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Mobile:
+91 93220 35920
Email:
shankar.bhagat@gmail.com
Website:
www.radiographers.org

Biological Effect of Radiation

Ananya Girish Babu, Radiology Lecturer, Aster MIMS Academy.

Although the radiation is introduced in the world by W.C Roentgen in 1895, it gradually became aware of their value to the medical community both as a diagnostic and as a therapeutic tool. The x rays have the ability to per nitrate through the skin and cause injury and biological changes in the cells. X-rays are a form of ionizing radiation. When passing through matter, ionizing radiation produces positively and negatively charged particles (ions). The production of these ions is the event that may cause injury in normal biologic tissue

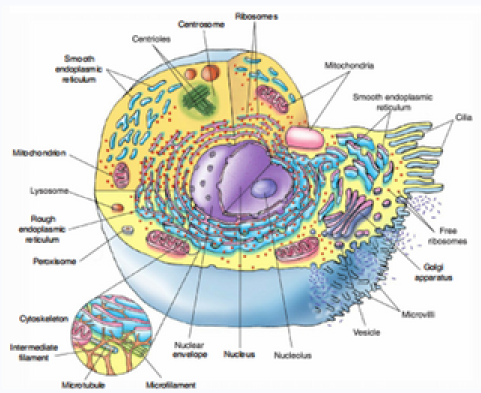
Structure of Cell

The human body is composed of trillions of cells. These cells exist in a multitude of different forms and perform many diverse functions for the body. All the living things are made up of protoplasm.

The main 2 components in cells are

A. cytoplasm

B. nucleus



Deoxyribonucleic Acid

Deoxyribonucleic and Ribonucleic Acids. Cells contain two types of nucleic acids that are important to human metabolism:

1. Deoxyribonucleic acid (DNA)
2. Ribonucleic acid (RNA)

The four nitrogenous organic bases in DNA macromolecules are as follows:

1. Adenine (A)
2. Cytosine (C)
3. Guanine (G)
4. Thymine (T)

Cell division is the multiplication process whereby one cell divides to form two or more cells they are Mitosis and Meiosis.

Linear Energy Transfer (LET)

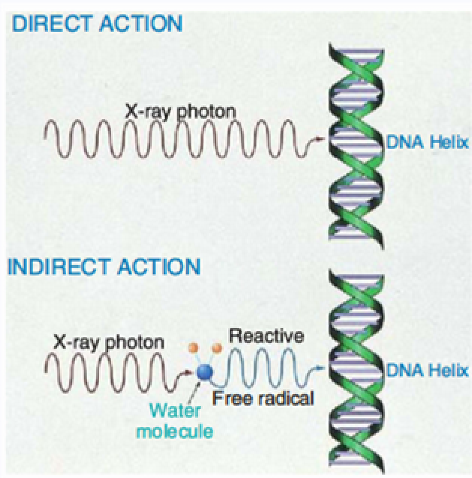
When passing through a medium, ionizing radiation may interact with it during its passage and as a result lose energy along its path (called a track). The average energy deposited per unit length of track is called linear energy transfer (LET)

Ionizing radiation interaction can be classified as: -

When ionizing radiation interacts with a cell, ionizations and excitations (the addition of energy to a molecular system that transforms it from a ground state to a higher-energy, or excited, state) are produced either in vital biologic macromolecules (e.g., DNA), or in water (H20), the medium in which the cellular organelles are suspended.

Based on the site of the interaction, the effect of radiation on the cell is classified as either;

1. **Direct -** biologic damage occurs as a result of ionization of atoms on essential molecules
2. **Indirect -** biologic damage occurs as a result of ionization of atoms on essential molecules



Effect of Radiation In DNA

Single-Strand Break-

If ionizing radiation interacts with a DNA macromolecule, the energy transferred could rupture one of its chemical bonds and possibly sever one of the sugar phosphate chain side rails, or strands, of the ladder like molecular structure (single-strand break). This type of injury to DNA is called a point mutation

Double-Strand Break-

Further exposure of the affected DNA macromolecule to ionizing radiation can lead to additional breaks in the sugar-phosphate molecular chain(s). These breaks may also be repaired, but double-strand breaks (one or more breaks in each of the two sugar phosphate chains) are not fixed as easily as single-strand breaks

Radiation effects can be classified as deterministic effect and stochastic effect. A stochastic effect is one in which the probability of the effect, rather than its severity, increases with dose. Radiation-induced cancer and genetic effects are stochastic in nature. Stochastic effects are believed not to have a dose threshold, because injury to a few cells or even a single cell could theoretically result in production of the disease. Therefore, even minor exposures may carry some, albeit small, increased risk.

Acute Radiation Syndrome (ARS).

When the whole body is subjected to a large acute radiation exposure, there is a characteristic clinical response known as the acute radiation syndrome (ARS). ARS is an organismal response quite distinct from isolated local radiation injuries such as epilation or skin ulcerations. The ARS is actually a combination of sub syndromes occurring in stages over a period of hours to weeks after the exposure, as the injury to various tissues and organ systems is expressed. These sub syndromes result from the differing radio sensitivities of these organ systems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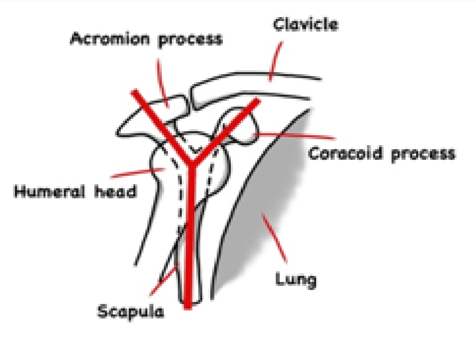
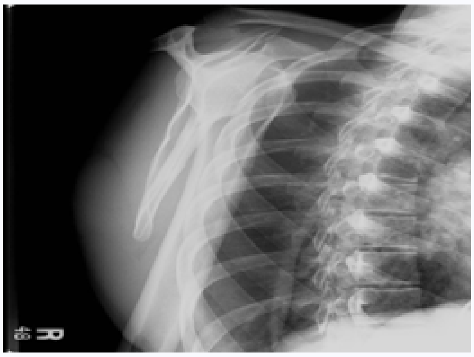
Y –View Shoulder (Radiography)

Ramesh Sharma, Rtd. Chief Technical Officer Radiology, NCI-AIIMSy - New Delhi.

