WAVES

THE OFFICIAL PERIODICAL OF CALCUTTA ACADEMY OF RADIOLOGY

VOLUME V, ISSUE I, FEBRUARY 2024

Joint Editors: Dr. Anup Sadhu, Dr. Bijon Kundu and Dr. Viral Parekh.

Calcutta Academy Of Radiology
A Platform For Radiology Education & Interaction

Waves

WAVES: THE OFFICIAL PERIODICAL OF CALCUTTA ACADEMY OF RADIOLOGY
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INSIDE THIS ISSUE

Editorial: AI in Radiology

Dear friends, colleagues, juniors & seniors; we are happy to publish 20th. Edition of CAR periodical.

AI, or artificial intelligence, is a branch of computer science that aims to create machines or systems that can perform tasks that normally require human intelligence, such as reasoning, learning, and decision making. AI has been making rapid advances in recent years, thanks to the availability of large amounts of data, powerful computing resources, and sophisticated algorithms.

One of the areas where AI has shown great potential is radiology. AI can assist radiologists in various ways, such as: Enhancing image quality and reducing noise, detecting and segmenting lesions and abnormalities, measuring and quantifying features and parameters, classifying and diagnosing diseases and conditions, predicting outcomes and prognosis, recommending treatments and interventions

AI can also help improve the efficiency and productivity of radiology workflows, by reducing the workload and time required for image analysis, improving the accuracy and consistency of interpretations, and facilitating communication and collaboration among radiologists and other clinicians.

AI is not meant to replace radiologists, but rather to augment their capabilities and complement their skills. AI can provide radiologists with more information, insights, and confidence, while allowing them to focus on more complex and challenging cases, as well as on the human aspects of patient care.

However, AI also poses some challenges and limitations for radiology, such as: ensuring the quality and validity of the data used for training and testing AI models, evaluating the performance and reliability of AI models in different settings and scenarios, addressing the ethical, legal, and social implications of AI applications in radiology, developing the standards and guidelines for the integration and regulation of AI in radiology practice, educating and training radiologists and other stakeholders on the use and interpretation of AI in radiology.

Therefore, it is essential for radiologists to be aware of the opportunities and challenges of AI in radiology, and to actively participate in the development, evaluation, implementation, and governance of AI in their field. Radiologists should also embrace lifelong learning and continuous professional development, to keep up with the evolving trends and technologies in radiology.

AI is a powerful tool that can transform radiology for the better. By harnessing the power of AI, radiologists can enhance their performance, improve patient outcomes, and advance their profession.

This issue would not have been possible without the help of Dr. Bhavin Jankharia and Dr. Rajesh Botchu. We are indebted to them.

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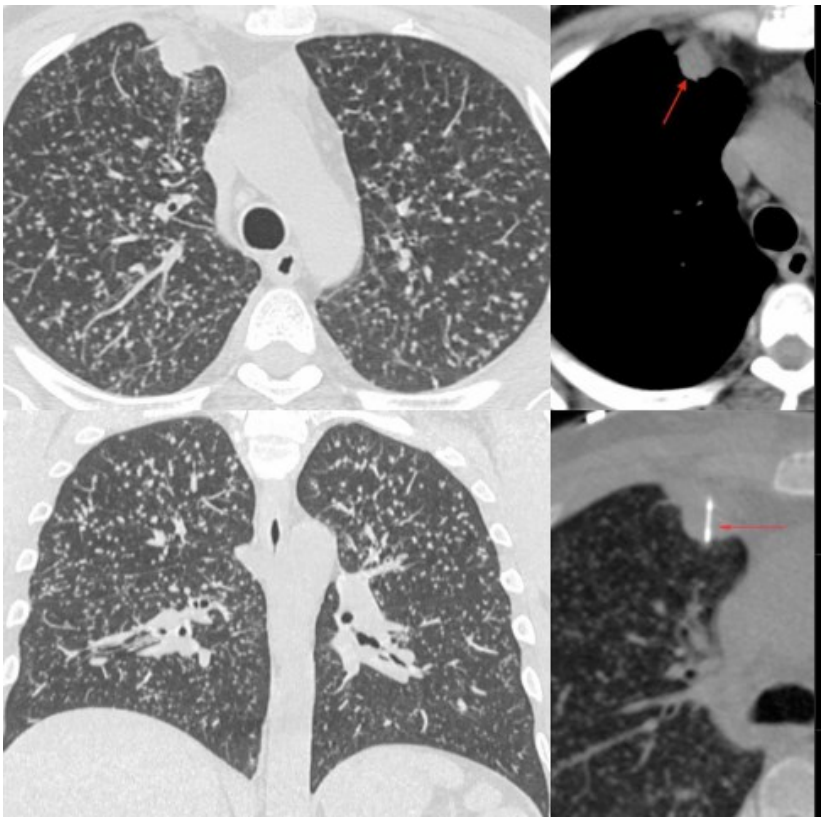
Dr. Bhavin Jankharia needs no introduction to the Radiology fraternity. As you all know he is a renowned Radiologist and academician and has contributed immensely in propagating Radiology education. Presently, he is a Consultant Radiologist at Picture This by Jankharia. He is also a Trustee of Radiology Education Foundation. He has consented to share some of his work with us, which will help all the Residents as well as practicing Radiologists. Here is some information about him in brief.

