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(Day 1)

Bin Zheng, OMICS J Radiol 2016, 6:5(Suppl)
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Bin Zheng
University of Oklahoma, USA

Identifying and testing new quantitative image, an analysis based clinical markers to predict breast cancer risk and prognosis

Quantitative image feature analysis plays an important role in cancer screening, diagnosis, and prognosis assessment. In our laboratory, we focus on identifying and testing new quantitative image analysis based clinical markers to help more accurately predict cancer risk and prognosis. In this presentation, I will discuss our work and recent progress in assessing near-term breast cancer risk and breast tumor response to neoadjuvant chemotherapy. First, we applied image feature analysis method based on detection of bilateral mammographic density and tissue asymmetry to build a new machine learning model to predict risk of the individual women developing early breast cancer in the near-term (i.e., within the 2 years after a negative mammography screening). Second, we extracted kinetic image features from breast MR images to build another new model to predict the likelihood of complete response of breast tumors to neoadjuvant chemotherapy. To increase confidence of clinians to consider and/or accept the prediction results of our new models, we also developed and implemented the graphic user interface (GUI) platforms for interactively applying our new image processing scheme and prediction models to process and analyze images. Our preliminary testing results using several image datasets demonstrated that applying the new quantitative image feature analysis based models could yield significantly higher discriminatory power in predicting near-term breast cancer risk and tumor response to the chemotherapy. If it is successfully applied, the new image marker based prediction models has potential to help establish a new and more effective personalized breast cancer screening and/or treatment paradigms in the future.

Biography

Bin Zheng has received his PhD from University of Delaware in 1993. After working in Department of Radiology, University of Pittsburgh for 20 years, he joined the Faculty in University of Oklahoma in 2013 as a Professor at School of Electrical and Computer Engineering and Oklahoma TSET cancer research scholar at Stephenson Cancer Center. Since 1998, he has served as Principal Investigator in five R01 and one R21 grant awards from NCI, NIH, one DOD breast cancer project, and subcontract PI of two other NIH R01 grant awards. Currently, he is AIMBE Fellow and an Editor-in-Chief of *Journal of X-ray Science and Technology.*

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Michael L Goris et al., OMICS J Radiol 2016, 6:5(Suppl)
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Analytical fusion of different modality images based on prior knowledge

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Background: Fusion is the simultaneous and combined analysis of two images mapping identically in the same object space, but recording a different attribute of the object. Most fusion has been performed as visual representation in which the attributes are represented independently into overlapping but independent color scales. In this work we explore fusion, in which the attributes are combined in a mathematical or logical manner, to address a specific goal.

Methods: The first approach is mathematical, and concerns a particular combination of brain imaging: In patients treated for brain tumors, the usually clear delineation of pathology by MRI is compromised because the treatment itself may produce an ambiguous signal. Specifically, a FLAIR sequence will show post-treatment edema and recurrent tumor as a high signal intensity region. FDG PET on the other hand will show little or no density in the former, and (near normal) in the latter. A viable tumor would also show increased density in PET and post contrast T1 sequence, but not all post T1 high densities represent regions with high metabolic activity. The combination of these a-priori judgments (or prior knowledge) can be done in different manners: After normalization, the product MxP would favor viable tumor and the artangent of (P/M) would likely represent non-viable or non-malignant lesions.

In the second approach, in preparation for a treatment of liver metastases with radioactive ^{90}Y-labeled microspheres, the liver is infused intra-arterially with 99mTc macro aggregates, imaged, and reinjected with 99mTc colloid and imaged. The result is two in-line registered image volumes, defining MAA perfused tumor and liver, and functional liver (colloid) (Figure 2). The analysis of the fusion allows the computation of relative and absolute volumes, and relative doses to liver and tumor. We found that the relative dose to normal liver perfused by MAA is the best predictor of post therapy toxicity (as measured by the liver enzyme elevation). In cases of toxicity, the average relative volume was 66%, in the absence of toxicity, the relative volume was 33% ($p<0.01$), with only one case overlapping.

Biography

Michael Goris has a Medical degree from the University of Leuven in Belgium and a PhD degree in Medical Physics from UC Berkeley. He has been a Professor in the Stanford Medical School and is Emeritus since 2012 and served as a Chairman for University panel on Radiation safety during 2003-2010. He has more than 120 publications in peer reviewed, journals. His research interests are Radio-immunotherapy, Medical Imaging Processing and Quantification for diagnosis Clinical validations.

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Notes:

Bital Savir-Baruch, OMICS J Radiol 2016, 6:5(Suppl)
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The role of nuclear medicine in early breast cancer diagnosis - "How do we do?"

Bital Savir-Baruch
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Breast cancer is the most common diagnosed cancer worldwide. Since the introduction of mammography as gold standard for screening purposes in the diagnosis of breast cancer, mortality decreased significantly. However, its performance in a population with dense breast is very low. Among all screening women, approximately 48% women will present with heterogeneously or extremely dense breast. Low performance of mammography is likely due to overlying glandular tissue masking tumor lesions. Hence, other modalities such as molecular breast imaging are been evaluated. Tc99m Sestamibi Molecular Breast Imaging (MBI) has demonstrated significantly higher sensitivity and equivalent specificity in the detection of breast cancer among high risk women when compared to mammography and is thus being used increasingly as an adjunct to mammography and ultrasound in selected women. Large trial by Rhodes et. al. evaluated the performance of MBI using as low as 8 mCi of Tc99m Sestamibi in the screening of high risk women with mammographically dense breasts. MBI sensitivity was significantly higher than that of mammography, 81% versus 24%, with same specificity of 93% vs. 89%. However, when compared to mammography, nuclear medicine breast modality generates all body radiation dose. When targeting a younger population with increased probability of having dense breast, appropriate risk to benefit ratio has to be established. In this presentation, we will review the role of nuclear medicine in the diagnosis of early breast cancer.

