indexes were determined based on stenosis of less than 50% and greater than 50% of the proximal and distal arteries of the lower limbs in DFU patients.

Materials and Methods: 71 DFU patients over 18 years of age were screened in the

Infectious Diseases Department, and finally, 62 patients with suspected peripheral arterial disease were referred to the Radiology Department. In the radiology department, patients underwent Colour Duplex ultrasound. The final inclusion criterion for inclusion in the study was the presence of any abnormalities confirming peripheral arterial disease in DUS. Exclusion criteria included a history of vascular interventions, contraindications to the use of contrast agents, and pregnancy. Also, some patients did not have a tendency to undergo angiography, so they were excluded. Finally, 40 patients were included in the study. Three steps were performed for all patients, respectively. The first step was to examine the patient and complete the designed checklist; the second step was to evaluate the hemodynamic parameters of vascular stenosis by arterial duplex scanning;

and the third step was to evaluate the severity of vascular stenosis by conventional contrast angiography. Finally, if necessary, based on the angiography results, the patient was referred by a radiologist for angioplasty. Duplex ultrasound was performed for all patients by an experienced radiologist, and angiography for all patients was performed by another expert radiologist who was unaware of the DUS results.

Result: Based on these parameters, all three ultrasound hemodynamic indexes had excellent diagnostic power in all four arteries, except for the PSV index in the common femoral artery, which had low sensitivity, specificity, and accuracy. In

all four arteries of DFU patients, a total of 12 cut-off points for ultrasound hemodynamic indexes were determined.

Conclusion: The present study's findings showed that duplex ultrasound has higher diagnostic power than angiography for evaluating the severity of vascular stenosis in patients with DFU. Therefore, ultrasound can be a noninvasive diagnostic method for these patients. This study also covers information about quantitative ultrasound indexes' cut-off points so clinicians can better manage DFU.

Keywords: Angiography DFU Duplex scanning

Classifying Mild Cognitive Impairment And Normal Subjects Using Machine Learning Techniques And Olfactory-related Features: Resting-State fMRI Functional Connectivity Study

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Introduction: Mild cognitive impairment (MCI) serves as an indicator of significant cognitive decline between normal cognition and Alzheimer's disease (AD), with early and late stages of MCI (EMCI and LMCI) identified. The risk of conversion from LMCI to AD is higher than that of EMCI. Olfactory impairment is considered a potential early indicator of this neurodegenerative stage, and memory decline is associated with a decrease in the sense of smell. Besides, Machine learning (ML) algorithms

have improved the diagnostic process for AD. The objective was to assess a classification framework for distinguishing late stages of mild cognitive impairment from age-matched cognitively normal individuals using olfactory functional connectivity network features.

Materials and Methods: Our study included 150 patients with LMCI and 150 cognitively normal individuals. We utilized resting-state functional Magnetic Resonance Imaging (rs-fMRI) data from the Alzheimer's Disease

Neuroimaging Initiative (ADNI). To examine the effectiveness of a classification framework in distinguishing between these two stages, we utilized features derived from olfactory functional connectivity matrices extracted from four regions of interest: orbitofrontal cortex (OFC), amygdala, piriform, and uncus, using seed-based analysis. Additionally, we incorporated the subjects' age, Mini-Mental State Examination (MMSE) scores, clinical dementia rating scale (CDR), Global Deterioration Scale (GDS) scores, and genetic information (APOE gene) into our machine learning classifier.

Result: In our research, we found that regardless of the machine learning algorithms that we used, the olfactory functional connectivity results alone, achieved an accuracy of 0.65 when employing the k nearest neighbor (KNN) algorithm. By integrating clinical, genetic, neuropsychological scores, and olfactory connectivity measurements, the highest accuracy of 0.843 was attained using a supporting vector machine (SVM) with a Gaussian kernel function. Following some optimization and parameter

tuning, we achieved an accuracy of 0.85 using KNN. However, due to the multifactorial nature of cognitive impairment, relying solely on neuropsychological tests is generally deemed inadequate; therefore, we did not utilize them alone in our feature selection procedure.

Conclusion: Our findings provide evidence in favor of the idea that employing a variety of machine learning algorithms and multiple biomarkers from various modalities like clinical assessments, neuropsychological evaluations, and imaging examinations contributes to enhancing the accuracy of predictions. However, we believe that augmenting the inclusion of additional olfactory-related features such as effective connectivity measurements comprising directional causal activities, connection strengths, and inhibitory self-connections can enhance the performance of our classification. Furthermore, these features may also aid in diagnosing other stages, such as EMCI and AD.

Keywords: MCI Functional connectivity olfactory Classification

Evaluation Of Ovarian Endometrioma Signal Intensity Changes In Different TI (Time Of Inversion) In Pelvic MRI Of Patient with Clinical Suspicious to Endometriosis

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Introduction: Although there are studies to evaluate the accuracy of non-invasive methods such as ultrasound and MRI in the diagnosis of endometriosis, surgery is still the gold standard diagnostic method for this disease. If non-invasive methods are further studied and

proven to be effective in diagnosing the disease, surgery can be prevented. The aim of this study was to evaluate the signal changes in ovarian endometrioma with different time of inversions in pelvic MRI of patients with endometriosis.

Materials and Methods: This cross-sectional

study was performed in 2019 on patients who were referred to Ghaem Hospital affiliated to Mashhad University of Medical Sciences to confirm the diagnosis of endometriosis or control previous lesions for pelvic MRI. Inclusion criteria were clinical signs of endometriosis (including pelvic pain, dysmenorrhea, infertility or the presence of nodules, and tenderness on examination), sonographic signs (cysts with endometriosis, such as having internal echoes, multilocularity, hypo echo parietal foci, and nodule), And patients with initial diagnosis who were referred for control. At the end of the menstrual cycle, after obtaining permission from patients, axial T2-TIRM sequences with different TIs (160, 400 and 900) were performed. The images were then examined for changes in the lesions. Finally, based on the comparison of the results with the gold standard test, sensitivity, specificity, positive predictive value, and negative predictive value were determined.

Result: the analyzes showed that the sensitivity, specificity, positive predictive value, and negative predictive value in High TI = 900 sample were higher than other samples (100%, 82%, 86% and 100%, respectively). These values were 55%, 10%, 40% and 70% for High TI = 400, and 27%, 10%, 25% and 11% for High TI = 160, respectively.

Conclusion: The results of the present study showed that MRI as a non-invasive method can have a relatively high diagnostic power in endometriosis. More studies with larger sample sizes should be performed in the future to obtain more accurate results and to compare MRI with other non-invasive methods (such as ultrasound) that may be effective in diagnosing endometriosis.

Keywords: time of inversion MRI endometriosis

Use Of Volumetric Apparent Diffusion Coefficient for Testicular Evaluation In Patients with Azoospermia

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Introduction: It is suggested that the use of non-invasive and cost-effective imaging modalities, including Magnetic Resonance Imaging (MRI), can be beneficial in detecting areas with spermatogenesis and predicting the presence of sperm in the testicles, thereby improving the management of patients with azoospermia.

Materials and Methods: The present

descriptive and analytical study included 38 patients with azoospermia presented to the Rasoul Akram and Firoozgar hospitals in Tehran. The patients underwent MRI, testicular biopsy, and hormonal investigations. The data were analyzed and compared between the patients with Obstructive Azoospermia (OA) and Non-Obstructive Azoospermia (NOA).

Result: The study included 76 testicles from 38 patients with OA (n=14) and NOA (n=24). the patients with OA and NOA were not significantly different in testosterone (OA: 4.78, NOA: 5.33, P=0.755) and prolactin levels (OA: 10.75, NOA: 9.77, P=0.540). However, those with NOA had significantly higher levels of Follicle-Stimulating Hormone (FSH) (OA: 4.66, NOA: 20.61, P<0.001) and Luteinizing Hormone (LH) (OA: 3.15, NOA: 12.40, P<0.001), as well as Apparent Diffusion Coefficient (ADC) (OA: 0.96, NOA: 1.16, P<0.001). Moreover, the patients with OA had a significantly higher volume of testis (20.37 cm³) compared to

those with NOA (8.16 cm³, P<0.001). Also, there were significant correlations between pathological grade and the variables of the testicular volume (correlation coefficient: 0.672, P<0.001) and ADC (correlation coefficient: 0.480, P<0.001). Finally, the multivariate regression analysis showed a significant relationship between testicular volume and pathological grade.

Conclusion: The MRI-related parameters of ADC and testicular volume are helpful in differentiating and diagnosing OA and NOA.

Keywords: Azoospermia, MRI, Volumetric Apparent Diffusion

Evaluation Of Gallbladder Contractility And Doppler Findings In Patients with Irritable Bowel Syndrome; A Case-control Study

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Introduction: Irritable Bowel Syndrome (IBS) is a common gastrointestinal disorder causing abdominal pain, altered bowel habits and bloating without structural issues. Gallbladder dysfunction may be linked to IBS due to disrupted cholecystokinin release. This study aims to assess gallbladder function and related hemodynamic parameters using Doppler ultrasound in IBS

before and after meals.

Materials and Methods: In this case-control study, we investigated gallbladder function differences between constipation-predominant IBS (C-IBS) patients and healthy volunteers. Participants underwent ultrasonography to measure gallbladder parameters before and after consuming a predefined meal.

Gallbladder volume, wall thickness and resistance index (RI) of cystic and superior mesenteric arteries (SMA) were assessed. Student t-test and paired t-test were used to compare case and control groups and pre- and post-meal data, respectively.

Result: A total of 34 people (18 C-IBS and 16 healthy control) were included. The mean (Standard deviation) of gallbladder fasting volume was measured 24.74 (8.85) and 29.73 (9.65) cubic millimeter for case and controls, respectively. Postprandial volume was 11.34 (5.66) and 16.9 (6.16) cubic millimeter for case and controls respectively. We observed a statistically significant difference in emptying fractions (EF) between groups (p value = 0.009). IBS patients had a smaller fasting SMA RI (p value

= 0.016) but the fraction of change after meal was not significant (p value = 0.10). The cystic artery RI did not reach statistical significance between the fasting and post-meal values (p value = 0.067).

Conclusion: IBS patients have a higher emptying fraction and lower change in SMA RI compared to healthy controls. Further studies with larger sample size, inclusion of patients with different coexisting conditions and subtypes of IBS and combining colon transit study with gallbladder ejection fraction evaluation can be used to further provide more meaning to this study.

Keywords: Irritable bowel syndrome gallbladder

Radiological Findings Of Patients with Definite Diagnosis Of Basidiobolomycosis Fungal Infection In Shiraz Namazi Hospital During 2016-2022

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Introduction: Most cases of Basidiobolomycosis have been reported as opportunistic infections of the subcutaneous, nasal and sinuses in children. But in recent years, many cases of infection have been seen in people with an efficient immune system, especially in the digestive system. Due to the non-specific symptoms of this patient and the lack of access to accurate diagnostic methods, in many cases of this disease, it leads to wrong

diagnoses such as malignancy or inflammatory bowel disease.

Considering the large number of Basidiobolomycosis cases in the southern regions, especially in Fars province, and the importance of conducting local studies in this study, we decided to investigate the radiological findings of patients with a definite diagnosis of Basidiobolomycosis in Namazi Hospital, Shiraz,

during the years 2016-2022

Materials and Methods: The statistical population of this retrospective cohort study was patients with a definite diagnosis of Basidiobolomycosis based on pathological examinations who were examined with radiological diagnostic tools after admission to the hospital.

Patients and files were reviewed and imaging interventions were evaluated in terms of location of lesions, appearance of lesions, size of lesions, accompanying conflicts, form of conflicts and visible complications. The collected data were statistically analyzed in SPSS version 23 software.

Result: The study included 32 patients with an average age of 13.78 ± 9.84 . Of the 32 patients, 37.5% had been admitted to the initial diagnosis of malignancy, 31.3% with an initial diagnosis based on appendicitis, and 9.4% with a diagnosis of hydatid cyst.

Most patients, including 40.6% of them, had symptoms of fever + abdominal pain + nausea

and vomiting. Examination of lesion location in radiologic findings of patients showed that liver 21.9%, ileocecal and ascending colon accounted for 18.8% of these lesions. Follow-up studies of patients showed that of the study population, only 9.4% of patients died and the rest recovered.

Conclusion: In the current study, radiological findings of patients showed that the involvement of this infection is more in the gastrointestinal tract and especially the liver and colon. Inclusion of these lesions in body organs was shown as increased wall thickness and also masses with different dimensions. Due to the rare nature of this disease and non-specificity of the symptoms of infection with this fungus, better recognition of radiological findings as an accessible diagnostic tool is important and these characteristics are helpful in achieving a proper diagnosis.

Keywords: basidiobolomycosis, fungal infection, radiologic findings

Comparing Ovarian Morphology In Women with Intrauterine Pregnancy (IUP) And Ectopic Pregnancy (EP) Using Transvaginal Sonography (TVS): A Cohort Study

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Introduction: EP, the implantation of a fertilized egg outside the uterus, is a potentially life-threatening condition that affects approximately 2% of all recognized pregnancies. It accounts for 15% of maternal deaths during the first trimester. Delay in diagnosis can limit treatment options, potentially leading to riskier surgical interventions.

PCOS, the most prevalent hormonal disorder among reproductive-aged women.

Characterized by a combination of irregular or absent menstrual cycles, excess androgen hormones and polycystic ovaries (PCOM). While the diagnosis of PCOS cannot be definitively established during pregnancy due to hormonal fluctuations, PCOM, a key feature of the syndrome, can be assessed using transvaginal sonography (TVS)

The aim of this study is to compare the ovarian morphology of women with IUP and

EP using transvaginal sonography (TVS). We hypothesize that women with EP will have a higher prevalence of PCOM compared to women with IUP.

Materials and Methods: A total of 67 participants meeting the study criteria were enrolled. Demographic and clinical characteristics, including age, weight, height, BMI, number of pregnancies, polycystic ovaries (PCO) on ultrasound, hirsutism, oligomenorrhea, and history of abortion, were comprehensively analyzed and presented in Tables 1 and 2. Univariable logistic regression analysis (Table 3) examined the individual association of these factors with EP. Subsequently, multivariable logistic regression analysis (Table 4) explored the combined impact of these factors on EP.

Result: The study cohort consisted of 40.3% intrauterine pregnancies (IUP) and 59.7% EP. Comparative analysis between IUP and EP groups revealed notable trends in age, weight, height, BMI, and PCO prevalence. Univariable

analysis identified age, BMI, and PCO as potential contributors to EP, with PCO showing a significant association (OR=6.00, 95% CI: 2.05 - 17.55, $p<0.001$). Multivariable analysis reinforced the significance of PCO (OR=6.91, 95% CI: 2.08 - 23.00, $p=0.002$) and identified BMI as an independent predictor (OR=1.17, 95% CI: 1.01 - 1.36, $p=0.041$).

Conclusion: This study illuminates the relevance of PCOM, as assessed by transvaginal sonography, as a significant predictor of EP. Additionally, elevated BMI emerged as an independent risk factor. The findings contribute to understanding the multifaceted factors influencing EP, emphasizing the potential clinical utility of sonographic evaluation for EP risk assessment, particularly in the presence of PCOM. Future research should explore these associations in larger, diverse populations to validate the clinical implications of our findings.

Keywords: Ectopic pregnancy-polycystic ovaries- intrauterine pregnancies

Exploring the Potential Of Virtual Biopsy In the Diagnosis Of Thoracic Cancer Using CT-guided Biopsy Images

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Introduction: Tumors exhibit heterogeneity due to the significant genetic and phenotypic variations between them.

The gold standard for confirming cancer is a tissue biopsy, but it is an invasive procedure. Virtual biopsy can provide a non-invasive and low-risk way to identify such heterogeneity alongside image-guided biopsy. This study aims to investigate the potential of radiomics in identifying patients with thoracic cancer using

CT-guided biopsy images.

Materials and Methods: CT images and clinical data of 174 patients (131 retrospectively and 43 prospectively) with pulmonary lesions were selected for this research. The Inclusion criteria were as follows: (1) Availability of pathology reports confirming the diagnosis, and (2) Presence of iodine contrast-enhanced CT images in addition to CT-guided biopsy images for patients scanned without contrast

injection. Clinical data including age, gender, history of smoking, coughing status, dyspnea, hemoptysis, and imaging findings including effusion, pneumothorax, adenopathy, ground-glass opacity, emphysematous, necrosis, narrowing, pleural thickening, consolidation, mass, collapse, calcification, cyst, nodules, osseous lesion, cavity, and spiculation were used in addition to 106 radiomics features. After image preprocessing, manual segmentation was performed by ITK SNAP software.

Result: This study shows the relevance of clinical data and radiomics features in the diagnosis of thoracic cancer in patients with

pulmonary lesions. Each clinical data or radiomics feature may be a handy tool to determine the heterogeneity of lesions in the same patient or among different patients.

Conclusion: This study shows the relevance of clinical data and radiomics features in the diagnosis of thoracic cancer in patients with pulmonary lesions. Each clinical data or radiomics feature may be a handy tool to determine the heterogeneity of lesions in the same patient or among different patients.

Keywords: virtual biopsy, radiomics, thorax, CT

Fully Automated Bone Age Estimation Using Pre-trained Xception Deep Neural Network Architecture In X-Ray Images

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Introduction: The importance of bone age assessment is to diagnose and treat children's

endocrine disorders, orthodontics, and pediatric orthopedic disorders and to determine whether

a person is considered a minor or an adult in legal issues. Currently, there are different methods for assessing bone age such as the Greulich-Pyle and Tanner-Whitehouse methods. The main drawback of these methods is the time-consuming nature and the intra- and inter-individual variations in bone age estimation. To address these issues, deep learning technology has rapidly developed in recent years. This paper aims to solve such challenges by estimating bone age using deep learning neural networks.

Materials and Methods: Bone age estimation was formulated as a classification problem with hand X-ray images as input and estimated age as output. We trained a convolutional neural network model of the pre-trained Xception architecture with ImageNet dataset weights to improve the efficiency and accuracy of bone age assessment in clinical applications. We utilized the public dataset from the Radiological Society of North America (RSNA) pediatric wrist and hand radiographs, which consists of 12611 training, 1425 validation, and 200 test images. Images were labeled with estimates of bone age in the range of 1 to 228 months and gender from the reports of two pediatric radiologists

and based on the accompanying Greulich-Pyle atlas provided at the time of imaging. Also, the Z-score method as an image preprocessing procedure has been used for enhancing model convergence, improving model generalization, reducing sensitivity to outliers, and normal distribution, which reduces image changes among data samples that are not related to age changes.

Result: In the experimental results, the RSNA test set was formed to evaluate the validity of the approach. The best-performing model could yield a standardized mean absolute error (MAE) and mean squared error (MSE) of architecture in age prediction at 5.54 months and 3.52 months, respectively. This is more accurate and faster than the radiologists for bone age classification.

Conclusion: It is demonstrated that the pre-trained Xception neural network architecture could be utilized to estimate a pediatric bone age from hand X-ray images, eliminating the necessity for tedious atlas look-ups in practical clinical use and improving the cost efficiency and time of the estimation process.

Keywords: Bone age assessment

Classification Of Benign And Malignant Breast Cancer Tumors Using Multimodal Deep Learning

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Introduction: Breast cancer remains a significant global health concern, underscoring

the imperative for early detection to enhance patient outcomes. Traditional diagnostic methods

involve mammography, pathology examinations, and sonography. However, the integration of artificial intelligence (AI), specifically multimodal deep learning, offers an innovative approach to improve diagnostic accuracy. This study seeks to leverage complementary information from demographic data, history and physical examination findings, grayscale and shear-wave ultrasound (US) images, mammography images, and Core Needle Biopsy (CNB) reports to develop a robust model for classifying benign and malignant breast cancer.

Materials and Methods: The proposed approach involves a multimodal deep learning architecture that fuses demographic information, history and physical exam findings, grayscale and shear-wave images, mammography images, and CNB reports to enhance the discriminatory power of the model. The architecture comprises distinct branches, each dedicated to processing one modality. A shared feature extraction layer facilitates the extraction of relevant features from each modality, followed by concatenation to form a unified feature vector. The model utilizes a deep neural network, specifically a Convolutional Neural Network (CNN) or a hybrid architecture, for classification. The training process involves a multicentric dataset of 1400 instances of benign and malignant cases. The model optimizes its parameters through a combination of supervised learning and transfer learning techniques to adapt to the unique characteristics of each modality. Techniques such as hyperparameter tuning, cross-validation, and ensemble learning further enhance the model's generalization capabilities.

Result: In our comprehensive experiments, employing a dataset encompassing diverse

instances of benign and malignant cases, the proposed multimodal deep learning model showcased exceptional proficiency in classifying breast cancer. Notably, its performance surpassed that of models trained on individual modalities, underscoring the significant advantage of integrating multiple data sources for a more holistic breast cancer diagnosis. The multimodal approach outperformed single modality-based models, emphasizing the pivotal role of combining different modalities. This integration proved critical in enhancing the model's discriminatory power, leading to more accurate and nuanced classifications. The superiority of the multimodal model was evident in its ability to discern subtle features present in the new modalities, a capability that holds great promise for practical clinical applications.

Conclusion: This study introduces a less-explored approach to breast cancer classification by leveraging multimodal deep learning techniques. The integration of new modalities enhances the model's diagnostic accuracy, surpassing the limitations of individual modalities. The outstanding results obtained underscore the potential of multimodal deep learning in revolutionizing breast cancer diagnosis. This research contributes to the growing body of evidence supporting the efficacy of AI-driven approaches for early cancer detection, providing a foundation for future advancements in clinical practice.

Keywords: breast cancer, artificial intelligence, multimodal

Computer-assisted Evaluation Of Small Airway Disease In CT Scans Of Iran-Iraq War Victims Of Chemical Warfare by a Locally Developed Software: Comparison between Different Quantitative Methods

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Introduction: Diagnosis of small airway disease on computed tomography (CT) scans is challenging in patients with a history of chemical warfare exposure. We developed a software package based on different methodologies to identify and quantify small airway disease in CT images. The primary aim was to identify the best automatic methodology for detecting small airway disease in CT scans of Iran-Iraq War victims of chemical warfare.