- **He has written 5 books, 35 chapters, 57 articles (PubMed listed)**
- **Presented 32 posters**
- **More than 1500 invited lectures over 27 years**
- **Editor-in-Chief, Indian Journal of Radiology & Imaging (2007-2012)**
- **Latest Book (2019): Computed Tomography of Interstitial Lung Diseases**
- **Hon. Visiting Consultant – Radiology – Tata Medical Centre, Kolkata**

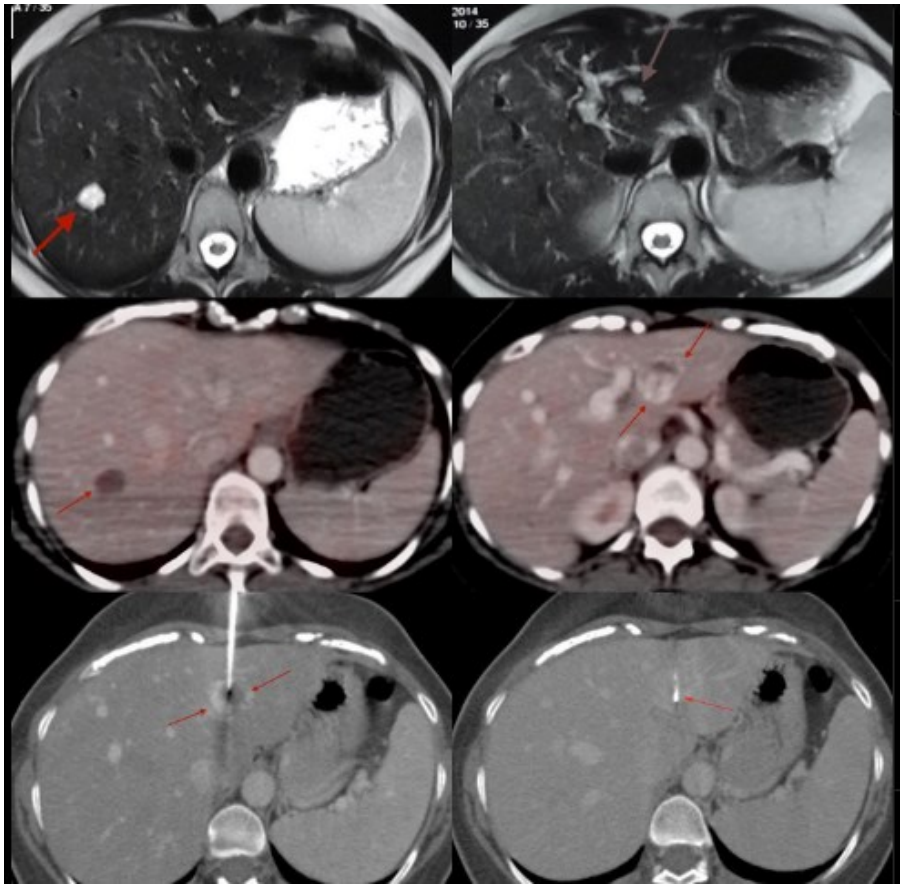
Case I : Miliary Nodules and One Focal Nodule - Tuberculosis or Malignancy



This 43-years old man came with fever and dyspnea. CT scan showed multiple nodules of the same size throughout the lung parenchyma, looking like miliary nodules with one larger lesion in the anterior segment of the right upper lobe. I don't remember, but sputum or bronchoscopy / lavage was likely negative.

The question was - is this miliary tuberculosis or is this carcinoma with miliary metastases. The nodules are not all of the same size, though they are evenly distributed. The one large focal lesion in the RUL really complicates the matter. Lung nodule was biopsied with a 20G coaxial biopsy gun. It turned out to be rifampicin resistant tuberculosis.

Case II - Patient with Low Grade Endometrial Stromal Sarcoma



This is a 43-years old woman operated for a low grade endometrial sarcoma. In 2014, she had an MRI that showed two lesions in the liver, likely hemangiomas, in segments 3 and 7 respectively, as shown. She had a PET/CT in 2018, which showed that while the segment 7 lesion was more or less the same, the segment 3 lesion had significantly increased in size, without any uptake and with a contrast CT picture of puddling that was quite typical of a hemangioma. So here is the conundrum. Liver hemangiomas are known to grow, but in this case only one lesion (segment 3) has grown, while the other (segment 7) had not. Endometrial stromal sarcomas are extremely rare. Liver metastases are even rarer. However, low grade sarcoma metastases, in general, can be indolent and may not show uptake and may be vascular.

So a judgement call was taken with the patient in the loop, to biopsy the segment 3 liver lesion. During the biopsy with a 20G coaxial biopsy gun, to ensure that the needle was properly within the lesion and that no specific vessel was being punctured, I gave contrast as well - the lesion shows classic peripheral enhancement and filling-in.