Biography

Bital Savir-Baruch is a board certified Nuclear Medicine Physician. She received her Medical degree from Semmelweis University, Budapest, Hungary. She completed the Nuclear Medicine residency program at Emory university Hospital, Atlanta, GA, In 2014, she joined Loyola University Medical Center, Maywood, Illinois as an Assistant Professor of Radiology.

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Ilona Kowalik-Urbaniak, OMICS J Radiol 2016, 6:5(Suppl)
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Does interpolation affect diagnosis? – Quantitative assessment of the effects of interpolation on uncompressed and compressed medical images

Ilona Kowalik-Urbaniak
Client Outlook Inc., Canada

The resolution at which medical images are displayed on output devices often differs from the original. Image rescaling is accomplished by estimating pixels at unknown locations through interpolation. The most common artifacts resulting from this estimation include blurring, edge distortion, ringing and aliasing. Even for the same image, different interpolation techniques may produce images that differ significantly. As a result, interpolation may have an impact on diagnostic image quality. Objective quality assessment of interpolated images is a challenging task since there is no one-to-one mapping between the original and the interpolated image. No objective model has been yet established for medical images. A quantitative evaluation of the impact of interpolation on medical image quality with the use of the most common interpolation techniques is presented. The quality of 60 interpolated compressed and uncompressed neuro- and abdominal CT images was evaluated objectively using the mean squared error (MSE), signal-to-noise ratio (SNR), structural similarity index (SSIM) and a proposed technique based on the deterministic and statistical information of the signal. This work is an attempt to capture the loss of diagnostic information of interpolated compressed and uncompressed medical images. We propose a full-reference objective measure of quality for interpolated images, which considers deterministic and statistical knowledge about the image. The statistical properties are acquired from the frequency domain (high-frequency content) of the signal and are combined with the elements of SSIM. Future work will involve validation of the proposed image fidelity measure based on subjective radiological assessments using a modified Receiver Operating Characteristic (ROC) analysis. We aim to present a model that could serve as a predictor of quality of interpolated images at different rescaling factors for a given image modality and anatomical region.

Biography

Ilona Kowalik-Urbaniak has completed her PhD in 2015 at the University of Waterloo in Applied Mathematics. Currently, she holds a Postdoctoral research position (TalentEdge Postdoctoral Fellowship) at Client Outlook Inc., Waterloo, Ontario. Her work is mainly focused in the area of quality assessment of compressed medical images and the effects of image compression on diagnosis. Her PhD dissertation dealt with mathematical modeling of subjective radiologists' responses using objective image quality assessment methods. She has been awarded for her work on medical image quality at conferences on several occasions.

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Sanjay Gandhi, OMICS J Radiol 2016, 6:5(Suppl)
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Role of radiology in changing the landscape of managing multiple myeloma

Sanjay Gandhi
North Bristol NHS Trust, UK

Imaging of multiple myeloma has been transformed in the past few years due to new research and developments. It is important to keep abreast of the new recommendations, for example smoldering multiple myeloma, the risk of progression to malignant disease in the first 5 years is about 10% per year and therefore a robust strategy for diagnosis, follow up and staging is essential. In particular, low dose whole-body CT (LDWBCT), whole-body diffusion weighted MRI and PET/CT are increasingly being used and likely to replace plain films skeletal surveys. This lecture will focus on morphologic and functional imaging techniques and the latest recommendations of the international myeloma working group (IMWG). Strategies for managing monoclonal gammopathy of unclear significance (MGUS) and smoldering multiple myeloma along with the role of interventional and palliative radiology techniques such as vertebroplasty or kyphoplasty, radio-frequency thermal ablation and targeted cryoablation therapy will be discussed. In addition, this presentation will also discuss Durie-Salmon PLUS staging system, the relative merits and limitations of different imaging modalities and practical challenges faced in the management of multiple myeloma.

Biography

Sanjay Gandhi is a Senior Attending Radiologist at one of the largest teaching hospitals and Regional Trauma Units in the UK. For the past 17 years, he has been teaching at the University of Bristol and University of West of England. As a Professor, he also teaches at Sri Devaraj Urs University, India. He has won multiple academic awards and has been involved in numerous research projects and collaborative trials. He has published widely on use of cutting-edge technology and co-authored and edited eight medical textbooks. He is an internationally recognized leader in Healthcare IT and development of Smart Apps.

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Monika Beresova et al., OMICS J Radiol 2016, 6:5(Suppl)
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Differentiation between osteoblastic, osteolytic and healthy bone tissue in CT images by texture analysis

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Objectives: The aim of this study was to perform texture analysis of the bone metastasis, to find and describe the difference of heterogeneity parameters, in osteolytic osteoblastic, mixed (osteolytic and osteoblastic) and healthy bone lesions.

Methods: In this study, 5 patients with vertebral metastatic lesions were examined using CT images. Pathological lesions were manually segmented and binary masks were created for the all osteoblastic, osteolytic, mixed and healthy spine areas for each patient. Histogram (min, max, mean, SD, variance and SD/mean) and co-occurrence matrix (contrast, correlation, energy, entropy and homogeneity) features were extracted. For statistical comparisons, the segmented lesions were split into four groups according to their sizes: (1) 0-0.25cm3, (2) 0.25-0.5cm3, (3) 0.5-1 cm3 and (4) >1 cm3. ROC analysis and Kolmogorov-Smirnov test were done and we used non-parametric Kruskal-Wallis tests with Bonferroni correction to compare the different bone lesions.

Results: Based on reliability and ROC analysis, smallest ROIs (group 1) were discarded, and osteolytic lesions were also excluded from this study, because the sizes were falling into 0-0.25 cm3 range. The maximum, mean, SD, variance, SD/mean and contrast were significantly different between mixed and healthy lesions at ROI size larger than 0.25 cm3. At the same size range, the maximum, mean, SD, variance, contrast and correlation were significantly different between healthy and osteoblastic lesions. At last, comparing the mixed and the osteoblastic lesions, the maximum, mean, SD, variance and contrast parameters were found significantly different.

