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Light at the end of the tunnel

Hi! Namaste,

It is really satisfying to bring out this sixth newsletter of Calcutta Academy Of Radiology.

It is around a year since this pandemic of novel corona virus and we have seen many things changing throughout the world. This pandemic has taught us lot of things which we would not have learnt in normal circumstances. We Radiologists are in the forefront of fighting this pandemic besides General and Chest physicians, Epidemiologists, and Critical Care Specialists. The nursing and paramedical staff have also fought this battle valiantly. Since the first case reported in India in March 2020, India as a country has fought this pandemic in an exemplary manner. Within just 9 months, we have come out with indigenous vaccine and are helping other countries around the world also by donating vaccines. We were branded as pharmacy of the world by supplying necessary medicines to many countries during this pandemic. Advanced countries are struggling, while we have almost escaped the pandemic with few bruises. So, it seems there is light at the end of the tunnel.

We could have fought this pandemic in a much better way if HRCT scan of Chest would have been used extensively as a screening method. We have seen instances where RT-PCR is negative but HRCT scan is showing ground glass opacities and crazy paving pattern in patients presenting with fever with cough. Later on these cases have come out to be RT-PCR positive.

So, let us all start this new year - 2021 in a positive manner but at the same time we should not be complacent. The next pandemic might not be far away. So preventive measures should start from now only. Union budget is going to be presented on first February and let us all hope that Government increases the national healthcare expenditure and starts investing in medical facilities around the country.

During this pandemic what I felt was that there is a dying need of hospitals where middle class of India can go for their treatment. In India, we have either government hospitals where poor and lower middle class go for their treatment and we have private hospitals which are expensive and cater to upper middle class and rich of India. But middle-middle class can not go to either of these facilities. There seem to be a need of hospitals which can provide treatment in a neat and clean atmosphere at an affordable cost. Insuring the whole country with Mediciam like facilities is must and a huge way forward.

The health care providers should take an active role in educating the general population about vaccines and remove all the doubts which they might have. Mass vaccination seems to be a good tool in creating herd immunity. So, let us all be vaccinated.

This newsletter would not have been possible without the academic contribution from Dr. Bhavin Jankharia, Dr. Ankur Shah, Dr. Himansu Shekhar Mohanty, and Dr. Hirak Ray Choudhury. We sincerely thank all of them for their unconditional support in bringing out this newsletter.

We are also thankful to Gentek Lifesciences and Electrocurative for publicizing their products in our newsletter.

Viral Parekh.



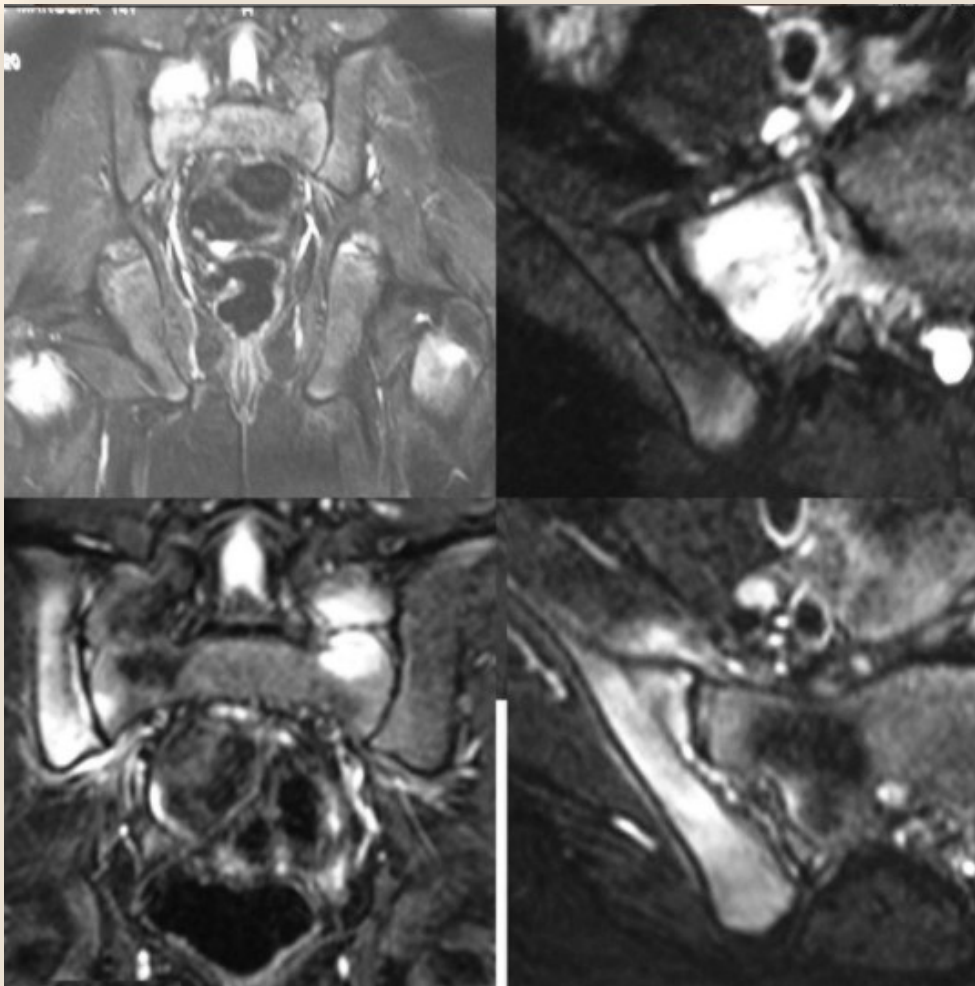
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Dr. Bhavin Jankharia needs no introduction to the Radiology fraternity. As you all know he is a renowned Radiologist and academician and has contributed immensely in propagating Radiology education. Presently, he is a Consultant Radiologist at Picture 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.