The Y view anatomy: The Y view is shot in an angle that separates the scapula and humerus from the ribs. It's essentially a true lateral of the scapula. The scapula looks like a Y when viewed laterally. Laterally, the body of the scapula, acromion, and coracoid process all converge at the glenoid. If you connect straight lines through the axis of these structures, they will form a Y. If the humeral head falls in the middle of this convergence, then it is seated in the glenoid and there is no dislocation. If it is anterior to this convergence (or Y) then there is anterior dislocation. If it is posterior to this convergence there is posterior dislocation. Anterior dislocations are usually readily apparent with this view. Posterior dislocations can be more subtle and may require an axillary view if the Y view is not definitive Y





Patient position

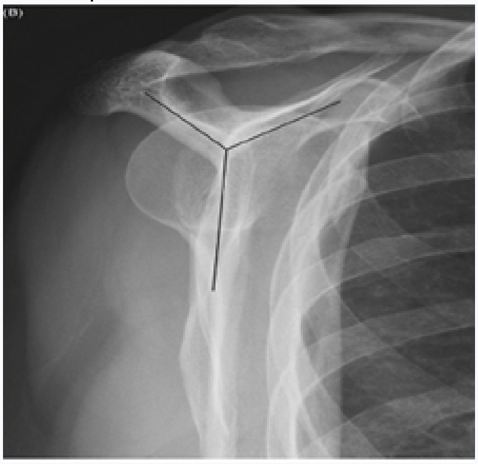
- erect or sitting, facing the upright detector
- rotated in an anterior oblique position so the anterior portion of the shoulder is touching the upright detector
- the hand is placed on the patient's abdomen with the arm flexed
- degree of anterior rotation can vary from patient to patient
- scapula should be end-on to the upright detector, and this can be done via palpation of the Scapula border.
- before the contrast study to feed the infant during the 24 hour period following the examination.

Technical consideration Factors : poster anterior lateral projection cantering point

- the level of the glenohumeral joint on the posterior aspect of the patient (5 cm below the top of the shoulder)
- central to the medial scapula border

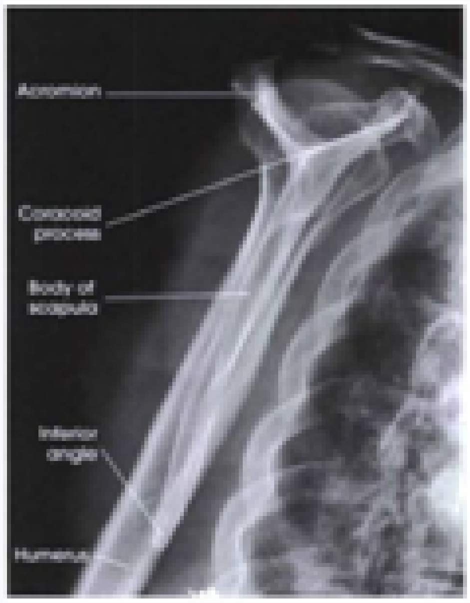
collimation

- laterally to include the skin margin
- medially to cover the entirety of the medial scapula
- superior to the skin margin
- inferior to the inferior angle of the scapula



Radiography positioning: (Lateral scapula shoulder / Oblique (RAO/LAO) or Y view

Purpose and Structures Shown: This view should demonstrate the bones and soft tissue of the shoulder specifically the scapular Y. It is often used for examination of suspected shoulder dislocations. Position of patient: The position of the patient can be either recumbent or upright. A posterior oblique position is often better when the patient is injured. The patient should suspend respiration for the exposure. Position of part: With the anterior surface of the affected shoulder facing the the image receptor, turn the patient to place the midcoronal plane at an angle of 45-60 degrees anterior oblique with their arms down. The flat surface of the scapula is positioned perpendicular to the image receptor. Central ray: Perpendicular to the image receptor directed to the scapulohumeral articulation.



X-ray tips for Y position:

- **The medial border:** Feel for the medial border of the scapula with your thumb. Turn the patient do that your thumb lines up with the humeral head that is positioned against the body
- **The midline curve:** Position the patient and look for the curve of the vertical center line of the collimator. If 'obliqued' correctly, the vertical center line will curve against the medial border of the scapula.
- **The sponge cheat:** Place the 45-degree wedge sponge against the bucky then position the patient against it. This tends to work better on slimmer patients.
- **The palm guide:** Place the palm on the scapula. With your fingers, feel for the humeral head and line up both points perpendicular to the image receptor.
- **The AC joint:** Feel for the AC joint and line it up with the medial border of the scapula.

Ref: Scapular fractures: a common diagnostic pitfall Acta Biomed. 2018; 89 (Suppl 1): 102–110.

CT- Guided DIEP (Deep Inferior Epigastric Perforator)

Anurag Kumar Shukla, Scientific Assistant B, Department of Radio-diagnosis,
Homi Bhabha Cancer Hospital & Research Centre, Visakhapatnam, Andhra Pradesh.

Introduction:

A DIEP (Deep Inferior Epigastric Perforator) flap is a surgical procedure used in breast reconstruction, particularly for women who have had a mastectomy. CT (Computed Tomography) guidance can be used in the planning and execution of this procedure to improve precision and outcomes.

Indication:

Mastectomy for Breast Cancer: The most common indication for DIEP flap reconstruction is after a mastectomy, which is the surgical removal of one or both breasts due to breast cancer. DIEP flap reconstruction offers a way to rebuild the breast mound and restore a woman's physical appearance and confidence after cancer treatment.

Prophylactic Mastectomy: Some women with a high genetic risk of breast cancer, such as those with BRCA gene mutations, may opt for prophylactic mastectomy (preventive breast removal). In such cases, DIEP flap reconstruction can be performed to provide breast reconstruction simultaneously with mastectomy.

Failed Previous Reconstructions: DIEP flap surgery may be considered when previous breast reconstruction procedures, such as implant-based reconstruction or other autologous flap procedures like the TRAM (Transverse Rectus Abdominis Myocutaneous) flap, have failed or resulted in complications.

Desire for Natural-Looking and Feeling Breasts: Many women prefer DIEP flap reconstruction because it uses a patient's own tissue (skin, fat, and blood vessels) from the lower abdomen, which can result in a more natural-looking and feeling breast compared to breast implants.

Concerns about Implants: Some women have concerns about the long-term safety or complications associated with breast implants, leading them to choose autologous tissue reconstruction like the DIEP flap.

Radiation Therapy: If radiation therapy is part of the breast cancer treatment plan, DIEP flap reconstruction may be preferred over implant-based reconstruction because the latter can be less compatible with radiation treatment.