Conclusions: The heterogeneity parameters allowed us to describe the differences between pathological bone lesions. Texture analysis was not reliable in small lesions, but we could differentiate the healthy, the mixed and the osteoblastic areas utilizing the following textural parameters: maximum, mean, SD, variance and contrast.

Biography

Monika Beresova is a PhD student at University of Debrecen. She is working on Texture Analysis in Medical Images. She works in the Department of Biomedical Laboratory and Imaging Science Faculty of Medicine (University of Debrecen) as Biomedical Engineer. She is a Lecturer for basics of MRI, Anatomy and she also works in the following research areas: NMR measurement on Earth magnetic field, image post-processing and in fMRI study.

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Elaine Iuanow et al., OMICS J Radiol 2016, 6:5(Suppl)
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Accuracy of cyst vs. solid diagnosis in the breast using quantitative transmission (QT) ultrasound

Elaine Iuanow, Kathleen Smith, Nancy A Obuchowski, Jennifer Bullen and John C Klock
Cleveland Clinic Foundation, USA

We present the results of a receiver operator characteristic (ROC) study using an emerging ultrasound technology, quantitative transmission (QT) ultrasound. We present the readers the accuracy in determining whether a breast lesion is a cyst versus a solid using QT ultrasound. Digital mammograms (XRM) and QT ultrasound imaging were selected from the QT ultrasound library of images. All solid cases had ground truth pathology. Hand held ultrasound images were used as ground truth for cysts. Thirteen readers performed blinded reading of 32 cases (15 solids and 17 cysts) using XRM+QT, assigning both a confidence score (0-100) and a binary classification (solid/cyst) to classify lesions. A 95% percentile bootstrap confidence interval (CI) was computed for the mean readers' area under the ROC curve, sensitivity (proportion of solids correctly classified as solid) and specificity (proportion of cysts correctly classified as cysts). Results show that when a speed of sound measurement >1571 m/s was used to indicate a solid, mean sensitivity and specificity of QT ultrasound were 0.75 (95% CI: 0.56, 0.92) and 0.85 (CI: 0.67, 1.00), respectively. Using the readers' binary classifications with XRM+QT, mean sensitivity and specificity were 0.95 (CI: 0.87, 1.00) and 0.84 (CI: 0.66, 0.98), respectively. When the readers' confidence scores with XRM+QT were used to distinguish solids versus cysts, mean ROC area was 0.923 (CI: 0.830, 0.988). QT ultrasound is an emerging ultrasound technology that demonstrates high accuracy in distinguishing cyst versus solid lesions in the breast.

Biography

Elaine Iuanow has graduated with her Medical degree from Tuft's University School of Medicine and has completed her Fellowship in Breast Imaging at Brigham and Women's/Faulkner-Sagoff Breast Center in Boston, MA. She is the Chief Medical Officer working with the research and development team at QT Ultrasound Labs, a novel breast ultrasound development company based in the San Francisco Bay Area. She brings her significant expertise in Breast Imaging as a Board Certified Radiologist with experience in administering world class care at premier medical institutions in the United States. Her research interests include breast ultrasound, entrepreneurship in health care delivery models, providing care to underserved women, breast disease in female and male patients, and advocacy regarding preventative breast health on the local, national and global arenas.

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Barath Narayanan Narayanan et al., OMICS J Radiol 2016, 6:5(Suppl)
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Feature selection using linear classifiers for computer aided detection of pulmonary nodules in CT

Barath Narayanan Narayanan, Russell C Hardie and Temesguen M Kebede
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Lung cancer is the leading cause of cancer death in the United States. It usually exhibits its presence with the formation of pulmonary nodules. Nodules are round or oval-shaped growth present in the lung. Computed tomography (CT) scans are used by radiologists to detect such nodules. Computer aided detection (CAD) of such nodules would aid in providing a second opinion to the radiologists and would be of valuable help in lung cancer screening. In this research, we study various feature selection methods using linear classifier for the CAD system framework proposed in FlyerScan. Algorithmic steps of FlyerScan include: (i) Local contrast enhancement, (ii) automated anatomical segmentation, (iii) detection of potential nodule candidates, (iv) feature computation and selection, and (v) candidate classification. In this paper, we focus on backend processor which comprises of (iv) and (v). We study the performance of the FlyerScan by implementing various feature selection methods such as sequential forward selection, sequential backward removal or implementation of these after holding onto certain robust features. We also evaluate the tuning of Fischer linear discriminant classifier and study the impact of feature selection on it. This algorithm is implemented using a publicly available lung image database consortium-image database resource initiative (LIDC-IDRI) dataset. 107 cases from LIDC-IDRI are handpicked in particular for this paper and performance of the CAD system would be studied based on k-fold validation. This research will aid in improving the nodule detection rate in CT scans, thereby enhancing a patient's chance of survival.

Biography

Barath Narayanan Narayanan is currently a Graduate Teaching Assistant for the ECE department at University of Dayton. He has done his graduation from SRM University, Chennai, India in 2012 with a Bachelor's degree in Electrical and Electronics Engineering. He obtained his Master's degree in Electrical Engineering from University of Dayton in 2013. He is currently pursuing his PhD research in the field of Medical Image Analysis. His research focuses on "Computer Aided Detection for identifying lung nodules on Computer Tomography and Chest Radiography". Early detection of such potential cancerous nodules could potentially save people's lives from lung cancer. His specific areas of interests include Pattern Recognition and Image processing. His Master's publication revolved around the application of Super-Resolution for JPEG2000 compressed images which are utilized for Airborne Imaging.

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Zang Hee Cho

Seoul National University, South Korea

Ultra high field MRI and PET fusion imaging for neuroscience research: From Parkinson diseases to cognitive sciences

Recent progresses on new imaging and system developments, especially on the brain dedicated PET-MRI, using high resolution HRRT-PET and ultra-high field 7.0 T magnetic resonance imaging (MRI) and their applications to basic and clinical neuroradiology will be discussed. With high field MRI, such as the 7.0 T MRI, one can now visualize the subfields of the hippocampus and brainstem in vivo as well as tractography hitherto unable to do with existing MRI systems. Together with molecular imaging using positron emission tomography (PET), now, it is possible to visualize metabolic functional changes quantitatively in human brain.

