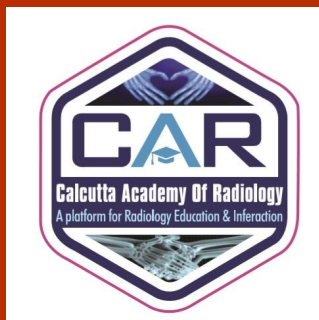


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Pandemic and Healthcare.

Hi! Namaste,

This is Dr. Viral Parekh from Kolkata, India. It is quite gratifying to bring out this second newsletter of Calcutta Academy Of Radiology.

We are still going through this pandemic of novel Corona virus and it seems that it will continue for many more months to come. It has exposed the healthcare of not only developing countries like us but that of many developed countries in the western world too. It seems that the healthcare all over the world is not able to handle the unforeseen crisis and it compels me to muse that lot of changes are needed in existing healthcare of our country. Though I am not a Public health expert but my 30 years of experience as a Radiologist working in hospital setup and 34 years as a Doctor, have some insights into the present problem faced by existing healthcare system.

One thing is clear that politicians of all hues and colour have got away with ignoring Healthcare. Budgetary allocation for healthcare is kept as low as possible. At present India's budgetary allocation for healthcare is around 1.2 to 1.3% of GDP.

Many countries are learning that you cannot build healthcare capacity during a crisis. It takes time and investment to build a good public health system. India has not been successful to invest in health for last seven decades and this must change post-Covid19. Health spend must at least increase to 3% of GDP.

Another thing which has become quite evident is that Telemedicine is not only the future but a great saviour too. The medical fraternity will have to embrace the technology and come out of its comfort zone. The government on its part must also facilitate the Telemedicine by regularizing and making necessary changes in existing legislation or guidelines.

There is need of standardizing of medical education also. All medical colleges must follow the same protocol. Every college must have same fee and salary structure. Private medical colleges charge huge tuition fees but when the student becomes a Doctor, they are not paid stipend at par with other medical colleges in respective state health universities. Many private colleges don't have proper fac-

ulty also. Part time doctors visiting occasionally are shown as full time faculty. The regularizing authority must look into this and make these colleges follow rules.

Affordable healthcare and health insurance are need of the hour and government and medical fraternity on their part must play constructive and complementary roles.

There is also a need for Indian Medical Services on the lines of IAS, IFS, IPS and IRS also. Central as well as state Governments all over the country must have same pay structure based on the rank and order and provide stability and safety to their employees. Government doctors on their part must refrain from private practice.

There are challenges galore and we must all unite to improve the health and life of fellow countrymen, and that will be the biggest patriotism.

We are grateful to Dr. Bhavin Jankaria, Dr. Nidhi Bhatnagar, Dr. Sikander, Dr. Saugata Sen and his team, Dr. Amar Udare, and Dr. Ankur Shah for contributing to this newsletter and in the process making it rich in its scientific content.



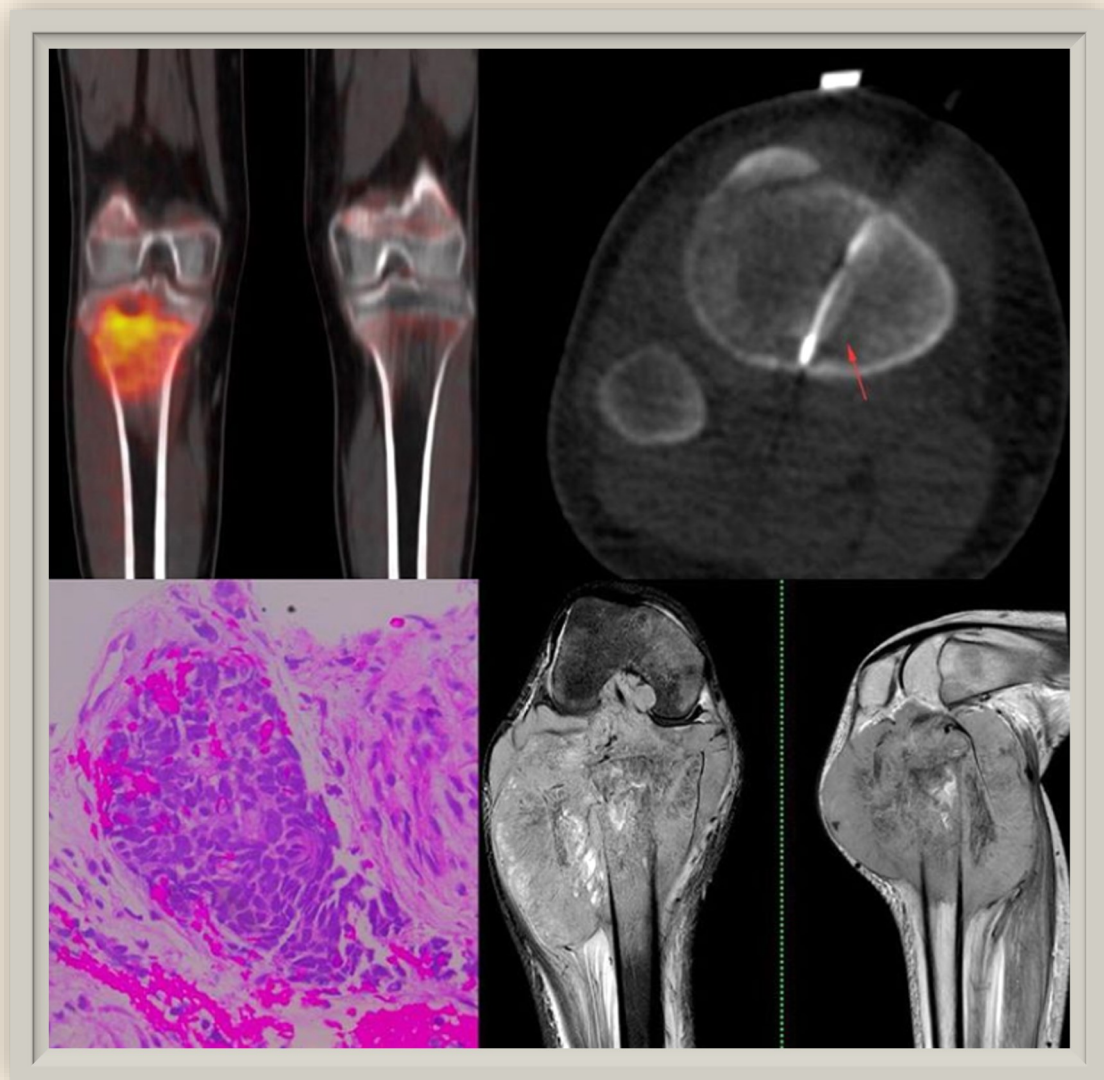
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Dr. Bhavin Jankharia needs no introduction to the Radiology fraternity. As you all know he is a renowned Radiologist and academician and has contributed immensely in propagating Radiology education. Presently, he is a Consultant Radiologist at Picture 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
- Past President – Indian Radiology & Imaging Association – 2014

Case I



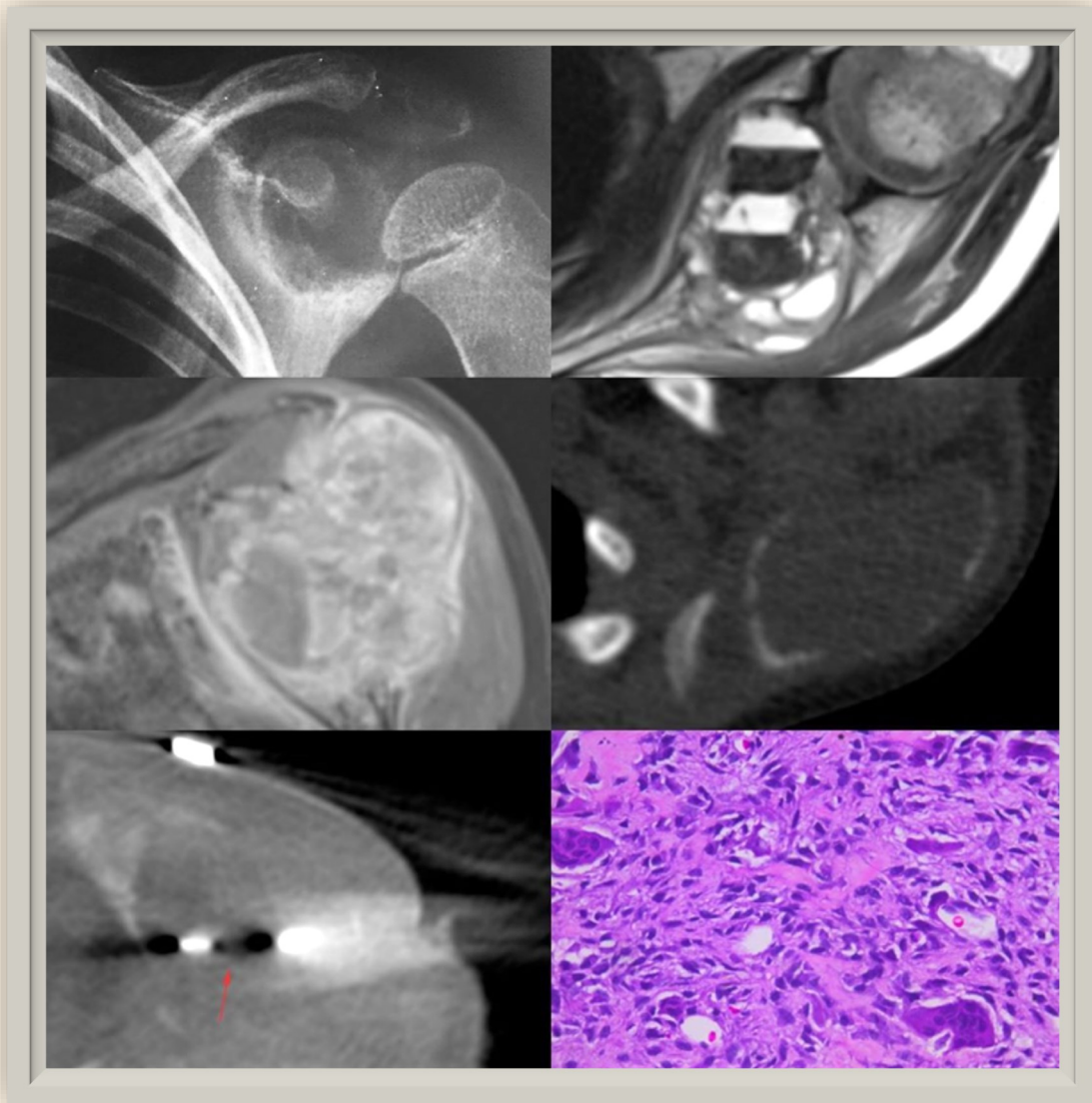
This 12-years old girl had Ewing sarcoma of the rib, for which she was treated. A follow-up PET/CT showed uptake in the proximal right tibia that was worrisome.

We did a biopsy that showed metastasis.

Nothing was done.

She came back recently 3 months later with a high mass with flexed flexion deformity.