Cosmetic Reasons: In some cases, women who have not had mastectomies but are dissatisfied with their breast appearance may opt for DIEP flap surgery for cosmetic reasons to improve breast size or shape.

Contra-indications:

- Immobility, confinement to bed.
- Hyperthyroidism
- Pregnancy in the first trimester and after the 36th week of gestation.
- Known allergy to the CT contrast.

Risks:

- Ct-contrast allergic reaction
- Extravasation

Modality:

- CT-guided

Preparation before Procedure:

- Will need pre-operative scan to confirm diagnosis, evaluate surrounding structures.
- Patients should be NPO for 4 Hrs .
- Recent RFT labs values should be in normal range.
- Patients should be ask to change the gown.
- Information about the procedure and risk during procedure should be explain to patients.
- High Risk consent is mandatory before the procedure.

Technique:

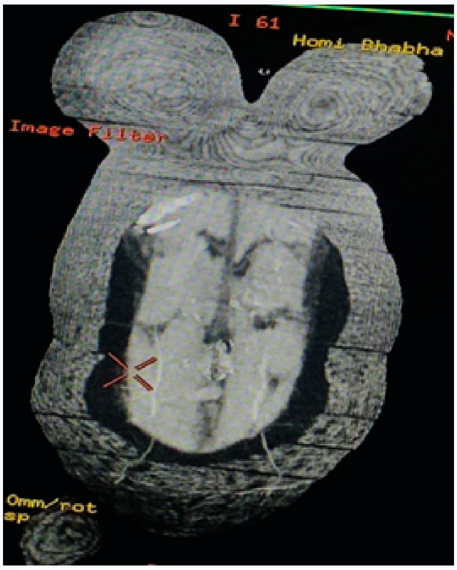
- Patients should be lies on ct-scan couch in appropriate position.
- Scan area should be between thorax & abdomen & pelvis.
- Topogram of scan range should be taken.
- Pre contrast scan should be taken withbreath-hold instruction.
- Arterial phase (15-25sec) of scan range should be taken with breath-hold instruction.
- Venous phase (60-65sec) of scan range should be taken with breath-hold instruction.
- Reconstruction Slice thickness should be 1.25mm.

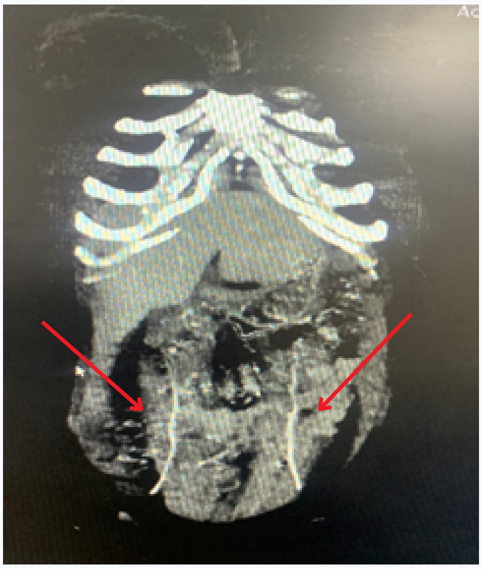
- 3D Reconstruction MIP Images of scan range should be reformatted.
- Radiologists or surgeons will review the CT images to identify and mark the location of the perforator vessels and assess the patient's anatomy. This information guides the surgical planning process.

Patients Care after Procedure:

- Patients may need to stay for a short observation period after the procedure.
- Check patient’s cannula area for any extravasation.
- If patients got any allergic reaction after procedure then medication starts immediately.

Images





Artificial Intelligence in Radiology

Sanjeev Kumar, Msc, Radiation and physics, Master Hospital Administration, PGDHQM, RSO Distt Hospital Bathinda

Artificial intelligence (AI) is rapidly transforming the field of radiology. AI algorithms are now being used to automate tasks, improve diagnostic accuracy, and personalize patient care.

One of the most common applications of AI in radiology is in the detection of cancer. AI algorithms can be trained to identify subtle patterns in medical images that are indicative of cancer. This can help radiologists to make more accurate diagnoses and to identify cancer at an earlier stage, when it is more treatable.

AI is also being used to improve the diagnosis of other diseases, such as heart disease, stroke, and Alzheimer's disease. In some cases, AI algorithms have been shown to outperform radiologists in the diagnosis of these diseases.

In addition to improving diagnostic accuracy, AI is also being used to automate tasks in radiology. For example, AI algorithms can be used to segment images, which is the process of identifying different structures in an image. This can help radiologists to save time and to focus on more complex tasks.

AI is also being used to personalize patient care. For example, AI algorithms can be used to predict the risk of a patient developing a disease. This information can then be used to tailor treatment plans to individual patients.

The use of AI in radiology is still in its early stages, but it has the potential to revolutionize the field. AI algorithms have the potential to improve diagnostic accuracy, automate tasks, and personalize patient care. As AI technology continues to develop, it is likely to have an even greater impact on the field of radiology.

Benefits of AI in Radiology

There are many potential benefits of using AI in radiology, including:

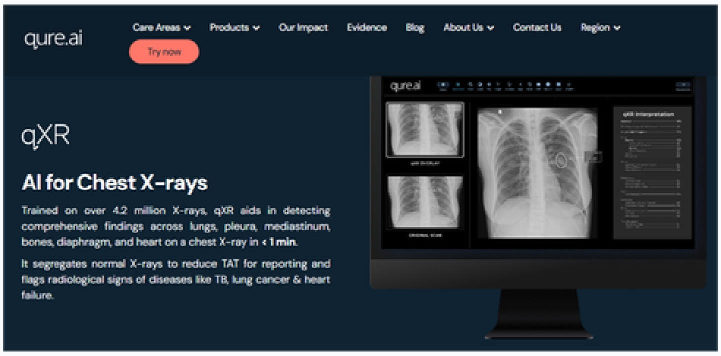
- Improved diagnostic accuracy: AI algorithms can be trained to identify subtle patterns in medical images that are indicative of disease. This can help radiologists to make more accurate diagnoses, especially for diseases that are difficult to diagnose with traditional methods.
- Increased efficiency: AI algorithms can automate many of the tasks that are currently performed by radiologists, such as image segmentation and image interpretation. This can free up radiologists' time so that they can focus on more complex tasks.
- Personalized patient care: AI algorithms can be used to predict the risk of a patient developing a disease or to identify the best treatment plan for a particular patient. This can help to personalize patient care and improve patient outcomes.