Materials and Methods: This retrospective case-control study enrolled 46 patients with a history of chemical warfare exposure and 27 controls with inspiratory/expiratory (I/E) CT scans and spirometry tests. Image data were automatically segmented, and inspiratory images were registered into the expiratory images' frame using the locally developed software. Parametric response mapping (PRM) and air trapping index (ATI) mapping were performed on the CT images. Conventional QCT methods, including expiratory/inspiratory mean lung attenuation (E/I MLA) ratio, normal density E/I (ND E/I) MLA ratio, attenuation volume Index (AVI), %low attenuation areas (LAA) < -856 in exhale scans, and %LAA < -950 in inhale scans were also computed. QCT measurements were correlated with spirometry results and compared across the two study groups.

Result: The correlation analysis showed a significant negative relationship between three air trapping (AT) measurements (PRM, ATI, and %LAAExp < -856) and spirometry parameters (Fev1, Fvc, Fev1/Fvc, and MMEF). Moreover, %LAAExp < -856 had the highest significant negative correlation with Fev1/Fvc ($r = -0.643$, $P\text{-value} < 0.001$). Three AT measurements demonstrated a significant difference between the study groups. The E/I ratio was also significantly different between the two groups ($P\text{-value} < 0.001$). Binary logistic regression models showed PRMFsad, %LAAExp < -856, and ATI as significant and strong predictors of the study outcome. Optimal cut-points for PRMFsad = 19%, %LAAExp < -856 = 23%, and ATI = 27% were identified to classify the participants into two groups with high accuracy.

Conclusion: QCT methods, including PRM, ATI, and %LAAExp < -856 can greatly advance the identification and quantification of SAD in chemical warfare victims. The results should be verified in well-designed prospective studies involving a large population.

Keywords: air trapping; computed tomography; quantitative

Methotrexate-targeted MnO₂@5-Aminolevulinic Acid Nanoparticles for T1-T2* Dual-modal MR Imaging Of Glioblastoma.

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Introduction: Molecular magnetic resonance imaging (MMRI) has emerged as a promising imaging modality in glioblastoma multiforme (GBM) diagnosis due to its exceptional sensitivity to minute tissue changes and the ability to penetrate deep into the brain. The novel targeted contrast agent in GBM detection utilized a modified chitosan coating on manganese dioxide (MnO₂) nanoparticles. The modification included adding methotrexate and 5-aminolevulinic acid (MnO₂/CS@5-ALA-MTX) to target cells with overexpressed folate receptors and breaking down excess hydrogen peroxide (H₂O₂) in tumor tissue, resulting in increased T1- T2* MRI signal intensity. The nanosystem was fully characterized in in vitro and in vivo.

Materials and Methods: The novel targeted contrast agent in GBM detection utilized a modified chitosan coating on manganese dioxide (MnO₂) nanoparticles. The modification included adding methotrexate and 5-aminolevulinic acid (MnO₂/CS@5-ALA-MTX) to target cells with overexpressed folate receptors and breaking down excess hydrogen peroxide (H₂O₂) in tumor tissue, resulting in increased T1- T2*

MRI signal intensity. The nanosystem was fully characterized in in vitro and in vivo. Each study group underwent external field (H) = 3 T, slice thickness = 5 mm, NEX = 3, FOV = 128 × 128 mm², flip angle = 90°, number of signal averages = 3, matrix sizes = 256 × 256. T1 relaxation time was obtained with echo time fixed at TE = 11 ms with variable repetition time (TR = 50-2000 ms). Variable echo times (TE = 10, 30, 60, 90, 130, 170, 210, 240, 270, and 350 ms) and a constant TR = 3,000 ms were used to quantify T2 relaxation times.

Result: MnO₂/CS@5-ALA NPs (72 nm) had no cytotoxicity on cell lines U87MG and NIH3T3 after 24/48 hours. MRI scans of mice with M109 carcinoma indicated significant tumor uptake and NP capacity to improve the positive contrast effect.

Conclusion: This developed MnO₂/CS@5-ALA-MTX nanoparticle system could exhibit great potential in the accurate diagnosis of U87MG.

Keywords: Manganese oxide , Glioblastoma multiforme, MRI

Design And Synthesis Of the Novel Multifunctional Delivery System Based on BSA-coated Magnetic Iron Oxide Nanoparticles as an MRI Contrast Agent And Radiosensitizer Of GBM Brain Tumor.

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Introduction: Glioblastoma multiforme is the most common and lethal form of primary malignant brain tumor in adults. The poor delivery of therapeutic agents to the tumor site and the unclear delineation of the tumor margins pose a problem in the treatment of this brain tumor. Nanoparticles and drugs, which can selectively accumulate in tumor tissue through a leaky vasculature and the enhanced permeability and retention effect, have demonstrated potential as both therapeutic and diagnostic agents for brain tumors. Superparamagnetic iron oxide nanoparticles (SPIONPs) have been exploited as useful T2-weighted MRI contrast agents with the aim of locating and imaging tumors. 5-aminolevulinic acid (ALA) as a metabolic product is a precursor of protoporphyrin IX (PpIX) in the heme biosynthesis pathway that improves the radiotherapy effect because the resulting PpIX improves the ROS generation in tumor cells upon X-ray irradiation.

Materials and Methods: In this study, the dual application of Fe₃O₄-BSA/ALA NPs as potential radiosensitizer and MRI diagnostic

probe were investigated. The prepared NPs were fully characterized using FTIR, TEM, DLS, and zeta potential analysis to assess their chemical and physical properties. The cell survival percentage was evaluated through the Alamar Blue metabolic assay and flow cytometry.

Result: By evaluating the radiosensitizing ability of these NPs, it was found that the combined treatment with radiotherapy and radiosensitizer improved tumor cell death. For diagnostic purpose, these NPs as MRI contrast agent was assessed, and found that magnetic NPs increased the negative contrast in T2-weighted MRI.

Conclusion: Based on these results, it seems that with further studies and testing, Fe₃O₄-BSA/ALA NPs may find a way from the bench to the bedside and play a role as a theranostic agent in radiotherapy and MRI of brain tumors.

Keywords: GBM, radiotherapy, radiosensitizer, SPIONPs, MRI

Deep Learning for Classification Of Dual-Energy X-ray Absorptiometry Scan Of Postmenopausal Women

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Introduction: Bone mineral density (BMD) scans play a vital role in the early diagnosis and treatment of osteoporosis, particularly for postmenopausal women. Dual-energy X-ray absorptiometry (DXA) is a well-established imaging modality for such tasks. The T-score is a DXA measure representing the difference between the patient's BMD and the average BMD of young/healthy adults of the same sex. Therefore, this work aims to classify a DXA scan into (1) normal, (2) osteopenia, and (3) osteoporosis classes using deep learning.

Materials and Methods: To do so, DXA scans (femoral neck and/or lumbar vertebrae) of 210 postmenopausal women were acquired. The vendor-provided DXA test reports were considered as ground truth. The dataset portioning into training, validation, and test sets was 5:1:1. A pre-trained convolutional neural network was then exploited to classify the DXA scans. The performance of the deep classifier was evaluated in terms of sensitivity, specificity, and the area under the receiver operating

characteristics curve (ROC AUC).

Result: The results show an encouraging performance of the utilized deep classifier. The findings are comparable to those of the DXA test reports by offering a sensitivity of 0.91 and a specificity of 0.87. The calculated ROC AUC is 0.89 indicating the promising performance of the exploited multiclass deep neural network in the classification of the DXA scans. An accuracy of higher than 0.93 is also observed.

Conclusion: The findings demonstrate fast and accurate classification of DXA scans into (1) normal, (2) osteopenia, and (3) osteoporosis classes. By exploiting the proposed architecture, the risk of fractures can be significantly reduced for postmenopausal women.

Keywords: DXA Women Deep Learning Osteoporosis

A Comparative Study of Uterine Leiomyoma Infarction Rate after Uterine Artery Embolization by Non-Spherical Polyvinyl Alcohol Particles and Tris-acryl Gelatin Microspheres: A Retrospective Study

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Introduction: Uterine fibroids or leiomyomas are benign uterine tumors with smooth muscle origin commonly encountered in daily practices. Symptomatic fibroids have been treated by myomectomy or hysterectomy for years; however, over the past two decades, new treatment options, i.e., uterine artery embolization (UAE), have become available.

Several embolic agents have been introduced for UAE, and the most effective ones are non-spherical polyvinyl alcohol particles (nsPVA) and tris-acryl gelatin microspheres (TAGM). In the present study, we compare leiomyoma infarction rate and embolization success using pelvic MRI after uterine artery embolization (UAE) by non-spherical polyvinyl-alcohol particles (nsPVA) or tris-acryl-gelatin microspheres (TAGM).

Material & Methods: A retrospective study was conducted on 141 patients (mean age 38y) who underwent standard bilateral UAE by either nsPVA (80) or TAGM (61). A total of 556 fibroids were evaluated, with a median uterine volume of 435 cm³ and a median dominant fibroid volume of 110 cm³. Embolization success was defined as complete infarction of all discernible fibroids. Results were compared between the two groups. Mann-Whitney U and independent-sample t-test were used to compare data type. A binary logistic regression was performed.

Results: There were no significant differences

between the two groups regarding baseline characteristics, including age ($P=0.446$), uterine volume ($P=0.148$), dominant myoma volume ($P=0.124$), and non-infarcted myoma number ($P=0.092$). The tumor infarction rate in the nsPVA and TAGM groups was 74% (251/337) and 79% (174/219), respectively, which was approximately similar ($P=0.191$). Likewise, embolization success was similar among both groups (67.5% vs. 72.1% for nsPVA and TAGM, respectively, $P=0.589$). There was an inverse relationship between preliminary non-infarcted myoma number and embolization success rate ($P=0.035$). Still, embolization success was not affected by patient age ($P=0.583$), uterine volume ($P=0.277$), and size of dominant myoma ($P=0.341$).

Conclusion: Uterine artery embolization using non-spherical polyvinyl alcohol particles or tris-acryl gelatin microspheres has comparable individual myoma infarction rates determined on post-embolization contrast-enhanced pelvic MRI. Besides, both agents have similar rates of embolization success and uterine and myoma volume reduction.

Keywords: Leiomyoma UAE PVA TAGM

Deep Learning Approach to Femoral AVN Detection in Digital Radiography: Differentiating Patients and Pre-collapse Stages

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Introduction: This study aimed to evaluate a new deep-learning model for diagnosing avascular necrosis of the femoral head (AVNFH) by analyzing pelvic anteroposterior digital radiography.

Material & Methods: The study sample included 1167 hips. The radiographs were independently classified into 6 stages by a radiologist using their simultaneous MRIs. After that, the radiographs were given to train and test the deep learning models of the project including SVM and ANFIS using Python programming language and TensorFlow library. In the last step, the test set of hip radiographs was provided to two independent radiologists with different work experiences to compare their diagnosis performance to the deep learning models' performance using the F1 score and McNemar test analyses.

Results : The performance of SVM for AVNFH detection (F1 score=0.7931) was slightly higher than less experienced radiologists (0.7519) and slightly lower than experienced radiologists (0.8593) without reaching significance (p -value> 0.05). Evaluation of the performance of SVM

for pre-collapse AVNFH detection with the F1 score of 0.6296 showed significantly higher performance than less experienced radiologist (F1 score= 0.4058, p value<0.00). On the other hand, no significant difference is noted between experienced radiologist and SVM for pre-collapse detection. ANFIS algorithm for AVNFH detection with the F1 score of 0.8393 showed significantly higher performance than less experienced radiologists (F1 score= 0.7519, p value=0.03). Although reaching higher performance compared to experienced radiologists is statistically not significant (F1 score= 0.8593, p value=0.2)

Conclusion: Our study has shed light on the remarkable capabilities of SVM and ANFIS as diagnostic tools for AVNFH detection in radiography. Their ability to achieve high accuracy with remarkable efficiency makes them promising candidates for early detection and intervention, ultimately contributing to improved patient outcomes.

Keywords: Deep learning, AVN detection

Poster Accepted Abstract of ICR2024

A Solitary Renal Metastasis Originating from Postmolar Choriocarcinoma without A Primary Tumor within the Uterus

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Introduction: Choriocarcinoma, a relatively rare and highly malignant type of gestational trophoblastic disease (GDT), may occur after a miscarriage, pregnancy, or a hydatiform mole. Metastasis to the kidney is scarce, and renal involvement from postmolar choriocarcinoma is infrequently reported in the literature. In this report, we presented a unique case of postmolar choriocarcinoma emerging two years after a complete hydatiform mole, with solitary kidney metastasis in the absence of a primary uterine tumor and other site metastases, accompanied by urological symptoms and spontaneous renal hemorrhage (SRH).

Materials and Methods: A 41-year-old female patient with a history of antecedent complete molar pregnancy was evaluated at the emergency department due to severe flank pain, nausea, vomiting, gross hematuria, and vaginal bleeding. In laboratory tests, anemia (hemoglobin: 9.2 mg/dl) was detected, and serum beta human chorionic gonadotropin hormone (β -hCG) level was 60,000 mIU/mL. Imaging studies revealed a lesion with active

bleeding surrounded by hematoma within the lower pole of the left kidney, alongside an empty uterine cavity. Furthermore, bilateral pleural effusion was identified in the absence of identifiable lesions within the lungs. Subsequently, a laparotomy exploration was performed that was ended by partial nephrectomy and left para-ovarian cystectomy. Moreover, the patient underwent an endometrial curettage. Histopathology results confirmed renal metastasis from choriocarcinoma with high expression of β -hCG, cytokeratin 7, and Ki 67. Notably, the endometrial curettage specimens were also free of malignant cells, and the para-ovarian cyst contained a corpus luteum cyst. Furthermore, no metastasis was found in a brain MRI, and thoracocentesis specimens showed no malignant cells in the pleural effusion. Given the diagnosis of high-risk gestational trophoblastic neoplasia [Stage IV:11], the patient underwent a three-week standard EMA-CO regimen (etoposide, methotrexate, actinomycin D, cyclophosphamide, and vincristine/ovcovin), resulting in a reduction of β -hCG level to 5

mIU/mL. Finally, the patient was followed for six months, during which no evidence of new metastasis or recurrence was observed, and β -hCG levels remained within the normal range.

Conclusion: Considering the rarity of postmolar choriocarcinoma and its renal involvement, postmolar choriocarcinoma with renal involvement without a primary uterine tumor could only be limited to urological

manifestations like hematuria and SRH. Hence, it is plausible that choriocarcinoma causes unexplained urological symptoms among females of reproductive age, particularly when a history of an antecedent molar pregnancy exists. Therefore, evaluating β -hCG levels could prove beneficial in suspected cases.

Keywords: postmolar choriocarcinoma Renal metastasis

Associated Computed Tomography Scan Findings, Clinical Symptoms, And Inflammatory Serum Markers In Patients Diagnosed with Mesenteric Panniculitis

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Introduction: Mesenteric panniculitis is an inflammation of the fat tissue covering the small intestine, which is mainly diagnosed during abdominal computed tomography (CT) scans. While mesenteric panniculitis is considered a relatively rare disease that is incidentally found in abdominal imaging studies, our current knowledge about this disease is scarce. This study was designed to investigate associated

clinical, laboratory, and imaging findings in patients diagnosed with mesenteric panniculitis.

Materials and Methods: Medical records of every patient referring to Baqiyatallah Hospital emergency department on 5 years from 2017 until 2021 who underwent abdominal and pelvic CT scans for various clinical indications were screened. Patients with mesenteric panniculitis were selected as the case group and matched

in age and gender with a control group from the same department. Both group's clinical symptoms, laboratory, and imaging findings were compared.

Result: Among 30,655 separated CT scans of the abdomen and pelvis 357 people were diagnosed with mesenteric panniculitis (1.16%). While the control group had significantly higher ESR levels ($P < 0.001$), the rest of the inflammatory indexes including WBC, neutrophils, and CRP were not significantly different among the study groups ($P > 0.05$). Patients with mesenteric panniculitis had significantly higher flank pain and urinary symptoms ($P < 0.05$ for all). Among 357 cases of mesenteric panniculitis, 72 cases (20.7%) were isolated. When non-isolated, urinary stones and obstruction of the urinary

system were significantly higher in comparison with the control group ($p < 0.05$). Having malignancy was not associated with either isolated or non-isolated panniculitis ($P > 0.05$)

Conclusion: The present study demonstrated that flank pain as well as urinary symptoms are higher among patients with mesenteric panniculitis. Among associated CT scan findings, Urinary stones and urinary system obstruction are higher in patients with mesenteric panniculitis. Moreover, mesenteric panniculitis is not associated with specific clinical or laboratory findings or with malignancy.

Keywords: mesenteric panniculitis, mesentery, computed tomography

Accuracy Of MRI Versus Laparoscopy In the Diagnose Of Pelvic Endometriosis

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Introduction: Endometriosis is one of the most common diseases in women whose timely and accurate diagnosis can be helpful in controlling, treating and preventing recurrence. Due to the invasiveness of the laparoscopic procedure, it is necessary to consider non-invasive procedures more and more.

Materials and Methods:

A descriptive Analytic study was done on 58 women referred to private gynecology clinic who were candidate for diagnostic laparoscopy with endometriosis suspected. All woman underwent MRI imaging and laparoscopy; all images were examined by radiologist. The finding was analyzed in SPSS.V20. P value $< 0/05$ was considered to be significant.

Result: According to this study, the frequency of endometriosis in women was 45 (77.6%) based on MRI, while the frequency of endometriosis was 48 (82.8%) based on diagnostic laparoscopy. The sensitivity of MRI to detect endometriosis was 79.17% and its specificity was 30.00%. ($P = 0/527$).

Conclusion: According to this study MRI may be able to detect small endometrial lesions that cannot be diagnosed by laparoscopy.

Keywords: Endometriosis, Mri

Clinical Presentation, Diagnostic Evaluation, And Management Of Undifferentiated/Unclassified Cardiac Sarcoma: A Case Report And Literature Review

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Introduction: This case report details a challenging instance of undifferentiated/unclassified cardiac sarcoma in a 28-year-old female, presenting with diverse symptoms like muscle weakness, shortness of breath, and hemoptysis. Diagnostic hurdles led to an initial misdiagnosis of Granulomatosis with polyangiitis (GPA) before discovering a sizable left atrial mass, ultimately diagnosed as high-grade undifferentiated/unclassified sarcoma. Despite initial surgical intervention, the patient's condition worsened, underscoring the complexities in managing such cases involving cardiac sarcomas. This case emphasizes the diagnostic complexities associated with primary cardiac sarcomas (PCSs), particularly the challenges in achieving accurate diagnoses and formulating effective treatment strategies.

Materials and Methods: A 28-year-old Iranian female presented to Rasoul Akram Hospital with complaints of progressive pain, muscle weakness, and shortness of breath. Her symptoms included limb weakness, difficulty in standing up, and discoloration of fingernails and toenails. Further symptoms included morning dryness, weight loss, night sweats, migraines, blurred vision, and paresthesia in hands and feet. Medical history revealed a diagnosis of polycystic ovary syndrome (PCOS) and a family history of rheumatoid arthritis (RA). She was on multiple medications for depression.

Initial vital signs were stable, but laboratory tests indicated elevated inflammatory markers and abnormal spirometry suggesting a restrictive pattern. Subsequent investigations

revealed vague lung lesions and a 13mm lung nodule. Further evaluation with bronchoscopy and tissue sampling was inconclusive. The patient was discharged pending pathology results. However, upon worsening, she was readmitted with severe shortness of breath, mild hemoptysis, and deteriorating vital signs. Laboratory findings showed anemia, elevated LDH, calcium derangements, and abnormal venous blood gas.

With suspected Granulomatosis with polyangiitis (GPA) flare-up, cortisone pulse therapy was initiated. Due to suspected pulmonary thromboembolism (PTE), a CT angiography revealed a large left atrial mass. Echocardiography confirmed a tumoral mass in the left atrium, necessitating urgent cardiac surgery. Post-surgery, the patient recovered well and was discharged. Pathological examination revealed a high-grade spindle cell sarcoma with aggressive features, leading to plans for chemotherapy.

However, during chemotherapy considerations, the patient's condition deteriorated rapidly, requiring intubation and resuscitation attempts, unfortunately resulting in her demise.

Conclusion: Diagnosing cardiac tumors is challenging due to their rarity and vague symptoms. Imaging is vital, but histopathology is crucial for precise diagnosis. High-grade spindle cell sarcomas are rare and aggressive, with a poor prognosis. Surgical excision is the gold standard, yet difficult due to tumor patterns and delayed diagnosis. Chemotherapy and radiation's efficacy is unclear, but neoadjuvant therapies might aid

surgical outcomes. Multidisciplinary teamwork involving specialists—cardiologists, surgeons, radiologists, pathologists, and oncologists—is essential for optimal patient care.

Keywords: Undifferentiated_sarcoma, Multimodal_imaging, Echocardiography Malignancy Surgery

A Case Series Of 10 Pediatric Patients with MSK Disorders

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Introduction: A variety of congenital and acquired Non neoplastic disorders can involve children .it is imperative for a radiologist to be familiar with typical findings of these disorders

Materials and Methods: 10 patients in different age groups were referred to department of Radiology of Imam Hossein pediatric hospital of Isfahan medical university for more evaluation of suspicious musculoskeletal disorder

Result: Imaging of the patients were

evaluated and in correlation with clinical findings the most probable diagnosis was made by a pediatric radiologist

Conclusion: It is important for a general radiologist to be familiar with typical imaging findings of musculoskeletal disorders in children which is presented in this case series

Keywords: Radiology musculoskeletal pediatrics

Coinfection Of Pulmonary Tuberculosis And Mucormycosis In A Patient with Poor Controlled Diabetes Mellitus: A Case Report

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Introduction: Mucormycosis, caused by angiotrophic fungi in Mucorales, poses

a life-threatening emergency, primarily in immunocompromised patients. With varied

anatomical localizations, risk factors include hematologic neoplasms, diabetes, trauma, and immunosuppression. Co-occurrence with tuberculosis is rare but presents a diagnostic challenge due to similar clinical features. Prompt diagnosis, often through tissue examination, is crucial for timely and effective management to reduce mortality and organ loss.