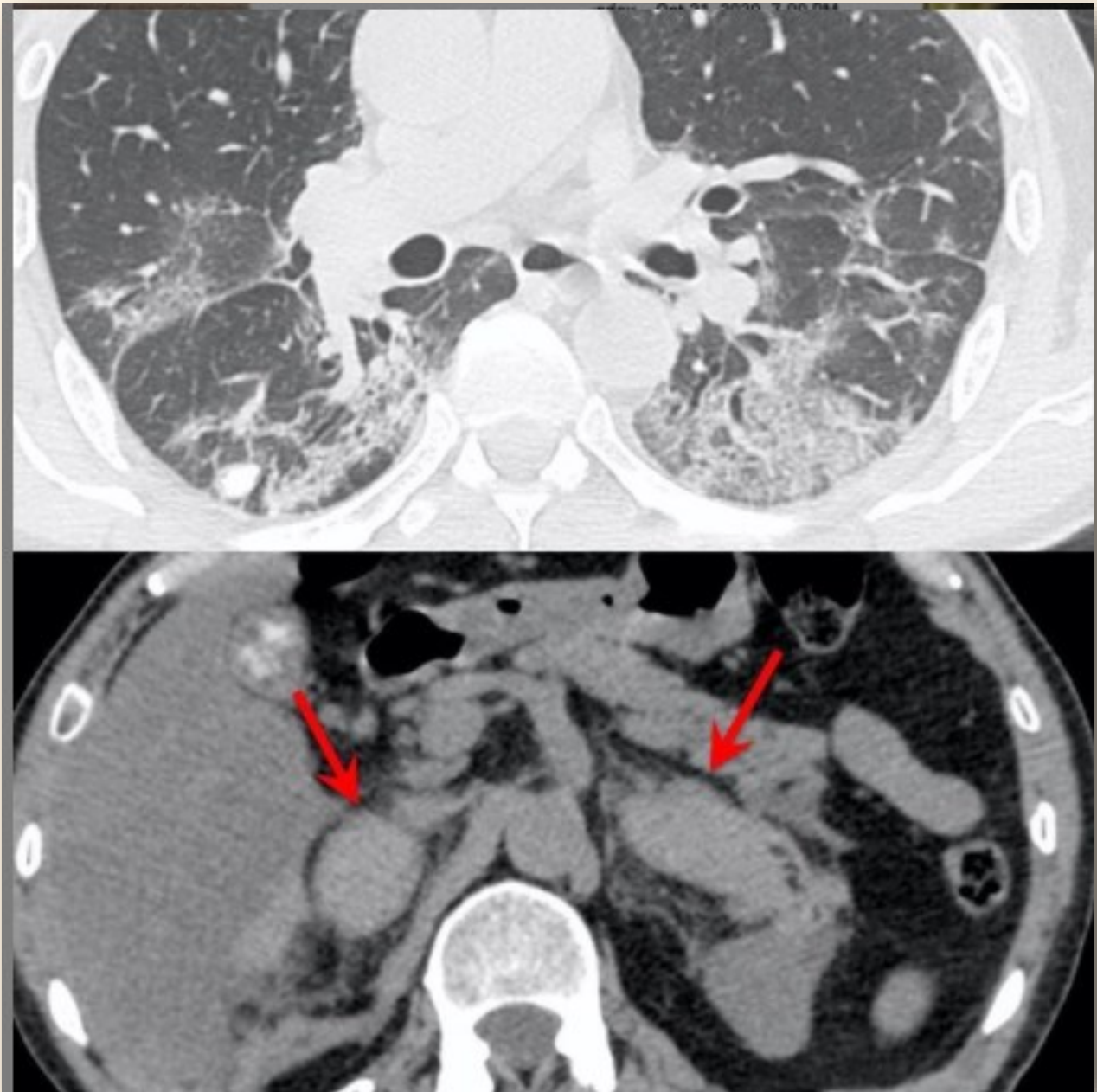
- He has written 5 books, 35 chapters, 57 articles (PubMed listed)
- Presented 32 posters
- More than 1500 invited lectures over 27 years
- Editor-in-Chief, Indian Journal of Radiology & Imaging (2007-2012)
- Latest Book (2019): Computed Tomography of Interstitial Lung Diseases
- Hon. Visiting Consultant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

Case I



This 16-years old boy presented in 2011 with waxing and waning pain in the hips and back. The MRI at the time (top row) showed areas of marrow edema in both femoral necks and the sacral alae. Another MRI a year later showed regression with a new iliac crest lesion (not shown). He was thought to have CRMO (NBO) and treated accordingly. One more year later when his symptoms increased, the MRI (bottom row) showed classic asymmetry sacroilitis and he was diagnosed to have a juvenile seronegative spondyloarthropathy.