Case II



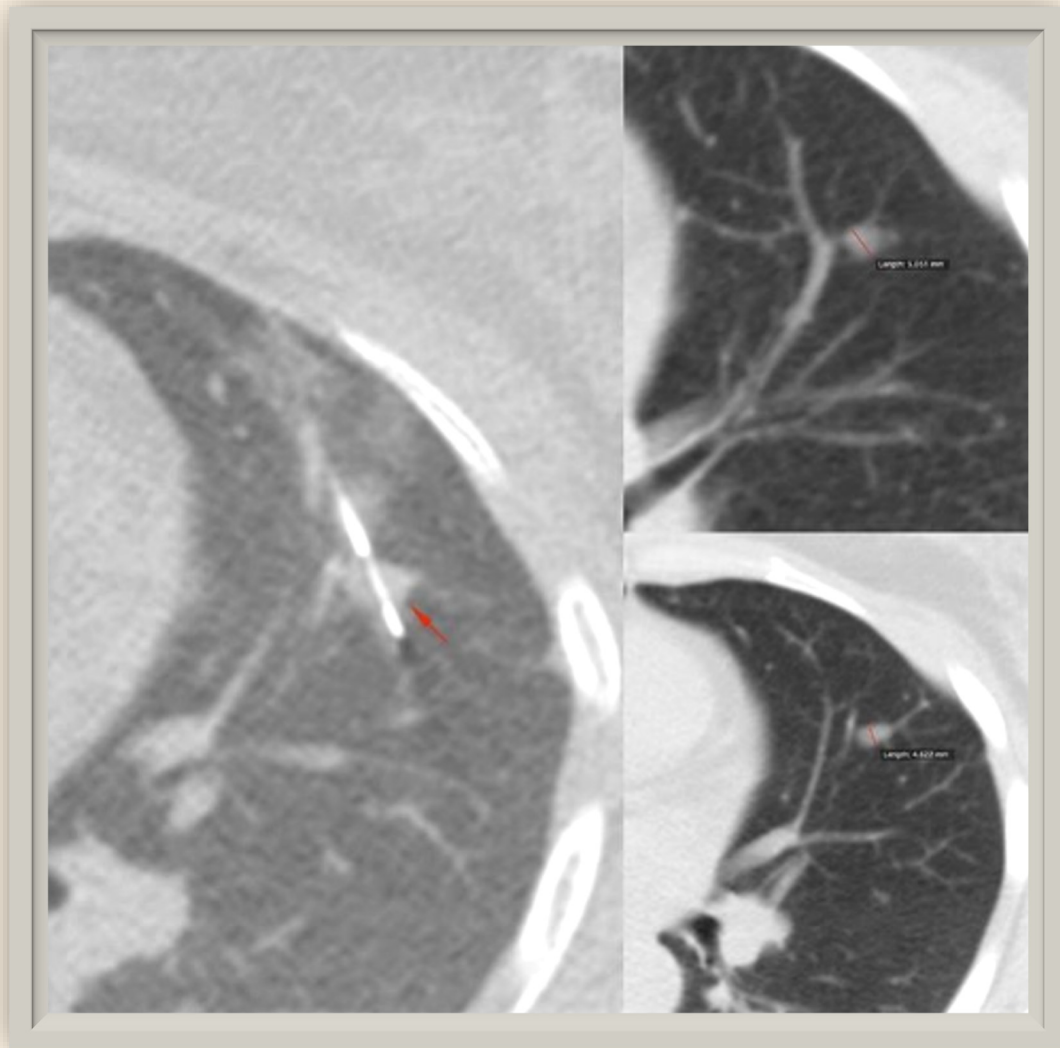
This is a 3 years old boy who presented with an expansile osteolytic lesion in the glenoid of the left scapula. The MRI shows fluid-fluid levels, but these do not occupy the entire lesion. On the contrast study, the sagittal image shows heterogeneous enhancement.

This patient needs a biopsy irrespective of our pre-procedure diagnosis, given that the findings are atypical, which means that other conditions like telangiectatic osteosarcoma also need to be ruled out, though the patient is a little too young for this diagnosis.

The CT scan shows an expansile lesion. A biopsy was performed with an 18G coaxial needle in the prone position. The diagnosis was a giant cell containing tumour consistent with aneurysmal bone cyst (ABC).

Dr. Bhavin Jankharia, MD

Case III



5 mm Lung Nodule Biopsy

This young girl has abdominal malignancy with nodes. A PET/CT showed lung nodules, all around or less than 5 mm in diameter. The status of the lung nodules would affect management, and hence a CT guided biopsy was planned.

The patient was extremely co-operative with her steady free shallow breathing. Using an in-room monitor and the fluoroscopy unit, the canula was guided up to the nodule. With the gun inside the canula, a quick push allowed the gun to go through the nodule. The firing width was adjusted to prevent unnecessary over-throw of a 10 mm throw, which would lead to hemorrhage, etc. Moral of the story: Even 5 mm lung nodules can be biopsied if the patient is co-operative.

Dr. Bhavin Jankharia, MD

A SHORT GLIMPSE INTO COVID-19 IN CHILDREN

Dr. Bijon Kundu

Children seem to be relatively unaffected or less affected by this virus or indeed other closely-related corona viruses with large cohort studies reporting that 1-2% of COVID-19 patients are children. (Dong Y, et al. Epidemiological characteristics of 2143 paediatric patients with 2019 corona virus disease in China (2020) Paediatrics' : 10.1542/peds.2020-0702-Pubmed). However, there have been cases of critically ill children with infants under 12 months likely to be more seriously affected. A very low number of Pediatric deaths have been reported (Ludvigsson JF. Systematic review of COVID-19 in children show milder cases and a better prognosis than adults (2020). Acta paediatrica (Oslo, Norway : 1992) doi.10.1111/apa.15270. Pubmed.). In children male gender does not seem to be a risk factor. The incubation period has been reported to be shorter than in adults, at about two days.

Radiographic

features :

Plain radiograph although less sensitive than chest CT, chest radiography is typically the first line of imaging used for patients with suspected COVID-19. For case of decontamination, use of portable radiography unit is preferred.

Chest radiographs may be normal in early or mild disease. Findings are most extensive about 10-12 days after symptom onset.

The most frequent findings are airspace opacities, whether described as consolidations or less commonly ground-glass opacities. The distribution is most often bilateral, peripheral and lower zone predominant.

In a small study of five children that had been admitted with positive COVID-19 RT-PCR tests and who had CT chest performed, only three children had abnormalities. The main abnormality was bilateral patchy ground-glass opacities,

similar to the appearances in adults, but less florid, and in all three cases the opacities resolved as they clinically recovered (Weili et al. Chest computed tomography in children with COVID-19 respiratory infection. Pediatric Radiology. Doi 10.1007 / s00247-020-04656-7).

On 18th March 2020, the details of a much larger cohort of 171 children with confirmed COVID-19 & evaluated in a hospital setting was published as a letter in the New England Journal of Medicine. Ground-glass opacities were seen in one-third of the total, whereas almost 16% of children had no imaging features of pneumonia.

Further, studies are ongoing in many places of the world. However, we need to keep our children safe and well. For now at least social distancing and wearing of face masks are the order of the day.

CALCUTTA
ACADEMY OF
RADIOLOGY

FOUNDER'S PAGE



The first news letter of CAR (Vol I Number I) was appraised by all. The second issue is tabled just in time. We hope , this issue will also be enjoyable to you all. Dr Viral Parekh and Dr. Bijon Kundu made best use of their time during the period of lockdown.

As you all know, we, at CAR always thrive for the best. This news letter is simple ,relevant, manageable and fun. The open style and carefully selected material says to every avid reader “this newsletter is doable”.

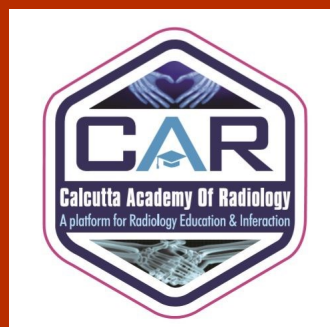
We boast of an era of fantastic medical progress in which machines reproduce body functions and living images as well as human organs are passed from one person to another .But the man’s struggle against disease , a struggle which began in prehistoric time - still continues through periods of advance and enlightenment ,ignorance and disbelief. We firmly believe in man’s superiority—we shall definitely witness the victory over evil.

Happy reading!

Dr. Anup Sadhu, MD.

**CALCUTTA
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FOUNDER’S PAGE



Social Media and Radiology - Viral Parekh

When we fulfilled our long cherished dream of establishing a platform for Radiology education and interaction, we started it with forming a WhatsApp group and it was a huge success. This is a group where we have discussed thousands of cases so far and Radiologists from all over the world have shared their insights. Soon , it was followed by Telegram and YouTube channels and Facebook page and group. What we realised during this journey that social media plays a huge role in propagating and sharing knowledge.

We can not think of interacting without a social media platform. It is the easiest and fastest way to reach your audience.

The radiological societies world over are using Website and email

to inform their members. This is one way traffic, where the society or association informs the members of latest developments, whereas social media is live and there is two way traffic between the association and its members, so in fact there is interaction. Our parent association, IRIA has taken a step in right direction by forming a Telegram channel to inform members of the latest developments. But, it is also one way traffic. But, with member strength close to 20000; it is understandable.

Days are not far when the societies world over will have to adapt to social media to stay in touch with their members. It is a way forward and practical way to expand.



Dr. Priya Ghosh



Dr. Argha Chatterjee



Dr. Anisha Gehani



Dr. Sumit Mukhopadhyay



Dr. Saugata Sen

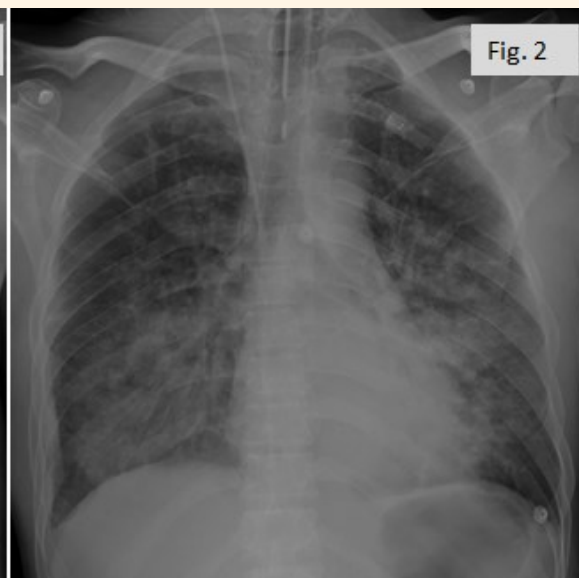
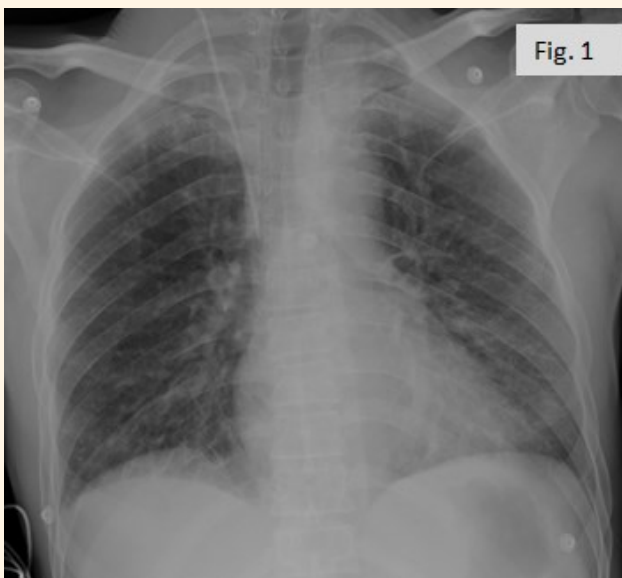
COVID-19: Radiology experience from an Oncology hospital