Materials and Methods: We present the case of a 60-year-old woman with poorly controlled diabetes mellitus who developed dysphonia, persistent cough, and expectoration. Imaging studies revealed a cavitary lesion and a mass in the left lung, along with stenosis of the left main bronchus. A bronchoscopy confirmed the presence of a bronchomediastinal fistula with pus discharge. Polymerase chain reaction testing of bronchial secretions revealed a co-infection of tuberculosis and mucormycosis. The patient was initiated on appropriate treatment for both infections, and her symptoms improved without disease progression.

Conclusion: Concomitant pulmonary mucormycosis and tuberculosis pose significant diagnostic challenges due to overlapping clinical and radiological features. Early recognition and a multidisciplinary approach involving infectious disease specialists, pulmonologists, radiologists, and surgeons are crucial for optimal management. The prognosis of this coinfection is poor, emphasizing the importance of timely diagnosis and treatment.

To improve outcomes, comprehensive screening and early detection of coinfections in high-risk patients, such as those with uncontrolled diabetes, are essential. Future advancements in diagnostic tools may facilitate prompt and accurate diagnosis. Clinicians should maintain a high index of suspicion and employ appropriate diagnostic techniques to ensure early identification and effective management of these complex infections.

Keywords: Mucormycosis Tuberculosis Coinfection Diabetes_mellitus Radiology

Correlation Between Pre-Operative DTI Indices And Post-Operative Outcome In Degenerative Cervical Myelopathy (DCM): A Systematic Review And Meta-Analysis

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Introduction: The correlation between pre-operative Diffusion tensor imaging (DTI) metrics and post-operative clinical outcomes in patients with degenerative cervical myelopathy (DCM) has been widely investigated with different studies reporting varied findings. We conducted a systematic review to determine the association between DTI metric and clinical outcomes after surgery.

Materials and Methods: We identified relevant articles that investigated the relationship between pre-operative DTI indices and post-operative outcome in DCM patients by searching PubMed/MEDLINE, Web of Science, Scopus, and EMBASE from inception until May 2023. For inclusion in our systematic review, primary studies of any design were required to meet the following eligibility criteria: (1) Enrolment of adult patients diagnosed with DCM who have undergone any form of decompressive surgery for the condition, (2) Evaluation of the impact of DTI parameters on patient outcomes, (3) Reporting of any post-operative outcomes, and (4) Implementation of any correlation analysis between DTI parameters and surgical outcomes (5) Reporting of correlation coefficient and p value or 95% CI for it. On the contrary, studies failing to adhere to these specifications were excluded. We imposed no restrictions on the publication dates of the potential studies. In addition, quantitative synthesis and meta-analyses were performed.

Result: FA was significantly correlated with

postoperative JOA or mJOA across all age and follow up subgroups, changes observed in JOA or mJOA from preoperative to postoperative stages (Δ JOA or Δ mJOA) in subgroups aged 65 and above and in those with a follow-up period of 6 months or more, as well as recovery rate in all studies pooled together and also in the under-65 age bracket. Additionally, a significant correlation was demonstrated between recovery rate and ADC across all age groups. No other significant correlations were discovered between DTI parameters (MD, AD, and ADC) and post-operative outcomes.

Conclusion: DTI is a useful noninvasive evaluation tool that is quantifiable and easy to measure and can be employed in patients with DCM. DTI shows promise for becoming an integral part of the diagnostic imaging work-up for DCM. Although DCM remains a clinical diagnosis, DTI may add value in assessing disease severity and influence the treatment plan. The advantage of this imaging is that it gives objective data, which removes interobserver variability in interpretation of the conventional MRI.

Keywords: Diffusion_tensor_imaging
Degenerative_cervical_myelopathy Prognosis
Clinical_outcome

Extraskkeletal Mesenchymal Chondrosarcoma Arising from Soft Tissues: A Rare Case Report

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Introduction: Chondrosarcomas are an exceedingly rare form of cancer, impacting only a few individuals per million. Among chondrosarcomas, a small fraction belongs to the mesenchymal sub-type. Furthermore, only one-third of mesenchymal chondro-sarcomas manifest in extraskkeletal locations.

Materials and Methods: A 38-year-old woman was referred by a midwife after experiencing pain in the right upper quadrant of her right breast for 2 months. The mass had been palpable for 1 week before the initial assessment. According to radiological evaluations, the tumor is outside breast tissue and not connected to the bones. Hence, a biopsy of the mass is done. The biphasic morphology

of the tumor during pathological evaluation, in addition to immunohistochemistry testing, confirms the diagnosis of extraskkeletal mesenchymal chondrosarcoma (EMCS). Finally, the mass was surgically removed, and 6 months of chemotherapy were administered to the patient.

Conclusion: Given the tumor's rarity and the lack of established guidelines, diagnosing EMCS can be challenging and prone to errors. As such, meticulous sampling, along with precise pathological and imaging investigations, is imperative to accurately establish the diagnosis of these tumors.

Keywords: biphasic pattern extraskkeletal mesenchymal chondrosarcoma

Endometrial Cancer Arising from Adenomyosis with Unusual Manifestation: A Case Report

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Introduction: Adenomyosis is a common gynecological disease that typically affects pre-menopausal, multiparous women in their thirties to forties, with a prevalence of 20 to 30% among hysterectomy cases. Ultrasonography is considered the first-line diagnostic technique, providing a dynamic examination with high accuracy in diagnosing gynecological pathologies

when performed by trained sonographers. Meanwhile, MRI has emerged as the most crucial modality, offering comprehensive information about uterine diseases. While the coexistence of endometrial cancer with adenomyosis is not uncommon, endometrial cancer arising from adenomyosis is extremely rare. Several factors, such as BMI (per 5 kg/m²) and multiparity,

have been associated with endometrial cancer. However, the association between polycystic ovary syndrome (PCOS) and endometrial cancer remains a subject of controversy.

Materials and Methods: In this report, we present the case of a 34-year-old virgin woman who experienced irregular uterine bleeding. Transabdominal sonography revealed an unusual view of adenomyosis and a large lobulated hyperechoic mass of unknown origin. Despite performing pelvic MRI with gadolinium-based contrast material, the origin of this mass could not be determined; however, it raised suspicion of cancer, although diffusion-weighted imaging showed no apparent restriction. Transrectal ultrasonography failed to provide practical information to define the mass as well. Subsequently, hysteroscopy was performed, revealing a focal endometrial thickening with a suspicious polyp-like appearance. Given the high probability of cancer, surgeons opted for a total

abdominal hysterectomy and bilateral salpingo-oophorectomy. Pathological examination of the endometrium confirmed the diagnosis of endometrial cancer arising from adenomyosis.

Conclusion: The diagnosis of endometrial cancer arising from uterine adenomyosis may pose challenges due to the complexities of the lesions. Accurate diagnosis often requires a combination of radiologic modalities and thorough pathology examination to establish a definitive conclusion. Clinicians and researchers should be aware of the rare possibility of endometrial cancer originating from adenomyosis to ensure appropriate management and treatment decisions. Further studies are warranted to elucidate the underlying mechanisms and risk factors associated with this rare phenomenon

Keywords: Endometrial cancer Adenomyosis Ultrasonography

A Case Of Omphalomesenteric Duct Torsion In a 8-years-old Boy

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Introduction: Omphalomesenteric duct anomalies include a group of entities that result from failed resorption of the omphalomesenteric duct. These anomalies include Meckel diverticulum, omphalomesenteric fistula, fibrous bands, cysts, and umbilical polyps.

Meckel diverticulum is the most common congenital anomaly of the gastrointestinal tract and is usually asymptomatic.

Symptoms develop when Meckel diverticulum involves complications such as hemorrhage, inflammation, and perforation, or when it causes intussusception or bowel obstruction.

Axial torsion of the diverticulum is the rarest complication that can occur mainly in children.

Giant Meckel diverticulum is a relatively rare type of Meckel diverticulum characterized by its large size and a length exceeding 5 cm. A longer Meckel diverticulum allows greater mobility and facilitates incidental strangulation and torsion.

Materials and Methods: Here, we report a rare case of a giant Meckel diverticulum axial torsion associated with omphalomesenteric duct band connected to the umbilicus in a eight years old boy, who presented with acute abdominal pain and ascites.

Gray scale, color doppler ultrasound and CT scan with contrast were performed and revealed the diagnosis.

Previous literature of omphalomesenteric duct complications are reviewed and the imaging features of this patient are discussed.

Conclusion: The diagnosis of these complications can be challenging, as their clinical

manifestations are usually nonspecific and can masquerade as other acute intraabdominal entities such as appendicitis, inflammatory bowel disease, or other causes of bowel obstruction and missed diagnosis can lead to life threatening events.

Keywords: omphalomesenteric torsion
Meckel diverticula complication

Spontaneous Rupture Of A Gastroduodenal Artery Side Branch Immediately Following Endovascular Treatment Of Gastroepiploic Artery Aneurysm or Pseudoaneurysm

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Introduction: Pseudoaneurysms and aneurysms of the visceral arteries are rare entities. To the best of our knowledge, rupture of a proximal parental artery during endovascular treatment of a visceral aneurism/pseudoaneurysm has not been reported and should be kept in mind as a tragic possibility

Materials and Methods: A 55-year-old woman with a history of coronary artery disease was referred to our hospital with abdominal pain as her primary complaint. Early works revealed anemia, a small amount of free peritoneal fluid, and a possible large aneurysm or pseudoaneurysm by the greater curvature of the stomach. She underwent emergency angiography that showed a large aneurism/pseudoaneurysm of the gastroepiploic artery. Successful embolization of the lesion was performed using the isolation technique. Perforation of a side branch of

the gastroduodenal artery was observed on the immediate postembolization control angiography. Therefore, parent artery coiling was done immediately with good results. She was symptom-free and stable hemodynamically after the procedure, during the hospital course, and in the follow-ups.

Conclusion: As/PAs of the visceral arteries are rare entities, and spontaneous rupture of the parental arteries proximal to them during endovascular management is even a rarer entity that has not been reported and should be kept in mind as a possible catastrophic event immediately following the procedure.

Keywords: angiography vascular intervention
aneurysm/pseudoaneurysm

Evaluation Of Fetal Cardiac Anomalies And Their Outcomes In Isolated Cardiac Anomalies And Non-isolated Groups And Based on Minor And Major Abnormalities

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Introduction: Congenital Heart Disease (CHD) is the most common anomaly in the fetus, with the prevalence of cardiac abnormalities being 6 times higher than chromosomal abnormalities and 4 times more common than neural tube defects. Estimates show that CHD has an incidence of 8 to 10 cases per 1000 births, about one-third of which are severe diseases. CHD is responsible for 20% of neonatal mortality and 40% of perinatal mortality.

The present study aimed to evaluate the characteristics and outcomes of isolated and non-isolated CHD prospectively to compare with major and minor cardiac anomalies and to evaluate the types of extracardiac accompanying abnormalities in the final results of CHD pregnancies. We also studied isolated minor cases without hydrops and cystic hygroma to show the impact of these situations on pregnancy outcomes.

Materials and Methods: This prospective observational study was performed on 135 cases of CHD from September 2018 to December 2021. Patients were prospectively evaluated for abortion, intrauterine death, death during or after delivery, and live birth. Finally, these variables were compared between the two groups of minor and major CHD, and also isolated and non-isolated CHD.

Result: Out of 135 patients, 54 (40.0%) had minor and 81 (60.0%) had major CHD. Also, 78 cases (57.8%) were isolated and 57 cases (42.2%) were non-isolated. The most common minor anomalies are TR (21 cases, 15.6%) and VSD (19 cases, 14.1%), and the most common major anomalies are AVSDs (22 cases, 16.3%). 14 cases (43.8%) of minor CHD and 6 major CHD cases (10.2%), resulted in a live birth (p -Value = 0.002). Also, 18 cases (36.0%) of isolated CHD and only 2 cases (4.9%) of non-isolated CHD

resulted in live birth (p-Value = 0.002). The most common extracardiac accompanying anomalies were head, neck, and central nervous system abnormalities, which were seen in 36 cases (26.7%). Moreover, 84.6% of isolated minor CHD cases without hydrops and cystic hygroma survived.

Conclusion: Generally, the major cardiac anomalies and their association with extracardiac abnormalities reduce the likelihood of live birth. Moreover, those minor anomalies accompanied by Figure 4: An 18 weeks fetus with cystic hygroma, multiple anomalies and common truncus. a) Common truncus is overriding a peri-membranous VSD. b) Right

sided aortic arch. c) Double SVC in three vessel tracheal view with normal thymus. d) There is a connection between aorta and pulmonary artery at common truncus with some degree of associated pulmonary hypoplasia.

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hydrops and cystic hygroma have a poorer prognosis than other isolated minor anomalies. Overall, the existence of major cardiac anomalies rather than hydrops and cystic hygroma is a more significant factor influencing the outcome of pregnancy.

Keywords: Cardiac abnormality Fetal echocardiography

An Overview Of Pediatric Head And Neck Cystic Lesions

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Introduction: Pediatric patients with neck mass are commonly referred to department of radiology for more evaluation. These masses are often found to be congenital or acquired cystic lesions and it is imperative for a radiologist to be familiar with these lesions as correct diagnosis can change the treatment plan.

Materials and Methods: In this article we will have an overview of congenital and acquired pediatric Head and Neck cystic lesions and their radiological features

Result: In this article we had an overview of radiological features of pediatric Head and Neck cystic lesions

Conclusion: It is important for a Radiologist to be familiar with Radiological features of pediatric head and neck cystic lesions which was presented in this article.

Keywords: Cyst Pediatric Radiology

Assessment Of Progesterone Receptor Status In Breast Cancer Patients Using Radiomics Features Of Mammography

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Introduction: The most frequent cancer in women and the second leading cause of cancer-related deaths in women globally is breast cancer. These illnesses are varied and comprise a broad spectrum of molecular and genetic subgroups. There are notable variations in these subgroups' imaging patterns and clinical behavior. The risk of breast cancer in women has also been assessed by breast imaging, especially mammography. Using machine learning, we aim to determine how immunohistochemical markers relate to imaging characteristics.

Materials and Methods: 20 patients (PR+:14, PR-:6) were involved in this study. breast masses were segmented by a 15-years-experienced radiologist. Using CLAHE, Median, Gaussian, and Scharr filters 4 new images were reconstructed from each original image. Almost 7500 features were extracted from every Patient's mammogram by applying PyRadiomics and 50 effective features were selected.

Result: Due to the limited dataset, 5-fold cross-validation was used for more acceptable results. We achieved 0.818 accuracy with AUC of 0.875 in predicting PR+ and PR- patients with ensemble method.

Conclusion: While histopathological characterization remains the gold standard for identifying molecular subtypes of breast cancer, the development of noninvasive diagnostic techniques is becoming more popular. Depending on the molecular type of the malignancy, distinct imaging features are seen. While molecular classification can be predicted with the use of imaging features, these features' predictive power is still limited. The breast cancer subtype could be accurately identified by the radiomics signature. This study shows that AI can be useful in the diagnosis of breast cancer subtypes.

Keywords: Machine learning, Radiomics, Breast cancer

Magnetic Resonance Imaging Predictors Of Clinical Deterioration In Cerebral Venous Thrombosis

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Introduction: Cerebral sinus thrombosis is an uncommon but serious disease. Prediction of the patients' deterioration after hospitalization is vital, because neurodegeneration may occur some days after hospitalization and that nearly one third of patients with neurologic deterioration may show new parenchymal lesions in case of imaging repetition. This indicates the necessity of a predicting tool for monitoring of these patients who are in urgent need of aggressive treatment. Since few studies have been conducted on the imaging results that predict the clinical deterioration of patients, we decided to examine the MRI results predicting the clinical deterioration of CVT Patients. Obviously, by finding the factors involved in predicting the clinical deterioration we can obtain more detailed information on the type of treatment and level of care during and after the hospitalization of the patient.

Materials and Methods: In this cross-sectional study, clinical and MRI imaging findings were examined in 112 patients with confirmed diagnosis of cerebral sinus thrombosis that were hospitalized in the emergency department. The check list designed for the retrospective study was based on the patient's records, and for the prospective study the check lists were filled by examining the patients and using their medical history. The collected data was analyzed using appropriate statistical methods and SPSS 21 software, and $p < 0.05$ was considered as significant.

Result: This study was performed on 112

patients, including 40 men and 72 women with an average age of 37.4 ± 12.3 . 37 women with cerebral venous thrombosis (54.1% in this study) had a history of birth control pills consume and 104 patients (92.9%) experienced a headache as the most common clinical manifestation. The area with the most thrombosis was the transverse sinus (in 93 patients which is 83% of the population). Variable analyzes have shown that DWI Hyper intensity, Mass Effect, parenchymal hemorrhage, venous infarcts, Cytotoxic Oedema and Sulcal effacement in the improved group with level 1 and 2 clinical severity, showed statistically significant difference. Also Vasogenic Oedema and subarachnoid hemorrhage with level 2 clinical severity had a statistically significant relationship (p -value < 0.05).

Conclusion: Due to the significant relationship between a number of MRI imaging findings and clinical deterioration in patients with cerebral sinus thrombosis in this study, it seems that MRI findings predict clinical deterioration in patients with CVT and could lead to early diagnosis and better prediction of the prognosis and therefore reduce the complications of the disease, and help to monitor these patients for the urgent need of an aggressive treatment and even the type of treatment and patient care during and after hospitalization in these patients.

Keywords: Magnetic resonance imaging
CVT

Prevalence Of Cesarean Scar Dehiscence as An Incidental Finding In Lumbar MRI Of Women with Low Back Pain

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Introduction: Every year, 1/5 million caesarean sections are performed worldwide. One of the effects of this operation is cesarean scar dehiscence. As a result of the increase in cesarean rate, cesarean scar dehiscence also increases. Magnetic resonance imaging (MRI) is one of the useful methods for diagnosing and defining the extent of defects in the caesarean section scar; therefore, the purpose of this research is to investigate the prevalence of cesarean scar dehiscence in women with a history of previous caesarean section who underwent magnetic resonance imaging of the lumbar region due to back pain.

Materials and Methods: In this cross-sectional (retrospective) study, who complained of back pain and underwent lumbar MRI were included in this study and examined for the presence of scar dehiscence. Patients whose uterus and caesarean scar could not be seen well in the lumbar MRI were excluded from this study. First, the MRI of the patients (women) referred to the MRI department of Ghaem and Imam Reza Hospital in Mashhad, who refers due to back pain, was examined for the presence of cesarean scar dehiscence as an incident, and then the location and depth of the caesarean section in the T2W sequence. Also, the demographic information of the patients and the number of cesarean sections, which were available in the information sheet in the MRI department, were extracted and recorded in the checklist. Finally, the collected data has been analyzed by SPSS

version 26 software and Spearman's correlation test.

Result: In the study of 700 female patients who had lumbar MRI due to back pain or other reasons, 72 (10.28 percentage) had cesarean scar dehiscence. The average age of the participants in this study was 40.77 ± 7.65 years. 38 women (53.3 percentage) had 1 cesarean delivery, 31 women (43.7 percentage) had 2 cesarean deliveries and 2 women (2.8 percentage) had 3 cesarean deliveries. The mean and median depth of remaining myometrium dehiscence in patients were 3.51 ± 1.41 and 3 mm, respectively. Also, the mean and median length of remaining myometrium opening in patients were 4.79 ± 2.01 and 4.4 mm, respectively. There was no significant relationship between the number of cesarean deliveries and the length of remaining myometrium dehiscence ($P = 0.089$).

Conclusion: Based on the results obtained from the present study, it appears that there is a significant relationship between the number of cesarean deliveries and the depth of scar dehiscence.

Keywords: caesarean section scar lumbar MRI

Machine Learning-based Assessment Of Olfactory fMRI Data Due to Classification Of Olfactory Disorders Using Deep Learning Methods

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Introduction: Olfaction has an essential role in human life. It can be known as an early marker of neurodegenerative disease. However, less assessment of olfactory function was conducted due to methodological difficulties associated with olfactory-related cerebral areas.

Materials and Methods: Our approach employs fMRI data and artificial intelligence algorithms to identify the function of brain regions and parcellate the brain with homogeneous properties; then classify healthy olfactory subjects from those with olfactory dysfunction.

Result: The fMRI result achieved by the k-means unsupervised machine learning model was similar to those found with the conn toolbox in detecting

active areas. Plotting intra-region parcellation shows that intra-regions of four different ROIs aren't active simultaneously. Moreover; results show applying a CRNN deep learning model can lead to an accuracy score of 97% for the classification of fMRI data in two different healthy and with olfactory disorders groups.

Conclusion: Machine learning methods specifically the K-means unsupervised algorithm assessed in this study, can be effective in detecting active regions in the brain. Classification results show that the CRNN architecture achieved the best accuracy score in the classification of olfactory fMRI data.

Keywords: fMRI; Deep learning; Brain parcellation

Efficacy Of DTI Imaging In Detecting White Matter Alternation In Mild Cognitive Impairment (MCI) And Alzheimer's Disease (AD) with 2-year Follow-ups

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Introduction: Alzheimer's disease (AD) is a neurodegenerative disease manifested by cognitive decline. Evaluating DTI as a method

to differentiate different stages of the AD spectrum was the aim of this study. Accordingly, a comparison was performed between different

neurological pathways of normal, MCI, and AD participants over the years.