Here are some of the roles of artificial intelligence (AI) in radiology, as well as explanations of qXR, qER, qCt-lung, qVH, and qMSK:

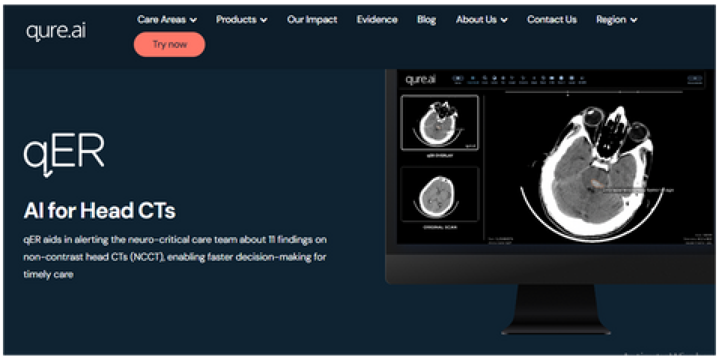
- **AI can be used to improve diagnostic accuracy.** AI algorithms can be trained to identify subtle patterns in medical images that are indicative of disease. This can help radiologists to make more accurate diagnoses, especially for diseases that are difficult to diagnose with traditional methods. For example, AI algorithms have been shown to be effective in the detection of cancer, heart disease, and stroke.
- **AI can be used to automate tasks.** AI algorithms can automate many of the tasks that are currently performed by radiologists, such as image segmentation and image interpretation. This can free up radiologists' time so that they can focus on more complex tasks. For example, AI algorithms can be used to segment images, which is the process of identifying different structures in an image. This can help radiologists to save time and to focus on more complex tasks.
- **AI can be used to personalize patient care.** AI algorithms can be used to predict the risk of a patient developing a disease or to identify the best treatment plan for a particular patient. This can help to personalize patient care and improve patient outcomes. For example, AI algorithms can be used to predict the risk of a patient developing lung cancer based on their medical history and imaging findings. This information can then be used to tailor treatment plans to individual patients.

Here are some specific examples of AI applications in radiology:

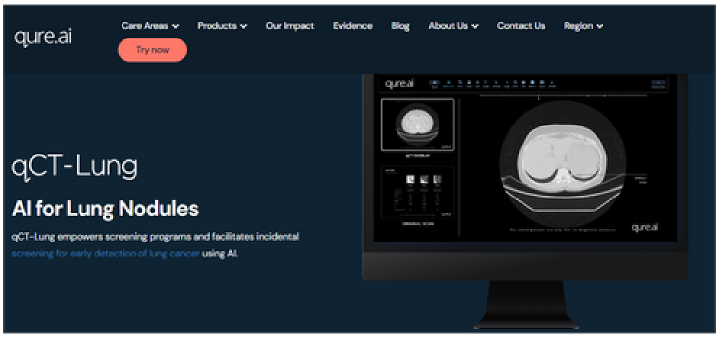
- **qXR:** qXR is an AI-powered chest X-ray interpretation tool that can automatically detect and localize up to 30 abnormalities, including indicators of lung cancer, TB, and COVID-19.



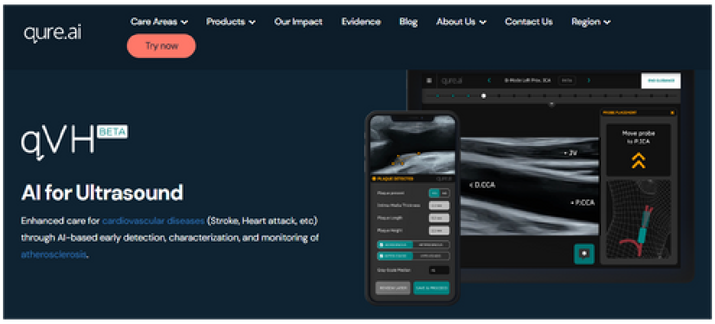
- qER: qER is an AI-powered emergency radiology tool that can automatically detect and localize abnormalities in emergency department images.



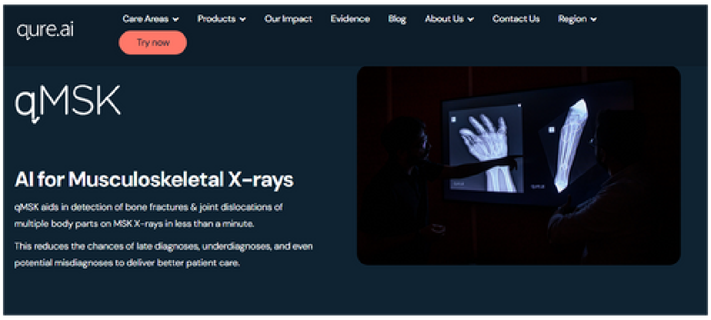
- qCt-lung: qCt-lung is an AI-powered tool that can automatically detect and localize lung nodules in CT scans.



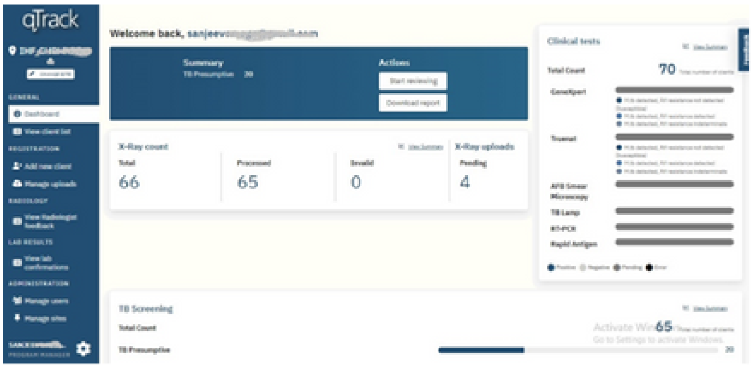
- qVH: qVH is an AI-powered tool that can automatically detect and localize vascular abnormalities in ultrasound .



- qMSK: qMSK is an AI-powered tool that can automatically detect and localize musculoskeletal abnormalities in images .



These are just a few examples of the many ways that AI is being used in radiology. As AI technology continues to develop, it is likely that we will see even more innovative and impactful applications of AI in radiology in the future.