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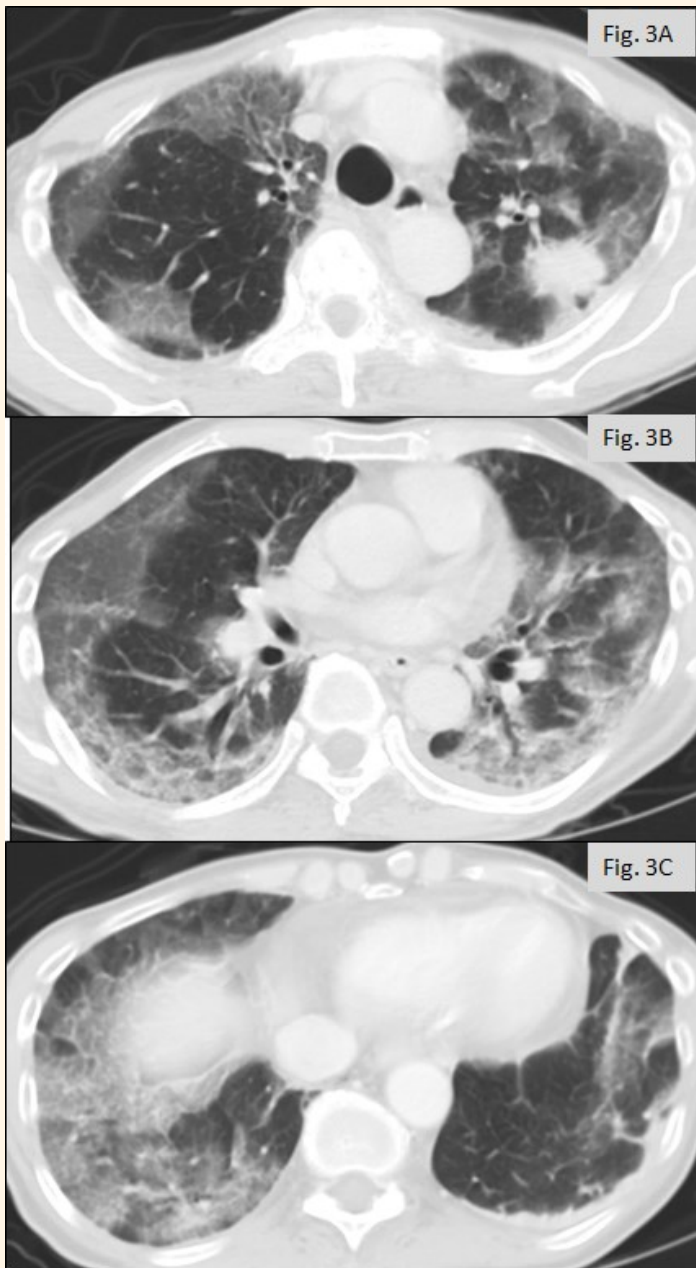
The recent pandemic of Coronavirus Disease (COVID-19) has shifted the attention of everyone from everything else. Working at a cancer hospital, it felt as if even cancer can wait! As the first cases began to be reported in India, the initial few days were spent in panic mode. Gradually, over the weeks, guidelines fell in place and adequate protective equipment arrived. In fact, we were not sure what “adequate” meant. It took some time, but going through International guidelines and available evidence, our hospital and department formulated policies which are now in place, ensuring smooth running of routine work. Patient load has been less than normal due to the ongoing lockdown in the country, but it is slowly creeping back to normal.

I would be sharing a few cases from our department.

Our first encounter with COVID-19 was a 50 year old male patient, resident of Kolkata, who had been recently diagnosed with acute lymphoblastic leukemia. The patient was admitted for treatment and developed fever. The initial chest radiograph obtained was normal (Fig.1) but the patient developed respiratory symptoms soon and the chest radiograph showed bilateral non-peripheral lower zone alveolar infiltrates the next day (Fig. 2). Nasopharyngeal swab was sent for RT-PCR and results were positive for SARS-CoV-2. Though the chest radiograph findings were not typical, in view of an ongoing pandemic, the threshold of suspicion was low. Eventually, the patient deteriorated, and could not be revived.



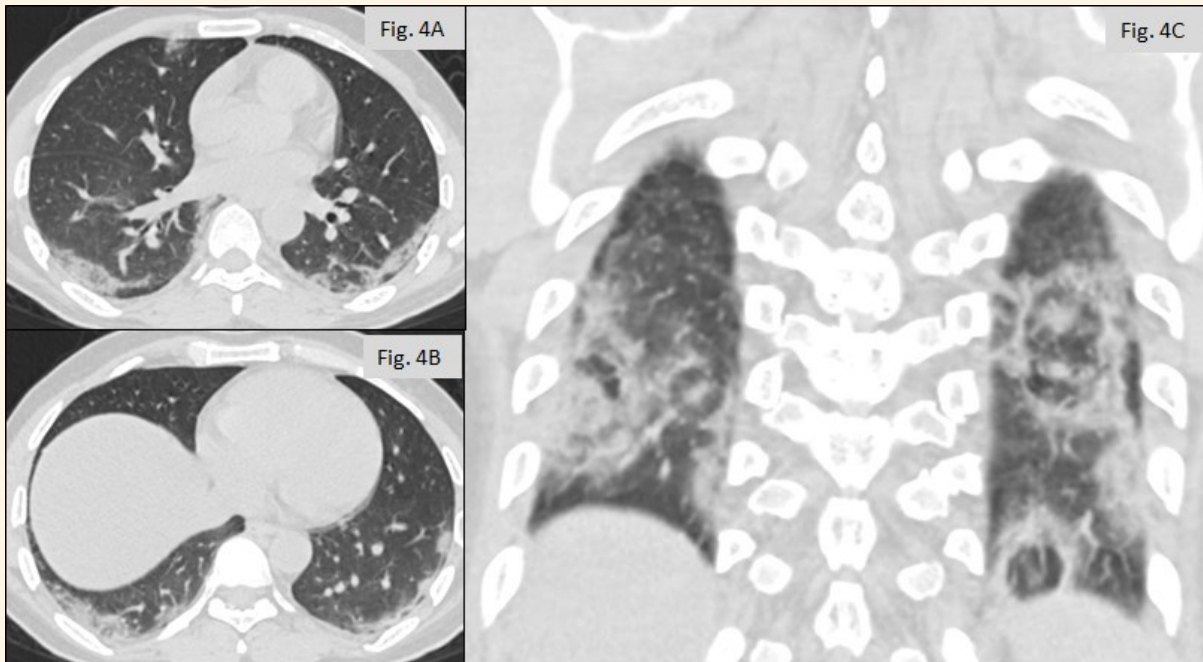
Next, there was a 63-year old male patient who presented with cough at another hospital, and had undergone a CT Thorax there. The scan detected a left lung mass suspicious of cancer, and ground glass opacities. The patient came to our hospital, visited a medical oncologist, and was advised to undergo CT scan of the abdomen for completion of staging. The staging CT abdomen showed extensive ground glass opacities at the lung bases, and suspecting COVID, we extended to perform a CT Thorax (Fig. 3A, 3B, 3C). The scan showed bilateral peripheral ground glass opacities and intralobular lines – crazy paving pattern – typical of COVID-19. The patient was admitted in isolation and nasopharyngeal swab was positive for SARS-CoV-2. This patient also succumbed to death within few days.



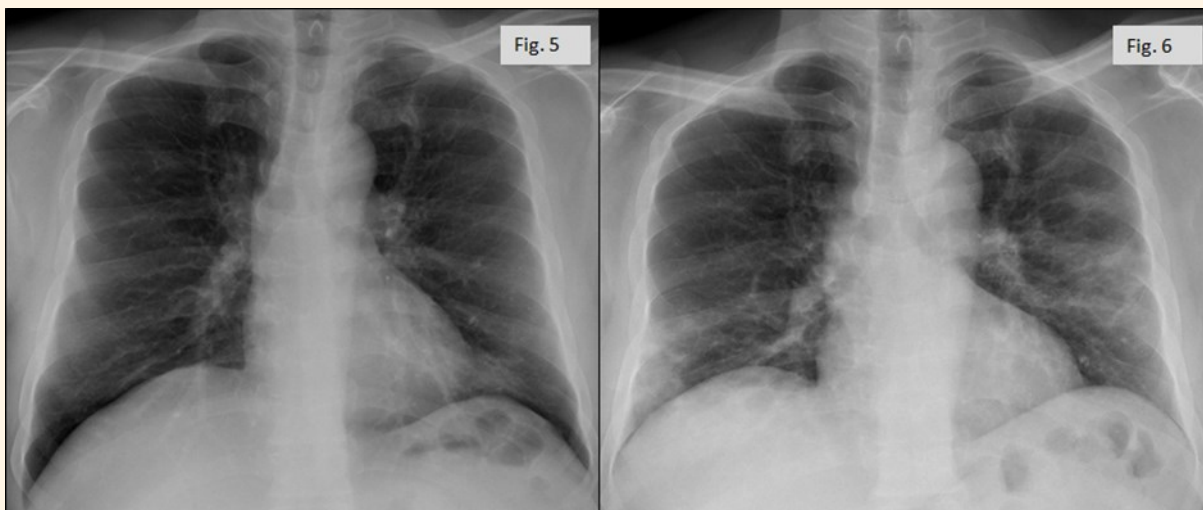
Authors

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After few days, a 53-year old male patient suffering from rectal cancer came to the department of radiology for routine CT scan of the thorax and abdomen during the course of treatment. CT scan showed extensive peripheral ground glass opacities in both lungs, with organising pneumonia pattern (Fig. 4A, 4B, 4C) – again typical COVID findings.



Another patient worth mentioning was a post operative, post radiotherapy patient of buccal squamous cell carcinoma, 55 year old male, who developed intermittent fever on follow up. His initial chest radiograph was normal (Fig. 5). But on his next visit after 12 days, his fever continued, and chest radiograph this time showed characteristic peripheral alveolar opacities in bilateral lung fields (Fig. 6). He was isolated and nasopharyngeal swab was sent. Eventually, RT-PCR turned out to be negative, but the radiology findings were highly suspicious.



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RSNA has published reporting guidelines and templates for COVID-19 CT scan, and in summary, the radiological findings can be categorised into the following [1]:

1. Typical:

- a) Peripheral, bilateral ground glass opacities (GGO) with or without consolidation or visible intralobular lines (“crazy-paving”), OR
- b) Multifocal GGO of rounded morphology with or without consolidation or visible intralobular lines, OR
- c) Reverse halo sign or other findings of organizing pneumonia

2. Indeterminate:

- a) Absence of typical features, AND
- b) Presence of:
 - I. Multifocal, diffuse, perihilar or unilateral GGO with or without consolidation lacking a specific distribution and are non-rounded or non-peripheral, OR
 - II. Few very small GGO with a non-rounded and non-peripheral distribution

3. Atypical:

- a) Absence of typical or indeterminate features, AND
- b) Presence of:
 - I. Isolated lobar or segmental consolidation without GGO, OR
 - II. Discrete small nodules (centrilobular, tree-in-bud), OR
 - III. Lung cavitation, OR
 - IV. Smooth interlobular septal thickening with pleural effusion

4. Negative for pneumonia:

No CT features suggesting pneumonia.