Materials and Methods: A total number of 20 normal, 23 AD, and 44 MCI patients DTI data were obtained from the ADNI database. Since our data contains right-handed participants, we implement our analysis on the left hemisphere of the individuals. The AD, FA, RD, and MD values were measured over time using repeated measure ANOVA test in SPSS.

Result: In the corticospinal tract and Medial lemniscus, we could observe a significant change between the MCI group after one year ($p < 0.05$) and two years ($p < 0.01$). Unlike FA results the AD parameter of the DTI Posterior limb of the internal capsule revealed significant alternation among AD participants after two years, while the FA analysis suggested a high rate of changes only after one year. Posterior thalamic radiation is a potential pathway in MCI groups that revealed significant differences in all parameters of DTI. Fornix-Stria

terminalis is another important pathway that is damaged during AD with an egregious devastating value among MCI participants. In all DTI parameters, the Genu of corpus callosum depicted significant differences among normal, MCI, and AD groups. Splenium of the corpus callosum is a susceptible pathway in MCI and AD groups. All parameters except for RD reported a fluctuation in the Retrolenticular part of the internal capsule in AD and MCI groups after one year.

Conclusion: The AD and MD parameters have a higher sensitivity to track potential changes that occur during AD. We could even consider the MD parameter as the most accurate parameter since some of the values calculated with higher detail and some differences suggested in this parameter are absent in other parameters. Eventually, the FA parameter could be helpful in AD detection.

Keywords: AD DTI MCI diagnosis

Importance Of CT Imaging Findings And Grading Of Otosclerosis

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Introduction: In this lecture we focus on the role of imaging modalities spatially HRCT of the temporal bone as a gold standard in diagnosis of Otosclerosis we present cases that proved in ENT department

Materials and Methods: In this lecture we focus on the role of imaging modalities spatially HRCT of the temporal bone as a gold standard in diagnosis of Otosclerosis. Although clinical symptoms and audiological tests are diagnostic, CT is very helpful to define the lesion and bone involvement

Result: We pay attention to diagnostic difficulties for general radiology that may missed CT findings of Otosclerosis, Finally CT could clarify post-surgical complications and prosthesis position.

Conclusion: In this lecture we show CT Imaging of cases and discuss about differential diagnosis. we reported a rare cases of bi lateral Otosclerosis.

Keywords: CT, Otosclerosis, bilateral

Pictorial Review Of Nipple Areola Complex Diseases In Different Imaging Modalities

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Introduction: The aim of this study is to review the radiologic characteristics of the normal variants and benign and malignant diseases of the nipple-areolar complex.

Materials and Methods: We assessed the imaging features of nipple-areolar complex lesions, in the different imaging modalities including mammography, ultrasound and contrast-enhanced magnetic resonance imaging (MRI).

Result: Radiologic entities of the nipple-areolar complex anatomy, Montgomery tubercles, nipple inversion, calcifications, inflammatory process, ductal ectasia, intraductal papillomas, fibroadenomas, neurofibromatosis, dermatosis, adenomas, hyperplasia and

malignant lesions have been discussed.

Conclusion: Different Imaging modalities have an important role in the diagnostic workup of the nipple-areolar complex diseases. Breast radiologists should know the anatomy and pathology of the nipple-areolar complex diseases to diagnose them in early stages. It is necessary to assess the clinical, radiological, and sometimes pathological findings to establish the correct diagnosis. Some conditions involving the nipple-areola may have controversial clinical and radiological presentations that may cause delay in the diagnosis.

Keywords: Nipple, Breast, Mammography, ultrasound, MRI

Thoracic CT Scan Findings In Patients with Confirmed Hematologic Malignancies Admitted to the Hospital with Acute Pulmonary Symptoms

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Introduction: Background: Hematologic malignancies are the fifth most common malignancies worldwide. Pulmonary symptoms are among the patient's common complaints. Early diagnosis based on patient symptoms, laboratory testing, and imaging may lead to an appropriate therapeutic approach.

Objectives: To evaluate thoracic computed tomography (CT) scan findings in known cases of

hematologic malignancy with acute respiratory symptoms.

Materials and Methods: A cross-sectional study was conducted on 200 patients with hematologic malignancies admitted to Khansari cancer center for acute pulmonary symptoms, from December 2019 to May 2020. Collected data included demographic data, physical examination, laboratory tests and findings of thoracic CT images. Descriptive analysis

and chi-Square test were performed to analyze the data using SPSS version 20.

Result: Non-Hodgkin lymphoma was the most common malignancy, accounting for 48% of total cases. The most common radiological findings included atelectasis (49%), followed by pleural effusion (42%), mediastinal lymphadenopathy (38.5%), consolidation (37%), and ground-glass opacities (33.5%). Mediastinal lymphadenopathy was more prevalent in patients diagnosed with lymphoma. Among pulmonary pathologies, pneumonia was the most prevalent disease (41.5%), followed by small airway disease (13.5%), mediastinal lymphadenopathy (12.5%), chronic pulmonary disease (6.5%), and

pulmonary metastasis (6%). Normal thoracic CT scan was detected in 20% of participants. Overall assessment of clinical symptoms, laboratory tests, and imaging findings did not lead to the diagnosis of acute lung involvement in 5.5% of study participants, because complete clinical data were not available in some participants.

Conclusion: Assessment of the most common thoracic imaging findings in patients diagnosed with hematologic malignancies, may help make better diagnosis and planning of a rapid therapeutic approach.

Keywords: Hematologic Malignancy, Chest, CT

The Role Of Fetal Heart Rate In Frst Trimester Sonograms In Prediction Of Fetal Sex: A Systematic Review And Meta-analysis

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Introduction: Background Early fetal sex determination is worthy of providing alertness about possible x-linked disorders, as well as predicting sex-related pregnancy complications and outcomes. Satisfying the curiosity of parents is another advantage. In this way, several studies have been performed which have shown conflicting results.

Aim We planned a systematic review for identifying any plausible role of Fetal Heart Rate (FHR) for early predicting fetal sex during the first trimester of non-complicated pregnancies

Materials and Methods: This is a meta-analysis in which PubMed and Scopus databases were searched using different related keywords to find similar articles up to December 2022. Then the articles were screened to find eligible articles and finally, the articles entered in the meta-analysis were analyzed using Stata software (Stata Corp, College Station, TX). Standardized mean difference

(SMD) and their 95% confidence interval (CI) were estimated.

Result: A total of 223 articles were evaluated and five articles were included in the meta-analysis. The results showed that there is a significant heterogeneity between the articles ($p=0.012$, $I^2=69.0\%$). The results of meta-analysis with a random model showed that there is no significant difference between male and female genders in terms of mean FHR (SMD=0.04, 95%CI= -0.09–0.16, $Z=0.59$, $p=0.553$).

Conclusion: This systematic review and meta-analysis showed that even though male fetuses show faster FHR but such sex-related difference is minimal. Therefore, first-trimester FHR is not a reliable predictive test for fetal sex determination. Further studies are recommended to achieve a more precise conclusion.

Keywords: Fetus, Gender, Meta-analysis

AVF Of Superficial Temporal Vessels after Thread Brow Lift, Report Of a Case

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Introduction: This report presents iatrogenic arteriovenous fistula of superficial temporal vessels after thread brow lift, which emphasizes on consideration of such rare complications during the procedure.

Materials and Methods: A young woman presented with pulsatile mass of scalp after thread brow lift. Color Doppler and duplex sonography of the mass revealed an AVF (arteriovenous

fistula) of superficial temporal vessels, a complication that in a few articles has been mentioned. Patient had received conservative treatment and the mass became very small and about to be disappeared.

Conclusion: physicians must be aware of possible vascular injury during thread face lift and should be trained enough to avoid it.

Keywords: AVF, thread lift

CBA-NET: A Deep Learning Framework for Estimation Of Children's Bone Age Based on an X-ray Radiograph Of Hand

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Introduction: Estimation of bone age is of paramount importance for assessing bone growth, particularly in children. Any discrepancy between chronological and estimated bone ages is an indicator of developmental problems. X-ray radiography of the left hand is commonly used

for such tasks. In this work, the children's bone age (CBA)-NET has been proposed for direct and accurate estimation of their bone age.

Materials and Methods: To do so, X-ray scans (fingers, hand, and wrist) of 256 children were acquired. The well-known Greulich and Pyle (GP)

atlas was also used to calculate bone age. The dataset portioning into training, validation, and test sets was 6:1:1. The X-ray radiographs were also pre-processed to further suppress the image noise and resampling. Data augmentation was also employed to enrich the dataset. A regression deep learning framework (CBA-NET) was then proposed. Root mean square error (RMSE) and R2 score were then calculated to evaluate the performance of the proposed framework.

Result: The evaluation metrics prove the promising performance of the proposed regression framework. The deep regression model offers an RMSE of 0.06 and an R2 score of 0.96 both indicating an accurate prediction of

children's bone age from X-ray scans of the left hand. The results show that there is a correlation between the estimated and chronological bone ages. Furthermore, the outcome of the proposed regression architecture is comparable to that of the GP method.

Conclusion: The findings demonstrate a fast and accurate estimation of children's bone age based on their left-hand X-ray radiographs. By exploiting the national dataset, the CBA-NET is more accurate compared to the widely used GP atlas for the Iranian population and therefore can be the method of choice for such tasks.

Keywords: Bone Age X-ray Deep Learning

Pomegranate (*Punica granatum* L.) Peel Extract Ameliorates Metabolic Syndrome Risk Factors In Patients with Non-alcoholic Fatty Liver Disease: A Randomized Double-blind Clinical Trial

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Introduction: Non-alcoholic fatty liver disease (NAFLD) is a metabolic syndrome (MS)-related liver disorder that has an increasing prevalence. Thus, the aim of our study is to

evaluate the effects of pomegranate peel extract (PP) supplementation on hepatic status and metabolic syndrome risk factors.

Materials and Methods: In phase one, the

hydro-alcoholic extraction of the peel of 750 kg of pomegranate (*Punica granatum* L.) was performed by the soaking method. Then, in phase two, NAFLD patients received 1500 mg of placebo (n = 37) or pomegranate peel capsules (n = 39) with a 500-kcal deficit diet for 8 weeks. Gastrointestinal intolerance, dietary intake, lipid and glycemic profiles, systolic and diastolic blood pressure, body composition, insulin resistance indexes, and elastography-evaluated NAFLD changes were followed.

Result: The mean age of participants was 43.1 ± 8.6 years (51.3% female). Following the intervention, the mean body weight (mean changes: -5.10 ± 2.30 kg), waist circumference (-7.57 ± 2.97 cm), body mass index (-1.82 ± 0.85 kg/m²), total cholesterol (-10.51 ± 0.77 mg/dl), triglyceride (-16.02 ± 1.7 mg/dl), low-density

lipoprotein cholesterol (-9.33 ± 6.66 mg/dl; all $P < 0.001$), fat free mass (-0.92 ± 0.90 kg; $P < 0.003$), and fasting blood sugar (-5.28 ± 1.36 mg/dl; $P = 0.02$) decreased significantly in PP in contrast to the placebo group in the raw model and when adjusted for confounders. Also, high-density lipoprotein cholesterol (5.10 ± 0.36 mg/dl), liver steatosis and stiffness (-0.30 ± 0.17 and -0.72 ± 0.35 kPa, respectively, all $P < 0.001$) improved in the PP group.

Conclusion: In conclusion, 1500 mg pomegranate peel extract along with a weight-loss diet improved metabolic syndrome risk factors and reduced hepatic steatosis in patients with NAFLD after 8 weeks.

Keywords: Pomegranate, fatty liver, ultrasound, elastography

The Agreement Between Long-Term Monitoring by Electroencephalography And Magnetic Resonance Imaging In Pediatric Seizure

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Introduction: Demonstration of high agreement between structural abnormalities identified on magnetic resonance imaging (MRI) and physiologic abnormalities identified on electroencephalography (EEG) could benefit the assessment of epileptic focus in childhood seizures. The present study aimed to assess the agreement between abnormal findings on brain MRI and long-term monitoring (LTM) by EEG as the standard protocol in children with abnormal focal epileptic discharges in LTM.

Materials and Methods: This cross-sectional study was performed on 95 consecutive children who suffered from seizures with evidence of focal

epileptic discharges in LTM which was referred to the Children's Medical Center in 2017. All patients were also concurrently evaluated by MRI. All MRIs were evaluated two times, before and after knowing the EEG results.

Result: 59 out of 95 patients with abnormal LTM had concurrently abnormal MRI findings. The diagnostic agreement between the MRI and LTM in discovering abnormal findings was found to be high (86.4%) with a kappa correlation coefficient equal to 0.79.

Conclusion: About two-thirds of patients with abnormal LTM findings had concurrently abnormal MRI features with high agreement

between the two modalities. Thus, MRI and EEG can be valuable in predicting epileptic focus in drug-resistant patients who need surgery.

Keywords: seizure, magnetic resonance imaging, electroencephalography

Automatic Segmentation Of Liver Tumors based on Spatial-Enhanced 3D-DenseNet In CT Images

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Introduction: Liver cancer is a prevalent and prominent contributor to cancer-related deaths worldwide. The precise segmentation of liver tumors from computed tomography (CT) scans to determine their exact location plays a crucial role in hepatic surgical planning. Manual segmentation of liver tumors is time-consuming and susceptible to clinician bias. Consequently,

there is a great need for automated liver tumor segmentation using deep learning algorithms since it would be a great aid for surgical planning processes and enable more objective post-trial assessments.

Materials and Methods: This paper introduces a Spatial-Enhanced 3D-DenseNet for precise volumetric liver tumor segmentation

in CT scans. The network comprises three main components: a 3D encoder responsible for feature extraction, a recurrent block with ConvLSTM layers designed to capture fine-grained spatio-temporal information, and a 3D decoder for accurate reconstruction of volume segmentation masks. Notably, ConvLSTM layers are strategically employed to enhance the model capability of identifying tumor margins with precision. The inclusion of densely connected 3D-convolutional layers within the encoder and decoder facilitates robust feature aggregation throughout the network. This comprehensive architecture is designed to leverage both spatial and temporal information, contributing to the accurate and efficient segmentation of liver tumors in CT scans.

Result: The Spatial-Enhanced 3D-DenseNet

shows promise in improving the accuracy of liver tumor segmentation by leveraging both spatial and temporal information. The effectiveness of the proposed method is validated using the LiTS dataset. Dice scores and sensitivity for liver tumor segmentation in the LiTS dataset are 95.87% and 98.67%, respectively.

Conclusion: The presented Spatial-Enhanced 3D-DenseNet has proven its efficacy in the automatic segmentation of liver tumors within the LiTS dataset. This promising result highlights the capacity of the network to enhance the precision and efficiency of liver tumor segmentation in CT scans, which has substantial implications for advanced hepatic surgical planning.

Keywords: Liver Tumor Segmentation, Deep learning

Pitfalls In Radiology that Lead to Delayed Diagnosis Of Breast Cancer

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Introduction: Delayed diagnosis means a delay in the onset of symptoms and initiation of treatment, for instance, a gap of 3 months between the onset of symptoms and the start of treatment. Some delayed diagnoses can occur in women recalled at screening mammography. The origin of the delay might be patients or health system delays, including diagnostic teams. This study evaluates diagnostic pitfalls in radiology that lead to delayed diagnosis.

Materials and Methods: 1800 breast cancer patients since 2015 were included in the study,

and their screening or follow-ups were assessed to evaluate delayed diagnosis and its causes. Delay diagnosis subgrouped into

Result: In some cases, the delayed diagnosis went back to surgeons who blindly did a biopsy, which led to a false negative pathologic result. In some other cases, it was because the discrepancy between the radiologist's and pathologist's reports was neglected.

To reduce the delayed diagnosis with the origin of radiology pitfalls, it can be suggested that when radiologists determine B0 for a lesion,

they should not reassure the physician that it might be a benign lesion because it may cause the physician to neglect the necessary follow-ups. Comparing the subsequent radiographs can be very helpful in detecting size-increasing or new developing lesions. Finally, suspicious malignant microcalcification needs a biopsy, and its stability in follow-ups can not be a reason not to perform tissue diagnosis.

Conclusion: Delayed diagnosed malignant cases might not be very frequent; however, it should be considered that this event is related to

young women, each of whom manages a whole family. The involvement of these women with malignancy involves the whole family. Moreover, economic problems and the psychological collapse of the family might likely occur.

Repeated training for young radiologists who entered the breast imaging field and self-examination training for women are suggested to reduce delayed diagnosis.

Keywords: Delayed Diagnosis Mammography Breast Malignancy

Breast Imaging And Pathologic Findings During Pregnancy And Lactation

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Introduction: Breast density during pregnancy and lactation increases due to hormonal changes, which leads to imaging challenges. In this situation, ultrasound is the first choice for dense breast imaging because it is safer and more sensitive to detect pathologies. This study aimed to assess the breast imaging and pathologic findings during pregnancy, lactation, and weaning.

Materials and Methods: All patients referred for breast imaging (mammography and ultrasound) during pregnancy, lactation, and weaning were included in the study. The patients who did not complete the profile of imaging or pathologic results were excluded. Patient demographic information, mammography, ultrasound, and pathology results were collected from PACS. The frequency and correlation of breast imaging and pathology findings were evaluated.

Result: 234 patients were referred for breast imaging since 2016, from whom 88 patients underwent biopsy. Therefore, the study included 86 patients (mean-age= 31.88 ± 6.60 Y/o) with complete imaging and pathology results. 9.09% of patients had a family history. 69.15% and 30.85% of patients were referred during breastfeeding and pregnancy. 84.09% and 15.90% were palpable and non-palpable mass cases. 18.91% and 81.08% of cases had malignant and benign lesions. One of the malignant cases was angiosarcoma. There were 13.51% of lactating adenomas and 27.03% of mastitis among patients. Although pregnancy and lactation are not the contra-indication of mammography, most of the patients did not have mammography and underwent a biopsy under the guidance of ultrasonography.

Conclusion: Some masses might happen

related to pregnancy and lactation, such as galactoceles and lactating adenoma and, in some cases, mastitis; however, with less prevalence, breast cancer might also happen. Therefore, a breast exam and sonography should be performed in the first line, and if the patient needs biopsy, it should be considered

that mammography is not forbidden during pregnancy or lactation. Finally, Delayed diagnosis can likely happen during pregnancy since the symptoms were attributed to hormonal changes and dense breasts.

Keywords: Breast Pathologic Findings Pregnancy Lactation

A Computer-based Analysis for Identification And Quantification Of Small Airway Disease In Lung Computed Tomography Images: A Comprehensive Review for Radiologists

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Introduction: Respiratory diseases involve various components of the lung, including the small airways. Evaluation of small airway disease on CT images is challenging as the airways cannot be visualized directly by a CT scanner. Small airway disease can manifest as pulmonary air trapping (AT). Although AT may be sometimes seen as mosaic attenuation on expiratory CT images, it is difficult to identify diffuse AT visually. Quantitative CT (QCT) methods are being rapidly developed to quantify underlying lung diseases with greater precision than subjective visual assessment of CT images. This review aimed to describe the available methods for the identification and quantification of small airway disease on CT images.

Materials and Methods: Computed tomography (CT) imaging is being increasingly used in clinical practice for detailed characterization of lung diseases. Respiratory diseases involve various components of the lung, including the small airways. Evaluation of small airway disease on CT images is challenging as the airways cannot be visualized directly by a CT scanner. Small airway disease can manifest as pulmonary air trapping (AT). Although AT may be sometimes seen as

mosaic attenuation on expiratory CT images, it is difficult to identify diffuse AT visually. Computer technology advances over the past decades have provided methods for objective quantification of small airway disease on CT images. Quantitative CT (QCT) methods are being rapidly developed to quantify underlying lung diseases with greater precision than subjective visual assessment of CT images. A growing body of evidence suggests that QCT methods can be practical tools in the clinical setting to identify and quantify abnormal regions of the lung accurately and reproducibly. This review aimed to describe the available methods for the identification and quantification of small airway disease on CT images and to discuss the challenges of implementing QCT metrics in clinical care for patients with small airway disease.

Result: Computed tomography (CT) imaging is being increasingly used in clinical practice for detailed characterization of lung diseases. Respiratory diseases involve various components of the lung, including the small airways. Evaluation of small airway disease on CT images is challenging as the airways cannot be visualized directly by a CT scanner. Small airway disease can manifest

as pulmonary air trapping (AT). Although AT may be sometimes seen as mosaic attenuation on expiratory CT images, it is difficult to identify diffuse AT visually. Computer technology advances over the past decades have provided methods for objective quantification of small airway disease on CT images. Quantitative CT (QCT) methods are being rapidly developed to quantify underlying lung diseases with greater precision than subjective visual assessment of CT images.

Conclusion: Computed tomography (CT) imaging is being increasingly used in clinical practice for detailed characterization of lung diseases. Respiratory diseases involve various components of the lung, including the small airways. Evaluation

of small airway disease on CT images is challenging as the airways cannot be visualized directly by a CT scanner. Small airway disease can manifest as pulmonary air trapping (AT). Although AT may be sometimes seen as mosaic attenuation on expiratory CT images, it is difficult to identify diffuse AT visually. Computer technology advances over the past decades have provided methods for objective quantification of small airway disease on CT images. Quantitative CT (QCT) methods are being rapidly developed to quantify underlying lung diseases with greater precision than subjective visual assessment of CT images.

Keywords: air trapping; computed tomography; quantitative

Quantitative Analysis Of the Chest CT Images To Differentiate Lung Lesions In COVID And Non-COVID Cases

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Introduction: It is well known that the early detection of COVID-19 can save the life of patients. Computed Tomography is a

gold standard method to confirm COVID-19 at the early stage. The present study aims to differentiate the common lung lesions, such as

consolidation and Ground Glass Opacity (GGO), in COVID-19 and non-COVID cases, such as trauma and N1H1, using quantitative CT analysis.