Biography

Zang Hee Cho was the Professor of Radiological Science at University of California at Irvine and the University Professor and Director of the Neuroscience Research Institute, Incheon, Korea since 1985, until he moved to Advanced Institutes of Convergence Technology, Seoul National University. He has been a pioneer in positron emission tomography (PET) and magnetic resonance imaging since the inception of the computerized tomography (CT) in 1972. He was the first one who pioneered world's first "Ring PET", the first molecular imaging device, in 1975.

More recently, he pioneered the first PET-MRI (Proteomics 2008) demonstrating that in vivo human sub-millimeter high resolution molecular imaging is possible and published over one hundred neuroscience and related scientific publications. He has more than 300 peer reviewed scientific publications covering from nuclear physics to neuroscience and published 3 graduate level text books. Among the numerous honors and awards, he was elected as a Member of the US National Academy of Sciences, Institute of Medicine in 1997.

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Applying computer-aided detection schemes to assist predicting response of ovarian cancer patients to chemotherapy in clinical trials

Bin Zheng
University of Oklahoma, USA

The majority of ovarian cancer cases are diagnosed at late stage and it has the highest mortality rate among gynecologic malignancies. Thus, applying effective chemotherapy is important for reducing patients' mortality rate. A principle challenge in treating ovarian cancer is that no biomarker exists to date to reliably select treatment options, predict clinical benefit, and determine drug resistance. In our group, we developed and tested several computer-aided detection (CAD) schemes, which aim to more accurately predict response of ovarian cancer patients to chemotherapy at an early stage using CT images acquired either pre-therapy, post-therapy or both. In this presentation, I will discuss 4 recent studies, which include (1) developing a B-spline based deformable image registration scheme to automatically detect more tumors that have significant volume and density changes depicting in pre- and post-therapy CT images, (2) segmenting targeted tumors and quantifying image feature change between the pre- and post-therapy CT images, (3) detecting non-tumor based quantitative image features and (4) testing the feasibility of using tumor image features computed from pre-therapy CT images only to predict progression-free survival (PFS). From our experimental results, we made following observations. First, using CAD schemes, we enabled to detect more clinically-relevant tumors that have impact on PFS. Second, it is feasible to predict PFS of patients who participated in the clinical trials at an early stage (i.e., 6 weeks after starting therapy). Third, quantifying some non-tumor (i.e., adiposity) features can play a useful role to predict patients' PFS. Last, using tumor features computed from pre-therapy CT images only also provide discriminatory information to predict PFS. However, using the features difference computed pre- and post-therapy CT still yielded higher prediction accuracy. In conclusion, we demonstrated that applying CAD schemes has potential to assist developing more effective personalized cancer treatment strategy in the future.

Biography

Bin Zheng has experience in developing and evaluating computer-aided quantitative medical image analysis schemes for more than 20 years. Currently, his computer-aided diagnosis laboratory is working on the following research areas: (1) Identify quantitative image feature markers and develop machine learning classifiers or statistical models to help predict or assess cancer risk and prognosis (i.e., breast, lung and ovarian cancer); (2) develop interactive CAD schemes and workstation using content-based image retrieval (CBIR) approach to assist radiologists in cancer diagnosis (classify between malignant and benign lesions); (3) develop new electrical impedance spectroscopy (EIS) technology to assist cancer screening (e.g., breast) and/or lesion classification (e.g., thyroid nodules).

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David A Gutman, OMICS J Radiol 2016, 6:5(Suppl)
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The cancer digital slide archive (CDSA): A web based resource linking pathology, radiology, and genomics

David A Gutman
Emory University School of Medicine, USA

The Cancer Genome Atlas (TCGA) is an NCI funded project integrating clinical, histopathological, molecular (mRNA/miRNA, protein, copy number, etc.), and metadata for over 25 different cancer types. The overall goal is to harness large data sets to discover insights in cancer progression. Several recent TCGA studies have illustrated important relationships between morphology observed in whole-slide images, clinical data, and genetic events and therefore the ability to link these data sources over hundreds of patients could potentially lead to a greater insight in cancer progression. However, the integration and visualization is a common challenge in biomedical informatics and better tools are needed to combine the vast and disparate data types. Our group has developed a number of web-based tools to support the federation, visualization, and analysis of both pathology and radiology imaging data. The CDSA houses over 25,000 digital pathology images, as well as integrated tools to view related metadata, as well as for image markup and data analysis. A brief overview of some of the capabilities and data available in this public resource will be discussed. In addition, we will review some of the open-source tools used to power this archive. Finally, some of the science that this technology has enabled will be reviewed.

Biography

David A Gutman received his MD/PhD from Emory University, and then completed a Psychiatry residency. He has published over 75 papers, and has a broad range of interests in the digital imaging (radiology and pathology), and clinical informatics. He is currently an Assistant Professor of Neurology, Psychiatry & Biomedical Informatics and is also a staff Physician at the Atlanta, VA.