Standardised reporting format has also been suggested by RSNA.

A multinational consensus statement on the role of chest imaging in patient management in COVID-19 has been published by Fleischner Society, and is worth going through [2]. Also, an International expert consensus statement on chest imaging in paediatric COVID-19 management has been published, containing imaging findings, reporting and imaging recommendations [3].

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1. Simpson S, Kay FU, Abbara S, Bhalla S, Chung JH, Chung M, et al. Radiological Society of North America Expert Consensus Statement on Reporting Chest CT Findings Related to COVID-19. Endorsed by the Society of Thoracic Radiology, the American College of Radiology, and RSNA. *Radiology: Cardiothoracic Imaging* 2020;2:e200152. <https://doi.org/10.1148/ryct.2020200152>.
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3. Foust AM, Phillips GS, Chu WC, Daltro P, Das KM, Garcia-Peña P, et al. International Expert Consensus Statement on Chest Imaging in Pediatric COVID-19 Patient Management: Imaging Findings, Imaging Study Reporting and Imaging Study Recommendations. *Radiology: Cardiothoracic Imaging* 2020;2:e200214. <https://doi.org/10.1148/ryct.2020200214>

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Case Presentation

12 years old was referred to PET-CT with diagnosed Neuroblastoma for pretherapy Staging

History of intermittent pain in abdomen last six months gradually increasing . Significantly increasing since last one month unbearable since last one week

Physical examination shows Mild Hepatomegaly with associated mass in the Right hypochondrium and lumbar region.

Lab investigations reveal : Elevated Homovanillic acid (HVA), vanillylmandelic acid (VMA).

Ultrasound was done outside showing large irregular heterogenous echotexture mass lesion. Irregular necrotic areas noted within. Mild increased vascularity noted in the periphery of this lesion.

Histopathological report was Poorly differentiated Neuroblastoma.

Was referred for staging to our PET-CT department.

Whole body PET-CT was done after injecting the FDG and scan was acquired from vertex of skull to the Ankle.

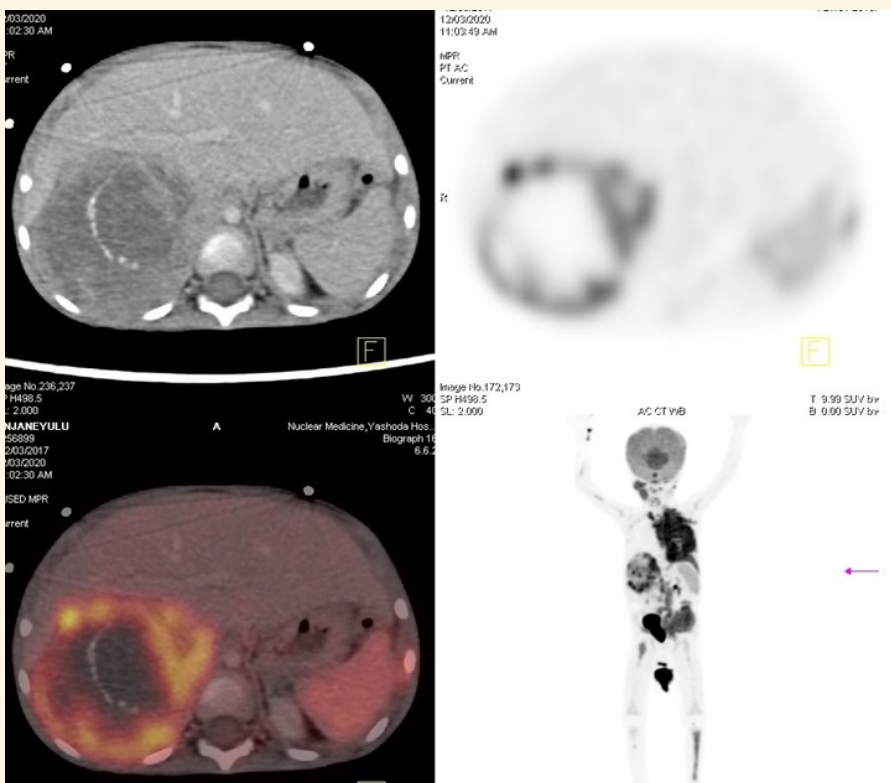


Figure 1: Whole body PET-CT Axial sections at the level of the adrenal showing Large irregular heterogeneously enhancing lesion involving the Right adrenal and abutting the adjacent surface of the Liver. The uptake on PET corresponds with the viable tissue and necrotic centre. The SUV Max measures 11.5

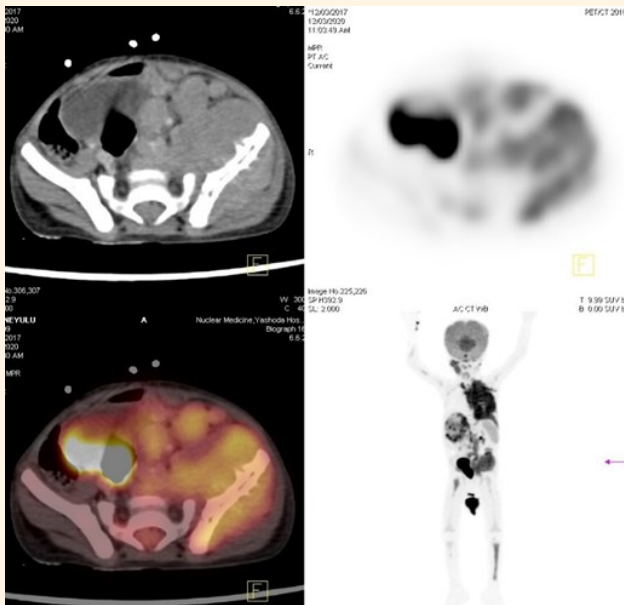


Figure 2:

The axial sections of the abdomen at the level of Iliac regions showing large patchily enhancing soft tissue component with destruction of the left iliac bone with associated periosteal reaction. This soft tissue is displacing the adjacent bowel loops on right side. The SUV Max of the increased uptake measuring 10.2. FDG uptake on right side is physiological bowel uptake.

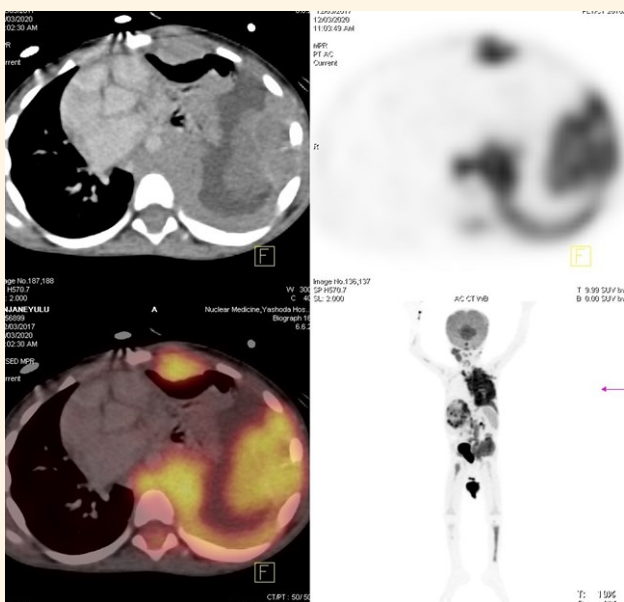


Figure 3:

The axial section of the Chest showing diffuse irregular pleural nodularities with large irregular mass lesion in lateral chest wall. Another small nodule seen in the left anterior aspect. This lesions shows diffuse increased uptake with SUV Max value of 12 .

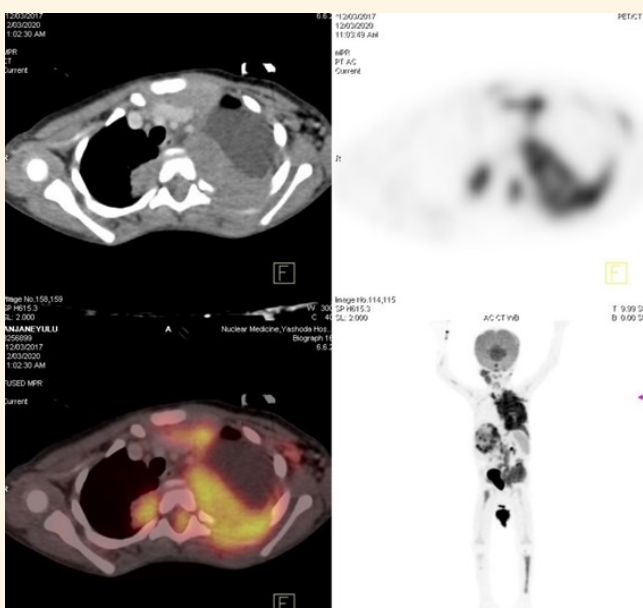


Figure 4:

The axial sections at the upper chest shows irregular pleural nodules on both sides left more than right. There is associated pleural effusion also noted. This pleural nodules at this level shows loss of plane of cleavage with the underlying chest wall muscles. The SUV Max measures 13.0.

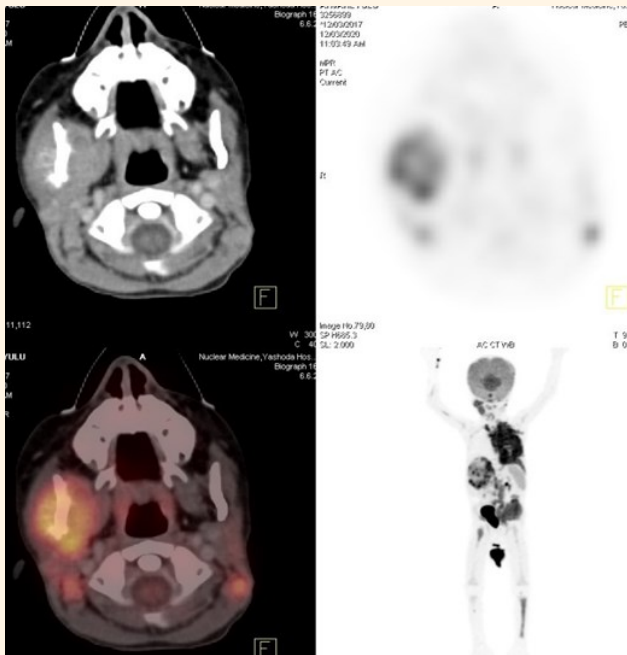


Figure 5:

The axial sections at the level of the upper cervical region shows irregular heterogeneously enhancing lesion with destruction of the right mandible. This lesion shows SUV Max of 10.8

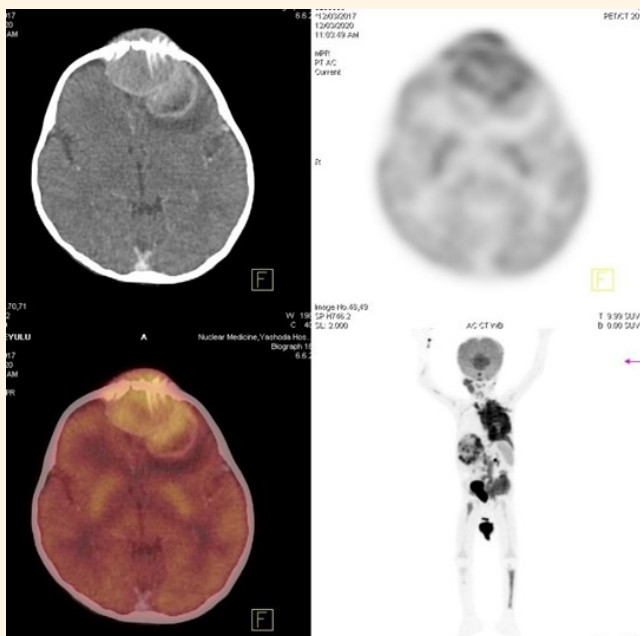


Figure 6:

The axial section at the level of the supratentorial cerebral parenchyma showing large lobulated heterogeneously enhancing lesion in bilateral frontal lobes with erosion and destruction of the frontal bone and involvement of the scalp bones. SUV Max on 8.3

The whole body scan showing the extensive disease in supra and infra diaphragmatic regions.