The diagnosis was hemangioma. Hemangiomas are in the end tumors and there should be no increased risk in performing their biopsies. We do land up sometimes doing biopsies of slow form vascular malformations, with no ill-effect.

Dr. Bhavin Jankharia, MD

Case III: Intelligent Scanning Helps Biopsy Better - Iliac Bone - Myeloma

This is a 60-years old man with severe backache. The MRI (T1W and T2W sagittal images) showed multiple focal lesions. The CT scan at the time of biopsy (sagittal image) showed multiple lesions and the plan was to target the anterior D12 vertebral body lesion. This biopsy had a certain degree of difficulty and there was no guarantee we would have got adequate material for a diagnosis.

Since there were multiple lesions, I asked the technologist to run a pelvic scan, which showed large left sacral and iliac bone lesions. After that, it was the easiest thing to put an 18G coaxial core biopsy gun into the iliac bone lesion to get the diagnosis of a plasma cell neoplasm, which given the multiple lesions was suggestive of multiple myeloma.

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Evolving role of Magnetic Resonance Imaging in assessing professional soccer players with suspected acute thigh muscle injury.

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Both professional and amateur athletes frequently sustain muscle injuries, though the frequency varies depending on the type of sport and the competitive level it is played. These contribute to a substantial proportion of injuries in professional sports, primarily affecting the lower limbs. Muscular injuries cause considerable time away from training and competition, accounting for 25% of injury-related absences in professional football. The British Athletics Muscle Injury Classification (BAMIC) classifies muscle injuries using a 0-4 scale of muscle injury and sub-classifies these grades according to the site of injury (myofascial, musculotendinous, or intratendinous) based on Magnetic Resonance Imaging (MRI). Though the BAMIC Classification is widely used throughout all professional sports, professional football players have exhibited MRI muscle signal abnormalities that differ from the BAMIC system, which may be relevant in decision-making process regarding injury management and rehabilitation.

These subtle muscle signal abnormalities have been termed ERSA (Exercise Related Signal Abnormality). On fluid-sensitive MRI images, these changes in muscle signals manifest as a subfascial ring of slightly enhanced signal or a peritendinous ovoid area. This pattern of signal abnormalities is different from the typical feathery edema found in acute muscle strain injuries as described in the BAMIC Classification. ERSA (Exercise Related Signal Abnormality) refers to signal changes and is further sub-classified on the presence of the peritendinous ovoid ring (Type A), the subfascial ring (Type B) or both (Type C) signal alterations . Considering the relationship found between the subfascial ring and the peritendinous ovoid ring, it is reasonable to consider both features as different MRI features of the same case.

The radiological differences between acute muscle strain injuries and ERSA lesions needs to be distinguished, especially when applying the established BAMIC classification system. This inconsistency gives rise to concerns regarding possible misclassification as ERSA lesions may be assigned a minimum grade 3 classification incorrectly. Mistakes in grade classification can lead to overestimation of injury severity, which can lead to extended rehabilitation times, unwarranted limitations on an athlete's return to sport, and improper allocation of resources to injures that do not require the level of care recommended.

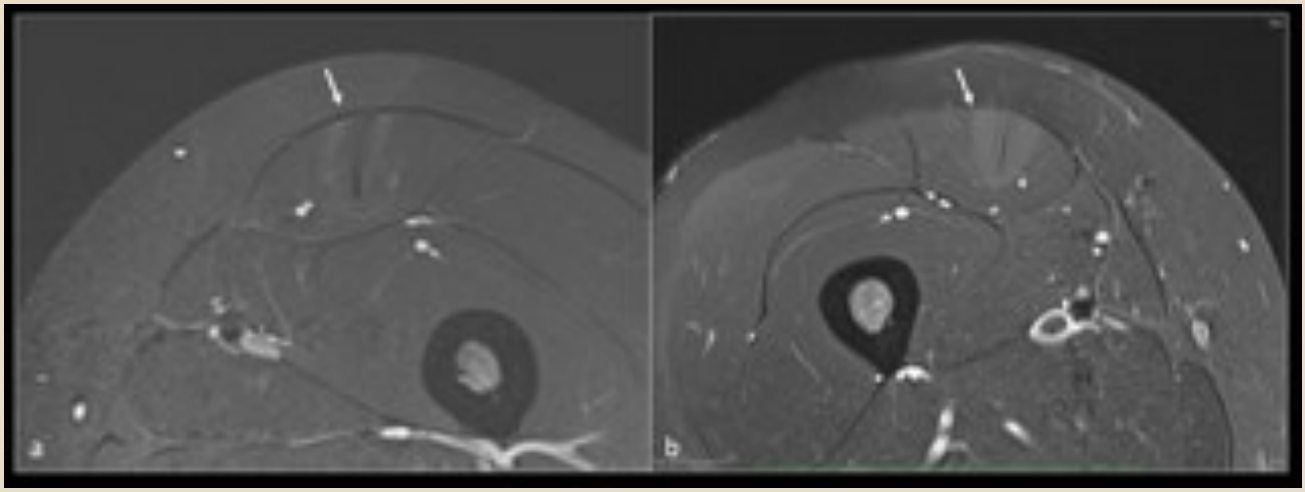

Figure 1. Axial PDFS (a and b) showing ERSA type A of rectus femoris (arrow)