Materials and Methods: The PACS system was used to extract the chest CT images of the COVID and non-COVID patients. The mean, minimum, maximum, and standard deviation of consolidation and GGO were measured by the proper size of ROI in COVID and non-COVID cases. The histogram analysis is used to make cumulative and probability distributions. Also, the Kolmogorov-Smirnov test was done to evaluate the CT-density values overlapping between the two cases.

Result: The histogram, cumulative, and

probability distributions of the HU values of consolidation between COVID and non-COVID cases showed differences. The Kolmogorov-Smirnov test showed that the two distributions are different with a 99% confidence level.

However, the same trend does not exist between COVID and non-COVID cases for GGO lesions.

Conclusion: Although the present study revealed the quantitative analysis of the chest CT images can be used to distinguish consolidation between COVID-19 from non-COVID cases, this method did not work for GGO lesions.

Keywords: COVID-19, Computed Tomography, Quantitative analysis

Concentration Dependence Of the HU Of Iodine Solutions: Application In Quality Control Of CT Systems And Iodine Dose Assessment

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Introduction: Iodine compounds, because of their high x-ray attenuation, compared to human tissues, are commonly used as contrast agents in CT imaging. This paper aims to test the

dependence of HU values for different weight/weight concentrations of iodine (w_i) in mixtures and to find the iodine concentration limits for which reasonable contrasts can be achieved.

Materials and Methods: Different concentrations of iodine solutions in weight/weight% (wi) were made. These solutions were scanned at 80, 90, 100, 110, 120, 130, and 140kVps, and their HU(V) was measured. The variation of HU with wi was analyzed as, $HU(V;i) = a_0(V) + a_1(V)w_i$. The values of $a_1(V)$ must be equal to the attenuation coefficient divided by 1000, being averaged over the source spectrum. We try to estimate the equivalent energy of the source spectrum from the $a_1(V)$ values.

Result: The variation of the HU(V) versus wi was linear at all energies. The equivalent energies by this method are 17, 34, 40, 38, 40, and 42

keV at 80, 90, 100, 110, 120, 130, and 140 kVps respectively. These equivalent energies are much lower than the usual expected value which is approximately kVp/3. This rather low value is because iodine has an absorption peak at 33 keV.

Conclusion: This method can be used for testing the linearity of the CT system. For iodine contrasts the equivalent energy to be used should be properly estimated and is generally less than kVp/3. This has to be kept in mind for radiological diagnostics with iodine contrast.

Keywords: Linearity, iodine dosimetry, kVp values

Dextroversion with Large Ventricular Septal Defect And Tubular Hypoplasia Of Aorta And Aortic Coarctation; A Complicated Fetal Echocardiography

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Introduction: The heart is normally levoposition and levocardia. If the apex of cardia is right it is called dextrocardia. Dextroversion is used when dextrocardia is associated with situs solitus. Dextroversion is usually associated with other cardiac and non-cardiac anomalies.

Materials and Methods: The patient was a 37-year-old woman who was referred for a screening ultrasound. Dextrocardia and associated disorders were seen in the ultrasound performed

Result: A 37-year-old white multi par without previous medical history was referred for obstetric ultrasonography at 18 weeks and 6 days of gestation. In fetal echocardiography dextroversion with coarctation of the aorta,

tubular hypoplasia, and large VSD were seen. Due to its rarity, it is very difficult to diagnose prenatal dextroversion, on the other hand, the association of dextroversion with CHD doubles the importance of its diagnosis, which causes close follow-up. The key finding in sonography was dextroversion.

Conclusion: In this reported case study, a large number of cardiac and non-cardiac disorders associated with dextroversion were reported, which were not previously reported in any of the studies for a fetus, and fetal encephalocele was reported, which was not reported in any of the previous studies with dextroversion.

Keywords: Dextroversion, tubular hypoplasia, fetal echocardiography

β -cyclodextrin-coated Bi₂O₃ Nanoparticles Conjugated with Curcumin for CT Imaging-Guided Synergetic Chemo-Radiotherapy In Breast Cancer

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Introduction: Nowadays more attention has been paid to the design and development of theranostic nanosystems in molecular computed tomography (CT) imaging and radiosensitizer in radiation therapy (RT).

Materials and Methods: This research produced and characterized bismuth oxide (Bi₂O₃) nanoparticles modified polycyclodextrin (PCD) and functionalized glucose (Glu) for curcumin (CUR) loading (Bi₂O₃@PCD-CUR-Glu). The prepared nanosystem was fully characterized and cytotoxicity, cellular uptake, reactive oxygen species (ROS) generation ability, as well as in-vitro CT contrast and X-ray RT enhancement evaluation assessed.

Result: The final synthesized spherical NPs, measuring approximately 80 nm in size, exhibited remarkable toxicity against the SKBr-3 breast cancer cell line. The cell viability was at its lowest level after 48 hours of exposure to a

radiation dose of 2 Gy at concentration of 100 μ g/mL. The combined treatment involving the utilization of Bi₂O₃@PCD-CUR-Glu NPs along with X-ray radiation demonstrated a substantial increase in the generation of ROS, specifically a remarkable 420% growth. The in-vitro CT imaging analysis also conducted unequivocally demonstrated the notable superiority of the NPs over Omnipaque in terms of X-ray absorption capacity, a staggering 1.52-fold increase at 80 kVp.

Conclusion: Results suggested that Bi₂O₃@PCD-CUR-Glu NPs, integrated with CT imaging and chemo-radiotherapy, have great potential as a versatile theranostic system in clinic.

Keywords: Breast cancer, CT, Bismuth oxide

Comparison Of the Radiation Cancer Risk from Cone-beam Computed Tomography And Panoramic Radiography In Pediatric And Adult Patients

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Introduction: This study aimed to estimate and compare the absorbed dose, lifetime cancer risk and mortalities due to cone-beam computed tomography (CBCT) and panoramic examinations on patients.

Materials and Methods: The exposure factors were applied to 332 patients in two age groups (6-10, and >18-year-old). The dose-area product (DAP) values were measured for CBCT and panoramic radiographies. Organ absorbed doses and effective doses were calculated based on the collected parameters applying PCXMC software. The risk of exposure-induced death (REID) and cancer risks were estimated by BEIR VII phase 2 model at different age groups and genders for the two dental radiography modalities.

Result: Salivary glands was the largest contribution of the organ absorbed dose and effective dose in both CBCT and panoramic radiographies. The mean (\pm SD) REID values (per

ten million) in CBCT were obtained at 35.6 ± 5.2 for females and 29.01 ± 1.8 for males, in the pediatric group, and were 31.1 ± 2.2 for females and 25.71 ± 2.02 for males in the adult group for all cancers. In addition, these values for panoramic radiography were 10.2 ± 1.2 and 6.61 ± 1.2 for women and men, respectively, in the pediatric group, and were 5.3 ± 1.06 and 3.01 ± 1.12 in the adult group. The mean REID values were higher significantly in CBCT compared to panoramic, and also in the pediatric than adult groups ($p < 0.05$).

Conclusion: CBCT had a significantly higher level of radiation risks compared to panoramic radiography. Therefore, clinicians should request CBCT examinations by considering their determinants and benefits.

Keywords: CBCT, Panoramic, Effective dose

Evaluation Of Difference between Computed Tomography Dose Index And Equilibrium Dose Using A Standard Phantom

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Introduction: The dose of Computed tomography (CT) scan exams consists of a large proportion of all medical imaging modalities' dose burdens. There are different methods to measure and describe radiation in CT. A standardized way is to measure the Computed Tomography Dose Index (CTDI). However, due to the increase in the detector system size along the z-axis in new CT scanners generations, new measurement methods are described in the American Association of Physicists in Medicine-Task Group No.111(AAPM-TG111). This study aims to estimate the equilibrium dose and compare it with the dose displayed in the volume computed tomography dose index (CTDIvol) at the end of each exam. Eventually, the effective dose was calculated for both methods.

Materials and Methods: Using standard phantom of polymethylmethacrylate (PMMA) and pencil ionization chamber, the values of CTDI₁₀₀, ϵ (CTDI₁₀₀), CTDIvol, cumulative dose, equilibrium dose, and effective dose were calculated.

Result: Six protocols performed in two centers and the results indicated that the measurements with a standard CT dosimetry phantom, was varied between average equilibrium dose and CTDIvol and the discrepancies ranged between 26% to 35%.

Conclusion: the CTDIvol is not suitable to evaluate the radiation dose at the end of each scan and the use of an equilibrium dose for dosimetry of new systems is recommended.

Keywords: Equilibrium dose, CTDI, AAPM

The Effect Of TNF- α -Fe₃O₄/Au And TNF- α -Fe₃O₄/Ag Nano-systems In Radiotherapy Of Breast Cancer Cell Line MDA-MB-231

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Introduction: Cancer is one of the leading causes of death worldwide. Among the primary reasons for the lack of treatment success and tumor recurrence is the development of resistance to therapeutic methods. Utilizing innovative and targeted approaches through the design of nano-structures that enhance drug effects and improve the impact of radiation in immuno\chemo-radiotherapy can play a valuable role in increasing the efficiency of treatment and reducing the side effects of each method. In this study, Fe₃O₄@Au and Fe₃O₄@Ag core-shell nanoparticles (NPs) were synthesized as radiosensitizer and effective drug delivery system. Tumor Necrosis Factor- α (TNF- α) was loaded on the surface of NPs and their synergistic effect was evaluated in radiotherapy of MDA-MB-231 breast cancer cell line.

Materials and Methods: Fe₃O₄@Au and Fe₃O₄@Ag NPs were synthesized and loaded with TNF- α . As a result, DLS, TEM, UV-visible, FT-IR characterization tests were performed to ensure the correct synthesis of NPs and binding of TNF- α to the surface of them. The MD-MB-231 cells were treated with different concentrations of TNF- α , Fe₃O₄@Au, Fe₃O₄@Ag, TNF- α -Fe₃O₄@Au and TNF- α -Fe₃O₄@Ag for irradiation at dose of 8Gy (energy of 6MV Siemens Oncore Linear Accelerator). Then, Cell

uptake, MTT, DAPI, ROS and hemolysis assays were used to check the performance of the nano-systems.

Result: The hydrodynamic size of Fe₃O₄@Au NPs was about 73.39nm, while the size of Fe₃O₄@Ag NPs was 46.91nm. Also, the zeta potential for each of the NPs was equal to -30.6mV and -17.3mV, respectively. Analysis of the TEM images showed that both NPs are almost spherical. Average particle sizes were around 24.34 \pm 5.74nm for Fe₃O₄@Au and 20.02 \pm 5.03nm for Fe₃O₄@Ag NPs. The Sensitizer Enhancement Ratios (SER) obtained for each group at highest concentration was as follows: TNF- α (10ng/mL) =2.04, Fe₃O₄@Au(100 μ g/mL) =2.02, TNF- α -Fe₃O₄@Au(100 μ g/mL) =2.41, Fe₃O₄@Ag(100 μ g/mL) =2.83, and TNF- α -Fe₃O₄@Ag (100 μ g/mL) =3.45. According to the results extracted from DAPI staining and ROS generation, it was found that the production of reactive oxygen species is the cause of radio-sensitization and cell apoptosis. In the hemolysis test, the synthesized NPs showed favorable blood compatibility.

Conclusion: In contrast to the proliferative activity of TNF- α on the MDA-MB-231 cell line, this protein promotes cell death in the presence of radiation. Fe₃O₄@Au and Fe₃O₄@Ag NPs increased radio-sensitization and also

the loading of TNF- α on their surface creates a synergistic effect and improves the efficiency of radiation therapy.

Keywords: Cancer, radiosensitizer, core/shell NPs, TNF- α

Non Invasive Prenatal Test As A Misleading Test for Anomaly Scan; A Case Report

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Introduction: In the past decades, with the advancement of genetic science, new tests have been introduced to investigate congenital disorders. One of them is non-invasive cell free DNA test that can be performed from the 10th week of pregnancy and is very easy and inexpensive. But this test may sometimes mislead us, as it happened in our case.

Materials and Methods: A 31-year-old white multipar was referred for obstetric ultrasonography at 17 weeks and 5 days of gestation

Result: A 31-year-old white multipar was referred for obstetric ultrasonography at 17 weeks and 5 days of gestation. In anomaly scan ultrasound nuchal translucency was 1.7 in normal range. Two most important findings were low set ear and crossed ectopic kidney that made us refer the patient for non invasive test

, cell free DNA. The test was normal. While we emphasize on ultrasonographic findings and refer to do amniocentesis. Genetic consultation was demonstrated trisomy 18 or Edward syndrome.

Conclusion: In this case, the sonographic findings raised a high diagnostic doubt for genetic diseases, but the initial screening test cell free DNA was negative. Due to the importance of these findings, the approach to these disorders was continued and amniocentesis was performed, and trisomy 18 was demonstrated. It seems that the importance of specific sonographic findings in supplementary evaluations has been given less attention, and sometimes, after a negative initial screening test, the continuation of the genetic examination process is avoided

Keywords: non invasive test, ultrasound

Invited Speaker Abstracts (21st IRSA)

Best Conventional And Advanced Techniques Of Breast MRI

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Breast cancer is one of the most common cancers and causes of cancer-related deaths. Breast MRI has been used for the evaluation of breast-related complaints and to distinguish benign changes from breast lesions. This paper reviews the current state-of-the-art protocols for

breast MRI and discusses the advantages and limitations of this technique from physicians and researchers who are actively involved in the diagnosis and treatment of patients with breast disease as well as from patients.

The Synergic Intersection Of MRI And Artificial Intelligence

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“The Synergic Intersection Of MRI And Artificial Intelligence” explores the dynamic relationship between two cutting-edge fields, shedding light on the transformative potential of their collaboration. Magnetic Resonance Imaging (MRI) has long been a cornerstone of medical diagnostics, providing detailed insights into the human body’s inner workings. However, the advent of Artificial Intelligence (AI) has opened up new frontiers, revolutionizing how we analyze and interpret MRI data. This presentation delves into the symbiotic partnership between MRI and AI, elucidating how AI algorithms can enhance MRI image analysis’s speed, accuracy, and precision. By harnessing the power of machine learning and deep learning, MRI scans can be interpreted with unprecedented

efficiency, leading to more accurate diagnoses and personalized treatment plans. Moreover, the integration of AI into MRI workflows has the potential to unlock novel biomarkers and imaging techniques, paving the way for earlier disease detection and intervention. Furthermore, this talk will spotlight the challenges and opportunities inherent in the fusion of MRI and AI, addressing ethical considerations, data privacy concerns, and the imperative of maintaining a human-centric approach in medical decision-making. By navigating through the intricacies of this synergic intersection, we can harness the full potential of MRI and AI to elevate patient care, advance medical research, and propel the field of diagnostic imaging into a new era of innovation and discovery.

The Importance Of Optimization In Clinical Musculoskeletal MR Imaging

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MR imaging has proven to be a valuable imaging tool in musculoskeletal structures in the body as a result of its ability to assess a wide range of anatomy and pathology ranging from ligament injuries to articular cartilage lesions. With its multi planar capabilities and excellent soft-tissue contrast, MRI has established itself as one of the most promising modalities for noninvasive evaluation of the musculoskeletal system. Today's faster imaging and various image plane reconstructions are possible, that it causes enabling better assessment of three-dimensional musculoskeletal anatomy and lesions.

The image quality, diagnostic accuracy, and acquisition time depend on the MRI protocol used. Therefore, it is important to optimize the MRI protocol. In this review, will talk about some parameters that they are important for optimizing MRI protocol. MSK MR Imaging has several characteristics that distinguish it from other areas: First, a large amount of fatty tissue in soft tissue and bone marrow has distributed so for increasing the contrast of lesions need

to use fat suppression techniques. Second, Proton density-weighted imaging is necessary for evaluating the structure of fibrocartilage or ligaments such as the meniscus. Third, various metal artifact reduction techniques are used to reducing artifacts caused by metal implants in images after orthopedic or spine surgery. For optimizing MSK MRI protocol we need:

- 1) Increase quality of clinical images Include of proper SNR and resolution, choice of coil, suitable pulse sequence for better observation of lesions, being familiar to different methods for fat saturation and methods to reduce or remove artifacts.
- 2) Optimizing the contrast for the tissue being evaluated being evaluated.
- 3) To examine the qualifications of all personnel 4) The effectiveness of quality control criteria In order to achieve these goals, Practice parameters and technical standards of the ACR can help us with recommendations.

Application Of Dual-Energy Spectral Computed Tomography In Oncology

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Background: Spectral CT is gaining increasing clinical importance with multiple potential applications, including oncological imaging. Spectral CT-specific image data offers multiple

advantages over conventional CT image data through various post-processing algorithms, which will be highlighted in the following review.

Methodology: The purpose of this review

article is to provide an overview of potential useful oncologic applications of spectral CT and to highlight specific spectral CT pitfalls. The technical background, clinical advantages of primary and follow-up spectral CT exams in oncology, and the application of appropriate spectral tools will be highlighted.

Results/conclusions: Spectral computed tomography (CT) has gained significant relevance in the field of oncology imaging, particularly in the evaluation and management of thoracic malignancies. This advanced imaging modality allows for virtual monoenergetic or monochromatic imaging, virtual non-contrast or unenhanced imaging, iodine concentration measurement, and effective atomic number (Zeff map). The clinical utility of dual-energy spectral computed tomography (DECT) has

been realized, leading to numerous studies exploring its use in thoracic oncology. Spectral CT offers multiple advantages over conventional CT imaging, including improved dose calculation, enhanced visibility of tumors and organs-at-risk, and the potential for predicting tumor recurrence through iodine content analysis.

Despite its potential, the use of spectral CT in radiotherapy clinics remains limited, but opportunities for applications in radiotherapy are being explored. Overall, spectral CT imaging presents promising opportunities for improving oncological imaging and treatment quantification.

Key points: The most important spectral CT reconstructions for oncology imaging are virtual unenhanced, iodine map, and virtual monochromatic reconstructions.

CT Scan Protocols Optimization Using The Concepts Of Image Reconstruction And Radiation Dose To The Patient

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CT scans play a crucial role in the early detection of various types of diseases and considered as modality of choice in cases such as brain hemorrhage (1-3). Despite the many advantages, the radiation dose to patients seems to be high with current techniques and acquisition parameters(4, 5). In order to reduce patient's dose in CT, some solutions such as diagnostic reference levels (DRLs), automatic tube current modulation (ATCM), dynamic shading, and iterative reconstruction algorithms have been proposed (6-8).The reconstruction algorithms in CT scan are back projection, filtered back projection, iterative reconstruction, and

fourier transform(9). In the past 5 years, deep learning reconstruction (DLR) techniques have become increasingly popular(10).The acquisition parameters including kVp, mA, rotation time, collimation, pitch factor affect radiation dose and image quality. kVp is considered a very important factor. Increasing mA and collimation lead to increase in dose. Pitch factor is inversely proportion to radiation dose but high pitch factor result in image quality degradation. To observe the radiation dose, volume CT dose index (CTDIvol) and dose length product (DLP) are recorded for each scan. In addition to have mastery over these factors, image quality should

be objectively and subjectively evaluated in order to optimize a CT protocol. Several studies

have been conducted with this regards.

Abdomen And Pelvic CT Scan; Case Presentation, Protocols And Techniques

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Technological advances in Computed Tomography including increased scan speed, increased image quality and patient dose reduction have opened new horizons in medical imaging domain. Abdomen and Pelvic CT Scan with and without contrast constitute a major percentage of CT requests. Regarding the presence of vital organs in Abdomen and Pelvis, physiology of these organs and also different pathologies in this region, necessity of tailoring specific protocol for each target organ is of great importance. Meanwhile patient data assessment including Medical History, previous studies like MRI, CT Scan, US, and Histopathology reports play an important role in determining exam

protocol, final diagnosis and treatment. Issues such patient preparation, GFR, Weight, Contrast Median type and dosage and Radiation Dose should also be added to considerations. Main Abdomen and Pelvic CT exams fall into categories like Without contrast, Early Arterial, Late Arterial, Portal, Portovenous, Renal Parenchymal, Equilibrium, and Delayed phase that must be chosen -as much as accurate- regarding target organs. In this context specific protocols for Liver, Pancreas, Billiary ducts, Kidneys, Adrenal glands and spleen will be addressed. Keywords: Computed Tomography, Radiation Dose, Image Quality, CT Protocols

Advances In Musculoskeletal MR Imaging

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Among the advanced MR imaging techniques, MR proton spectroscopy (MRS), diffusion-weighted imaging (DWI), and diffusion-tensor-imaging (DTI) are commonly used. These techniques have diverse applications, such as assessing tumors, ligaments, muscle injuries, and muscle disorders. The imaging characterization of musculoskeletal tumors can be challenging, and a significant number of lesions remain indeterminate when conventional imaging protocols are used. In recent years, there has been an increase in the clinical availability of advanced

MR imaging methods. These techniques show promise in improving tumor detection, characterization, and follow-up. Proton MRS provides noninvasive biochemical evaluation of tumors. Various metabolites present in human tissues have specific precession frequencies, and the amplitude of these frequencies in MRS is proportional to the metabolite concentration. In MSK oncology, choline compounds have been studied as markers of tumor aggressiveness. The application of DW-MRI in MSK oncology relates to the correlation between interstitial water

molecule movement and tumor cellularity, which is in turn associated with tumor aggressiveness. From diffusion data, parameters such as the anisotropy coefficient and the apparent diffusion coefficient (ADC) can be calculated. ADC is the most studied and widely available parameter for quantitative diffusion. DTI is a relatively new MRI-based technique relying on principles of DWI.

It holds potential for evaluating various musculoskeletal and peripheral nerve conditions.

DTI appears to be a promising tool, capable of providing valuable quantitative information about muscular tissue and peripheral nerves. Therefore, we aim to highlight some of the most important applications of MRS, DWI, and DTI in evaluating the musculoskeletal system. By considering the advantages and potentials of these techniques, it is hoped that their use in clinical practice will be expanded as much as possible.