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Detection and clinical significance of sternal lesions on breast MRI

Limin Yang
University of Iowa, USA

The purpose of this study is to characterize sternal lesions detected on breast MRI, compare MRI detection of sternal lesions with other imaging modalities (bone scan, PET/CT and chest CT), and ascertain how often patient management is altered by discovery of sternal lesions. Retrospective review of 1143 breast MRIs between 2007 and 2012 identified 17 patients with sternal lesions including 15 patients with newly diagnosed breast cancer and 2 patients with remote history of breast cancer. Tumor size, histopathology, receptor status, nodal and distant metastasis, and images of breast MRI and other modalities were reviewed. Sternal lesions in 9 of the 17 patients were determined to be malignant (metastasis) either by biopsy or presence of widespread metastases. Sternal lesions in 8 of the 17 were benign, confirmed by biopsy or presumed benign as not detected by other modalities. The malignant group had statistically significant larger breast cancer size (malignant: 6.4 cm; benign: 2.3 cm), a higher percentage of diffuse sternal lesions (malignant: 56%; benign: 0%), and more frequently showed rapid initial enhancing (malignant: 100%; benign: 63%) and delayed washout curves (malignant: 67%; benign: 13%). Although not statistically significant, the malignant group had a higher frequency of invasive lobular carcinoma (malignant: 44%; benign: 13%) and more lymph node involvement (malignant: 78%; benign: 50%). Breast MRI detected more sternal lesions than did bone scan, PET/CT and chest CT. Four of the 17 (24%) patients were upgraded to stage 4 due to unsuspected metastatic sternal lesions on breast MRI. In conclusion, breast MRI is more sensitive than other modalities in detecting sternal lesions. Sternal metastases occur more frequently in aggressive breast cancer and exhibit malignant-type dynamics on breast MRI. Detection of unsuspected sternal metastasis alters staging and improves patient management with more appropriate treatment.

Biography

Limin Yang has completed her MD from Peking University Health Science Center, PhD and Post-doctoral training from The University of Texas Health Science Center at San Antonio. She completed her Radiology Residency and Breast Imaging Fellowship from The University of Iowa. She is a Clinical Associate Professor in the Department of Radiology, The University of Iowa and the Medical Director of Breast Imaging at The University of Iowa Hospitals and Clinics. She has published more than 20 papers in reputed journals and has been serving as an Editorial Board Member of *Journal of Medical Diagnostic Methods* and is reviewer for several reputed journals.

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Tamara Feygin, OMICS J Radiol 2016, 6:5(Suppl)
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Dynamic MR imaging (MR fluoroscopy): Clinical applications in pediatric radiology

Tamara Feygin
University of Pennsylvania, USA

Dynamic Cine Magnetic Resonance imaging (MR "fluoroscopy") is a rapidly developing technique, which evolves from research and works in progress into routine imaging sequences. This technique is designed to demonstrate some of the physiologic and pathologic processes of the human body in almost real time. MR "fluoroscopy" offers many advantages over other dynamic imaging modalities (such as x-ray based fluoroscopy, nuclear medicine examinations or ultrasonography) due to its lack of ionized radiation and short acquisition time. These features are particularly important in pediatric and prenatal medicine. The dynamic sequences are based on fast acquisition and organization of images in a sequential-loop, resulting in an impression of observing a real-time movie. The sequences vary slightly in different manufactures but almost any sequence sensitive to flow may be employed. They are easily obtainable from a technical standpoint, and are easily tolerated by patients. These dynamic sequences prove to be valuable tools in functional assessment of intracranial/intraspinal CSF flow dynamics, evaluation of effectiveness of endoscopic procedures, esophageal or bowel motility (and almost any other type of dynamic motion in the human body); evaluation of cardiac contractility and blood flow patterns and joint mobility. Dynamic Cine MR Imaging improves our knowledge of fetal physiology, demonstrates functional impairment of fetal fluids flow dynamics; provides clinically significant prognostic information for pre and postnatal planning and contributes in very careful selection of patients eligible for fetal intervention.

Biography

Tamara Feygin is an Associate Professor of Clinical Radiology in University of Pennsylvania, Perelman School of Medicine, and Staff Neuroradiologist in The Children's Hospital of Philadelphia. She led the development and implementation of magnetic resonance fluoroscopy in clinical practice for assessment of cerebral and spinal CSF flow dynamic in children and fetuses; for assessment of fetal swallowing; for evaluation of phonation in children with velopharyngeal incompetence. She is a dedicated educator and mentor of undergraduate and medical students, radiology residents, and radiology and neuroradiology fellows. She has been invited to present her work nationally and internationally. She is a member of the European Society of Neuroradiology, the Radiological Society of North America, the Society for Pediatric Radiology, and a senior member of the American Society of Neuroradiology.

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Hesham El Sheikh, OMICS J Radiol 2016, 6:5(Suppl)
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Intraductal breast masses: Sonographic and mammographic predictors of malignancy

Hesham El Sheikh
Benha University, Egypt

We compared the ultrasonographic and mammographic findings of 251 intraductal breast in 198 patients with the histopathology to determine the ultrasonographic and mammographic features of intraductal breast masses that may be associated with malignancy. On US, we assessed US features of the mass, its distance from the nipple, the pattern of duct filling by the mass, whether the mass involved the branch ducts and the presence of abnormal axillary lymph nodes. The mammograms were assessed for the presence of a mass, calcifications, a mass with calcifications and symmetry. The method and the results of US and mammographic examinations, the characteristic findings of intraductal breast masses that may be associated with malignancy will be presented and discussed.

Biography

Hesham El Sheikh, Medicine Doctor (MD-Medicine), is now a Professor of Radiology. He got his BSc in Medicine, MSc in Radiology, MD degree at Benha University, Egypt. He has published more than 21 papers in reputed journals and has interest in using radiologic imaging in the management of breast cancer. Currently, his research focuses on identification of sonographic and mammographic features of intraductal breast masses that may be associated with malignancy.

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Molecular imaging in the era of precision medicine

Precision medicine is an advanced procedure for disease treatment, prevention, diagnosis and, formulated around each individual's variability in genes, environment and life style, including nutrition. Precision medicine has made advances in diseases such as cancer, but the ultimate goal is to apply the approach to other diseases. With genomics, proteomics and molecular diagnostics, molecular imaging is well positioned to be a major driver of the precision medicine initiative. As a non-invasive tool, multi-modality molecular imaging excels at revealing quantitative information on the cellular and molecular pathways underpinning diseases on an individualized patient basis. Advancements in molecular imaging also provide new and specific ways to detect disease at early and potentially curable stages of disease. Molecular imaging can also identify which patients are likely to respond to certain therapies, from those less likely to respond. In this paradigm, molecular imaging has a huge role to play in accelerating and advancing the field of precision medicine towards more cost-effective healthcare. Our multi-modality molecular imaging research addresses targeted imaging of both the tumor and the tumor microenvironment (TME) and its associated stroma. In this context, we are studying mechanisms of therapeutic intervention within a heterogeneous tumor and TME. A theranostic approach to cancer therapy, where live monitoring of treatment, is visualized by molecular PET imaging of anticancer drugs. Such imaging data is used to guide location-dependent proteomic analysis within a heterogeneous tumor volume. This combined approach reveals information on individual drug resistance driven by alterations in the proteome of cancerous legions. The concept of imaging both tumors and the associated immune cell environment will also be highlighted.