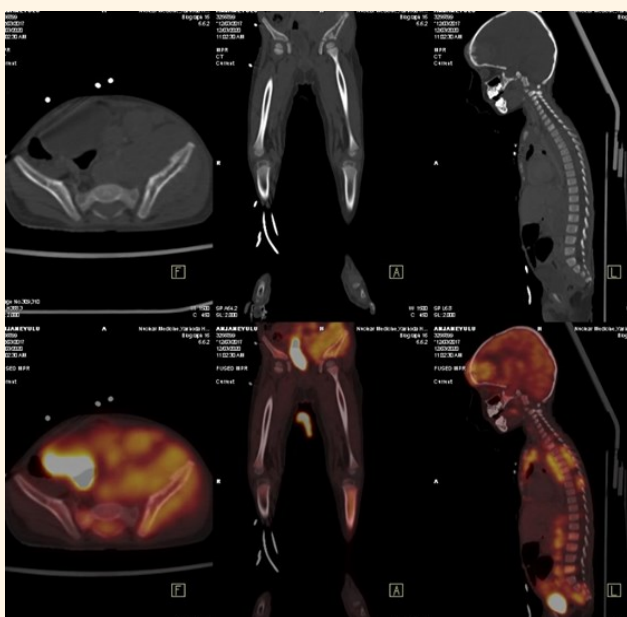


Figure 7:

There is subtle soft tissue component in the upper dorsal spinal cord with SUV Max of 7.9 .

Neuroblastoma (NB) is a type of cancer that forms in certain types of nerve tissue. It most frequently starts from one of the adrenal glands but can also develop in the neck, chest, abdomen, or spine. Symptoms may include bone pain, a lump in the abdomen, neck, or chest, or a painless bluish lump under the skin.

Neuroblastoma is the most common cancer in babies and the third-most common cancer in children after leukaemia and brain cancer. About one in every 7,000 children is affected at some time. About 90% of cases occur in children less than 5 years old, and it is rare in adults. Of cancer deaths in children, about 15% are due to neuroblastoma. The disease was first described in the 1800s.

The cause of neuroblastoma is not well understood. The great majority of cases are sporadic and nonfamilial. About 1–2% of cases run in families and have been linked to specific gene mutations. Familial neuroblastoma in some cases is caused by rare germline mutations in the anaplastic lymphoma kinase (ALK) gene. Germline mutations in the PHOX2B or KIF1B gene have been implicated in familial neuroblastoma, as well.

The common symptoms of neuroblastoma are often vague, making diagnosis difficult. Fatigue, loss of appetite, fever, and joint pain are common. Symptoms depend on primary tumour locations and metastases if present

In the abdomen, a tumour may cause a swollen belly and constipation.

A tumour in the chest may cause breathing problems.

A tumour pressing on the spinal cord may cause weakness, thus an inability to stand, crawl, or walk.

Bone lesions in the legs and hips may cause pain and limping.

A tumour in the bones around the eyes or orbits may cause distinct bruising and swelling.

Infiltration of the bone marrow may cause pallor from anaemia.

Neuroblastoma often spreads to other parts of the body before any symptoms are apparent, and 50 to 60% of all neuroblastoma cases present with metastases.

The most common location for neuroblastoma to originate (i.e., the primary tumour) is in the adrenal glands. This occurs in 40% of localized tumours and in 60% of cases of widespread disease. Neuroblastoma can also develop anywhere along the sympathetic nervous system chain from the neck to the pelvis. Frequencies in different locations include: neck (1%), chest (19%), abdomen (30% nonadrenal), or pelvis (1%). In rare cases, no primary tumour can be discerned.

The metastases from the Neuroblastomas are very common and involve nearly all the part of the body.

Spinal cord metastases is very rare. The literature mentions less than 5% of cases from the various malignancies and Neuroblastoma is common. The commonest spinal involvement is epidural spread.

DIFFERENTIAL DIAGNOSIS

Wilms Tumour.

IMAGING FEATURES

The general imaging features in the Neuroblastoma are.

The role of conventional Radiology is of less relevance with typical features of Suprarenal mass with tiny specks of calcifications. IVU shows displaced right kidney with probable splaying and displacement of the pelvicalyceal system or significant mass effect depending on the size of the mass lesion.

Ultrasound has significant role as it is the commonest imaging modality which shows the various additional features like necrotic areas, calcifications and most important the vascularity. The adjacent vascular status also can be defined precisely.

CT scan has important role especially in confirming the ultrasound findings as well. For staging and adjacent organ infiltrations.

MRI has evolved but not widely used. The role of MR is more precise for adjacent soft tissue involvement. It is not used for staging or restaging.

PET-CT is the important modality nowadays which acts like one stop shop for metastatic evaluation for staging, restaging, monitoring response to therapy.

PET-MR is evolving and probably may have role in defining the adjacent soft tissue involvement which changes the staging of the tumour.

Interventional Radiology does not have direct role but sometimes to evaluate the feeder vessels if the vasculature is not clear for surgical options.

PROGNOSIS, TREATMENT AND THERAPEUTIC OPTIONS.

The prognosis depends on the staging and grading of the tumours. The undifferentiated tumours show very poor prognosis.

The new risk stratification will be based on the new INRGSS staging system, age (dichotomized at 18 months), tumour grade, N-myc amplification, unbalanced 11q aberration, and ploidy into four pre-treatment risk groups: very low, low, intermediate, and high risk.

When the lesion is localized, it is generally curable. However, long-term survival for children with advanced disease older than 18 months of age is poor despite aggressive multimodal therapy (intensive chemotherapy, surgery, radiation therapy, stem cell transplant, differentiation agent isotretinoin also called 13-cis-retinoic acid, and frequently immunotherapy [40] with anti-GD2 monoclonal antibody therapy.

Biologic and genetic characteristics have been identified, which, when added to classic clinical staging, has allowed assignment to risk groups for planning treatment intensity. These criteria include the age of the person, extent of disease spread, microscopic appearance, and genetic features including DNA ploidy and N-myc oncogene amplification (N-myc regulates microRNAs into low, intermediate, and high risk disease.

The therapies for these different risk categories are very different.

Low-risk disease can frequently be observed without any treatment at all or cured with surgery alone.

Intermediate-risk disease is treated with surgery and chemotherapy.

High-risk neuroblastoma is treated with intensive chemotherapy, surgery, radiation therapy, bone marrow / hematopoietic stem cell transplantation, biological-based therapy with 13-cis-retinoic acid (isotretinoin or Accutane) and antibody therapy usually administered with the cytokines GM-CSF and IL-2. A meta analysis has found evidence that in children with high-risk neuroblastoma, treatment with myeloablative therapy improves event-free survival but may increase the risk of side effects such as kidney problems when compared to conventional chemotherapy.

Chemotherapy agents used in combination have been found to be effective against neuroblastoma. Agents commonly used in induction and for stem cell transplant conditioning are platinum compounds (cisplatin, carboplatin), alkylating agents (cyclophosphamide, ifosfamide, melphalan), topoisomerase II inhibitor (etoposide), anthracycline antibiotics (doxorubicin) and vinca alkaloids (vincristine). Some newer regimens include topoisomerase I inhibitors (topotecan and irinotecan) in induction which have been found to be effective against recurrent disease.

Between 20% and 50% of high-risk cases do not respond adequately to induction high-dose chemotherapy and are progressive or refractory. Relapse after completion of frontline therapy is also common.

Most long-term survivors alive today had low or intermediate risk disease and milder courses of treatment compared to high-risk disease. The majority of survivors have long-term effects from the treatment. Survivors of intermediate and high-risk treatment often experience hearing loss, growth reduction, thyroid function disorders, learning difficulties, and greater risk of secondary cancers affect survivors of high-risk disease. An estimated two of three survivors of childhood cancer will ultimately develop at least one chronic and sometimes life-threatening health problem within 20 to 30 years after the cancer diagnosis.

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PEARLS FOR BEGINNERS : MUSCULOSKELETAL USG

Sonography is beginning to play an increasing important role in Musculoskeletal pathology evaluation. Advantages of High frequency Ultrasound over other cross-sectional modalities are now well known to all. Disadvantages however are operator dependence, often incomprehensible documentation, and inability to assess osseous structures.

1. A retracted tendon is easily detected ultrasonographically by comparison with the contralateral side. A tendon with degenerative changes is more difficult to evaluate. In general, normal tendon is hyperechoic in reference to the muscles, with echosignature referred to as fibrillar.
2. Sonography is well suited to diagnose ligamentous injuries. While normal ligaments are echogenic structures, injuries at the ligamentous insertion and involving the ligament itself are not only seen as continuity breaks but also as diffuse thickening and decreased echogenicity.
3. An intramuscular haematoma is sonographically detected as a hypoechoic or sometimes anechoic fluid accumulation. The musculature also loses its normal pinnate texture. Often the haematoma cannot reliably be differentiated from synovial fluid extruded from a ruptured Bakers' cyst in the calf.
4. Sonography can distinguish between soft tissue swelling and clavicular dislocation at the sternoclavicular joint. Cortical destruction can indicate underlying infective pathology.
5. Examining both shoulders makes it easier to evaluate the rotator cuff. The following signs have been found to be reliable evidence of a rotator cuff tear.
 - Focal interruption of rotator cuff.
 - Loss of the rotator cuff convexity.
 - Focal thinning of the rotator cuff. - loss of volume
 - Small hypoechoic band replacing the normal structure.
 - Cartilage interface sign.
6. Echogenic foci as intratendinous calcification are by far less informative and have a positive predictive value of 50% or lower by USG screening of underlying rotator cuff pathology. Such foci can be caused by zones of degeneration and calcification. A rotator cuff defect can remain undetected sonographically if it is partially or complete filled with granulation tissue, debris-containing fluid, bursal fat invagination or tendon remnants. Likewise, superimposed osseous structures (in particular, the acromion and acromioclavicular joint) can interfere with sonographic visualization of all components of the rotator cuff.
7. If correctly performed and judiciously interpreted, sonography can provide clinically relevant information, especially in differentiating an intact rotator cuff from a complete tear and diagnosing pathologic changes of the subacromial/subdeltoid bursa and biceps tendon (particularly tears and subluxations). Moreover, calcific tendinitis can be sonographically detected. Partial thickness tears detection has lower sensitivity.