Case II



This 70-years old man with COVID-19 has a CT scan showing typical lung findings. He also has bilateral adrenal hemorrhage in the upper abdomen, which was unsuspected clinically.

There have been a few case reports of patients with adrenal hemorrhage and insufficiency in the setting of COVID-19, likely related to a coagulation disorder. This can be life-threatening causing acute adrenal insufficiency.

Unfortunately, this patient did not survive. He collapsed the next day before his COVID-19 could be proven or any further testing could be done.

Case III



This is a 53-years old woman with pain in the right shoulder.

An MRI (PD fat sag axial and sagittal and STIR coronal) was performed, which showed a T2 bright lesion in the right humeral head without cortical break or marrow edema, findings absolutely characteristic of enchondroma and likely completely unrelated to her pain.

However, she had a couple of doctors in her family, who believed that the only truth is histology. They consulted an orthopaedic oncologist who advised a wait and watch and when they asked me, I said the same.

But the patient and relative and another general orthopaedic surgeon were insistent. The CT scan at the time of biopsy also showed a sclerotic rim with a cartilage matrix. I asked them again whether they wanted me to continue with the biopsy and they insisted I do.

I chose the simplest route, because I knew this was a benign enchondroma. If there was any suspicion, then I would have chosen the delto-pectoral groove approach, along the plane of the expected surgical incision, but there was no reason for surgery in this patient.

The diagnosis was benign cartilage containing tumor, which given the findings was consistent with an incidental enchondroma.

Real Life: Not everyone believes everything you say...and despite your beliefs it is best to sometimes just go with the flow.



Dr Himansu Shekhar Mohanty,
DNB, Fellow in Oncoimaging (European society of Radiology)
Consultant Radiologist, Yashoda Superspeciality & Cancer
Research Institute, Ghaziabad, India

Contrast enhanced digital mammography: A new addition to existing breast imaging

Clinical Presentation:

A 48-year-old woman presented with new onset right breast mass for one month. On physical examination, the right breast had a palpable lump with nipple retraction.

Imaging:

Plain and contrast enhanced digital mammography (CEDM) was done for this patient. Plain and low energy images showed bilateral dense breasts and associated skin thickening on the affected site of right breast (figure 1a-b). Right breast showed an irregular hyperdense central quadrant with partially obscured margin. The recombined mammogram showed an irregular heterogeneously enhancing mass with multiple enhancing satellite lesions in different quadrant. USG guided tru-cut biopsy from the mass was suggestive of Infiltrating ductal carcinoma grade 3.

Discussion:

Plain mammography is always thought to be a limitation for dense breast imaging. MRI plays a crucial role. CEDM uses a dual-energy technique performed after the IV administration of iodinated contrast agent to identify abnormalities on the basis of angiogenesis, as well as morphologic features and density, resulting in improved breast mass detection. Few of the current study say the information provided by CEDM is similar to that provided by breast MRI, without the added time or expense of conventional breast MRI protocols. Economically it is cheaper and more affordable. For a country like India where breast cancer is prevalent in low socioeconomic group it would be a suitable modality for early detection of cancer.

Conclusion:

In our case CEDM was an advantage in detecting the satellite lesions which were not so obvious in plain digital mammography. So the diagnosis was changed from single mass to multi centric lesions which overall changed the management plan from lumpectomy to modified radical mastectomy.