Biography

Dr. Zweit is a professor of Radiology, Radiation Oncology, Molecular Pathology, Biochemistry & Molecular Biology and Chemistry. He is the Director of the Center for Molecular Imaging and a senior member of the Massey Cancer Center at Virginia Commonwealth University Medical Center. He leads an inter-disciplinary and inter-collaborative molecular imaging and nanomedicine research program that emphasizes multi-modality molecular imaging approaches to study biochemical and biological pathways in vivo. Professor Zweit's research interests include the development of paradigms for molecular imaging and nanotechnology strategies for preclinical and clinical translational research in cancer, neuroscience and immunotherapy. Dr. Zweit is internationally recognized for his work in molecular imaging of cancer drug development, and conducted the "world's first" Molecular PET Imaging clinical trial of Anti-angiogenic therapy in cancer patients (Journal National Cancer Institute 2002 & 2006).

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Manohar Roda, OMICS J Radiol 2016, 6:5(Suppl)
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Role of MRI: Fetal body imaging

Manohar Roda
University of Mississippi, USA

USG is the primary technique for fetal imaging due to its proven utility, availability and low cost. Technical and therapeutic advances have driven the development of fetal MRI which now plays an increasingly important role in the evaluation of sonographically complex or occult anomalies of the fetal body. MRI during pregnancy was initially being used for maternal and placental abnormalities. Modern fetal MRI began with the availability of T2W- ultrafast sequences which provides an excellent contrast declination between the fluid (CSF) and tissues (developing brain). Fetal MRI was initially primarily utilized for evaluation of the fetal brain-neurological abnormalities. Development of more ultrafast breath hold sequences like T1, diffusion, echo planar, led to the MRI evaluation of the fetal organs. Continued progressive works of various groups has added signifcantly to the further development of this technique. Fetal MRI now offers an unrivaled method for advanced detailed anatomic imaging with a high degree of flexibility in the image contrasts. All the fetal cavities are fluid filled and appear T1 hypointense, T2 hyperintense; mouth, nose, ear, GI tract including stomach, kidneys, UB, GB, trachea, lungs, ventricles, CSF spaces and amniotic cavity. The bowel meconium, pituitary, thyroid and liver appears T1 hyperintense. Robust use of bright blood imaging and dark blood imaging sequences also helps in fast imaging as vessels and heart can appear bright/dark based on different imaging sequences. Fast MRI sequences have overcome fetal motion, hence scanning with adequate slice thickness, resolution, quality and SNR is now feasible. Parallel imaging is a general method for reducing the time of data processing required to produce images by simultaneous data collection on multiple separate channels with total imaging time ~30-45 minutes. Standard MRI screening and consent is obtained and scan is performed without any IV contrast administered. Main fetal safety concerns are first trimester teratogenesis and acoustic damage. Although safety has not been positively established, hazards appear negligible and outweighed by diagnostic benefit. Hence, pregnant women in the second and third trimester can be reassured that MRI poses no known risk to the fetus. My presentation will elaborate on common indications, ultrafast MRI technique, normal fetal anatomy and major congenital anomalies. All radiologists involved in prenatal imaging should be aware of the applications, safety concerns and limitations of this evolving modality.

Biography

Manohar Roda is a Board Certified Radiologist currently working as an Assistant Professor- Body Imaging with University of Mississippi Medical Center in Jackson, MS. He has immense expertise in whole body MRI with special interest in body, MSK, cardiac and fetal MRI. He is passionate about evaluation of complex fetal congenital abnormalities on MRI to help clinicians and families in planning further management during these complex situations to improve fetal and maternal well-being. He has interpreted more than 500 cases of fetal MRI while working in University of MS over last five years. He teaches radiology residents, fellows, maternal-fetal medicine fellows, radiology technicians to design protocol, perform and interpret fetal MRI's with focus on patient safety and diagnostic accuracy. He is one of the key imaging personnel at UMC in carrying forwards the fetal imaging program which is a well-coordinated multi-disciplinary team effort between MFM Department, Neuroradiology, Body Imaging Division and other relevant departments. He has completed Body MRI Fellowship in Radiology Department of Tufts Medical Center at Boston in 2009. He also completed Thoracic Fellowship in Radiology Department of M D Anderson Cancer Center at Houston in 2008. He has completed his Radiology Residency Program in 2002 from Ram Manohar Lohia Hospital, University of Delhi, India. During his Post-residency Tenure of five years, he worked with the best multimodality radiology centers. He completed his Medical Schooling in 1999 form Maulana Azad Medical College, University of Delhi, India.

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Notes:

Daniel Pastore, OMICS J Radiol 2016, 6:5(Suppl)
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Postoperative knee ligament reconstruction: What should be evaluated?

Daniel Pastore
Sao Paulo University School of Medicine, Brazil

Anterior cruciate ligament (ACL) lesion is the most frequently observed lesion among athletes. Cruciate ligaments are the center of knee kinematics and responsible for the primary restraints to anterior and posterior stability of the knee. These ligaments also maintain articular bone surfaces in contact and are capable to resist multiple combined forces and movements. One third of the cases in patients with ACL lesions will present osteoarthrosis in the future. Thus, it is extremely necessary to develop a more individualized treatment, considering some variables related to surgical intervention, such as ligament rupture grade, meniscal tears and lifestyle. The objective of this study is to demonstrate ligament anatomy, surgical principles and graft classification (structure constitution, fixation method and rehabilitation). It is also our aim to discuss imaging methods (radiographic studies, magnetic resonance, CT-arthrography and MR-arthrography) by illustrating clinical cases and post surgical complications. A correct interpretation of imaging aspects along with clinical evaluation are keys to a successful treatment.