PEARLS FOR BEGINNERS : MUSCULOSKELETAL USG

8. Sonography does not play a major role in evaluating shoulder instability, though it can confirm any clinical instability if the humeral head is moved with one hand and the probe is held in the other hand. Sonography can also show the Hills-Sachs lesion, but not bony Bankart unless a dedicated axillary scan is performed.

9. Sonography might delineate concomitant injuries, such as tears of the rotator cuff or of long head of the biceps tendon, or a joint effusion in cases of polytrauma.

10. USG in Children: Sonography might be helpful to identify free intra-articular bodies (flexion side) and to evaluate injuries in children (radial head dislocation?). The ossification centres can be seen sonographically before they are detected by radiographs, for suspected vascular injuries color-coded Doppler sonography is indicated. Developmental dysplasia of hip is diagnostic on dynamic scan.

11. Occult Green stick fractures: USG is especially useful in the paediatric age groups. Step deformities of the cortex can be diagnosed with high -frequency probes.

12. Sonography and MRI can diagnose injuries of the ulnar collateral ligament of the thumb and distinguish between Undisplaced and displaced ruptures.

13. The accuracy and dependability of sonography in distinguishing avulsions of ligamentous insertion from osteochondral fractures are improving. Furthermore, sonography can directly visualize injuries of the collateral ligaments and effusion of the inter-phalangeal joint in selected cases. Performing sonography as a dynamic examination also helps to differentiate complete from incomplete ligamentous tears.

14. Post-surgical seromas, hematomas, and abscesses can be identified sonographically and aspirated under sonographic guidance.

15. The hematoma found with acutely injured ligaments precludes an adequate sonographic evaluation of acute trauma. Sonography, therefore, does not play any role in the acute setting. Morel lavalle lesions can be diagnosed on the ultrasound.

16. Identifying the ossification centre within the epiphyseal cartilage in the neonatal age group and demonstrating its relationship to the already-ossified metaphysis allows the sonographic differentiation of a normal finding from a traumatic epiphyseal dislocation and joint effusion. If subchondral fracture, osteochondritis dissecans, or avascular osteonecrosis is suspected in infants and children, the sonographically demonstrated joint effusion should prompt a more extensive diagnostic evaluation. Failure to find a joint effusion sonographically makes acute trauma unlikely.

17. The acoustic properties of the neonatal anatomy are especially suitable for sonography. The first sonographic sign, seen even before any periosteal reaction, is deep soft-tissue edema and swelling. This is followed by sonographic detection of a thin hypoechoic fluid layer, which elevates the Periosteum and may progress to a space occupying abscess if the infection is not adequately treated. Ultrasound has sensitivity for acute Osteomyelitis.

Sonography, however, should not be overrated since these ultrasonographic findings are not always detectable. Depending on the site examined, the false negative rate can be high. Moreover, sonographic findings are often nonspecific and can be falsely interpreted as evidence of osteomyelitis.

18. In an older child and adult, sonography is an examination that supplements the evaluation of the soft tissues adjacent to bone. Soft tissue abscesses, sub-periosteal abscesses, cysts, and hematomas are excellently demonstrated on ultrasound as hypoechoic or anechoic lesions and as such are suitable for sonographically guided aspiration. Any associated cortical destruction may also be shown if the sonographic conditions are optimal (tissue harmonics). Diffuse soft-tissue infection and abscess can confidently be differentiated by sonography. Any diffuse

PEARLS FOR BEGINNERS : MUSCULOSKELETAL USG

soft-tissue swelling is characterized by echogenic thickening of the subcutaneous tissue.

19. Furthermore, sonography can detect a joint effusion that might explain the pain and restriction of motion. This finding frequently prompts a diagnostic joint aspiration in this clinical setting.

20. The sonographic findings of soft-tissue infection can be classified into three categories:

- Diffuse hyper-echogenicity: This reflects soft tissue edema, typically called cobble stone appearance, but its aetiology (e.g. erysipelas versus congestion) cannot be determined sonographically.
- Localized hypoechoic to anechoic area: These findings correspond to different degrees of tissue liquefaction. The presence of an abscess can only be established sonographically if a capsule is unequivocally delineated, and this is not always possible.
- Hypoechoic to anechoic linear bands or areas of a burrow-like configuration: These correspond to collections of pus in a phlegmonous infection.

21. Sonography is an acceptable bedside method for the detection and further evaluation of an undetermined swelling of the peripheral soft tissue, and supplements palpation and inspection. Ultrasonography is also suitable to guide percutaneous biopsies, especially of lesions in the peripheral soft tissues. Colour Doppler duplex sonography can also provide differential diagnostic criteria, distinguishing, for instance, a solid tumour from a hematoma.

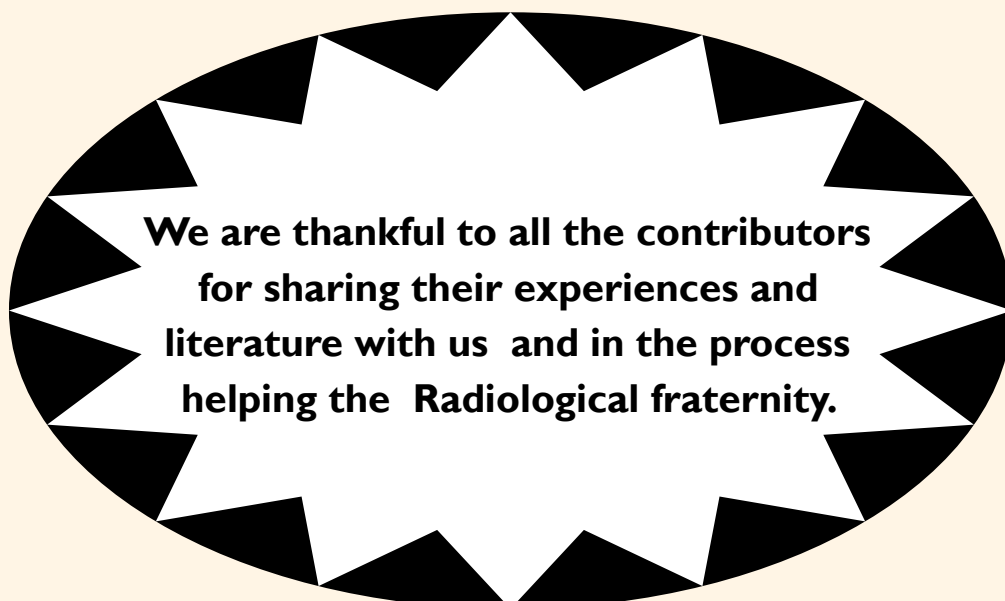
22. The cartilaginous cap of superficial osteochondromas can be superbly visualized.

23. With experience, sonography can be used to evaluate superficially located bones (e.g., ribs), as it can easily delineate cortical disruption or interruption.

24. Lipomas are highly echogenic and are occasionally surrounded by a sonographically discernible capsule. Almost all other soft tissue tumours appear heterogeneously hypoechoic. Cystic tumour components, necrosis, or acute haemorrhage can be identified as sonolucent areas.

25. A histologic diagnosis is sonographically impossible and should not be attempted. A description of the pathology and likely differential diagnosis is preferred.

26. High-resolution sonography can distinguish between degeneration and rupture of the tendon when the clinical findings are equivocal.





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Consultant Radiologist and Head, Sadbhav Imaging Centre, a division of Gujarat Imaging Centre, Ahmedabad since 2005

Working in MRI and CT scan with focus on musculoskeletal imaging

Secretary of Musculoskeletal Society of India
Joint editor of Indian Journal of Radiology and Imaging

Obtained advanced musculoskeletal radiology training at Cincinnati, USA in 2010

Completed Fellowship in Cartilage MRI on Ultrahigh field 7.0 T MRI at Vienna in 2015

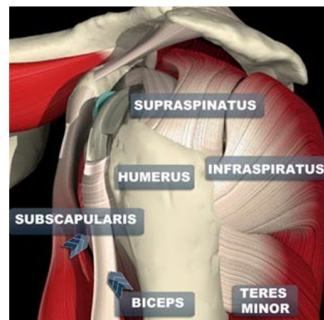
Has delivered lectures in national and international conferences

Has presented scientific papers and exhibits in various national and international conferences

MRI of rotator cuff

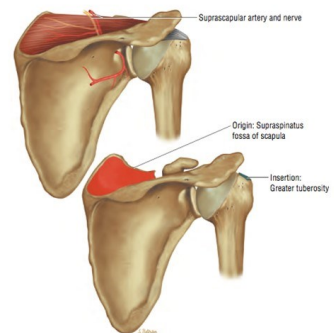
Rotator cuff

- The rotator cuff muscles form a cuff over the top of the humerus. It is formed by four muscles.
- The supraspinatus, infraspinatus, subscapularis and teres minor.
- Out of these, the supraspinatus, infraspinatus and teres minor has insertion at the greater tuberosity of humerus while subscapularis has insertion at the lesser tuberosity of humerus.



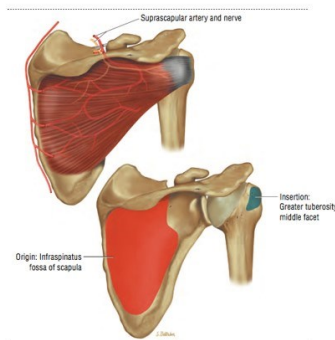
Supraspinatus

- Supraspinatus arises from the supraspinatus fossa of the scapula and inserts at the superior facet of greater tuberosity of humerus. It is supplied by suprascapular artery and innervated by suprascapular nerve.
- Function: It initiates abduction of the arm. It also acts as humeral head depressor.



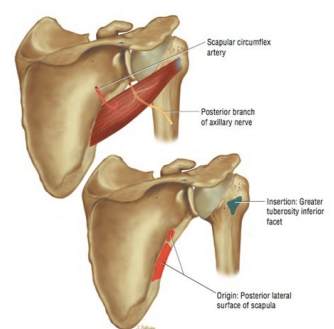
Infraspinatus

- Infraspinatus arises from the infraspinatus fossa of scapula and inserts at the middle facet of the greater tuberosity of humerus. It is supplied by suprascapular artery and innervated by suprascapular nerve.
- Function: It helps in external rotation and extension of the arm. It contributes in humeral head depression.



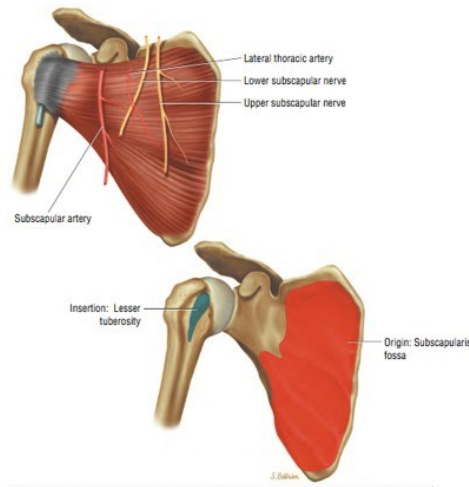
Teres minor

- Teres minor arises from posterior lateral surface of scapula and inserts at the inferior facet of greater tuberosity of humerus. It is supplied by scapular circumflex artery and innervated by posterior branch of axillary nerve.
- Function: It helps in external rotation and flexion of arm along with infraspinatus. It is more active when shoulder is in 90° of elevation.