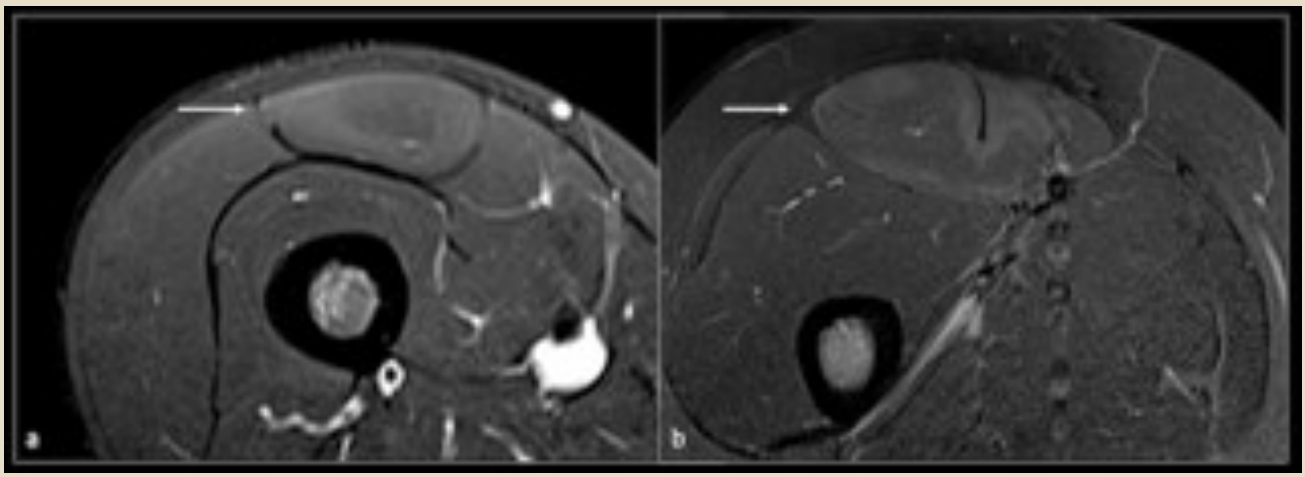

Figure 2. Axial PDFS showing ERSA type B (a) and type C (c) of rectus femoris (arrow)

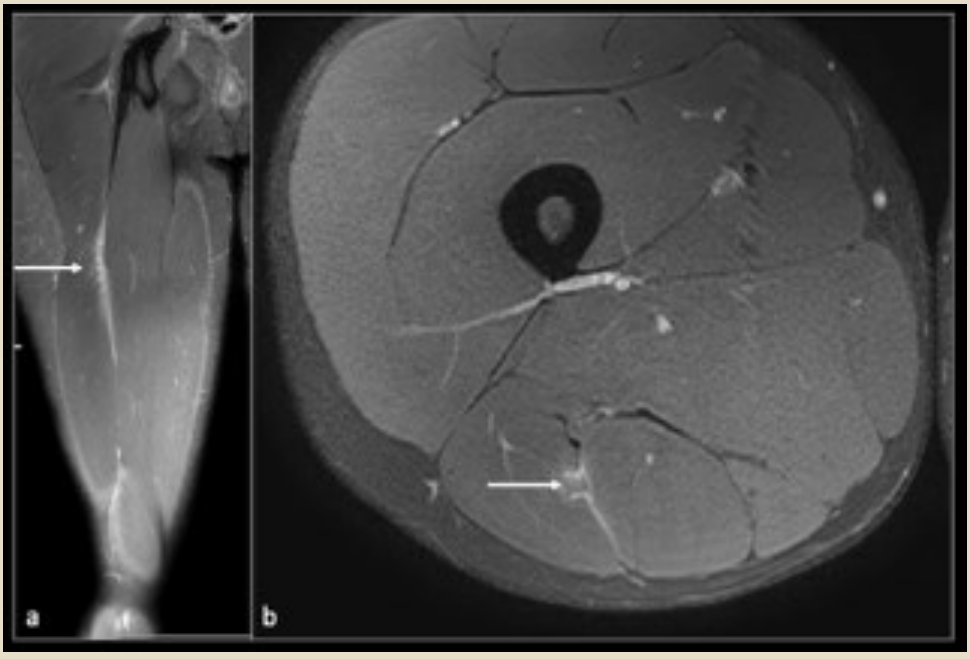

Figure 3. Coronal PDFS (a) and axial (b) showing BAMIC 2a injury of right biceps femoris (arrow)

DOMS (Delayed Onset Muscle Soreness) is a type of muscle injury defined by localised tenderness, tightness, and discomfort, typically appearing 24 hours after physical activity. In most cases, DOMS does not display any distinct MRI abnormalities. However, published MRI results of DOMs show diffuse signal changes, patchy high signal change, and feathery edema which are different from the appearance of ERSA lesions. In addition, ERSA lesions should be differentiated from muscle signal intensity changes that occur shortly following physical activity as muscles have shown diffuse increases in signal intensity on T2 and STIR immediately following activity.