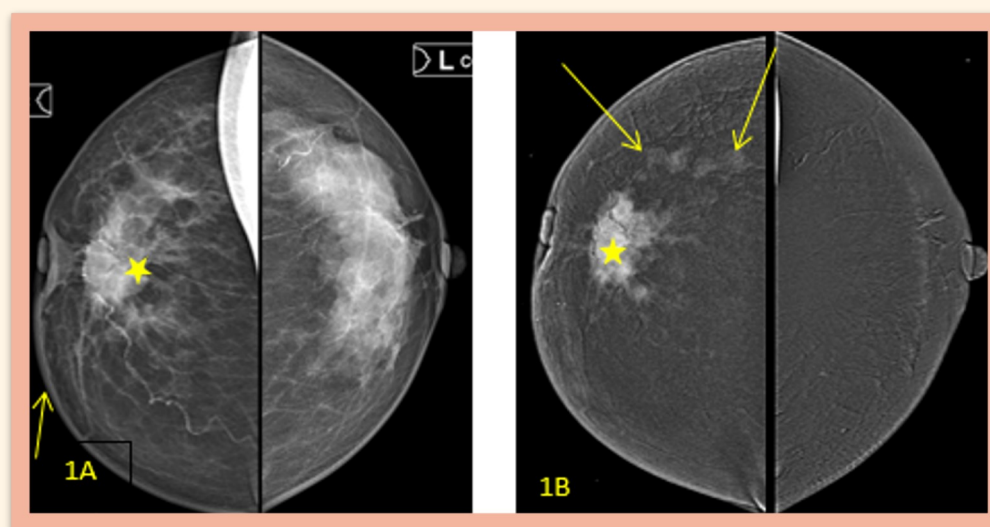


Figure:1 (A) Craniocaudal views plain digital mammography shows bilateral heterogeneously dense breast (ACR grade C). Right breast shows an irregular hyperdense central quadrant mass (star) with partially obscured margin and overlying skin thickening (arrow). (B) Contrast enhanced recombined image in craniocaudal projection shows an irregular heterogeneously enhancing mass (star) with multiple enhancing satellite lesions in different quadrant (arrow).

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ADVANTAGES OF CONTRAST ENHANCED MRI

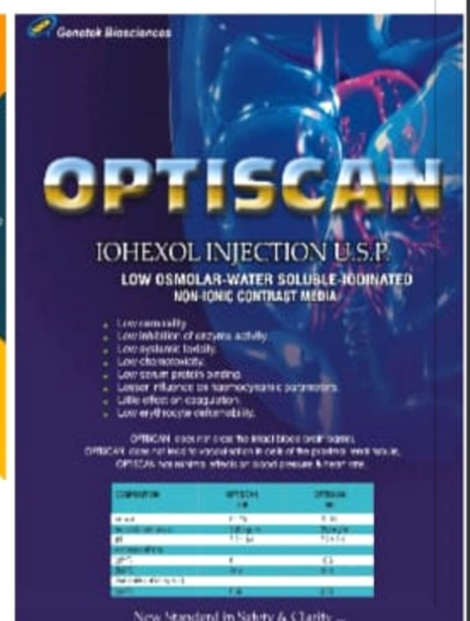
- Superior contrast enhanced T1 technique makes tissue signal changes caused by the T2 effect to cause a fourfold increase due to signal intensity gain.
- Technique for imaging soft tissues with excellent spatial resolution & tissue penetration & used in diagnosis of Haemangioma, Carcinomatous or hepatic disorders with different types of lesions.
- The signal originates from highly vascularized tissue & fat with differences in vascularization producing contrast between different tissues & biological fluids.
- Good resolution of the contrast in Magnetic Resonance Imaging for a better visualization of dimensions of lesions of the brain, spine, and surrounding tissue and of lesions of the liver, pancreas, gallbladder, pelvic, breast, prostate, and musculoskeletal system.

ADVANTAGES OF GADOMAX

- Superior contrast enhanced T1 technique makes tissue signal changes caused by the T2 effect to cause a fourfold increase due to signal intensity gain.
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3	PET CT Physics - Dr. Sikandar Sk.
4	PET CT in Neurology - Dr. Sikandar Sk.
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6	CAR - Case of the week - Case 2 - Adenocarcinoma of terminal ileum - Dr. Viral Parekh
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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 - Parosteal Sarcoma - Dr. Nivedita Chakraborty
20	CAR - Case of the week—Case 15 - Adrenal haemangioma - Dr. Viral Parekh

From the pages of history

Raymond Damadian – The Man and the Scientist



Raymond V Damadian visited Calcutta in mid 1987 and had a meeting with the members of IRIA, West Bengal Branch at USIS (United States Information Service) then located at Esplanade. Only a handful of Radiologists were present at Lincoln Hall. He was accompanied by a group of scientists who was working with him and FONAR. He talked on a topic "Future of MRI in India" – a time selected when there was no MRI in INDIA. Today we realize what a great visionary he is!

Dr Om Tavri, the pioneer of MRI in the country invited Dr Damadian to India. He had also visited FONAR corporation in Boston. Breech Candy hospital was first to get the MR in India when Dr Tavri and Dr Srinivas Desai took charge of the MRI unit owned Dr Viral Shah (personal communication with Dr Om Tavri).

Nizam Institute of Medical Science Hyderabad, Jaslok Hospital, INMAS, New Delhi obtained MRI later.

(Greatness is often measured in different ways. In business it is usually the bottom line or how much money is generated. In war its victory over the enemy. But how do you measure the greatness of a life? What exactly the measure of a man? There are men who adore themselves with a thin veneer of humility but Damadian's desire for God to receive all the glory goes all the way to the heart of the man - he says I am not great, but I serve a great God.)

Raymond Vahan Damadian (born March 16, 1936) is an American physician, medical practitioner, and inventor of the first MR (Magnetic Resonance) Scanning Machine.

Damadian's research into sodium and potassium in living cells led him to his first experiments with nuclear magnetic resonance (NMR) which caused him to first propose the MR body scanner in 1969. Damadian discovered that tumors and normal tissue can be distinguished in vivo by nuclear magnetic resonance (NMR) because of their prolonged relaxation times, both T1 or T2. Damadian was the first to perform a full body scan of a human being in 1977 to diagnose cancer. Damadian invented an apparatus and method to use NMR safely and accurately to scan the human body, a method now well known as magnetic resonance imaging (MRI).