Cardiac MRI For Patients With ICD

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Late gadolinium enhancement (LGE) in cardiac magnetic resonance imaging (MRI) is a pivotal tool for the assessment of myocardial viability and fibrosis, which has implications for the management of patients with various cardiomyopathies and those with implantable cardioverter-defibrillators (ICDs).

However, the presence of ICDs can introduce device-related artifacts (DRAs) that compromise the quality of LGE images, thus challenging the accurate assessment of myocardial tissue. To improve the quality of LGE imaging in patients with ICDs, wideband (WB) LGE protocols have been shown to significantly reduce the burden of DRAs, particularly in patients with transvenous ICDs (TV-ICDs).

The efficacy of WB LGE imaging varies with different ICD subtypes, with less impact on cardiac resynchronization therapy devices (CRT-Ds) and subcutaneous ICDs (S-ICDs), indicating that further developments are

needed to optimize LGE imaging for these devices. Additionally, the physical distance between the ICD and the heart, as well as patient factors such as body mass index, have been correlated with the extent of DRAs, suggesting that patient-specific factors and ICD positioning should be considered when planning LGE imaging. In summary, the use of WB LGE protocols represents a significant advancement in reducing DRAs and improving LGE image quality in patients with ICDs, particularly those with TV-ICDs. However, the variability in artifact reduction across different ICD types necessitates ongoing research and protocol optimization to enhance LGE imaging for all ICD patients. The consideration of patient-specific and device-related factors in the planning and execution of LGE MRI can further refine the quality of diagnostic imaging in this context.

The Importance Of Quality Control In Musculoskeletal MR Imaging

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With its excellent soft-tissue contrast and multiplanar capabilities, magnetic resonance imaging (MRI) has become well-established as a fundamental modality for the assessment of musculoskeletal (MSK) abnormalities. However, there is significant variability in the quality of MRI exams performed at different sites. Achieving the full potential of MRI requires careful attention to quality assurance (QA), both in regard to equipment performance and to the execution of imaging studies. The Magnetic Resonance Imaging Accreditation Program of the American College of Radiology (ACR) was established to verify the quality of the performance of magnetic resonance imaging at accredited facilities. Accreditation received through this program assures patients, referring physicians, and others that magnetic resonance imaging studies at accredited sites are only performed by well-trained and competent personnel using properly functioning equipment. All sites

accredited by the American College of Radiology in magnetic resonance imaging have agreed to carry out a continuous program of magnetic resonance imaging equipment quality control (QC). The QC program provides a framework within which even gradual or subtle problems can be identified, isolated, and resolved. The MR supervising radiologist has the responsibility for ensuring that all QA/QC requirements are met. The qualified medical physicist/MRI scientist is responsible for overseeing all equipment-related QA/QC practices. The MRI technologist is specially trained and given the responsibility to conduct QA/QC activities not assigned to the lead MRI radiologist or the medical physicist/MRI scientist, including weekly QC testing of the MRI system. Considering the global standard in the field of QA/QC, a fundamental question arises: Are ACR guidelines being considered and implemented in the MRI department in Iran?

Neurodegenerative Diseases Imaging

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Neurodegenerative diseases are a devastating group of disorders that can be difficult to accurately diagnose. Both anatomic structural imaging and physiologic molecular imaging have evolved to a state in which these neurodegenerative processes can be identified relatively early with high accuracy. Structural changes is earliest biomarkers that can be

used in the diagnosis of AD, such as atrophy. Neuroimaging tools, in particular structural (sMRI), are used for measures of atrophy, especially because the atrophic process occurs earlier than the appearance of behavioral amnesic symptoms. Assessment for region or lobar-specific patterns of volume loss, as these patterns are critical in differentiating the

neurodegenerative diseases. structures in the limbic system, such as the hippocampus and entorhinal cortex are directly involved in the common neurodegenerative disorders and are vital to interpreting anatomic imaging. Another important area to evaluate is the precuneus,

which is best evaluated on sagittal T1-weighted MR images. Detection of precuneus involvement also has potential implications in early-onset Alzheimer disease.

Technologists Considerations: Complication Of Contrast Agents Injection

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Introduction: In this topic, we discuss the considerations and challenges faced by technologists in the injection of contrast agents. We learned about the history of the use of a number of contrast agents and also the concept of injection. The most important challenge that the technologists are involved with is the discussion of contrast agents injections and the necessary training for it and the legal issues related to the injection, which was addressed by looking at the title of university courses and trainings and the description of the duties of technologists. We examined the opinion of the law in the field of injections and the people who are allowed to perform injections, and

we studied the related directives issued by the vice-president of treatment of the Ministry of Health and Medicine as a legal authority. In the end, we discussed the consequences that the law provides for meddling in medical affairs without having the necessary expertise and educational qualifications, and we learned about the punishment that the law provides for these violations.

Conclusion: In order to avoid legal issues, it is suggested that the respected colleagues in the imaging centers use qualified colleagues for the injection and a doctor must be present during the injection.

Adverse Reaction To Iodine Contrast Media: Prevention And Management

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This article described various forms of adverse side effects and reactions from the administration of iodine contrast media (ICM) vary from minor physiological disturbances to

rare severe life-threatening situations. Iodine contrast media as same as other contrast agents have been used to improve medical imaging. Their value has long been recognized,

as attested to by their common daily use in imaging departments worldwide. Like all other pharmaceuticals, however, these agents are not completely devoid of risk. Preparation for prompt treatment of contrast media reactions must include trained personnel, equipment, and medications. Therefore, such preparation is best accomplished prior to approving and performing these examinations. Familiarity emergency treatment of contrast media reactions must be part of the environment in which all intravascular contrast media are administered.

Although adverse side effects are infrequent, a detailed knowledge of the variety of side effects, their likelihood in relationship to pre-existing conditions, and their treatment is required to insure optimal patient care. Optimal treatment of contrast reactions starts with a well-designed

plan and a properly trained staff. In addition to basic life support training, on-site personnel should be trained in the rapid recognition, assessment, diagnosis, and treatment of contrast reactions. Adverse reactions to intravascular iodinated contrast media is divided into two main categories, general adverse reactions and renal adverse reactions.

General adverse reactions include: acute adverse reactions, late adverse reactions and very late adverse reaction.

Acute reactions are: Allergy-like, hypersensitivity reactions Chemo toxic responses. Renal adverse reactions is post-contrast acute kidney injury (pc-aki)

Keywords: Iodine contrast media, adverse reactions, treatment of contrast reactions

A Comprehensive Review Of Artifacts In CT Scans: Types, Causes, And Reduction Strategies

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Computed Tomography (CT) represents a fundamental imaging modality extensively utilized in the domain of medical diagnosis and therapeutic interventions. However, CT scans are susceptible to artifacts that have the potential to introduce image distortions and compromise the accuracy of diagnostic evaluations. This study aims to investigate and examine various aspects related to artifacts in CT scans, including their types, causes, and potential strategies for reducing their presence. The review classifies artifacts encountered in CT imaging as either patient-related, equipment-related, or image reconstruction artifacts. Various approaches are discussed to reduce artifacts. Optimizing patient

positioning and coaching, using breath-hold techniques or respiratory gating, and employing advanced hardware calibration and correction algorithms are effective in reducing artifacts. Post-processing techniques such as iterative reconstruction and metal artifact reduction algorithms also help in reducing artifacts. By understanding the various types of artifacts, their causes, and effective reduction strategies, healthcare professionals could enhance the accuracy of diagnoses and treatment planning. The integration of artificial intelligence (AI) holds promise in automating artifact detection and reduction processes, thereby improving efficiency and diagnostic precision.

Relaxation Time Mapping In Cardiac Magnetic Resonance

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Noninvasive characterization of tissue has long been the interesting space of attractive reverberation imaging (MRI) when compared to other imaging modalities. Strategies for such regularly emphasize one or more MR-based relaxation parameters and the comparing image differentiate or weighting.

With or without administration of a contrast media, cardiac MRI manages nitty gritty myocardial tissue characterization through different fragmented as well as single heart beat approaches. The important procedure for myocardial characterization has been late gadolinium enhancement (LGE); LGE is routinely performed in MRI centers around the world as an indispensably portion of about each cardiac MRI exam. Whereas initially created to characterize infarct scar, LGE has since gotten to be an imperative procedure to depict other highlights of myocardial malady such as fibrosis in no ischemic cardiomyopathy and differentiate such as sarcoid granuloma

and amyloid protein. LGE more often than not gives vigorous myocardial characterization, but has two major impediments. To begin with, it requires administration of gadolinium-based contrast, which may not be reasonable for people with known reaction to such contrast media or patients with progressed kidney malady. Moment, it may be harsh to more diffusely unhealthy myocardium where one loses the capacity to 'null' ordinary tissue through this technique's key reversal time parameter. To overcome these confinements, as well as to characterize other myocardial highlights, imaging methods that capture natural contrast in T1, T2 and other MR-based relaxation parameters are regularly consolidated into the cardiac MRI examination. Collecting prove recommends that quantitative approaches, also known as tissue mapping techniques, are making a further assist development MR-based myocardial characterization

How To Calculate And Evaluate The Effective Dose Of Patients In CT Scan Procedures

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One of the medical imaging modalities that has the largest contribution to the dose received by patients is the use of a CT scan machine. Knowing the amount of dose received by the patient can help to evaluate the safety

of patients. In this presentation, the methods of patient dose assessment in CT scan and its relationship with the risk of cancer in the society will be discussed.

Role And Responsibilities Of Health Physicists In Hospitals

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A Health Physicist is responsible for assessing and managing radiation risks associated with various healthcare settings. They work to ensure that workers and the general public are protected from harmful effects of radiation exposure. This job involves a combination of analytical, technical, and regulatory skills to effectively communicate risks and implement appropriate controls. Health Physics is a field that focuses on preventing or reducing human exposure to radiation and nuclear materials.

Health Physicist is a profession that requires high-level training and experience to understand and mitigate the risks of radiation Sources. The key responsibilities of a Health Physicist may include conducting radiation safety surveys, ensuring that safety procedures are followed, evaluating work activities and making recommendations, inspecting safety equipment, investigating unusual radiation occurrences, and maintaining radiation safety records.

Estimation Of Fetal Radiation Dose In Diagnostic Medical Exposure

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In some cases, it is clinically necessary to perform a radiological examination (diagnostic X-ray, CT or nuclear medicine) on a woman who is known to be pregnant or subsequently discovers that she was pregnant at the time of her exam. In radiological examinations of the lower abdomen and pelvis area, the fetus is directly irradiated and hence may receive some significant dose. Therefore, it is important to be able to determine the absorbed dose to the fetus. The determination of the absorbed dose to the pregnant patient in diagnostic medical exposure is of interest as a basis for risk estimates of the fetus.

Once the fetal radiation dose is estimated, the potential health effects can be assessed. The potential biological effects of in utero

radiation exposure of a developing fetus include prenatal death, intrauterine growth restriction, small head size, mental retardation, organ malformation, and childhood cancer. The risk of each effect depends on the gestational age at the time of exposure and the absorbed radiation dose level. In practice, Prenatal exposure to ionizing radiation as used during most diagnostic procedures generally not involving with high dose to abdominal/pelvic (less than 100 mGy), presents no increased risk of prenatal death, malformation or impairment of mental development (i.e. deterministic effects) compared to the background incidence of these entities. Malformations only occur above a threshold dose of 100-200 mGy. These doses are not normally reached with most properly

executed diagnostic procedures. Whoever, radiation exposure of the fetus is associated with some increase in stochastic effects (hereditary effects and cancer) which Fortunately are negligible in most cases.

The aim of this presentation, introducing the

software programs currently used for estimate the fetal radiation dose and calculates the risks of in utero exposure based on comparing the calculated doses with the natural spontaneous risks.

Recent Advancements In Biological Dosimetry Of Radiation Workers Exposed To Low Dose And Occupational Exposure

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Widespread usage of nuclear technology in industry and medicine leads to chronically exposure to longterm low-dose ionizing radiation of a large population working in these facilities. In case of nuclear and radiation accidents or emergency situations, those involved in the event do not have personal dosimeters. To distinguish between those who received radiation in order to provide them with timely medical treatment, Biological dosimetry (BD) has emerged as a valuable tool for radiation dose assessment for persons who does not have personal radiation measuring devices or when those devices cannot provide important information due to the inter-individual variation in biological response to radiation. Cytogenetic biodosimetric assays are based on a number of biological endpoints essentially related to chromosomal aberrations (CA) in peripheral blood lymphocytes (PBL). Such assays assess the radiation absorbed dose based on quantification of radiation induced dicentric chromosomes (DC), cytokinesis-block micronuclei (CBMN), premature chromosome condensation (PCC) fragments/rings, or translocation using

fluorescence in situ hybridization. Among these, DC is considered the 'gold standard' for BD for radiation emergency medicine by IAEA and other international agencies, because of its proven utility in the past large-scale nuclear incidents. However, cytogenetic assays for quantitative estimation of CA suffer from methodological limitations. Despite these limitations, DC is currently the most sensitive, reliable and widely used quantitative biomarker of radiation exposure.

From these, PCC assay seems an attractive cytogenetic technique because has no limitations of other cytogenetic methods. Other methods such as gamma-H2AX for assessment of unrepaired DNA double strand breaks, gene amplification, non-coding RNA molecules, are also under investigation to be used as possible reliable biomarker for low dose estimation.

Crucial MRI Pulse Sequences And AI In The Diagnosis And Monitoring Of Multiple Sclerosis

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Magnetic resonance imaging (MRI) plays a crucial role in the diagnosis and monitoring of multiple sclerosis (MS). Beyond its diagnostic utility, MRI techniques are essential for staging patients, measuring disease progression, assessing lesion burden, and predicting long-term disability. With the advent of new therapies for MS, MRI is pivotal in monitoring treatment response, determining baseline tissue damage, and evaluating treatment efficacy and safety. Standard MRI pulse sequences like T1-weighted, T2-weighted, and FLAIR sequences are commonly employed to visualize lesions, inflammation, and abnormalities in the brains and spinal cords of MS patients. Advanced MRI techniques, including diffusion tensor imaging (DTI), magnetization transfer imaging,

perfusionweighted imaging (PWI), and magnetic resonance spectroscopy (MRS), provide additional insights into MS pathology.

Furthermore, the implementation of inversion recovery (IR) and double inversion recovery (DIR) pulse sequences enhances the sensitivity and specificity of MRI for MS diagnosis and monitoring, particularly in highlighting lesions in challenging regions such as the cortex and juxtacortical areas. Additionally, AI techniques, such as machine learning and deep learning, have shown promise in analyzing complex MRI data to identify disease patterns and predict disease progression. The integration of MRI and AI has the potential to revolutionize our understanding of MS and ultimately improve patient outcomes.

Contrast Media In Ultrasound; Challenges, Opportunities, And Future Prospects

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Diagnostic imaging modalities like radiography, CT scan, MRI, and ultrasound play a crucial role in assessing disease severity accurately. Delayed disease diagnosis can escalate cancer care costs and mortality rates. Among these methods, ultrasound stands out for its real-time imaging and portability, especially in diagnosing malignancies and cardiovascular

conditions. In ultrasound imaging, waves pass through tissues, varying echo intensity based on acoustic impedance changes between interfaces. Early disease detection is a limitation, but contrast-enhanced ultrasound imaging can enhance sensitivity and specificity, aiding in early detection, treatment optimization, and reducing mortality and care costs.

Ultrasound contrast agents enhance acoustic impedance differences, increasing reflected echoes.

Criteria for these agents include optimal impedance changes, stability, size for vascular enhancement, compatibility, and tissue safety. Various factors impact contrast agent performance, such as particle size, core and shell materials, and thickness. New contrast agents focus on cellular and molecular realms, enhancing sensitivity and specificity for early disease detection. Nanoparticles with specific structures and binding properties offer targeted imaging and disease diagnosis improvements.

This update categorizes promising ultrasound contrast agents, their clinical uses, and future challenges. Key challenges faced by ultrasound contrast agents include designing circulation systems and ensuring safe clearance. Future efforts may concentrate on creating drug delivery systems and fine-tuning nanoparticle size. These systems will utilize diverse materials to uphold the correct signal echo intensity. Researchers strive to produce theranostic materials to enhance drug delivery and boost treatment effectiveness with ultrasound-guided imaging.

Keywords: Ultrasound; Contrast Agents; Nanoparticles; Challenges; Opportunities

Measurement And Quantative Musculoskeletal MRI Techniques

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Medical imaging has played a very important role in diagnosing, evaluating, controlling the progression of the disease and monitoring the treatment of the musculoskeletal system for over a hundred years.

Orthopedic segmentation and measurements involving the evaluation of length, distance and functional angles in the musculoskeletal system are among the most important applications of MSK imaging.

Magnetic Resonance Imaging (MRI) offers a range of visual contrasts and high resolution and information-rich images, as well as the ability to measure in all spatial dimensions and classification for orthopedic applications of glenoid version, α angle, scapholunate distance and as a medallion and diagnostic tool is very useful and reliable in the diagnosis of many MSK

disorders. Most of the use of MSK MRI is for qualitative evaluation. Most common disorders and diseases in the musculoskeletal system are related to changes and disorders of the cartilage, inflammation, change of muscle and skeletal mass. Currently, quantitative Magnetic Resonance Imaging (QMRI) pulses, which are sensitive to the biochemical and microstructural composition of tissue, are used for measurement and quantitative examination to assess joint damage, cartilage degradation, osteoarthritis, inflammation, etc ... It's used.

These pulse sequences include T1 , T2 mapping , Chemical shift, dGEMRIC and UTE/ UTZ. In this discussion.

MRI Mapping Of The Liver Clinical Application And Technical Considerations

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Infiltrative diseases, e.g. iron deposition, amyloidosis, and lipid accumulation lead to systemic alterations in tissue composition causing dysfunction of different organs, including heart, liver, and kidney. These pathological changes in tissue composition can be non-invasively visualized and quantified using novel multiparametric imaging techniques, whereas conventional MR imaging only enabled qualitative image interpretation and signal intensity based analysis using arbitrary units.

Initial efforts of multiparametric imaging using T1, T2 and T2* mapping have mainly focused on cardiac imaging, however these techniques also be applied in other organs, such as liver. T1 mapping is the geographical representation of true T1 of certain tissues within the field of view. In order to reconstruct the T1 map, proton spin-lattice relaxation times (T1) are calculated for every voxel within the field of view using multiple raw images with

different degrees of recovery of magnetization along the longitudinal axis following inversion recovery (IR) or saturation recovery (SR). T1 maps are reconstructed in either colour or grey scale, where the intensity of a certain voxel represents the corresponding T1 value. T2 mapping is the voxel-wise representation of the proton spin-spin relaxation time (T2) of the tissue of interest within the field of view. T2 values for each voxel are acquired via based T2 weighted images at various echo times (TE) with a long repetition time in order to minimize the effect of longitudinal relaxation. Acquired T2 values reflect the free water content present in the tissue of interest, which can be used for quantification of edema. T2* mapping uses the effective T2 value which decays faster than true T2 due to the dephasing effects of local field inhomogeneities from susceptibility differences present within the voxel. T2* mapping can be used for measurement of iron content in tissues.

How To Manage The Time And Quality Of Breast MRI In A Breast Imaging Center

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Breast MRI imaging is the most sensitive imaging modality for the detection of breast cancer.

This article provides specific recommendations for achieving high quality breast MRI. Because of different MRI hardware, software, and

scanning capabilities, it is not possible to achieve complete uniformity of protocols, but specific guidelines for equipment requirements and scanning protocols are given for performing bilateral contrast enhanced breast MRI with high spatial resolution, good temporal resolution, and

high SNR. Breast MRI is prone to various image artifacts such as motion, fat and Susceptibility Artifacts. This article focuses mainly on these three artifacts, with a brief discussion on aliasing and other artifacts. Using proper positioning techniques in this article will improve cancer

detection and imaging accuracy.

Keywords: Contrast agent, Spatial resolution, Temporal resolution, Technical quality, Artifacts, Positioning.

Imaging In Interventional Pain Medicine

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The goals of interventional pain management are to relieve, reduce, or manage pain and improve a patient's overall quality of life through minimally invasive techniques specifically designed to diagnose and treat painful conditions. These include, but are not limited to, trigger point injections, different nerve blocks, intravenous infusions, radiofrequency lesioning, botulinum toxin injections, intraspinal analgesics, and spinal or deep brain stimulation techniques. Guidance from X-ray or ultrasound imaging helps us deliver the therapy to the exact source of pain.

- The most important topics that will be discussed: Back Pain and IPM Treatments Epidural injections (in all areas of the spine): the use of anesthetic and steroid medications injected into the epidural space to relieve pain or diagnose a specific condition. Many conditions can cause this type of pain, such as herniated disc, degenerative disc disease, and arthritis. X-ray guidance helps us inject low doses of long-lasting corticosteroids (potent anti-inflammatory pain medications) directly into the source of the pain. This approach decreases inflammation and helps you feel better.

- Nerve, root, and medial branch blocks
- Facet joint injections
- Discography
- Pulsed Radiofrequency Neurotomy (PRFN)
- Spinal cord stimulation
- Intrathecal pumps
- Percutaneous Discectomy/Nucleoplasty
- Occipital nerve blocks Kyphoplasty (balloon kyphoplasty)

Muscle and joint injections under ultrasound guidance Platelet-rich plasma (PRP) therapy Sympathetic Blocks:

- Ganglion impar
 - Lumbar sympathetic blocks
 - Stellate ganglion Joint Injections
- CANCER PAIN MANAGEMENT Basic Techniques for Image-Guided Injection:

The patient's position is chosen with three factors in mind: (in order of priority) Safety Access for the block Patient comfort Radiation Safety Minimizing Patient Radiation Exposure ALARA principle Radiographic Contrast Agents

Abdomen Dynamic Grasp Vibe

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Compressed Sensing GRASP-VIBE combines the principles of Compressed Sensing and GRASP-VIBE to revolutionize abdominal MRI. This technique allows for high-resolution dynamic abdominal imaging under free-breathing conditions, expanding the patient population eligible for the procedure. Patients who have limited breath-hold capability or difficulty following breathing commands can now undergo

this exam with ease.