Challenges of AI in Radiology

There are also some challenges that need to be addressed before AI can be widely adopted in radiology, including:

- **Data availability:** AI algorithms require large datasets of labelled images to train. This can be a challenge in radiology, where there is often limited availability of labelled images.
- **Algorithm bias:** AI algorithms can be biased, which can lead to inaccurate diagnoses. This is a challenge that needs to be addressed before AI can be used in clinical practice.
- **Regulatory approval:** AI algorithms need to be approved by regulatory bodies before they can be used in clinical practice. This is a time-consuming process that can delay the adoption of AI in radiology.

Conclusion

Artificial intelligence is rapidly transforming the field of radiology. AI-powered tools like Qtrack have the potential to improve the diagnosis reduce the time it takes to generate radiology reports. Qtrack is a promising tool that has the potential to make a significant impact on the fight against TBAI has the potential to revolutionize the field of radiology. However, there are some challenges that need to be addressed before AI can be widely adopted. As these challenges are addressed, AI is likely to have an even greater impact on the field of radiology.

References:

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- World Health Organization. (2020). Global tuberculosis report. Geneva: World Health Organization.

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Difference between MRI 1.5 Tesla and 3 Tesla

The main difference between MRI scanners with different Tesla (T) strengths, such as 1.5 Tesla and 3 Tesla, lies in the strength of the magnetic field they generate. Here are some key distinctions:

1. Magnetic Field Strength:

- A 1.5 Tesla MRI scanner generates a magnetic field with a strength of 1.5 Tesla.
- A 3 Tesla MRI scanner generates a stronger magnetic field with a strength of 3 Tesla.

2. Image Quality:

- A 3 Tesla MRI typically produces higher resolution and sharper images compared to a 1.5 Tesla MRI. This increased magnetic field strength allows for better visualization of anatomical structures and pathology.

3. Signal-to-Noise Ratio (SNR):

- A 3 Tesla MRI provides a higher SNR, which means it can capture more detailed information while minimizing image noise. This is especially beneficial for imaging small structures and soft tissues.

4. Imaging Speed:

- The main difference between MRI scanners with different Tesla (T) strengths, such as 1.5 Tesla and 3 Tesla, lies in the strength of the magnetic field they generate. Here are some key distinctions:

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7. Signal-to-Noise Ratio (SNR):

- A 3 Tesla MRI provides a higher SNR, which means it can capture more detailed information while minimizing image noise. This is especially beneficial for imaging small structures and soft tissues.

8. Imaging Speed:

- In general, a 3 Tesla MRI can perform scans faster than a 1.5 Tesla MRI due to the increased signal strength. This can be advantageous for patients who have difficulty remaining still during a scan.

5. Clinical Applications:

- Both 1.5 Tesla and 3 Tesla MRI scanners are used for a wide range of clinical applications, including brain, spine, musculoskeletal, abdominal, and cardiac imaging. However, 3 Tesla scanners are often preferred for certain specialized applications, such as functional MRI (fMRI) and research studies.

6. Patient Considerations:

- Patients with certain medical conditions or implants may not be suitable candidates for a 3 Tesla MRI due to the stronger magnetic field, which can interact with metallic objects and potentially cause safety concerns.

In summary, the primary difference between a 1.5 Tesla and a 3 Tesla MRI scanner is the strength of the magnetic field they produce, which impacts image quality, speed, and suitability for specific clinical applications. The choice between them depends on the clinical needs of the patient and the type of imaging required.

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Got the issue of the magazine, downloaded it, read it and deleted it. Only this does not prove you a good reader. You can agree with or add to the content published in the magazine, so in such cases please write us your comment or feedback. Similarly, debate openly on the issues rose in the magazine and the questions raised and send it to us in writing. With this act of yours, where other readers will be benefited; we will also get guidance in various forms. So, whenever the time demands, do not forget to pick up the pen.

And one more thing, we have conveyed this issue to you, as an enlightened Radiographer, now it is your responsibility to forward this issue to other Radiographers.

Thanks in advance,
Editor

आप भी अपना पाठक धर्म निभाएँ

पत्रिका का अंक मिला, डाउन लोड किया, पढा और डिलीट कर दिया. केवल इससे पाठक धर्म नहीं निभ जाता. पत्रिका में प्रकाशित सामग्री से आप सहमत हो सकते हैं या उसमें आप कुछ और जोड़ सकते हैं, तो ऐसे मामलों में अपनी टिप्पणी अथवा प्रतिक्रिया हमें अवश्य लिख भेंजे. इसी प्रकार पत्रिका में जो मुद्दे उठाए गए हों, जो प्रश्न खड़े किए गए हों, उन पर भी खुल कर बहस करें और हमें लिख भेंजे. तात्पर्य यह है कि आप केवल पाठक ही न बने रहें, पाठक धर्म भी साथ में निभाते रहें इससे जहां अन्य पाठक बंधु लाभान्वित होंगे वहीं हमें भी विभिन्न रूपों से मार्गदर्शन मिलेगा. हाँ तो, जब भी समय की मांग हो, कलम उठाना न भूलें.

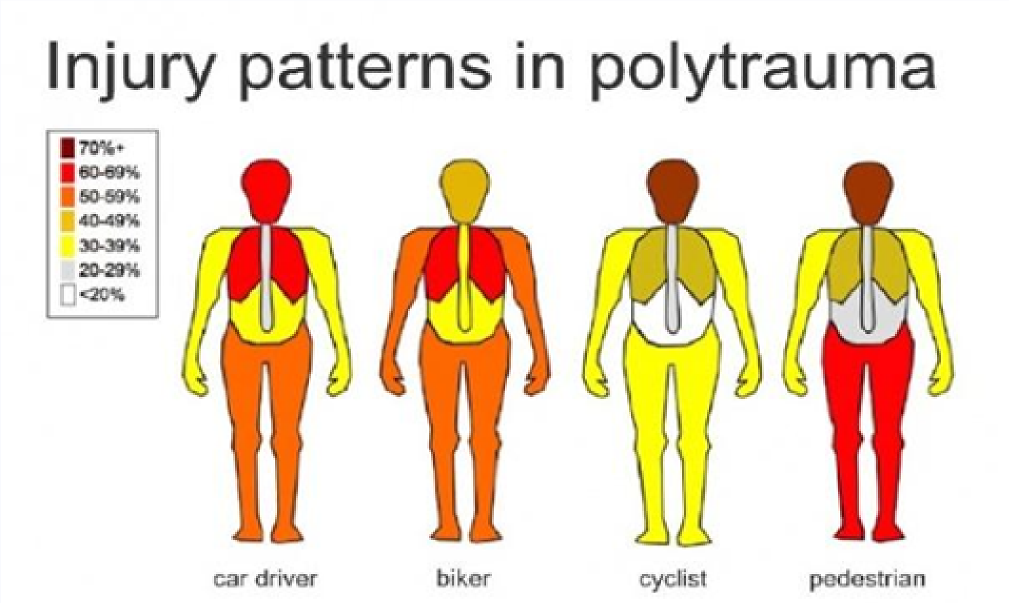
और एक बात, ये अंक हमने आप तक पहुंचाया, एक प्रबुद्ध रेडियोग्राफर के नाते अब ये आप की ज़िम्मेदारी बनती है कि इस अंक को आप भी और रडीओग्राफेर्स तक पहुंचाए यानि फॉरवर्ड करें.