This article raises the awareness of terminology ERSA (Exercise-Related Signal Abnormality) and its characteristic MRI findings. Recognition of such signal changes are crucial to avoid mischaracterization of these signal abnormalities as an acute muscle injury and will help target appropriate rehabilitation regime in professional soccer players.

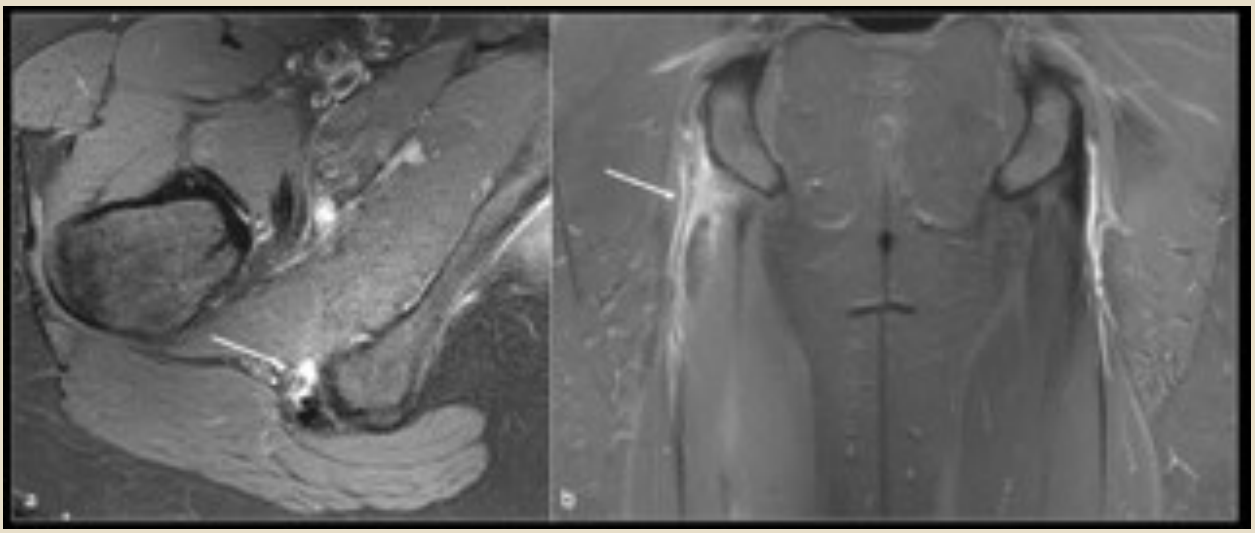

Figure 4. Axial PDFS (a) and coronal (b) showing full thickness tear of the conjoint tendon (arrow)