With its intelligent reconstruction and processing framework, Compressed Sensing GRASP-VIBE automatically identifies different phases of liver dynamics and outputs only the clinically relevant information. This streamlines the workflow and brings the advantages of this technique to daily clinical routines.

Low Dose Effects: Radiation- Induced Carcinogenesis Risk And Cancer mortality

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Adverse health effects of ionizing radiation (IR) particularly epilation and skin damages were identified shortly after the discovery of X-rays in 1895. The radiation-induced cancer could be considered as long-term stochastic phenomenon and radiation protection is prominently focused on cancer risk of low dose IR. However, the carcinogenic impact of IR is controversial because of imprecise and conflicting data at low dose.

The National Radiological Protection Board declared "low dose" as values below 100 mGy for acute low dose exposures and below 5 mGy per hour for low dose rate. Based on the epidemiological studies the lowest dose value of IR with increased risk of human cancer is 10–50 mSv for an acute exposure and 50–100 mSv for prolonged exposure. The basis for radiation protection standard mainly comes

from epidemiological studies of Hiroshima and Nagasaki. Accumulating evidence of survivors of the nuclear bomb (Chernobyl accident in 1986 and Fukushima Daiichi NPP in 2011) have shown a higher radiation-induced cancer risk in childhood IR exposure than in elderly. The increased relative risk of 1.0 and 1.7 per Sv was reported respectively with dose for both utero and early childhood. Significant dose response was illustrated over 0–0.2 Gy dose range which confirms the fact that there is no threshold below which cancers are not induced.

The cancer risks of occupational exposure might be received from medical or nuclear industry related works. National Registry for Radiation Workers announced the accumulative dose value above 100 mGy which is higher than the upper limit for "low dose" delivered acutely.

The main explanation is probably lack of any reports of deviation from linearity in the dose-response.

It is thoroughly believed that the Linear non-threshold (LNT) (adopted in late 1950s) has been the most widely applied model for radiation risk assessment by means of extrapolation the risk of high dose IR. Despite much research, there still remains considerable uncertainty to the LNT model including its overprotective approach in

low dose and fractionated irradiation as well as some biological effects, such as bystander response. In order to quantify the risk of low dose radiation, large epidemiological studies are needed to obtain the optimum level of precision. However, future cancer risk assessment will be associated with the radiobiological models. To conclude, application of advanced radiobiological models based on experimental and molecular data will enhance the accuracy.

Evaluation Of Medical Exposure to Ionizing Radiation: Dose Reduction Approach In CT Scan

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Abstract: Medical exposure is the exposure of patients as part of their medical diagnosis or treatment; exposure of asymptomatic people as part of health screening programmes or individual health assessment. The UNSCEAR 2020/2021 Report presented a comprehensive global estimate of frequencies and doses from medical exposure to ionizing radiation for the period 2009–2018. It is considered four general categories of medical practice using ionizing radiation:

- (1) diagnostic radiology, including dental radiology and computed tomography,
- (2) interventional radiology (image-guided interventional procedures),
- (3) nuclear medicine, and
- (4) radiation therapy.

About 4.2 billion medical radiological examinations were performed annually, resulting in an annual effective dose of 0.57 mSv per caput. The use of computed tomography (CT) has continued to grow and the contribution from interventional radiology has increased rapidly in recent years. Why increased dose in CT?

- Unlike radiography the higher exposures in CT results better image quality
- There is a tendency to increase the volume covered in a particular examination
- Modern helical CT involves volume scanning with no inter-slice gap and with possibility of overlapping scans
- Repeat CT examinations
- Same exposure factors used for children as for adult
- Same exposure factors for pelvic (high contrast region) as for abdomen (low contrast region)
- An increase by 10-30% may occur with multi-slice detector array

What can operators do?

- Limit the scanned volume
- Reduce mAs values
- Use automatic exposure control by adapting the scanning parameters to the patient cross section. 10-50% reduction in dose documented, without any loss of image quality
- Use of spiral CT with pitch factor >1 and

calculation of overlapping images instead of acquiring overlapping single scans

- Shielding of superficial organs such as thyroid, breast, eye lens and gonads particularly in children and young adults. This results in 30-60% dose reduction to the organ
- Separate factors for children. Can reduce dose by a factor of 5 or more
- Use of partial rotation e.g. 270 degrees in Head CT
- Adequate selection of image reconstruction parameters
- Use of z-filtering with multi-slice CT systems

Actions for manufacturers

- Introduce automatic exposure control
- Be conscious of high doses in CT
- Include safety features to avoid unnecessary dose
- Display of dose
- Convenience in using low dose protocols
- Draw attention of users to selecting separate protocols for paediatric patients

Actions for physician & radiologist

- Justification: Ensure that patients are not irradiated unjustifiably
- Request for CT examination should be generated only by properly qualified medical or dental practitioners

- Clinical guidelines advising which examinations are appropriate and acceptable should be available to clinicians and radiologists
- Consider whether the required information be obtained by MRI, ultrasonography
- Consider value of contrast medium enhancement prior to commencing examination
- CT scanning in pregnancy may not be contraindicated, particularly in emergency
- CT examination should **not be repeated** without clinical justification
- Clinician has the **responsibility** to communicate to the radiologist about previous CT examination of the patient
- CT examination for **research** purpose that do not have clinical justification
- CT examination of chest in young girls and young females needs to be justified in view of high breast dose

Medical exposure remains by far the largest human-made source of radiation exposure to the public.

Keywords: Medical exposure, Ionizing radiation, United Nations Scientific Committee on the Effects of Atomic Radiation

The Role Of MRI In Diagnosis Of Cerebral Dementia:

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Dementia is a syndrome characterized by multidomain acquired chronic cognitive impairment that has a profound impact on daily life. Neurodegenerative diseases such as Alzheimer's disease or nondegenerative diseases such as vascular dementia are considered to

cause dementia. The need for further diagnostic improvement originates from the prevalence of these conditions, especially in developed countries with a predominance of the elderly population. Today, the diagnosis and follow-up of all neurodegenerative diseases cannot

be performed without radiological imaging, primarily magnetic resonance imaging (MRI).

The introduction of 3T MRI and its modern techniques, such as arterial spin labeling, has enabled better visualization of morphologic changes in dementia. For better diagnosis and follow-up in patients with dementia, various semiquantitative scales have been designed to improve the accuracy of assessment and decrease interobserver variability. Moreover, there is a growing need for MRI in the assessment of novel therapies and their side effects. To better apply MRI findings in the diagnosis of both already developed dementia and its early stages, the aim of this paper is to review the available literature and summarize the specific MRI changes. Based on the main pathophysiological mechanism, dementia can be classified into neurodegenerative (Alzheimer's disease; Parkinson's disease; Frontotemporal dementia; Posterior cortical atrophy; Lewy body dementia; Huntington's disease) and nondegenerative dementia with numerous entities (Haemorrhagic and ischemic stroke; primary and secondary tumors; traumatic brain injury; diffuse axonal injury; normal pressure hydrocephalus).

There are a number of outstanding protocols for diagnosing brain degeneration, which include:

- 3D Ax T1W Bravo Cor T1W high resolution
- Ax T2W Prop Cor T2W FRFSE High resolution
- 3D FLAIR
- 3D SWAN/SWI**
- DWI TENSOR
- MRS
- FMRI & 3D ASL
- Gadolinium-based MRI

MRI has become one of the key diagnostic elements, not only in diagnosis but also in monitoring the therapeutic response of patients with dementia. Semiquantitative scales have been quite useful in the assessment of structural MRI; nevertheless, for even greater precision, they need to be complemented by other advanced techniques. Volumetric analysis and ASL have demonstrated a capacity to improve not only the diagnosis but also the precision in the prognosis of dementia. ASL may be used in cognitive decline prediction and may be effective in selecting candidates for future dementia therapies. However, further research is necessary for even greater usability of the abovementioned MRI techniques.

Advancements In Late Gadolinium Enhancement Imaging In Cardiac Magnetic Resonance

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Abstract: Late Gadolinium Enhancement (LGE) imaging in Cardiac Magnetic Resonance (CMR) has undergone significant progress, evolving into a pivotal tool for diagnosing various cardiac pathologies. This abstract explores the recent advancements in LGE imaging techniques,

focusing on their clinical implications and utility in cardiovascular disease management. We discuss novel imaging protocols, such as motion correction techniques and high-resolution imaging, which enhance the accuracy and reliability of LGE for detecting myocardial scar tissue.

Additionally, the integration of LGE with quantitative imaging methods, including T1 and T2 mapping, provides comprehensive tissue characterization, aiding in risk stratification and treatment planning for patients with ischemic and non-ischemic cardiomyopathies. Furthermore, advancements in LGE imaging have facilitated its application in assessing myocardial viability, guiding interventions, and monitoring therapeutic

response. Despite these strides, challenges remain, including standardization of imaging protocols and interpretation criteria, as well as addressing safety concerns related to gadolinium-based contrast agents. Overall, the progress in LGE imaging underscores its growing importance in the field of CMR, offering valuable insights into myocardial tissue pathology and contributing to improved patient care and outcomes.

The Role Of MRI In Diagnosis Female Pelvic Pathologies

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(MD)

MRI has improved the ability of the diagnostic radiologist to provide useful clinical information to the practicing gynecologist. Although US remains the screening procedure of choice for evaluation of the uterus and adnexa because of its relative safety and low cost, MRI is now considered the next imaging step.

MRI of the female pelvic is a gold standard for the diagnosis female pathologies in reproductive system by varied and multifarious pulse sequences. It can help find female diseases

such as tumours and cysts in the ovarians and uterus. It can give information of their features and characters. Although MRI can't find out reproductive cancer, but it has precious ability in determination of staging.

MRI can find reasons of pelvic pain in female, such as endometritis.

We are allowed following and finding uterine changes and its anomalies, by MRI, such as Rokitasky Syndrome (MRKH) and etc.

X-ray Contrast Agents: Structure And Physicochemistry

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Abstract: Nowadays applications of contrast media in X-ray imaging such as radiology and CT scan play a main role in diagnosis. Contrast media should be selected in the best way to have minimum side effects on tissues as it is used to develop the contrast resolution of imaging

modalities by improving the diagnostic values of anatomical structures.

The contrast media is divided to neutral such as water, positive such as Barium and negative such as air. Positive contrast agents are separated into iodinated and non-iodinated media.

The most important positive non-iodinated contrast media is used for visualization pathologies in GI system via swallow or enema. The most essential points to be considered by any technologists are benefits and risks of Barium.

There are two divisions for Iodinated contrast media; ionic and non-ionic agents. Ionic iodinated agents are used infrequently because of side effects after injection. Non-ionic iodinated agents are more practical due to great enhance X-ray

imaging and their safety to patients.

This article describes how the latest contrast media which is classified by viscosity and density can be effective on contrast. Moreover, the wide applications of Barium sulfate in X-ray imaging are reviewed.

Keywords: contrast media, iodinated contrast media, barium sulfate, viscosity, imaging modality

Clinical Application Of Advanced MRI Techniques In Neuro-Oncology; Opportunities And Challenges

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Advanced MRI techniques, including Diffusion Tensor Imaging (DTI), Perfusion imaging, and Magnetic Resonance Spectroscopy (MRS), have revolutionized the field of Neuro-Oncology by providing intricate insights into the structural, functional, and metabolic characteristics of brain tumors. Advanced MRI techniques such as DTI, perfusion imaging, and MRS play a crucial role in neuro-oncology by providing detailed insights into brain tumor microstructure, vascularity, and metabolism. These advanced techniques offer a deeper understanding of tumor characteristics, aiding in diagnosis, treatment planning, and response assessment. advanced MRI helps clinicians tailor personalized treatment strategies for patients.

Despite their significant clinical utility, challenges and limitations exist in implementing these advanced MRI techniques in neuro-oncology practice. Advanced MRI techniques, such as DTI, PWI, and MRS have transformed the field of Neuro-Oncology by providing detailed insights into the structural, functional, and metabolic features

of brain tumors. These advanced techniques play a vital role in neurooncology by offering a deeper understanding of tumor characteristics, aiding in diagnosis, treatment planning, and response assessment. By uncovering the intricacies of tumor microstructure, blood flow patterns, and metabolic processes, advanced MRI enables clinicians to customize personalized treatment approaches for patients. Despite their significant clinical value, challenges and limitations exist in the integration of these advanced MRI techniques into neuro-oncology practice. This article explores the clinical applications of advanced MRI techniques in Neuro-Oncology, highlighting the opportunities for enhanced tumor evaluation, treatment planning, and monitoring. Additionally, it addresses the obstacles and constraints associated with implementing these techniques in clinical settings, while also discussing future directions and emerging.

Brain Atrophy Measurement Using MRI: Technical Considerations

Houshang Amiri

Brain atrophy measured using structural magnetic resonance imaging has been widely used as an added value in clinical routine for various neurological conditions. To this end, both commercial and freely-available software have been developed. However, because the results of the measurements differ between

scanners and scanner settings, it is currently not possible to compare different measurements with each other. Moreover, other factors e.g. physiological variabilities hamper accurate measurement of brain atrophy. In this paper, technical consideration for a more precise atrophy measurement will be discussed.

Diffusion-weighted Magnetic Resonance Imaging For Assessment Of Tumor Response In Muscle-invasive Bladder Cancer Patients Undergoing Neoadjuvant Chemotherapy: A Prospective Study

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Objective: This prospective study tested the hypothesis that the apparent diffusion coefficient (ADC) value and tumor volumes (TV) measured in diffusion-weighted magnetic resonance imaging (DW-MRI) before, during, and after the treatment are independent imaging markers to assess tumor response in muscle-invasive bladder cancer (MIBC) patients undergoing neoadjuvant chemotherapy (NAC).

Materials and Methods: Pre-treatment ADC value, pre-treatment TV, as well as, percent of changes (Δ ADC%, and Δ TV%) in these parameters at mid- and post-treatment relative to baseline were calculated and compared between the patients with and without clinical complete response (CR). Also, further analysis was carried out based on the groups of patients with and without overall response (OR). Two different methods of ADC estimation including single-

slice ADC measurement (ADC_{single-slice}) and whole-lesion ADC measurement (ADC_{whole-lesion}) were used.

Results: A total of 50 eligible patients were included in the analysis. Our results showed that although there was no significant difference between the two groups of patients with and without CR in terms of mid-treatment Δ ADC% and mid-treatment Δ TV%, significant differences were observed in terms of the pre-treatment ADC ($p < 0.01$), pre-treatment TV ($p < 0.001$), posttreatment Δ ADC% ($p < 0.05$), and post-treatment Δ TV% ($p < 0.05$). The results of OR-based analysis were in line with the CR-based results. There was also a strong and significant correlation between ADC_{single-slice} and ADC_{whole-lesion} measurements ($r > 0.9$, $P < 0.001$).

Conclusion: Pre-treatment ADC,

pretreatment TV, post-treatment Δ ADC%, and post-treatment Δ TV% could be considered as promising noninvasive imaging markers of tumor response in MIBC patients undergoing NAC. Moreover, midtreatment Δ ADC% and

mid-treatment Δ TV% should not be used as predictors of tumor response in these patients. Further larger studies are required to confirm these results.

Melatonin A Promising Candidate For DNA Double-stranded Breaks Reduction In Patients Undergoing Abdomen-pelvis Computed Tomography Examinations

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Background and Objective: Cancer incidence is 24% higher in children and young adults exposed to Computed Tomography (CT) scans than those unexposed. Non-repairing of ionizing radiation-induced DNA Double-Strand Breaks (DSBs) can initiate carcinogenesis. In the present study, we aimed to investigate the radioprotective potential of melatonin against DSBs in peripheral blood lymphocytes of patients undergoing abdomen-pelvis CT examinations

SCIENTIFIC ORAL ACCEPTED ABSTRACTS (21st IRSA)

Investigating resting-state brain networks, during breathing of inert air and air mixed with odor, using MRI

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Introduction: Considering the strong anatomical and functional connections between smells and emotions, and their role in creating behavioral and cognitive changes, much attention has been paid to the flexible olfactory system. Therefore, our goal in this project is to investigate whether pleasant and unpleasant odors can affect the brain's resting state networks.

Materials and Methods: Thirty healthy participants (14 male and 16 female) between the ages of 19 and 35 ($M = 22.96$) were recruited for the study. To ensure the health of people's olfactory systems, the Sniffin' Sticks test kit was performed for all the subjects. Subjects performed the resting state fMRI experiment (while no task was performed). Imaging was done with two runs; for each run, four odor conditions were considered. Odor conditions include no odor, pleasant odor, air, and unpleasant odor,

respectively. Then, to investigate connectivity between olfactory and resting state networks, 11 ROIs were considered. Finally; SPM, FSL, and CONN imaging processing applications were used to analyze the data.

Result: According to the results obtained from the SCA and ROI-to-ROI analysis, in presenting pleasant odors, the areas related to the resting state network, including the anterior cingulate cortex, inferior parietal lobule, bilateral medial prefrontal cortex, superior parietal lobule, and the areas related to olfactory, including the orbitofrontal and piriform cortex, were activated. Our results showed activation of resting state areas including the precuneus cortex, medial prefrontal cortex, and anterior cingulate cortex during air presentation. In addition, the amygdala, precuneus, and piriform regions were activated in connection with the uncus, presenting unpleasant odors. The results

of the ICA analysis revealed other active areas for us. Although these areas were not among the areas we considered, the activation of a number of other areas related to the resting and olfactory network showed us in the conditions of pleasant and unpleasant odors.

Conclusion: According to the obtained results, pleasant, unpleasant, and air can cause changes in the pattern of regions related to the resting state networks when compared to no odor conditions. But the activity pattern created is completely different. Overall, our study revealed

a novel approach to the influence of pleasant and unpleasant odors and air on regions related to the DMN, ECN, and the Salience Network. This study shows a close relationship between the processing of different odors with resting-state networks, since resting-state networks can show significant differences in neurological diseases. Therefore, the results of this study can be used in preclinical and clinical studies.

Keywords: olfactory, resting-state networks, fMRI

Can Large Language Models Aid Computed Tomography Scan Technologists in Their Job?

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Introduction: Since the introduction of large language models like CHATGPT and Claude, most studies have focused solely on the role of these AI models in assisting radiologists, particularly in interpretation and report writing. Our research aims to explore the potential role of these models as assistants for Computed Tomography scan technologists. This is particularly important as many technologists, especially recent graduates, tend to use default machine protocols without adjusting for varying patient conditions such as cardiac output, weight, age, etc. Moreover, incorrect radiation conditions in Computed Tomography imaging can significantly increase the patient's radiation dose. In contrast-enhanced examinations, the volume and rate of contrast agent injection must be adjusted according to the patient's cardiac output,

vascular health affected by various diseases, and weight.

Materials and Methods: A key role for large language models in assisting technologists could be in determining radiation conditions and technical parameters by analyzing the described patient conditions and type of examination. In this study, we trained the AI model GPT-4 using Fine-Tuning techniques with standard Computed Tomography scan protocols from authoritative articles and books. Subsequently, using Prompt Engineering, we requested analysis of standard protocols and patient conditions, seeking outputs in a specific format. To validate the technique and the protocols suggested by the GPT4 model, we requested Prompt engineering guided requests for 10 commonly used Computed Tomography scan examinations.

Result: We examined the most commonly used Computed Tomography scan protocols and techniques referenced in studies along with GPT-4 results using the large language model Claude2 for similarities and scientific correlations. The average result obtained was approximately 90 to 95 percent.

Conclusion: AI can optimize Computed

Tomography scan technique and protocols on a per-patient basis by accounting for both universal standards and individual factors. Personalized optimization improves image quality, lowers patient radiation exposure, and reduces errors stemming from suboptimal techniques.

Keywords: LLMs, CT, Radiology, Imaging, AI

AI And Large Language Models As Contrast Media Administration Assistants

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Introduction: The purpose of this work is to demonstrate how artificial intelligence can assist radiologists in safely administering contrast media to patients in order to: 1) Reduce potential adverse reactions; 2) Improve radiologists' preparedness in managing contrast reactions; and 3) Enhance overall patient safety. Contrast media can potentially cause patient harm if improperly administered and some patients require unique precautions or are prohibited from receiving contrast entirely. However, contrast administration is also essential for urgent diagnoses like pulmonary emboli. While staying current with lengthy, frequently updated ACR/ESUR contrast guidelines is important, it is infeasible for most practicing radiologists. This work offers an AI-powered solution to provide radiologists instant guidance on optimizing contrast use at the point of care.

Materials and Methods: We developed ContrastO - a freely accessible AI assistant bot built using the Claude2 natural language model. In a streamlined "fine-tuning" process, we

ingested the full ACR/ESUR contrast guidelines into the model. We then engineered the prompt to assume the identities of three personas when queried - an MRI radiologist, interventional cardiologist, and nurse.

Contrasto aggregates the guidance from each persona by referencing key highlights from the encoded guidelines.

Result: In a test scenario, ContrastO successfully managed a various scenarios of acute post-contrast injection reaction is. The response cited direct recommendations from the guidelines including oxygen delivery rates, salbutamol administration, adrenaline dosing, and monitoring needs - optimizing care through up-to-date protocol adherence. Also you can access scenarios through: <https://poe.com/s/qf5h9Or9WXabh3BRvEqZ>

Conclusion: This proof-of-concept demonstrates an AI assistant that empowers radiologists and radiographers with instant guideline-based recommendations to maximize patient safety around contrast delivery. By

querying Contrasto on any contrast-related scenario, radiologists and radiographers can get expert advice at the point of care, enabling confident evidence-based decision making. We believe AI augmentation of this nature

meaningfully addresses the persisting patient risks associated with contrast administration.