अग्रिम धन्यवाद.
संपादक

Trauma/Emergency Radiography

J Venkat, MBA, Ireland recognized Radiographer (CORU), Asst. Professor, Global Hospital, Chennai

Note: This article is compiled adherent to the Medical University syllabus for the benefit of BSc Radiography students



Selection of types of X-ray equipment in trauma/Emergency
Selecting the appropriate types of X-ray equipment for trauma situations depends on the specific needs of the medical facility and the types of injuries commonly encountered. Generally, in a trauma setting, the following types of X-ray equipment are commonly used:

1.Portable X-ray machines: These are essential for trauma situations where the patient's condition might not allow for immediate movement to the radiology department. Portable X-ray machines can be brought to the patient's bedside in the emergency room, ICU, or operating room, allowing for quick imaging to assess injuries without compromising patient stability.

2.Digital Radiography (DR) systems: DR systems are becoming more popular than traditional film-based X-ray machines due to their faster image acquisition and better image quality. They are suitable for capturing high-resolution images in trauma cases, allowing clinicians to identify fractures, dislocations, or other injuries with greater clarity.

3. C-arm fluoroscopy units: C-arm machines are versatile and widely used in trauma settings, especially during surgical procedures. They provide real-time imaging during surgeries, such as orthopedic procedures, where the surgeon needs to visualize the progress of the surgery and verify the placement of implants.

4. Computed Tomography (CT) scanners: While not typically used at the initial stage of trauma assessment, CT scanners play a crucial role in diagnosing and evaluating complex injuries, such as traumatic brain injuries, internal bleeding, or spinal injuries. They provide cross-sectional images of the body, giving a more detailed view of the trauma site.

5. Mobile CT scanners: Some large trauma centers may have access to mobile CT scanners, which can be brought into the emergency department or operating room when necessary. These are particularly useful for situations where a patient cannot be moved easily to the radiology department.

6. Fluoroscopy systems: For certain types of trauma cases, where real-time imaging is required, fluoroscopy systems are used. They are beneficial in visualizing dynamic movements, such as joint function, and guiding procedures like joint reductions or spinal interventions.

7. Specialized imaging equipment: Depending on the types of trauma cases commonly encountered, a trauma center might have additional specialized equipment. For example, dedicated dental X-ray units for facial trauma or extremity X-ray machines for limb injuries.

In any trauma setting, the choice of X-ray equipment should prioritize speed, image quality, and patient safety. It is also important for the medical staff to be trained in using the equipment effectively and safely in high-stress situations. The specific equipment available will vary depending on the resources and capabilities of the medical facility.

Patient position in emergency radiography
In emergency radiography, the patient's position depends on the suspected injury or condition being assessed. However, in most emergencies, the patient may not be able to assume the ideal position due to their condition or injuries. In these cases, the radiographer must prioritize obtaining the necessary diagnostic images while ensuring patient safety and minimizing discomfort.

Here are some common positions for emergency radiography:

1. Chest X-ray: The patient is typically in an upright or semi-upright position, standing or seated, to assess the lungs and heart. In cases where the patient cannot stand, a portable X-ray machine can be brought to the patient's bedside if the condition allows.

2. Abdominal X-ray: The patient can lie supine (on their back) for a frontal view of the abdomen, but if possible, they may be asked to stand or sit for an upright view to evaluate air-fluid levels and free air in the abdomen.

3. Extremity X-rays: Depending on the suspected injury, the patient may be positioned sitting, lying down, or standing to get the necessary views of the injured extremity.

4.Spine X-ray: The patient is usually in a standing or lying down position, depending on their ability to move and the suspected spinal injury.

5.Pelvis X-ray: The patient is typically in a supine position for a frontal view and may need to be rotated for oblique views.

6.Trauma X-rays: In cases of severe trauma, the patient may be in whatever position they can tolerate, depending on their injuries. The primary goal is to obtain diagnostic images quickly without worsening the patient's condition.

In emergency situations, the radiographer must adapt to the patient's limitations and the severity of their condition while ensuring the safety and comfort of the patient. Most of the lateral view x-rays should be taken with cross-table or trans lateral with horizontal beam. The use of portable X-ray machines and digital imaging technology has significantly improved the ability to obtain rapid diagnostic images in challenging situations

Radiographic projections and sequence for each patient in emergency radiography

In emergency radiography, the choice of radiographic projections and sequence for each patient depends on their specific clinical presentation and suspected injuries. The goal is to obtain essential diagnostic information quickly and accurately to aid in the patient's management and treatment. Here are some common radiographic projections and sequences for different emergency scenarios:

1. Chest Trauma:

a.Projection: Chest X-ray (CXR) is the initial imaging modality of choice.

b.Sequence: Poster anterior (PA) and lateral views are typically obtained for a comprehensive evaluation of the chest.

2. Abdominal Trauma:

a.Projection: Abdominal X-ray (AXR) is usually the first imaging study.

b.Sequence: A supine AP view of the abdomen is commonly done.

3. Head Trauma:

a.Projection: Non-contrast Computed Tomography (CT) of the head is the primary imaging modality in most cases.

b.Sequence: Axial images of the brain are obtained to evaluate for any acute intracranial pathology, such as hemorrhage or edema.

4. Spinal Trauma:

a.Projection: CT or X-rays can be used for initial evaluation.

b.Sequence: For CT, axial images of the injured area are obtained. For X-rays, specific views depend on the suspected injury, such as lateral cervical spine (C-spine) and anteroposterior (AP) lumbar spine.

5. Extremity Trauma:

a.Projection: X-rays are commonly used to assess fractures and dislocations.

b.Sequence: Two orthogonal views (usually anteroposterior and lateral) are obtained for the injured extremity to accurately evaluate the injury.

6. Pelvic Trauma:

a.Projection: X-rays or CT can be used.

b.Sequence: AP and inlet/outlet (Judet) views are often obtained to assess pelvic fractures.