From the pages of history

Raymond Damadian – The Man and the Scientist

Damadian has received several prizes. In 2001, the Lemelson-MIT Prize Program bestowed its \$100,000 Lifetime Achievement Award on Damadian as "the man who invented the MRI scanner. He went on to collaborate with Wilson Greatbach, one early developer of the implantable pacemaker, to develop an MRI-compatible pacemaker. The Franklin Institute in Philadelphia gave its recognition of Damadian's work on MRI with the Bower Award in Business Leadership. He was also named Knights of Vartan 2003 "Man of the Year". He received a National Medal of Technology in 1988 and was inducted in the National Inventors Hall of Fame in 1989.

Raymond V. Damadian, conceived the idea of using NMR (MR) to detect medical disease and proposed the MR body scanner to accomplish it. To prove its feasibility, he conducted experiments and discovered that cancer tissues produce abnormal NMR signals compared to normal tissues, with relaxation times that are markedly elevated relative to normal tissues. He also discovered that the healthy tissues themselves exhibit significant differences in NMR relaxation times. The relaxation differences among the normal tissues supply the contrast needed to see anatomic detail that was missing in other medical imaging technologies (x-ray and ultrasound). Recognizing that the abnormal NMR signals generated by cancers could be used to detect cancers non-invasively, he went on to build the first whole body magnetic resonance scanner, which he named Indomitable, and to achieve the first MRI scan of the live human body, as well as the first scan of a patient with cancer. The tissue signals he discovered and their marked differences among the normal tissues and between normal tissue and diseased tissue have remained the source of all MRI images today. In 2003, The Noble Prize for the MRI was awarded, not to Dr. Damadian, but to two nuclear magnetic resonance scientists. One employed a gradient, invented 50 years earlier by others, to improve the scanning method discovered by Dr. Damadian. Another was a member of a group who found a better way to use gradients to make an MRI image. Although the prize allowed for three winners, Dr. Damadian was excluded. (The author's intention is not to dishonour these two great scientists)

The award is a calculated affront to the truth of science.

It is also an affront to the will of Alfred Nobel, in which he specified that the award in medicine can only be given for "discovery," not for technological improvements. Thankfully, the truth of history endures.

Wright brothers for their first airplane were assisted by Marcel Penot Jr—Damadian's Grandmother's brother. He was also a pioneer of France's internal combustion engine. The spirit and inquisitiveness of Marcel was percolated to Damadian. He is an ardent God believer.

From the pages of history

Raymond Damadian – The Man and the Scientist

Damadian says “What is obvious about God on a macro level (the Universe) is equally true on the micro level (the atom). The creator has brilliantly designed creation in such a way that no matter where we look, we see the undeniable handiwork of amazing intelligence. We have but to open our eyes..... No God=No humanity”

“In granting us access to His truth the God has gifted us with the ability to make scientific discoveries that reveal things previously known only by him. Inventions like the MRI simply liberate and unveil His truth for the benefit of Mankind.... similarly, I attribute the invention of the MRI entirely to the Lord’s hand in revealing it to me”.

An old maxim warns “Those who ignore history are condemned to repeat it and I fear that we are now standing on the threshold of repeating the error and chaos of Babel.”

The tragedy that Raymond Damadian was not considered for Nobel prize.

It was not from lack of evidence that Damadian failed to receive his rightful recognition.

Again, it begs the question “why.”

He was not simply overlooked but by the committee. —it was an overt act.

Many Nobel laureates were surprised by the decision of Nobel committee and expressed their grief.

Damadian, however, enjoys a blissful life.

Suggested Reading

Gifted Mind—by Jeff Kinley



We are thankful to all the contributors for sharing their experiences and literature with us and in the process helping the Radiological fraternity.





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Joint Editor – IJRI
Secretary, Musculoskeletal Society of India.

MR imaging of post-operative shoulder joint - Rotator cuff repair

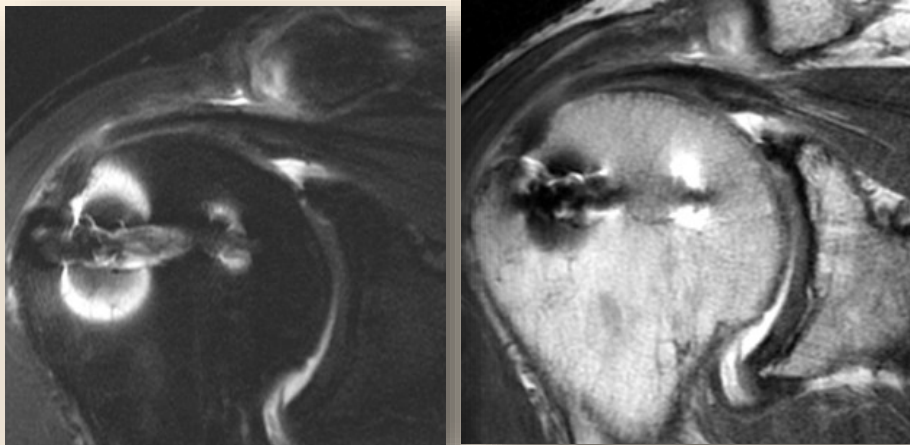
Rotator cuff repair is probably the most common shoulder surgery that is sent for imaging in post-operative course.