Keywords: Artificialintelligence, Contrast media, Patient safety

Evaluation of subjects with TBI and PTSD, using brain olfactory functional connectivity networks with resting-state fMRI data

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Introduction: Olfactory dysfunction is highly prevalent in military populations and is often attributed to the long-term effects of mild traumatic brain injury (mTBI) and chronic psychiatric disorders. Both mTBI and Post-Traumatic Stress Disorder (PTSD) are common outcomes for members of the military. Therefore, our aim was to investigate the functional connectivity network of the olfactory brain regions in subjects with PTSD and TBI using resting-state functional magnetic resonance imaging (rs-fMRI).

Materials and Methods: In this study, we used the data from the DOD ADNI website of the US Ministry of Defense. 276 non-demented veterans data rs-fMRI of patients in four groups (CONTROL= 69, PTSD=69, TBI=69, PTSD+TBI = 69), in the age range of 80-90 years were evaluated. The MATLAB Conn Toolbox was used for data processing and pre-processing. Functional connectivity (FC) network of primary olfactory regions in 4 primary olfactory regions; orbitofrontal cortex (OFC), amygdala, piriform, and uncus was analyzed as seed in seed to voxel (SBC) analyze.

Result: In to regins OFC and piriform showed The highest correlation with Frontal Pole Right (FPR) in All subjects in each 4 groups. PTSD+TBI and CN showed a lot of correlation in amygdala with Temporal Pole Left but in PTSD group the highest correlation is with Temporal Pole Right. The superior parietal lobule has the most connectivity of all clusters in PTSD + TBI in uncus seed. In all groups, Middle Frontal Gyrus Right has the lowest correlation with amygdala. Compared to the Control Group, decreased activity was observed in all four regions.

Conclusion: The results show that the functional Connectivity (FC) between the four seeds of the olfactory network (ON) and in four groups may be a sensitive marker for Presence and progression of the disease. rs-fMRI parameters may serve as potential biomarkers for traumatic and psychiatric anosmia by revealing more extensive functional damage than previously thought.

Keywords: TBI; rs-fMRI; PTSD; FC

Estimation of diagnostic reference levels in brain and chest Computed Tomography scans in adult patients at Bushehr “Khalije Fars Martyrs” hospital in 2022

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Introduction: The advent of Computed Tomography (CT) machines has revolutionized diagnostic radiology. With high precision in detecting abnormalities, CT scans enable earlier and more accurate diagnoses of diseases (1). Due to the increased use of CT scans (2), the risk of cancer caused by ionizing radiation, and the relatively high radiation doses associated with CT (3-5), it is crucial to have greater standardization of CT doses across institutions and countries (6). Therefore, this study aims to estimate and compare diagnostic reference levels (DRLs) in brain and chest CT scans in adult patients.

Materials and Methods: The study included 200 patients over 18 years old. Samples were randomly selected from patients who underwent chest and brain CT scans. Required information including age, gender, volumetric CT dose index (CTDIVOL), and dose length product (DLP) were obtained from the dose report window of the picture archiving and communication system (PACS). Then, by using

this information, the diagnostic reference levels of chest and brain CT scans were calculated. The reference dose was obtained by placing dosimeters in the phantoms' cavities.

Result: The patient's average age in brain and chest CT scans was 47.37 and 55.08 years, respectively. In chest and brain CT scans, the third quartile of CTDIVOL was 5.46 and 102.14 mGy, respectively. Also, the third quartile of DLP was 193.90 and 1464.61 mGy.cm in chest and brain CT scans, respectively. The mean Effective Dose (ED) in chest and brain CT scans were 2.69 and 1.67 mSv, respectively.

Conclusion: DRL values in chest CT scans in comparison to the other studies were acceptable, but these values in brain CT scans were higher than in other studies. Therefore, dose parameters in brain CT scans should be optimized to reduce the patient's dose.

Keywords: DRLs, Computed Tomography, Radiation Dose

Increasing the accuracy of MS lesions detection by the DIR sequence

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Introduction: Multiple sclerosis is the most common immune-mediated disorder affecting the central nervous system. about 2.8 million people were affected globally MS cortical gray matter lesions have been previously only observed histopathologically using inversion recovery (FLAIR) scans. However, DIR scans can be acquired at significantly higher resolution within clinically feasible times, Cortical lesions in MS are difficult to visualize in vivo when using standard MRI techniques. The introduction of double inversion recovery (DIR) has led to a major improvement in the detection of these lesions.

Materials and Methods: 80 people with MS and 30 healthy controls underwent brain volumetric T1- weighted post contrast and FLAIR, DIR MRI at 1.5T and cognitive assessment. Probability mapping of GM lesions marked on the DIR scans and voxel- based morphometry (assessing GM atrophy) were carried out. The associations of GM lesion load and GM volume with clinical scores were tested.

Result: DIR-visible GM lesions were most commonly found in the right cerebellum and most apparent in patients with primary progressive MS. Deep GM structures appeared largely free

from lesions, but showed considerable atrophy, particularly in the thalamus, caudate, pallidum and putamen, and this was most apparent in secondary progressive patients with MS. Very little co-localisation of GM atrophy and lesions was seen, and this was generally confined to the cerebellum and postcentral gyrus. In both regions, GM lesions and volume independently correlated with physical disability and cognitive performance.

Conclusion: the current study suggests that comparing available literature data on cortical lesions may be problematic, and increased consistency in acquisition protocols may improve scoring agreement. Sensitivity and specificity of the proposed recommendations should now be studied in a more formal, prospective, multi-center setting using similar DIR protocols.

Keywords: DIR, MS, GM lesions,

SCIENTIFIC POSTER ACCEPTED ABSTRACTS (21st IRSA)

Successful Computed Tomography Guided Percutaneous Sclerotherapy of Symptomatic Vertebral Hemangioma

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Introduction: Vertebral hemangiomas (VH) are almost always benign spinal tumor but less than 1% cause symptoms which require treatment and named aggressive vertebral hemangiomas (AVH)

Materials and Methods: There is no consensus about the best therapeutic method yet.

Result: The purpose of this study is exploring

a less aggressive method for treatment of AVH

Conclusion: However we report sclerotherapy with bleomycin as a safe and effective treatment for AVH which is used for the first time, clinical trial is yet needed to achieve more information about this sclerosant. We believe that this report could be the light and base of the research trial in future.

Keywords: Vertebral hemangioma sclerotherapy

Artificial Intelligence for Breast Cancer Detection Using Mammograms: A Review

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Introduction: Breast Cancer (BC) continues to be a major global health concern. Mammography

screening for early detection of BC can reduce mortality by 20–40%. Artificial intelligence

(AI) has made a revolution in computer-based mammography interpretation. This study aims to provide a comprehensive review of different deep and machine learning models applied for BC detection based on mammograms.

Materials and Methods: PubMed, Science Direct, Web of Science, and Google Scholar databases were explored up to December 2023, using different combinations of the keywords: "Breast Cancer", "Machine Learning", "Artificial Intelligence", "Deep Learning", and "Detection". Finally, eight more recent and relevant records were included in the study.

Result: The Random Forest (RF), Decision Tree (DT), K-Nearest Neighbors (KNN), Logistic Regression (LR), Support Vector Classifier (SVC), and linear SVC, as well as DenseNet 161, ResNet 50, VGG 16, AlexNet, ResNet 18, ResNet34, R-CNN are among the highly diverse

categorization models used in different studies for breast cancer detection. Deep learning models of AlexNet and ResNet with accuracies of about 98% had the highest accuracy among different applied models for BC detection. The minimum reported accuracy of 54% in the reviewed records had been obtained using the Faster R-CNN model.

Conclusion: The AI models are precise in identifying and describing breast lesions like microcalcifications on mammograms. Automatic deep learning techniques have great promise for enhancing clinical tools to lessen false positive and false negative screening mammography outcomes. These techniques can be easily trained to achieve high accuracy on heterogeneous mammography platforms.

Keywords: Breast Cancer, Mammography, Artificial Intelligence.

A Review of Pulmonary Embolism Diagnosis Techniques with Emphasis on CT Angiography

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Introduction: Pulmonary embolism is a common disorder with high mortality that

requires accurate diagnosis using appropriate diagnostic methods. Our aim is to review the

diagnostic techniques of pulmonary embolism and evaluate their performance.

Materials and Methods: This is a review about diagnosis of pulmonary embolism (PE) (1) (2, 3) PE is a clinical disorder that usually results from venous thromboembolism of the lower extremity that (4) blocks the pulmonary artery by a blood clot, with choosing the appropriate diagnostic method, death (25%) (5), pulmonary heart damage or risks of unnecessary anticoagulant therapy can be prevented. The first step in diagnosing pulmonary embolism is measuring D-dimer (6), to confirm pulmonary embolism.

Pulmonary CT angiography (CTA) is a main technique to examine lung function for the diagnosis of pulmonary embolism, this technique with high sensitivity and specificity that providing clear images of the pulmonary artery, not only shows the definitive result with high confidence but also has the ability to differentiate acute from chronic pulmonary embolism (7). Using CTA with the technique (ECG-gated CTA) cardiac motion artifact is significantly reduced (8), application of ECG-gated CTA with the protocol (TRO) is useful for diagnosis PE and the disease of the pulmonary, coronary and aortic arteries (9, 10). The use of dual-energy CT scan has high quality images to diagnosis small peripheral emboli and secondary perfusion defects in PE (11, 12).

The scan by nuclear medicine method of ventilation-perfusion SPECT with higher sensitivity than CT angiography (<95%) and lower radiation dose for quantitative determination of embolism extent and diagnosis of other pulmonary heart diseases is used but accuracy and diagnostic feature of it in pulmonary arteries under segmental from CTA is less (13).

Pulmonary angiography also as a standard criterion with providing high quality images is useful in diagnosis and treatment of PE (14) but because of creating serious side effects today has given its place to CTA (15). Angiography with magnetic resonance imaging is also a useful method in primary diagnosis of embolism but because of higher speed and efficiency usually CTA is used (16).

Result: Acute pulmonary embolism that involves pulmonary artery perfusion defect may lead to right ventricular (RV) dysfunction; which in CTA is accompanied by clear signs such as increase in ventricular cavity diameter, flattening or deviation of interventricular septum to the left and reflux of contrast material into inferior vena cava and hepatic veins (17) and as a result increase in right atrial pressure superior vena cava and azygos vein may also appear dilated (18)

Conclusion: Today CTA is a vital technique in diagnosis of embolism that in addition to diagnosis of disease severity in identification of disorders related to PE such as heart dysfunction (13), evaluation of effect of acute PE on hemodynamics of pulmonary vessels and risk classification in management of treatment of patients with chronic PE is also useful, therefore doctors in addition to image interpretation, should emphasize on Performing appropriate diagnosis method as well.

Keywords: embolism, D-dimer, CT angiography

Evaluating the Diagnostic Accuracy of Imaging Techniques in Prostate Cancer Screening: A Systematic Review and Meta-Analysis

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Introduction: Prostate cancer is a leading cause of male mortality and a prevalent global cancer. Prostate lesions are mainly linked to clinical symptoms such as enuresis, increasing urinary frequency, and prostatic-specific antigen (PSA). Diagnostic methods include measuring PSA concentration in blood serum, transrectal ultrasonography (TRUS)-guided biopsy, and different imaging modalities. Regarding the importance of early detection, this study aims to systematically review various imaging modalities' accuracy for prostate cancer screening.

Materials and Methods: PubMed, Science Direct, Web of Science, and Google Scholar databases were explored up to December 2023, using different combinations of keywords: "prostate cancer screening", "early detection", "transrectal ultrasonography", "magnetic resonance imaging (MRI)", "computed tomography (CT)", "magnetic resonance spectroscopy (MRS)", "positron emission tomography (PET-CT)", and "comparative diagnostic accuracy". Finally, eight more recent and relevant records were included in the study.

Result: Based on the reviewed records, various MR imaging sequences, including T2, diffusion-weighted (DWI), and dynamic contrast-enhanced (DCE), as well as MRS and multiparametric MRI (mpMRI), are utilized for

prostate cancer detection. Ultrasound methods such as US-elastography and contrast-enhanced US, along with combined modalities like PET/CT or MRI/MRS, are also applied. The mean sensitivity for MR sequences and MRS was 74.43 and 82.78, with mean specificities of 76.44 and 81.97, and mean accuracies of 71.38 and 84.88. US elastography and contrast-enhanced US provide average sensitivities of 84 and 53.06, respectively. Combined modalities PET-CT and MRI-MRS present accuracies of about 60 percent. Among MR sequences, T2-weighted ones illustrate higher sensitivity, specificity, and accuracy at 81.8, 95.5, and 88.6, respectively.

Conclusion: MRI, crucial in prostate cancer diagnosis, integrates anatomical and physiological data. mpMRI, combining T2-weighted and functional imaging (DWI, DCE, MRS), ensures precise detection, especially for patients with persistent suspicion post-negative biopsies. DCE-MRI is effective for abnormalities, and MRS examines metabolites. Originally using T1W and T2W, adding functional imaging allows for assessing tissue physiology.

Keywords: Prostate Cancer, Spectroscopy, Diagnostic Accuracy

Cardiac Image Segmentation: A Review of Artificial Intelligence Models

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Introduction: Cardiac segmentation is a valuable process in detection of various abnormalities such as atrial fibrillation, cardiomyopathy and valvular heart disease. It is also an initial step for measuring the wall thickness, chamber volume and blood pooling. With the advancement of Artificial Intelligence, computer vision techniques of cardiac segmentation have evolved towards deep learning. Currently, Neural Networks are gaining attention due to the limitations of manual segmentation, which requires specialized expertise and is time-consuming.

Materials and Methods: Articles published from 2018 to 2023 were retrieved by searching PUBMED and Google Scholar for key words such as “cardiac segmentation”, “artificial intelligence” and “deep learning”.

Result: Automated cardiac segmentation can be performed on a variety medical imaging modalities, including Magnetic Resonance Imaging(MRI), Computed Tomography(CT), and Ultrasound. However, MRI is the most popular one as datasets are more accessible with high quality images. Heart segmentation methods can act on each chamber separately or on the entire

heart. Some models are specially trained to segment the Left ventricle due to its importance in many abnormalities. As a result of the complexity and varying shapes of humans, apical and basal segmentation have the least accuracy. Image segmentation with convolutional neural networks, fully convolutional networks (FCN), and U-Net can be more effective than manually segmenting in some cases. A slice-by-slice segmentation method, a patch-based method, and increasing the convolutional filter size will improve the results.

Conclusion: The use of neural networks for automated cardiac segmentation is a powerful technique, and modifications to the architecture of these networks can increase the accuracy of these methods. In future studies, multicenter imaging and simultaneous detection of multiple abnormalities should be considered.

Keywords: Cardiac Segmentation, Artificial intelligence, DeepLearning

Deep Learning-Based Automated Segmentation Methods for Magnetic Resonance Imaging of Prostate Cancer: Narrative Review

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Introduction: Throughout the world, prostate cancer is one of the most common types of cancer. Prostate cancer diagnosis accuracy and clinical workflow efficiency can be increased by automatically identifying and segmenting intra-prostatic lesions (ILs) on magnetic resonance imaging (MRI). nowadays correct segmentation network decision importance is clear due to the network's accurate outcome. This study compares various auto-segmentation methods utilized in the deep learning approach in prostate cancer.

Materials and Methods: The keywords of "Deep learning", "auto segmentation", "prostate cancer" and "MRI" were entered into scientific databases of Google Scholar, Scopus, PubMed, and Elsevier. A total of 15 completely relevant articles in 2023 were extracted and reviewed.

Result: 21 networks have been used for segmentation and discussed in these articles. All of the papers prefer to use multicenter data for better results. Most of these articles mentioned the importance of tumor volume, type of tumor, and number of participants. There was no discernible link between clinical factors

and segmentation performance. Modified SegNet and MultiResU-Net performed the best (with an accuracy of 98.34% and 96.97). For the most aggressive lesions, MRRN-DS generated the most accurate segmentation. MRRN-DS, Unet, Unet++, and ResUnet produced significantly more accurate segmentations of tumors occurring in the peripheral zone. The segmentation results for the prostate's midgland were consistently better, independent of the MR sequences.

Conclusion: Regardless of architectural typology, deep learning-based segmentation algorithms may regularly obtain Dice coefficients of 0.9 or above with as little as 50 training patients. Future prostate disease management may benefit from these clinically acceptable auto-segmentation outcomes.

Keywords: Deep learning, prostate cancer, MRI

A Review on Natural Language Processing (NLP) for Radiology Reports Improvement

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Introduction: The radiology report is a text document containing all documented information about the radiologist's interpretation of imaging findings in a study. A radiology report is more than just a summary; it is a rich source of information created by the radiologist. Structured reporting and natural language processing (NLP) techniques aim to improve radiology reports quality. NLP, a subset of artificial intelligence, focuses on computer interpretation of human language. Radiology is particularly suited to benefit from applications of NLP, given that the primary mode of inter-physician and physician-to-patient communication is by way of the radiology report. This study reviews NLP applications, advantages, and limitations in radiology reports

Materials and Methods: PubMed, Science Direct, Web of Science, and Google Scholar databases were explored up to November 2023, using different combinations of the keywords: "Natural Language Processing", "NLP", "Artificial Intelligence", "Radiology", and "Radiology Reports". Finally, 15 more recent and relevant records were included in the study.

Result: NLP extracts valuable information from radiology reports, facilitating efficient data analysis and access. This contributes to quality improvement, epidemiological research, and monitoring guideline adherence. By analyzing language and structure, NLP identifies areas for improvement and standardizes report formats, enhancing overall report quality. NLP evaluation of radiology reports proves useful for efficiently generating data on departmental performance indicators and evaluating individual radiologists' performance. NLP can monitor report addendums to identify learning opportunities for peer learning and understanding, potentially improving the radiology reports language. NLP enhances radiology education performance. The ability to detect specific diagnoses within a radiology report through NLP analysis is potentially helpful for teaching case creation and identifying comparative example cases in the radiology work area for just-in-time education during clinical work.

Conclusion: Despite promising results, such as efficient structured reporting, improved clinical decision support, enhanced communication and follow-up, automated translation and speech recognition, data

mining and research applications, as well as reduced errors and improved standardization, NLP in radiology reports still faces challenges. These challenges include ambiguity, incorrect grammar usage, resistance to change, interference with unstructured data, variation in language patterns, and limited vocabulary,

and expressions. Addressing these challenges is essential to ensure the successful integration of NLP in radiology reports and maximize this technology's benefits

Keywords: Natural Language Processing
Artificial Intelligence

Enhancement Type at Contrast-enhanced Mammography and Association with Malignancy

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Introduction: Background Despite the increasing use of contrast-enhanced mammography (CEM), there are limited data on the evaluation of findings on recombined images and the association with malignancy. Purpose To determine the rates of malignancy of enhancement findings on CEM images in the presence or absence of low-energy findings using the Breast Imaging Reporting and Data System (BI-RADS) lexicon developed for mammography and MRI.

Materials and Methods: This review article was written by examining 8 authentic articles published by prestigious universities in the world in the last 5 years and by searching PubMed and Google Scholar databases.

Result: a total of 8 article with sufficient diagnostic CEM studies were reviewed. These articles were published in the last 5 years and were accessible in PubMed and Google Scholar databases. In the most important study among 190 CEM studies with enhancing findings, enhancing lesions were more likely

to be malignant when associated with low-energy findings (26% vs 59%, $P = .001$). Among enhancement types, mass enhancement composed 71% (99 of 140) of all malignancies with PPV of 63% when associated with low-energy findings. Foci, non-mass enhancement, and mass enhancement without low-energy findings had PPV of 6%, 24%, and 38%, respectively. Neither background parenchymal enhancement nor density was associated with enhancement type ($P = .19$ and $P = .28$, respectively).

Conclusion: Mass enhancement on recombined images using CEM was most commonly associated with malignancy, especially when associated with low-energy findings. Enhancement types were more likely to be benign when not associated with low-energy findings; however, they should still be viewed with suspicion, given the high association with malignancy

Keywords: Contrast-enhanced Enhancement
Mammography Malignancy CEM

Mammography and Artificial Intelligence Integration: A Review

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Introduction: Breast cancer is a global health challenge, requiring strategies for early detection and accurate diagnosis. Mammography, the traditional diagnostic approach, faces efficacy challenges, leading to the exploration of innovative technologies. Artificial intelligence (AI) and machine learning prove highly efficient in overcoming subjective interpretation challenges in mammograms by clinicians. AI's contribution to early detection improves patient survival prospects significantly. Deep learning (DL) methodologies are designed to expedite and enhance early breast cancer detection. This review explores the advantages of integrating mammography and AI.

Materials and Methods: PubMed, Science Direct, Web of Science, and Google Scholar databases were explored up to December 2023, using combinations of keywords: "breast cancer detection", "mammography", "artificial intelligence", "deep learning", and "machine learning". Finally, 14 more recent and relevant records were included.

Result: Based on the results, DenseNet-169 and EfficientNet-B5 were the most frequently used DL models for automatic breast cancer detection. The mean sensitivity, and specificity mentioned for DenseNet-169 and EfficientNet-B5 in the reviewed papers were 87, 88, 81, and 82%, respectively. The mean

area under the receiver-operating characteristic curve (AUC) for detecting breast cancer in each merged mammogram was 0.952 ± 0.005 by DenseNet-169 and 0.954 ± 0.020 by EfficientNet-B5, respectively. AI enhances breast cancer screening by analyzing mammographic images with machine learning algorithms, aiding early detection of abnormalities. This improves diagnostic accuracy, streamlines radiologists' workflow, and predicts breast cancer risks using extracted radiomics features.

Conclusion: The integration of AI models with mammography heralds a transformative era in breast cancer detection and diagnosis. This synergistic partnership not only enhances the accuracy and efficiency of screening but also empowers healthcare professionals with valuable insights. The amalgamation of advanced technology and medical expertise promises earlier and more precise detection, ultimately leading to improved patient outcomes.

Keywords: BreastCancer Mammography Artificialintelligence DeepLearning MachineLearning