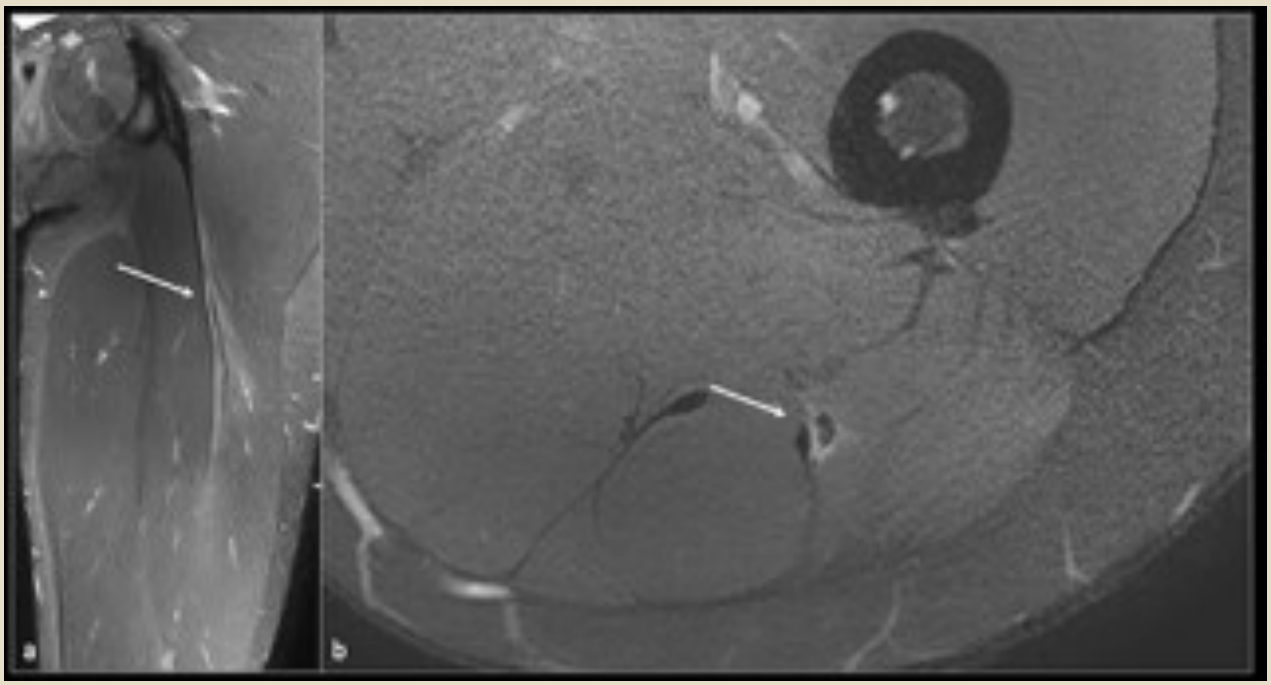

Figure 5. Coronal PDFS (a) and axial (b) showing BAMIC 2b injury of right biceps femoris (arrow)

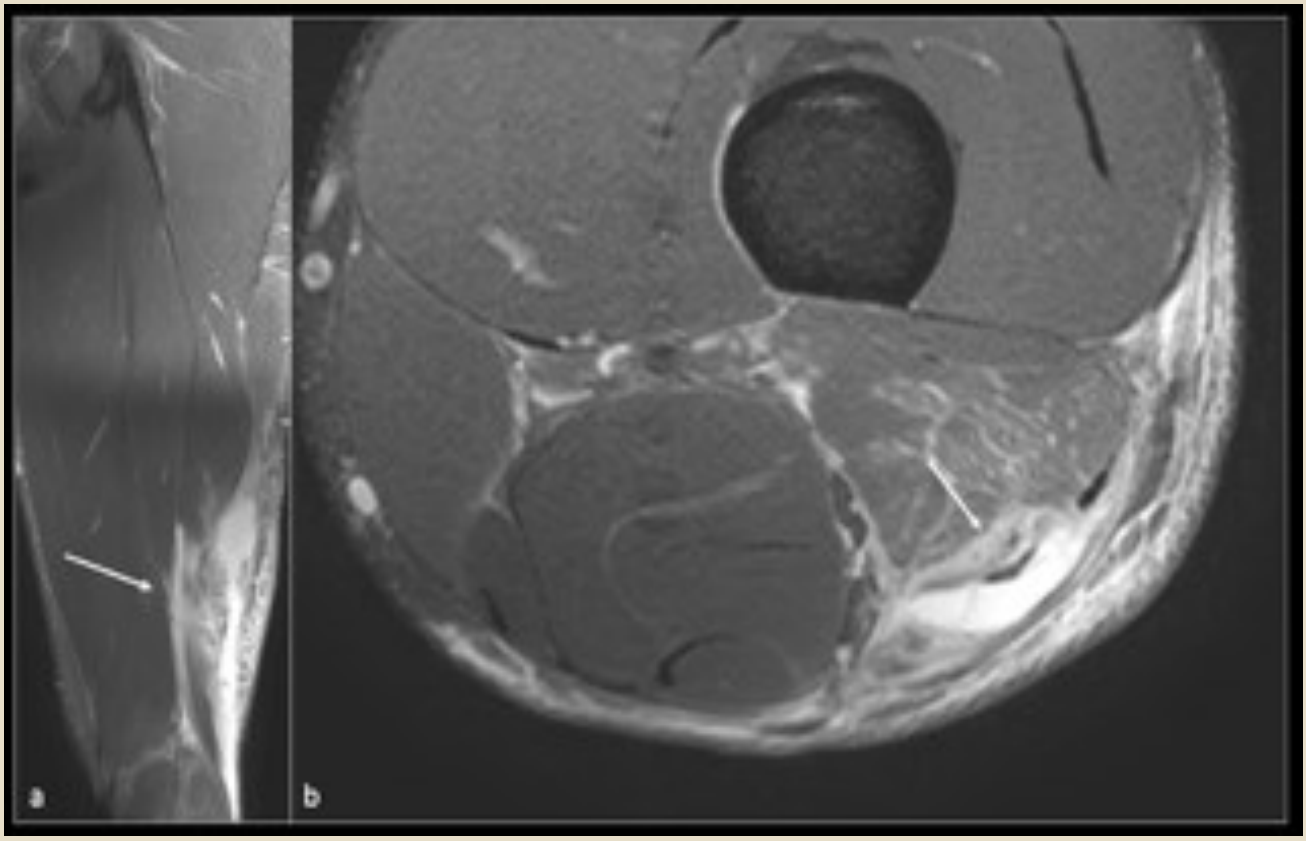

Figure 6. Coronal PDFS (a) and axial (b) showing BAMIC 3c injury of right biceps femoris (arrow)

References

1. Kho JSB, Botchu R, Rushton A, James SL. MRI features of ERSA (exercise-related signal abnormality) lesions in professional soccer players. Skeletal Radiol. 2022 Mar;51 (3):557-564.
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3. Vidoni A, Gillett M, Botchu R, James S. Lower limb muscle injuries: The good, the bad and the ugly. Eur J Radiol. 2018 Jul;104:101-107.