Biography

Daniel Pastore has completed his PhD from University of Sao Paulo, SP, Brazil in 2009 and research fellow in Musculoskeletal Imaging, Department of Radiology from University of California, San Diego, USA in 2007. He is a member of the Radiology Society of North America (RSNA), Musculoskeletal Radiologist at University of Sao Paulo and Fleury Medicine and Health. He has published as author and co-author in reputed journals and has been serving as a reviewer for *Skeletal Radiology* and *American Journal of Roentgenology*.

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Sanjay Gandhi, OMICS J Radiol 2016, 6:5(Suppl)
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Imaging of spleen made easy: A practical approach to focal and diffuse splenic disease

Sanjay Gandhi
North Bristol NHS Trust, United Kingdom

The focus of the talk would be to develop a greater understanding of benign and malignant splenic pathologies and increase confidence in dealing with lesions encountered in everyday practice. This presentation will be on a practical approach to focal and diffuse splenic pathologies, normal imaging appearances and clinically important variants, congenital anomalies such as cardiosplenic syndromes. Imaging features of common and some rare lesions including benign and malignant neoplasms such as hemangioma, hamartoma, lymphoma and infections and infarction will be discussed. Different imaging modalities including ultrasound, CT, MRI, nuclear medicine (Technetium sulfur colloid) and PET will be included along with the relative merits and limitations of each technique. A practical approach to splenic calcification, and solitary and multiple focal cystic and solid lesions will be discussed.

Biography

Sanjay Gandhi is a Senior Attending Radiologist at one of the largest teaching hospitals and Regional Trauma Units in the UK. For the past 17 years, he has been teaching at the University of Bristol and University of West of England. As a Professor, he also teaches at Sri Devaraj Urs University, India. He has won multiple academic awards and has been involved in numerous research projects and collaborative trials. He has published widely on use of cutting-edge technology and co-authored and edited eight medical textbooks. He is an internationally recognized leader in Healthcare IT and development of Smart Apps.

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Notes:

Mafalda Gomes, OMICS J Radiol 2016, 6:5(Suppl)
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Fetal risks from diagnostic imaging during pregnancy: A systematic review and proposal of a clinical protocol

Mafalda Gomes
University of Porto, Portugal

The use of radiation in diagnostic exams during pregnancy raises a lot of questions among clinicians and patients. Being a matter of great impact in our clinical practice, in this review we task the risks of radiation to the fetus, the doses in which this occurs, the most sensitive periods for radiation exposure and how should a medical professional behave in this situation. Between the 8th and 15th weeks of gestation there is a higher risk for most deleterious effects. The deterministic effects require a dose above 100-200 mGy in order to occur, being the risk consider negligible at 50 mGy. It is important to highlight that no diagnostic exam exceeds this dose. However, measures to diminish dosage should be kept and nonionizing measuresought to be preferred whenever possible. Every radiology center should have its own data onfetal radiation exposure. This systematic review poses as a guideline for every doctor dealing with possibly pregnant patients that require a diagnostic exam with radiation.

Biography

Mafalda Gomes has completed her degree in Basic Health Sciences in the Faculty of Medicine at the University of Porto, the best medical school in Portugal, in 2012. She is engaged in one of the biggest hospitals in the country and gained clinical experience in Hospital S Joao, with internships in Hospital Pedro Hispano and Povoa de Varzim-Vila do Conde Hospital Center. In 2015, she finished her Master's degree in Medicine in the same Faculty of Medicine. Her thesis was recently published in an international journal with an impact factor of 1.6.

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(Day 2)

Nilda Espinola-Zavaleta, OMICS J Radiol 2016, 6:5(Suppl)
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Ebstein's anomaly: Anatomo-echocardiographic correlation

Nilda Espinola-Zavaleta
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Background: Ebstein's anomaly is seen as part of a generalized disturbance in the development of the right ventricle and, in some cases, of the left ventricle.

Objective: The aim of this investigation is to demonstrate that in Ebstein's anomaly (EA) the right ventricle (RV) is affected in its three portions and to make an anatomo-echocardiographic correlation between the anatomic specimens and the equivalent echocardiographic images.

Methods: Thirty hearts with EA were studied. We describe the alterations of each portions of the RV. Fifty adult patients with this anomaly were studied by echocardiography.

Results:

Anatomy: All hearts had atrial situs solitus, 27 had concordant atrioventricular connection and 3 discordant. The degree of tricuspid valve (TV) displacement showed a spectrum from I to III. The inlet of the RV was markedly thin in 27. The trabecular portion had multiples muscular bands in all. The outlet portion was dilated in 20 and stenotic in 5. In 25 atrial septal defects were found.

Echocardiography: All patients had atrial situs solitus, 42 with concordant atrioventricular connection and 8 with discordant. The degree of TV displacement varied from I to III. The inlet of RV was markedly thin in 42. The trabecular portion had muscular bands in 45. The outlet portion was dilated in 31 and stenotic in 11. In 30 atrial septal defects were found. Associated defects included ostium secundum atrial septal defect, perimembranous ventricular septal defect, moderator band in the left ventricle and prolapse of the anterior mitral leaflet.

Conclusion: The EA affects the whole RV and the anatomo-echocardiographic correlation provides an appropriate understanding of echocardiographic images in terms of a precise diagnosis, therapeutic decisions and prognosis.

Biography

Nilda Espinola-Zavaleta has completed her Medical Academy in Warsaw and Postdoctoral studies from National Autonomous University of Mexico. She has published more than 150 papers in reputed journals and has been serving as an Editorial Board Member of repute.