Subscapularis

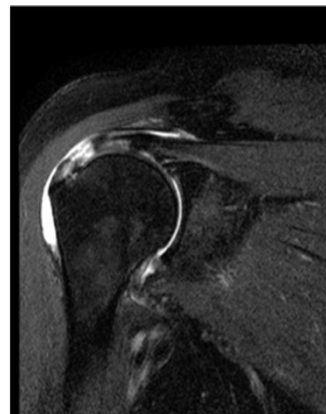
- Subscapularis arises from the subscapularis fossa of scapula and inserts at the lesser tuberosity of humerus. It is supplied by lateral thoracic artery and innervated by Lower subscapular and upper subscapular nerve.
- The subscapularis has a long vertical footplate (insertion site) and the tendon of subscapularis is multipennate.
- Function: It helps in internal rotation and flexion of the arm.



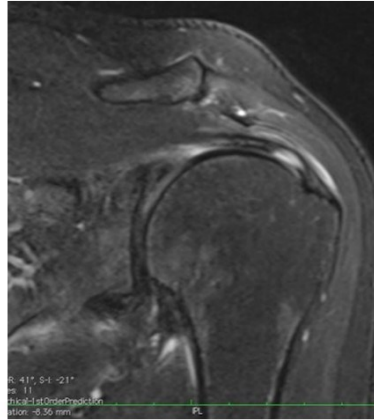
Rotator cuff tear

- Partial thickness / Full thickness
- Incomplete / Complete
- Articular surface / bursal surface / interstitial
- Insertional – foot plate / distal tendon / myotendinous junction

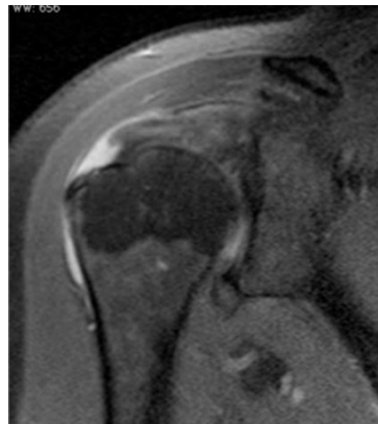
- Full thickness tear
Involves all fibers of tendon from superior to inferior. Best visualized on coronal plane of MRI as complete defect with CSF intensity signal at the site of tear.



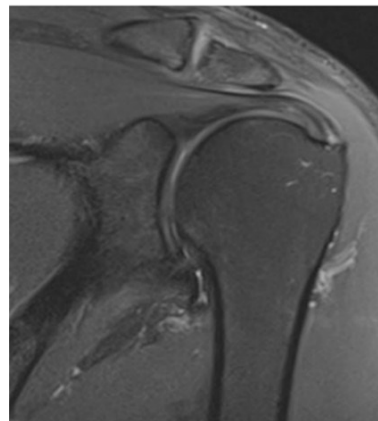
- Partial thickness tear – Involves only a few of the fibers of tendon from superior to inferior.
- Articular sided tear - When it involves inferior fibers adjacent to the superior margin of head of humerus.

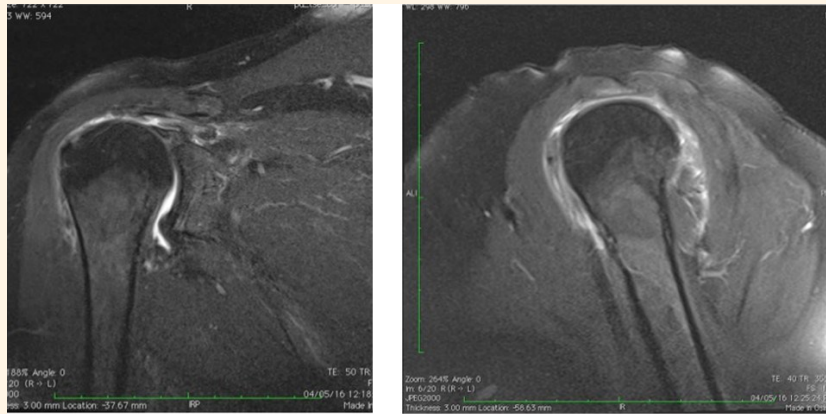


- Bursal sided tear – When it involves superior fibers adjacent to the subacromial bursa.

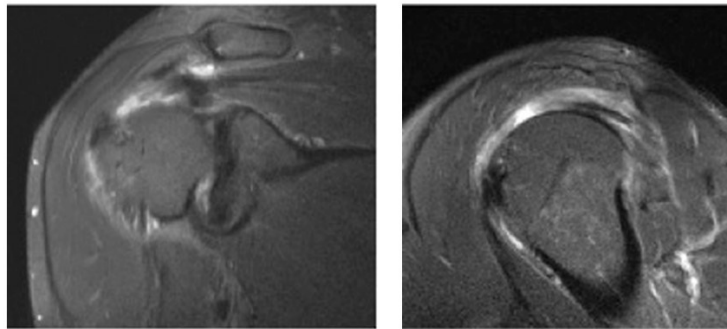


- Interstitial tear – When it involves central fibers with intact articular sided and bursal sided fibers.

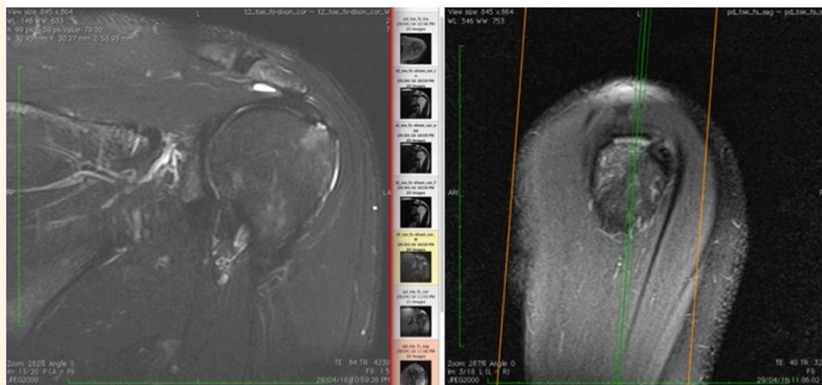




- Complete tear – When the tear involves all fibers of a specific tendon from anterior to posterior extent. Best visualized in sagittal plane as CSF intensity signal throughout the antero-posterior extent of the tendon.

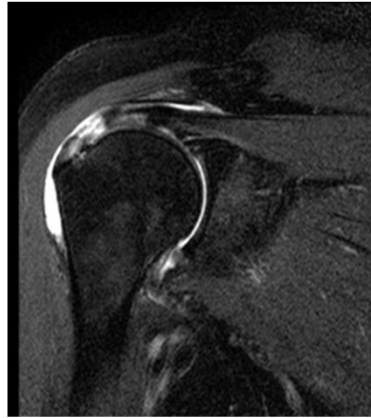


- Incomplete tear – When the tear involves only a few of the fibers (anterior / mid / posterior) of a specific tendon. Best visualized in sagittal plane as CSF intensity signal involving a part of the tendon.



- Insertional / footplate tear – When the tear involves distal most part of the tendon at the site of its insertion.

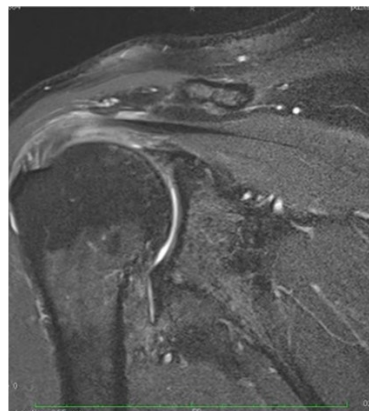
- Mid / distal tendon tear – When the tear involves mid / distal part of the tendon proximal to its insertion.



- Myotendinous junction tear – When the tear involves myotendinous junction.



- Tendinosis – Edematous changes involving tendon without discontinuity. On MRI it is seen as hyperintensity on T2W and PD images but less than CSF signals. On USG it is seen as loss of normal architecture of the tendon.



ISOLATED URETERIC DIVERTICULUM - A RARE ENTITY**Dr. Mayukh Bhattacharya, MBBS, MD****Dr. Viral Parekh, MBBS, DMRD, DNB****Abstract**

Ureteric diverticulum is a rare urinary tract anomaly with less than 100 reported cases worldwide in available literature. Sonography conducted on patients with affected condition will often be not diagnosed. Appropriate radiological investigation, viz. intravenous conventional or CT urography, is critical in not missing out diagnosis of rare urological conditions like ureteric diverticula. We describe one case of this pathology and the mode of diagnosis followed by detailed review of available literature.

Key Words: ureteric diverticulum, congenital type, acquired type, CT urography

INTRODUCTION

Ureteric diverticula are rare urological tract anomalies. The first case series of ureteric diverticula was reported as early as 1975.¹ These were thought to be congenital malformations, though the authors also suggested that they may be acquired in childhood or adult life. Ureteric diverticula may be associated with other complex pelvic or abdominal deformities. They may be entirely asymptomatic and only diagnosed incidentally. Painless hematuria, recurrent UTI and stone formation may be the alternate presentations. Ureteric diverticula have been classified into following types: abortive ureteric duplication, true congenital and acquired types.

CASE REPORT

A 21 year old female was referred to our department with recurrent left loin pain for CT urography. She had previously undergone sonography without any significant findings. Her past history was unremarkable. She did not have any prior complications or symptomatology related to the urinary tracts. She underwent a triple phase contrast enhanced CT (Siemens Somatom 128 slice MDCT equipment). CT scan revealed a long diverticulum arising from left upper ureter running parallel to the main ureteric channel and ending blindly just below the level of pelviureteric junction of left kidney. Approx. length of the diverticulum was mm and maximum caliber mm. The left urinary tract was non-dilated. No renal or ureteric stone was detected. Contralateral kidney and ureter were normal. No other congenital malformation was detected. Renal function was normal bilaterally. A diagnosis of isolated left ureteric diverticulum was made.

Presently, the patient is being managed conservatively and has been advised serial check-ups in our urology department. In the last follow up visit, she was asymptomatic.

DISCUSSION

Ureteric diverticulum is infrequently encountered in day-to-day radiology practice. McLoughlin et al in their case report published in 2013 found out only 41 case reports and case series from old literature. They themselves reported only 2 patients with isolated ureteric diverticulum. Sarailic et al reported 13 cases in their study series. Ureteric diverticula have been sub-classified into 3 categories: true congenital diverticulum, abortive duplications resulting in blind-ending bifid ureter due to disordered ureteric budding in utero, and acquired diverticulum. Acquired type is generally encountered in cases with distal obstruction, mostly due to ureteric calculus. Congenital types are mostly asymptomatic while patients with acquired diverticula often present with fever and pain.