Evolving role of Magnetic Resonance Imaging in assessing professional soccer players with suspected acute thigh muscle injury.

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Avascular necrosis of humeral head

Aetiology similar to hip:

Remember ASEPTIC mnemonic:

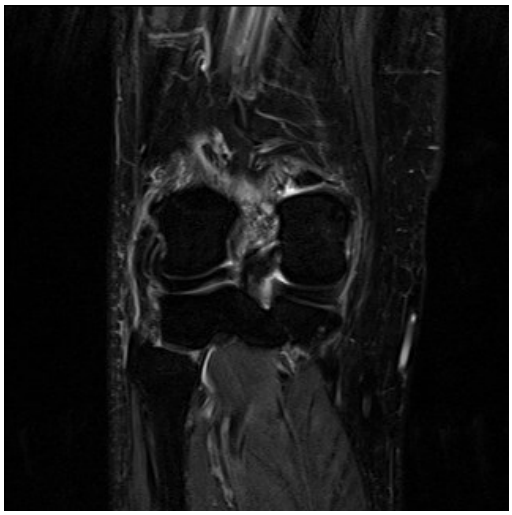
- Alcohol, AIDS
- Steroids (most common), Sickle, SLE
- Erlenmeyer flask (Gaucher's)
- Pancreatitis
- Trauma
- Idiopathic/ Infection
- Caisson's (the bends)

Stages:

- Stage I: Normal x-ray, changes on MRI only
- Stage II: Sclerosis (wedged, mottled) Osteopenia
- Stage III: Crescent sign indicating a subchondral fracture
- Stage IV: Flattening and collapse
- Stage V: Degenerative changes extend to glenoid

Dr. Viral Parekh, DMRD, DNB

Calcification of lateral collateral ligament of knee.



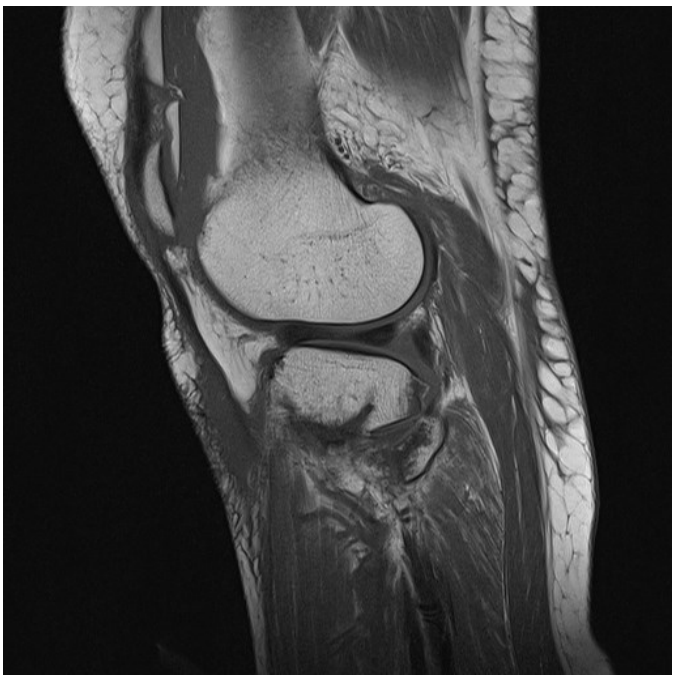
It is believed that hydroxyapatite deposition in the LCL was the primary mechanism of causation of this entity; however, the exact cause remains unknown.

Hydroxyapatite deposition disease usually affects men and women between the ages of 40 and 70 years. Patients present with atraumatic pain that is initially monoarticular, although it may be multiarticular. The most common site of involvement is the shoulder, although other sites such as the wrist and hand, foot, elbow, hip, and spine are well described.

Clinical findings include acute pain with local tenderness and swelling at the joint, some restriction of movement, and mild fever. Laboratory results are usually within the normal limits except the erythrocyte sedimentation rate, which may be elevated during an episode of pain. Hydroxyapatite crystals may deposit in tendons, ligaments, joint capsules, bursae, or soft tissues.

Dr. Viral Parekh, DMRD, DNB

Lipohaemarthosis following tibial fracture



Lipohemarthrosis is caused by an intra-articular fracture that allows fat and blood from the bone marrow to enter the joint. It is most commonly seen in the knee and is associated with a tibial plateau fracture or a distal femoral fracture; a patellar fracture occurs rarely. They have also been reported in hip, shoulder, elbow, and wrist fractures.

CT and MRI are much more sensitive to density differences, and they not only detect intra-articular fat but also a hematocrit effect, with three layers visible (fat above, serum/synovial fluid in the middle, and red blood cells below). The upper layer will follow fat across all sequences and saturate on fat-saturated sequences.