There are multiple challenges in imaging of post-operative shoulder due to

- Metal artifacts
- Presence of hardware
- Micro metallic shavings related to burring by the surgical instruments
- Scarring and altered morphology

To reduce the artifacts in post-operative imaging, we need to make certain changes in the imaging protocol

- Remove fat suppression
- Avoid use of Gradient echo sequences
- Use STIR instead of fat suppressed T2W sequence
- Use T1 FSE instead of SE sequence with low echo train
- Increase bandwidth
- Use a lower TE
- Increase FOV
- Increase matrix



It is important to get the details of surgery for proper understanding the post-operative changes.

Rotator cuff repair surgeries can be of different types

- **Arthroscopic rotator cuff repair** – Especially indicated in partial bursal-sided tears and in small full-thickness tears in the absence of significant tendon retraction. This surgery spares deltoid.
- **Mini-open repairs** – It requires vertical split in deltoid.
- **Open surgery** – Indicated in full thickness tears with significant tendon retraction. Deltoid is detached from the acromion. The recovery is prolonged.

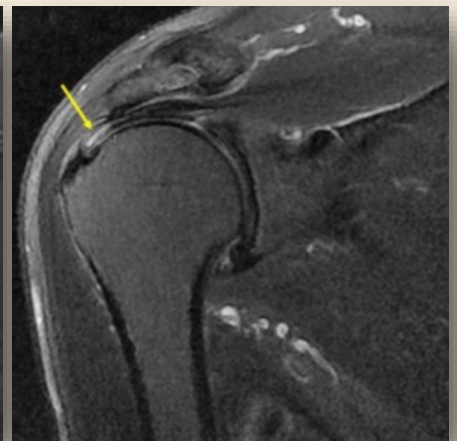
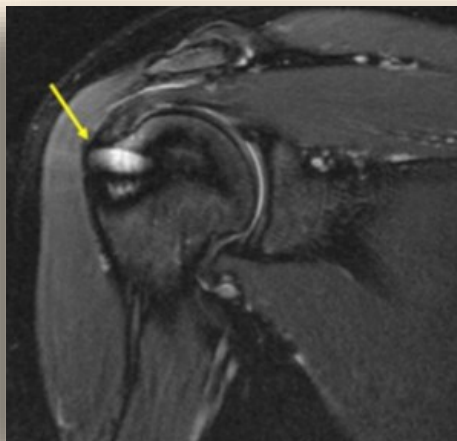
The rotator cuff repair can be

- **Debridement** – for partial tears
- **Tendon-to-tendon suturing** – for longitudinal or horizontal tears
- **Tendon-to-bone repair** – for full thickness tears. It can be with single or double row of sutures

The MRI findings in post-operative shoulder joint can vary. Many changes, which are considered as abnormal for a non-operated shoulder joint, can be normally seen in post-operative shoulder.

Normal post-operative findings:

- Fluid collection in subacromial bursa
- Small joint effusion and communication with subacromial-subdeltoid bursa
- Loss of subdeltoid fat
- Mild marrow edema
- High signal intensity and irregularity of repaired tendon
- Low signal intensity in repaired tendon – due to fibrosis
- High signal around sutures – due to granulation tissue
- Susceptibility artifacts due to sutures / bone anchors

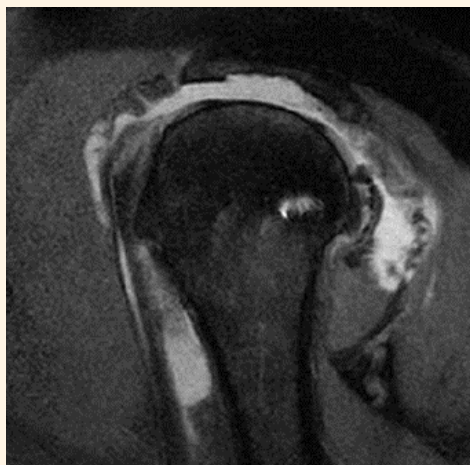
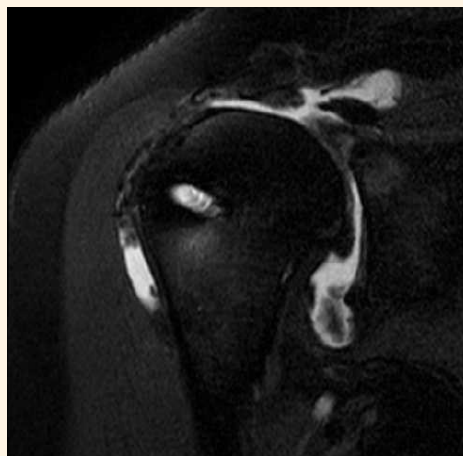