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Svjetlana Jefic, OMICS J Radiol 2016, 6:5(Suppl)
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Demyelinating diseases of the central nervous system (CNS)

Svjetlana Jefic
University Clinical Centre of Repablic of Srpska, Bosnia and Herzegovina

Demyelinating diseases (DD) of the CNS include a broad spectrum of CNS disorders that can be diagnosed relatively routinely in some circumstances, but very challenging in other situations. Clinical course and morphological features of these conditions may be considerable overlapping that can lead to clinical uncertainty and misdiagnoses. DD can be primary – idiopathic inflammatory demyelinating disorders (IIDDs) and secondary – superimposed to other pathological entities. Primary IIDDs include: Multiple sclerosis (MS), clinically isolated syndrome (CIS), neuromyelitis optica (NMO), acute disseminated encephalomyelitis (ADEM), tumefactive demyelinating lesions (TDL), transverse myelitis (TM), chronic inflammatory demyelinating polyneuropathy (CIDP), and Guillian-Barre Syndrome (GBS). The differentiation between them has important implications on their managment and diagnostic road contains clinical, laboratory and neuroradiological findings. In diagnostic complexity of the IIDDs there is an effort to find typical clinical, immunopathogenic and imaging features playing role of biomarkers that could improve accuracy of diagnose. Identification of specific imunopathogenic and neuroradiological profile should enable induvidualized differential diagnosis and tailored treatment in a given patient. MR imaging is incorporated in whole diagnostic criteria and protocols of the managing IIDDs with increasing of its importance over the time, not only in diagnostic aspect, but also researching. In everyday practice, MR is unique diagnostic tool that is helpful in: 1. Distinguishing IIDDs from other pathological entities - (e.g., tumoral or infections lesions) avoiding unnecessary aggressive diagnostic or therapeutic procedures; 2. Differentiation between different type of IIDDs which can provide appropriate therapy - for instance certain patients with NMO may not response well, or even deteriorate under some of the first-line treatment for MS; 3. Prognostic aspect – e.g. contribution to the identification of the patients with CIS or RIS who are at greater risk for disability progression or, on the other hand, will have a more benign course; 4. Understanding tissue changes during progression and remission – while the autopsy and anatomical observations - as a snapshot - do not explain adequately, e.g., the recovery seen in some MS patients, MRI imaging is better to follow the tissue changes caused by demyelination. The lecture is designed as a review of practical pearls and pitfalls of the IIDDs by presenting cases from everyday practice.

Biography

Svjetlana Jefic works as Radiologist at Department of Clinical Radiology, University Clinical Centre of Repablic of Srpska, Banja Luka, Bosnia and Herzegovina. She is general Radiologist with completed training in fluoroscopy, x-ray exams, ultrasound, CT and MRI with focus on cross sectional imaging and with main interest in neuroradiology as well as pathology of head and neck. Also, she had an experience in Family Medicine Practice certified by Queens University, Toronto, Canada and Medical University of Banja Luka. She is trained on numerous radiological and neuroradiological courses (ESOR Galen Foundation courses, 1st, 2nd, 3th Schools of Neuroradiology, MRI Schools of Novi Sad, Sarajevo etc.), published four abstracts (oral presentations and e-posters at Congres of Radiologists of Serbia and 39th Annual Meeting of ESNR), two invited lectures on BCR. Member of ESNR, ESR, Society of Radiology of BiH, Society of Radiology of Serbia.

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Aminur Rahman, OMICS J Radiol 2016, 6:5(Suppl)
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Spontaneous intradural cerebral artery dissection: Spectrum of clinical presentations and correlation with angiographic findings

Aminur Rahman
National Institute of Neurosciences and Hospital, Bangladesh

Aim: Aim of this study was to analyze the distribution of spontaneous intradural cerebral artery dissection in angiographically with the symptomatology of admitted patients to our hospital.

Materials & Methods: We analyzed retrospectively collected data of the stroke patients' with 4-vessels angiogram in our institute from January 2013 to June 2014. Out of 164 of cerebral dissections in angiographic pattern, we found only 16 patients of intradural dissecting aneurysms that were included in this study. The male-female ratio was 37.5:62.5 and the mean age was 47.56±13.19 years. According to the angiographic finding depicting the location of the dissection plane in the arterial wall, we categorized to steno-occlusive, aneurysmal and combined (steno-occlusive and aneurysmal) pattern. In each dissection pattern, we evaluated presenting symptoms and presence of subarachnoid hemorrhage (SAH), infarction and intracerebral hemorrhage (ICH) or combined.

Results: The most common symptomatic presentation was headache (75%), followed by neck pain (50%), motor weakness of limb(s) (43.8%) and loss of consciousness (LOC) (37.5%). The most common angiographic pattern was aneurysmal patterns (68.75%) followed by steno-occlusive (18.75%) and combined (12.5%) patterns. Aneurysmal pattern was most frequently related to SAH (7/11, 63.63%) in contrast to steno-occlusive pattern was only related to infarction (3/3, 100 %). The most frequent dissections were in the intradural vertebral arteries (IV) and posterior cerebral artery (PCA), presented with SAH 80% (4/5) and 33.33 % (1/3), respectively. Infarction was common abnormality in patients with the intradural carotid arteries (IC) 33.33% (1/3), superior cerebellar artery (SCA) 33.33% (1/3) and basilar artery (BA) 33.33% (1/3) each whereas ICH was common abnormality in patients with the posterior inferior cerebellar artery (PICA) 50% (1/2).

Conclusion: The most common symptomatology of intradural cerebral artery dissection are headache and neck pain followed by motor weakness of limbs and LOC. SAH with aneurysmal pattern, in the posterior circulation, especially in the IV is the most frequent diagnosis which requires combined analysis of angiographic pattern and clinical presentations of stroke.

Biography

Aminur Rahman has completed his MD from Sir Salimullah Medical College Mitford Hospital, University of Dhaka, Bangladesh. He is an Assistant Professor, National Institute of Neurosciences and Hospital, Sher-e Bangla Road, Bangladesh. He has published more than 15 papers in reputed journals and author of many neurology books.

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