7. Foreign Body Ingestion:

a.Projection: X-rays are typically used to locate ingested foreign bodies.

b.Sequence: A single supine abdominal X-ray is commonly done.

8. Pneumothorax or Hemothorax:

a.Projection: Chest X-ray or CT can be used for evaluation.

b.Sequence: For X-rays, a PA view of the chest is often performed, but an additional lateral decubitus view can be done to detect small pneumothoraxes.

It is important to note that in the context of emergency situations, the choice of imaging may vary based on the patient's stability and the urgency of the clinical scenario. Additionally, the decision on which projections and sequences to use will ultimately be determined by the treating physician or radiologist based on the individual patient's presentation and suspected injuries.

Modification of routine position in emergency radiography

Cross-table radiography, also known as cross-table lateral radiography or cross-table lateral view, is a technique used in emergency radiography to obtain an additional view of a body part without moving the patient. It is particularly useful when a patient is in significant pain or unable to move due to trauma or injury.

In regular radiography, such as an X-ray of the chest or abdomen, the patient is typically positioned upright or supine on the X-ray table, and the X-ray machine is placed opposite to the image receptor (film or digital detector) to capture the image. However, in some cases, it might be difficult or unsafe to move the patient into the desired position.

In cross-table radiography, the patient remains in the same position as for the initial X-ray, and the X-ray machine is positioned perpendicular to the image receptor. The X-ray beam is then directed horizontally through the patient's body to obtain a lateral (side) view of the body part in question. This is especially useful for assessing injuries, such as fractures, dislocations, or foreign bodies, from different angles, providing more information to aid in diagnosis and treatment decisions.

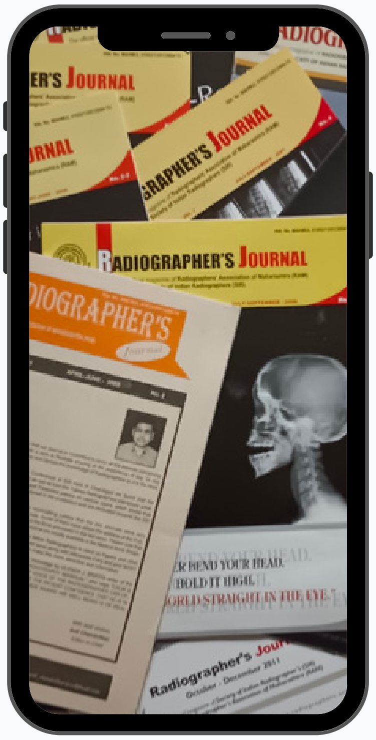
The cross-table lateral view complements the standard views and can help visualize anatomical structures that may not be clearly visible in regular X-ray images. It is commonly used in emergency departments when immediate imaging is necessary and the patient's condition limits their ability to cooperate with positioning changes.

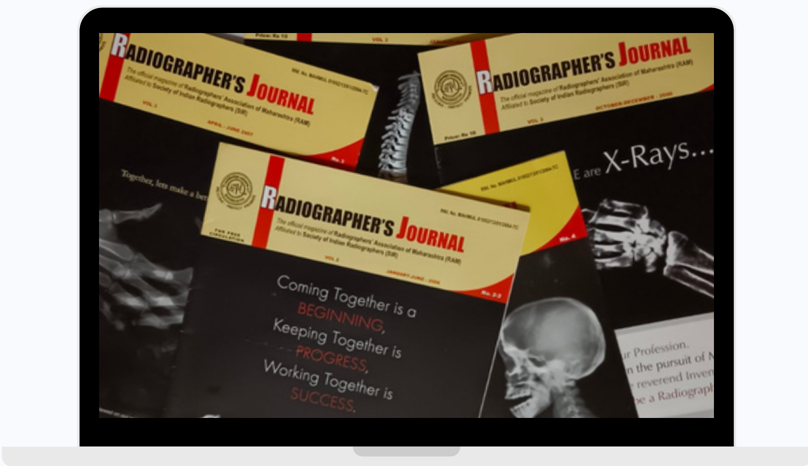
Radiation protection is a critical aspect of trauma and emergency radiography, as patients in these situations often require immediate imaging to assess and diagnose injuries

1. Justification: The use of X-rays or any other radiation-based imaging should be justified based on the potential benefit it will provide to the patient's diagnosis and treatment. In emergency situations, the need for immediate diagnostic information may outweigh the risks associated with radiation exposure.
2.Optimization: The imaging protocols should be optimized to obtain the necessary diagnostic information while keeping radiation exposure as low as reasonably achievable (ALARA). This involves selecting appropriate imaging techniques and using the lowest possible radiation dose without compromising image quality.
3. Shielding: Lead aprons and other shielding devices should be used whenever possible to protect sensitive organs and tissues from unnecessary radiation exposure. Shields can be particularly important for pregnant patients and young children.
4. Collimation: Proper collimation ensures that the X-ray beam is focused only on the area of interest, reducing unnecessary exposure to surrounding tissues.
5. Positioning and Technique: Accurate patient positioning and appropriate exposure techniques are essential to obtaining high-quality images on the first attempt. This reduces the need for repeat exposures and further minimizes radiation dose.

Patient care for trauma or emergency radiography

1. Assessment of Patient's Condition: Before proceeding with any radiographic imaging, assess the patient's condition and stability. If the patient is critically ill or in immediate danger, ensure that they receive necessary medical attention and stabilization before imaging.
2. Collaboration with Healthcare Team: Work closely with the emergency medical team, trauma surgeons, and other healthcare providers to ensure the patient's safety and coordinate any necessary actions during the imaging process.
3. Immobilization and Support: Trauma patients may have fractures or other injuries that require immobilization to avoid further damage during the imaging. Use appropriate immobilization devices and techniques to ensure patient comfort and safety.
4. Efficiency and Speed: In trauma situations, time is of the essence. Perform radiographic examinations efficiently without compromising the quality of the images. Collaboration between the radiologic technologist and the patient is crucial for achieving this.
5. Patient Positioning: Correct patient positioning is essential for obtaining accurate diagnostic images. If the patient cannot move due to injuries, carefully position the imaging equipment around them.
6. Evaluation of Images: After the imaging is complete, evaluate the images promptly to ensure they are of sufficient quality for diagnosis. If necessary, additional images may need to be taken.
7. Compassion and Empathy: Trauma and emergency situations can be distressing for patients and their families. Offer emotional support, compassion, and empathy throughout the imaging process





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Types of Probes Transducer Ultrasound Diagnostic

Sonaxshi Kar (MMRIT 1st Year), Tripura Institute Of Paramedical Sciences, Amtali, Hapania, Agartala, Tripura

What is a Transducer?