Dr. Ankur Shah

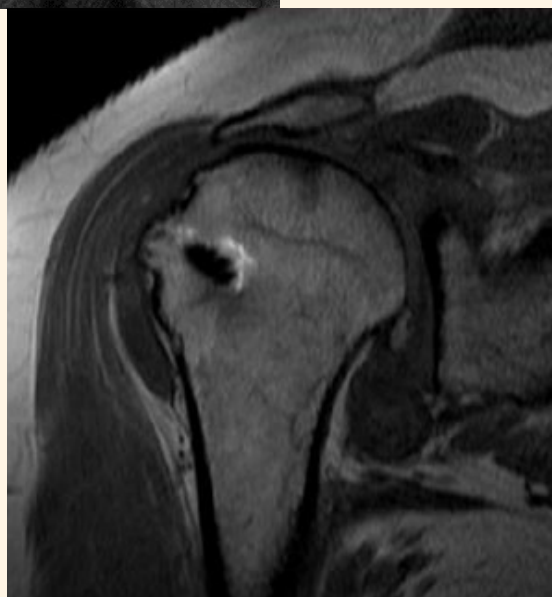
Abnormal post-operative findings:

Recurrent tear – most common complication can be considered when

- Full thickness tear larger than 1 cm
- Retraction of rotator cuff tendons
- Significant changes from prior examination (when available)



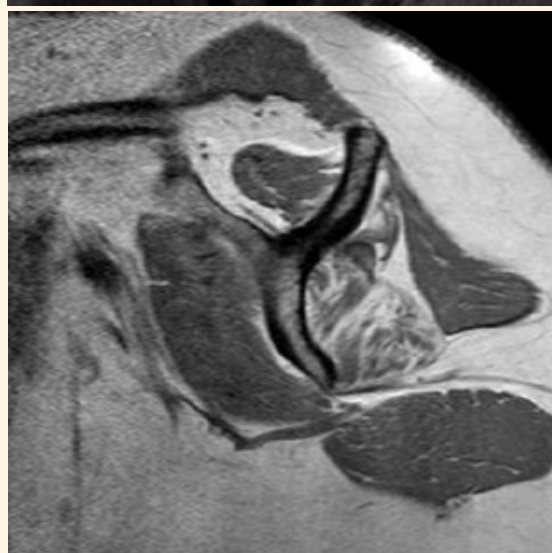
Superior migration of humeral head



Rotator cuff muscle atrophy

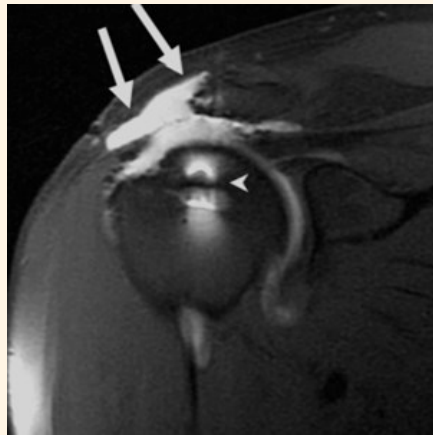
Glenohumeral osteoarthritis

Heterotopic ossification in rotator cuff tendons and surrounding soft tissues



Deltoid dehiscence – uncommon complication seen as fluid extending through the deltoid muscle usually near its acromial attachment

Fatty atrophy of deltoid muscle

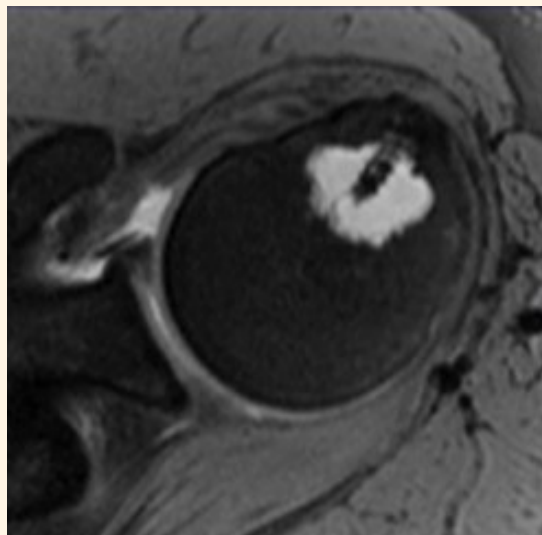


Post-operative infection with synovitis



Complications of bio-absorbable suture anchors

- Inflammatory reaction
- Loosening
- Reactive cyst formation





Dr. Hirak Ray Choudhury, MD
Consultant Radiologist & Head,
Dept. of Radiology,
AMRI Hospitals,
Kolkata

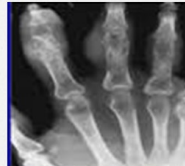
MSK Radiology Sign-Box

- o Sign: 'Sausage digit'
- o Most common cause is Psoriatic arthropathy
- o Also seen in Sarcoidosis, TB, Osteomyelitis, Sickle cell anaemia
- o Fusiform swelling of the digit due to soft tissue inflammation.
- o Seen due to underlying arthritis or dactylitis.