Radiological imaging is the cornerstone in the diagnosis of this uncommon entity. Sonographic evaluation of these patients is seldom useful other than in detecting complications. Previously, conventional antegrade and/or retrograde urography used to be the ideal tool to diagnose ureteric diverticulum. With the advent of modern CT scanners and even MRI (in cases of issues with radiation hazard or non-compatibility with intravenous iodinated contrast agents, renal impairment etc.), more cases ought to be diagnosed. It is also essential to differentiate between duplications and diverticula of the ureter. Cussenot et al reported a rare case of concomitant ureteric duplication and ureteric diverticulum in the same patient. Duplications are mostly asymptomatic, while diverticula may present with pain, fever, hematuria or obstructive uropathy due to ureteric stone formation.

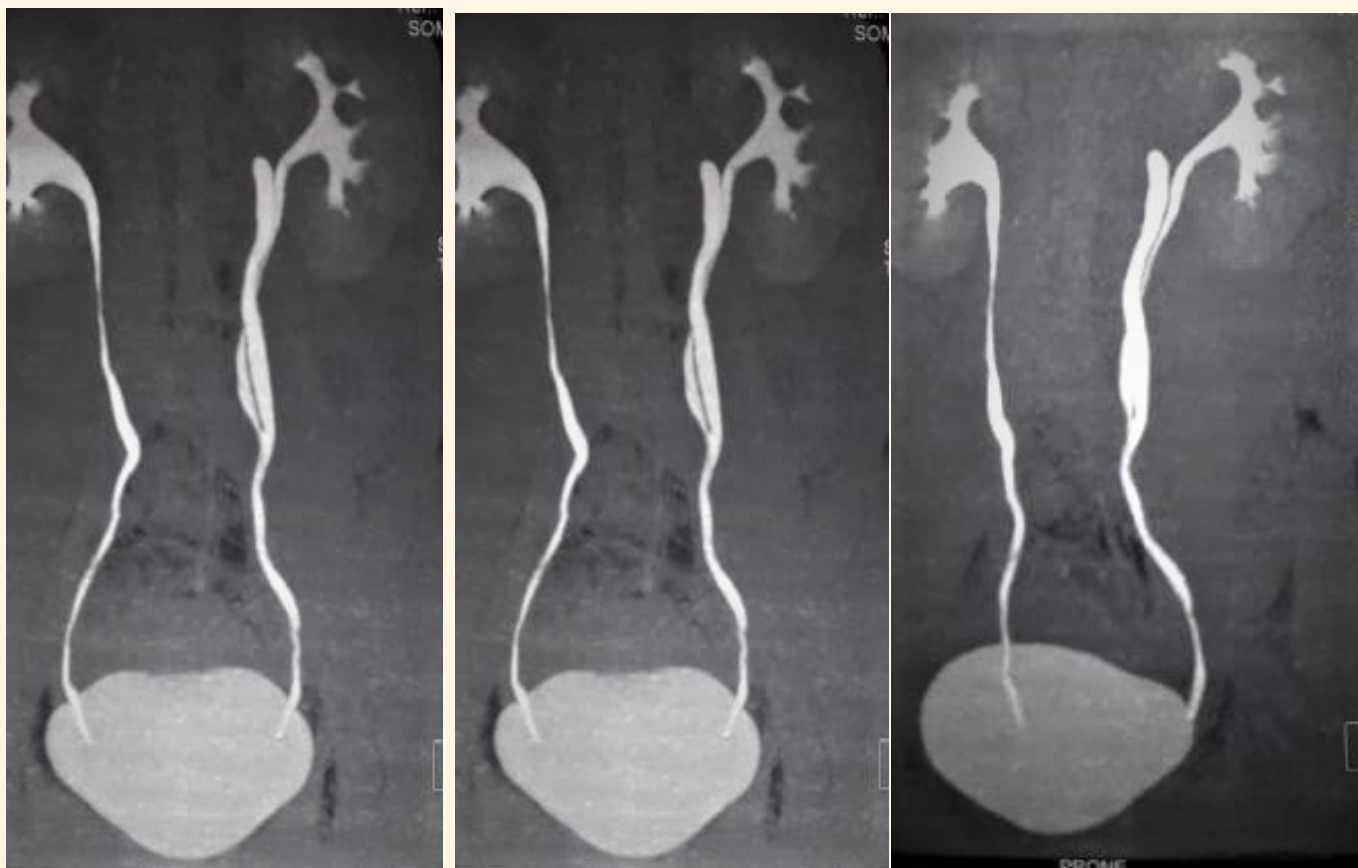
Ureteric diverticula usually do not require treatment, unless associated with obstruction. In the majority of reported cases, only conservative management or follow up was recommended. Diverticulectomy and reconstructive surgery are rarely required. Laparoscopic resection of acquired diverticula has also been attempted. Prognosis of untreated cases is excellent. Adverse events associated with ureteric duplication are a rarity. Hydroureteronephrosis, perforation of diverticula and development of TCC have been reported.

CONCLUSION

Ureteric diverticula are uncommonly encountered in radiology practice. Review of literature showed only a handful of available case series and case reports. Modern imaging has enabled definitive diagnosis of these entities and differentiation from the commoner ureteric anomalies like duplications. We recommend CT urography as the most appropriate imaging modality for diagnosis of ureteric diverticulum. In cases with contraindications, MR urography is the next best tool. Ureteric diverticula have excellent prognosis and better left alone, unless associated with obstructive uropathy.

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ISOLATED URETERIC DIVERTICULUM - A RARE ENTITY



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ISOLATED URETERIC DIVERTICULUM - A RARE ENTITY



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Cardiac CT Interesting Case - ALCAPA

A 44 years old male patient presenting with congestive heart failure was referred to our department for MDCT coronary angiography, which was performed on a dual source CT scanner.

The CT angiography revealed anomalous origin of left main coronary artery from the pulmonary artery. The right coronary artery originated normally from the Coronary sinus of Valsalva.

Anomalous origin of the left coronary artery arising from the pulmonary artery (ALCAPA) is a rare but serious congenital anomaly. The anomaly is also called Bland-White-Garland syndrome and most patients had died at a young age

On CT angiography, The LAD, LCX and RCA were markedly ectatic, which is usually due to collaterals between left and right coronary arteries.

Usually, the presentation is in the first year of life, but this case was unusual as the patient was diagnosed to suffer from this rare condition in the fifth decade of his life.

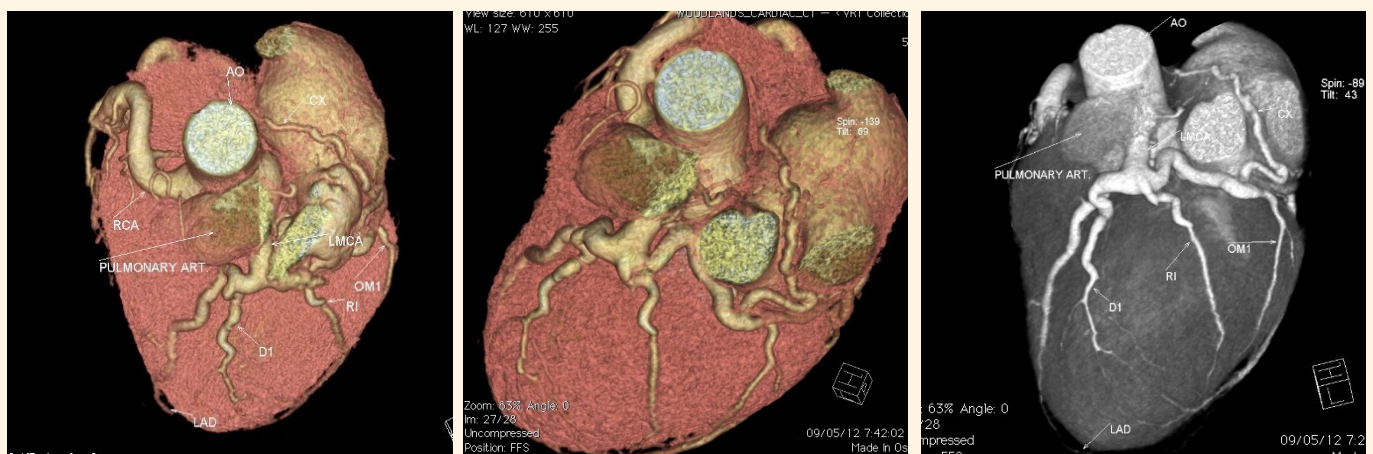


Fig. 1 to3: VRT images demonstrate the anomalous origin of LMCA from pulmonary artery.



Fig 4: VRT image demonstrates a very dilated and tortuous RCA.

Fig 5 & 6: MIP images demonstrate the anomalous origin of LMCA from pulmonary artery.



Dr. Amar Udare

MD, DNB

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Imaging,McMaster University,
Hamilton,

Dr. Amar Udare is a young and dynamic Radiologist. He is now doing his fellowship in Cross sectional imaging at Hamilton, Canada. He has developed a website - radiogyan.com - A free radiology website for radiology residents and professionals. He runs a Telegram group also, where thousands of Radiologists and Residents are members. Thanks a lot for helping the fraternity and spreading the knowledge. We are proud of you. Here are some of his cases.



Focal Hepatic hot spot / Hot quadrate sign

- Focal area of increased enhancement in the medial segment of the left hepatic lobe (segment IV) due to superior vena cava obstruction and portosystemic venous shunting between the superior vena cava and the left portal vein via the internal thoracic and paraumbilical veins. Note **superficial collaterals**.
- **Budd-Chiari syndrome** causes **hot caudate** due to the peculiar venous drainage of the caudate.



Joubert Syndrome

- Thickened superior cerebellar peduncles with a deep midline cleft at the pontomesencephalic junction give rise to the "**molar tooth sign**".
- Also seen: Small dysplastic or aplastic cerebellar vermis, and "**bat-wing**" 4th ventricle.
- Associated with **ocular (coloboma retinal dysplasia)**, **renal (MCDK)** and **liver (fibrosis)** abnormalities.

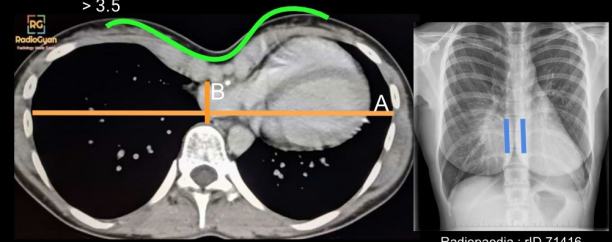


rID: 8238



Pectus excavatum

- Congenital chest wall deformity characterized by **concave depression of the sternum**.
- On CXR seen as blurred right heart margin. In females, the medial margins breasts are more **vertically oriented, parallel** and have a sharp margin.
- **Haller's index** is used on CT = A/B. Surgery recommended when > 3.5 .



Radiopaedia : rID 71416



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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 August 2020

We will be bringing out such Newsletters with a frequency of one issue every two months. So, next issue will be published in August, 2020.

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 July, 2020. You can send the word file to our abovementioned email address or you can

WhatsApp it to above-mentioned three phone numbers.

We are also inviting 8-10 minutes teaching Videos for our YouTube channel. If your video is of good quality and contains good teaching material, we will publish it on our channel. Please note that it should contain original teaching material.

So friends, utilize your time during this lockdown and engage yourself in academic activities and send it to us. We will be more than happy to publish it, of course it should be quality material.

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.

We hope there will be light at the end of the tunnel and there will be some effective treatment as well as vaccine against this Covid-19. Hope is the only thing stronger than fear. As Martin Luther King Jr. had said that **"We must accept finite disappointment, but never lose infinite hope"**.

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