Dr. Viral Parekh, DMRD, DNB

Hyperlinks of academic material published on YouTube by Calcutta Academy of Radiology

1	Imaging of acute Pancreatitis—Dr. Anirudh Kohli
2	USG of rotator cuff - Dr. P. K. Srivastava
3	PET CT Physics - Dr. Sikandar Sk.
4	PET CT in Neurology - Dr. Sikandar Sk.
5	CAR - Case of the week - Case 1 - Megalencephalic leukoencephalopathy with subcortical cysts. - Dr. Viral Parekh
6	CAR - Case of the week - Case 2 - Adenocarcinoma of terminal ileum - Dr. Viral Parekh
7	CAR - Case of the week - Case 3 - Stener lesion - Dr. Nivedita Chakraborty
8	CAR - Case of the week - Case 4 - Anterior shoulder dislocation - Dr. Nivedita Chakraborty
9	CAR - Case of the week - Case 5 - Secondary intracranial hypotension. - Dr. Viral Parekh
10	CAR - Case of the week - Case 6 - Intramyocardial Dissection - Dr. Ritu Agarwal
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12	CAR - Case of the week - Case 8 - Undisplaced right ulnar styloid base fracture - Dr. Nivedita Chakraborty
13	CAR - Case of the week - Case 9 - Hypoglycaemic encephalopathy. - Dr. Viral Parekh
14	CAR - Case of the week - Case 10 - Myocardial annular dysjunction - Dr. Ritu Agarwal
15	CAR - Tribute to Wilhelm Conrad Roentgen - Immortal Roentgen.
16	CAR - Case of the week - Case 11 - Dacryocystocele with anatomy of Nasolacrimal apparatus. - Dr. Viral Parekh
17	CAR - Case of the week - Case 12 - Tubercular osteomyelitis - Dr. Nivedita Chakraborty
18	CAR - Case of the week - Case 13 - Marchiafava Bignami disease - Dr. Viral Parekh
19	CAR - Case of the week - Case 14 - Parosteoal Sarcoma - Dr. Nivedita Chakraborty
20	CAR - Case of the week—Case 15 - Adrenal haemangioma - Dr. Viral Parekh

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22 CAR - Case of the week - Case 17 - MEN Syndrome - Dr. Sayan Sarkar

23 CAR - Case of the week - Case 18 - Langerhans cell histiocytosis - Dr. Sayan Sarkar

24 CAR - Case of the week—Case 19 - Hepatic angiomyolipoma - Dr. Viral Parekh.

25 CAR– Case of the week - Case 20 - Cirsoid aneurysm - Dr. Viral Parekh

26 CAR CME - Heart Anatomy

27 CAR– Case of the week - Case 21 - Pancreatic metastases - Dr. Viral Parekh

28 CAR - Case of the week - Case 22 - Intrapulmonary teratoma - Dr. M. Bhattacharya

29 CAR– Case of the week - Case 23 - Gall stone ileus - Dr. Viral Parekh

We have a new blog , where we publish cases, quizzes and various other education

We are on WhatsApp and Telegram

We are on YouTube

You can send your good case to us. We will publish it in our channel.

CAR

Calcutta Academy Of Radiology

A Platform For Radiology Education & Interaction

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A Platform For Radiology Education & Interaction

Calcutta Academy of Radiology was formed on international day of Radiology in 2019, that is on 8th. November, 2019 to promote Radiology education, keeping in mind Residents as well practicing Radiologists.

Since then we are on WhatsApp and Telegram, where thousands of cases have been discussed by members from all over the world and in the process we are sharing our experiences and helping each other. These social media platforms have turned out to be great learning tools.

We had organized a half day CME also on GI Radiology in February, 2020. Another CME on Neuroradiology was organized in July 2022, We have plans to organize more such CME programmes in future .

We are on YouTube also where we regularly post teaching videos and in the process try to propagate Radiology as much as possible.

Next issue will be published in April 2024

We will be bringing out such Newsletters with a frequency of one issue every two months. So, next issue will be published in April 2024.

We are hereby inviting good interesting cases and original work from our fellow Radiologists, which will be published on merit basis.

So, I request all of you to contribute to this Newsletter. Please send your material in Word format with good quality images. Please send your photograph and details of your place of work with email address also.

Your material should reach us by 15th. Of September, 2023. You can send the word file to our abovementioned email address or you can WhatsApp it to above-mentioned three phone numbers.

On our YouTube channel, we are presenting a new case every week and there is good response to such teaching videos. I hereby request all Radiologists to share their teaching videos with us and if they contain good teaching material, we will surely publish it on our channel. So friends, during this trying time , stay away from depression by engaging yourself in academic activities.

Our Telegram group is lagging behind in academic activities as compared to two WhatsApp groups, so I request all of you to join our Telegram group.

Telegram can add up to whopping 200,000 members. So, if we post our study material there; it will reach to and benefit huge number of members.

So friends, take care and be safe.

So, see you all in next issue of CAR newsletter.

So long,

Anup Sadhu, Bijon Kundu and Viral Parekh.