MSK Radiology Sign-Box

- o Sign: 'Sausage digit'
- o Sarcoid dactylitis presenting with lacy pattern of destruction in small bones.
- o No periostitis in radiograph;
- o However in MRI fine perpendicular lines seen extending from ghost of cortex resembling periostitis.



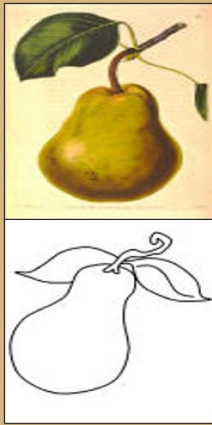
MSK Radiology Sign-Box

- o Sign: 'Sausage digit'
- o Seen in tubercular dactylitis (Spina Ventosa)
- o Usually proximal phalanx of index/middle fingers and metacarpals middle/ring fingers are involved.
- o Fusiform cystic expansion of short tubular bones with cortical thinning and destruction.
- o Periosteal reaction uncommon.
- o Sclerosis seen in chronic cases.

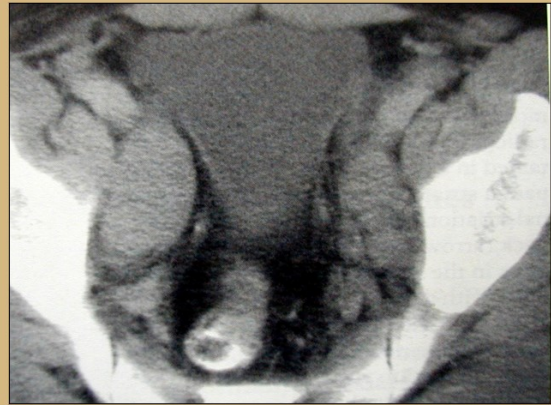


FOOD SIGNS IN RADIOLOGY - Dr. Viral Parekh, DMRD, DNB.

PEAR SHAPED BLADDER



PEAR SHAPED BLADDER



PEAR SHAPED BLADDER

- The bladder assumes the shape of a pear when it undergoes extrinsic compression due to excess tissue in the pelvis.
- Pelvic lipomatosis, pelvic haematoma, pelvic lymphadenopathy, pelvic fluid collections, iliopsoas muscle hypertrophy, bilateral iliac artery aneurysm.

HAMBURGER SIGN



HAMBURGER SIGN

- Also known as naked facet sign.
- Refers to CT appearance of an uncovered vertebral articular facet when the facet joint is dislocated.
- Characteristic of a flexion-distraction injury and indicates severe ligamentous disruption and spinal instability.

A case of Bilateral multicystic dysplastic kidney - Dr. Viral Parekh, DMRD, DNB.

A 25 years old primigravida came for a routine antenatal USG in 1999.

An USG was performed, which shows almost no liquor. The fetal urinary bladder is not visualized.

Both kidneys are visualized.

The images of the kidneys are given here.



A case of Bilateral multicystic dysplastic kidney - Dr. Viral Parekh, DMRD, DNB.



Bilateral multicystic dysplastic kidney (MCDK) is a lethal form of congenital anomaly of the kidney and urinary tract in which both kidneys are large, distended by non-communicating multiple cysts and non-functional.

A case of Bilateral multicystic dysplastic kidney - Dr. Viral Parekh, DMRD, DNB.

Ultrasound diagnosis:

- The kidneys are replaced by multiple irregular cysts of variable size with intervening hyperechogenic stroma.
 - Renal pelvis cannot be visualised.
 - The disorder can be unilateral (80% of cases), bilateral or segmental; if bilateral, there is associated anhydramnios and the bladder is 'absent'.
 - Abnormalities of the contralateral kidney (25%): duplex system, pelvi-ureteric obstruction, agenesis, ectopic or affected by vesico-ureteric reflux.
1. Bilateral: lethal either in utero or in the neonatal period due to pulmonary hypoplasia.
 2. Unilateral: normal prognosis. Postnatally, most urologists adopt an expectant approach because the kidney gradually shrinks and may disappear. The parents and family should also be scanned to exclude autosomal dominant branchio-otorenal syndrome.

- The affected kidney (or renal segment) has no functioning renal tissue and is replaced by multiple cysts.
- Two main types have been described 2:

1. Pelvi-infundibular

- most common
- multiple small non-communicating renal cysts representing the dilated calyces
- atresia of the ureter and renal pelvis
- may sometimes regress spontaneously

2. Hydronephrotic-obstructive

- dominant cyst present in the renal pelvis



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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. We have plans to organize more such CME programmes in future when world recovers from this ongoing pandemic.

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 2021

We will be bringing out such Newsletters with a frequency of one issue every two months. So, next issue will be published in April, 2021.

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 March, 2021. 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. Since, WhatsApp restricts the number of members to 256 only, whatever activity going on there is not helping the whole Radiology community.

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.