Transducer refers to a device which can convert one form of energy to the other. Transducer can vary in shape, size and the three most common types include linear, convex, and phased array.

Ultrasound Transducer

Ultrasound Transducer a device used in ultrasound examination which converts electric energy into ultrasound beam and then converts the received ultrasound beam into electric energy.

Linear Transducer

Linear transducer measures linear displacement or movement along a single axis in any direction. Linear transducer consists of a linear piezoelectric arrangement as suggested by the name. Their beam is rectangular in shape and they have a more precise near field resolution than average. They are generally high frequency probes. Linear transducer for 2D imaging and 3D imaging has wide foot print. Frequency of 2D imaging transducer is (2.5 to 12) MHz and for 3D imaging transducer is (7.5 to 11) MHz.

The linear ultrasound probe is a high frequency transducer that will give you the best resolution out of all of the probes but is only able to see superficial structures. A general of thumb is that if you are going to ultrasound anything less than about 8cm, then use the linear probe. Anything which is above 8cm in size cannot be seen much. The linear probe will give you a rectangular field of view that corresponds with its linear footprint.

Linear ultrasound transducer such as GE L12 has a high frequency and a small foot print. They appear to be a good choice for scanning the body parts where the surface area is small like thyroid, breast, arteries, carotids of vascular application and the nerves and are not deep inside the tissue. Others liner probe are Philips L 12-3. Linear probe have a flat array and appearance. They possess a high frequency and therefore, are capable to scan small parts and shallow structures near the surface like the thyroid in your neck. Linear probe produce rectangular image. Some of our best-selling models of linear probes are the 12L-RS and the 9L-D from GE. Linear probe provides about poor depth organs and it has low penetration power. Linear probe imaging depth 9cm.

Uses of linear probe:

- Vascular examination.
- Blood vessel visualization.
- Musculoskeletal –tendons, bones, muscles.
- Eyes.
- Breast.
- Thyroid gland.
- Tendons.
- Testicular.
- Appendicitis.

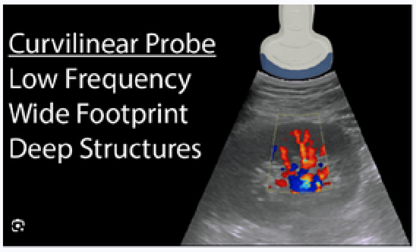
Application:

- Vascular applications.
- Thyroid/breast.
- Joints / tendons. Evaluation of superficial structure.
- Ophthalmologic.
- Lung.
- Procedural guidance.
- Abscess/foreign body.
- Peripheral/ central venous access.
- Nerve blocks.

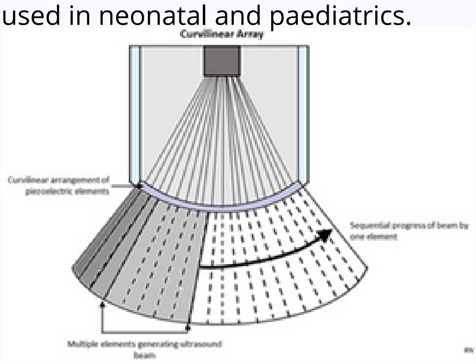
Convex Transducer

Convex transducers are also called curved transducer because of the curvilinear arrangement of the piezoelectric crystals. The beam is convex-shaped and suitable for depth sensing. Convex transducer for 2D imaging has wide foot print with a broadband frequency of 2.5 to 7.5 MHz. It is useful for Abdominal and Trans-vaginal examinations along with the diagnosis of certain organs. Convex transducer for 3D imaging has wide field of view with a broadband frequency of 3.5 to 6.5 MHz. 3D curve probes are electromechanical using moving parts within the transducer head. They are used to diagnose abnormalities in pregnancies. The beam has a convex shape that makes the transducer for deeper organ imaging examination.

The curvilinear ultrasound probe has a low frequency probe which allows for better lateral resolution as compared to the phased array probe. The curvilinear ultrasound probe is often used for cardiac and thoracic ultrasound exams but is limited by the large foot print and difficulty with scanning between rib spaces. Here is what the curvilinear probe looks like and how an ultrasound image will appear on the screen. The curve nature of the ultrasound image is shown below.



Curvilinear ultrasound probe has a good penetration capability. The density of the scan lines is reduced as the image depth increases which means you might have to compromise on the quality of the image. The transducer must be compressed against the skin to ensure complete contact. This may create complications by occluding small blood vessels. Examples of convex transducers include GE 4C- RS Convex probe, Sonosite c60 E etc. Best-selling convex probes are C5-1 and V6-2 from Phillips. The subtype of the curvilinear probe is also called micro convex which has a smaller footprint and due to the reason, it is used in neonatal and paediatrics.



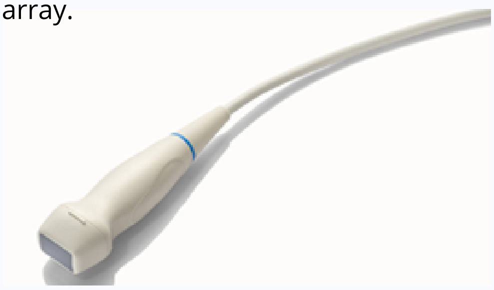
Curvilinear probe is also used for superficial organs' scanning like large breasts and large thyroid. Generally they are used for trans-abdominal images, trans-vaginal and trans-rectal examinations, musculoskeletal examinations and nerve, OB/GYN, vascular. Curvilinear probe imaging depth is 30 cm.

Applications of Curvilinear Probe

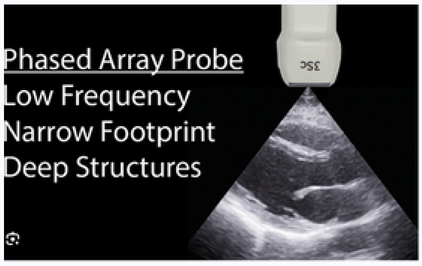
- Evaluation of abdominal structures.
- Hepatobiliary.
- Renal.
- Appendix (paediatric)
- Aoata
- Focused assessment with sonography for trauma
- Fatal heart tones and obstetric complications
- Bedside lung ultrasound
- Procedural guidance
- Paracentesis and thoracentesis

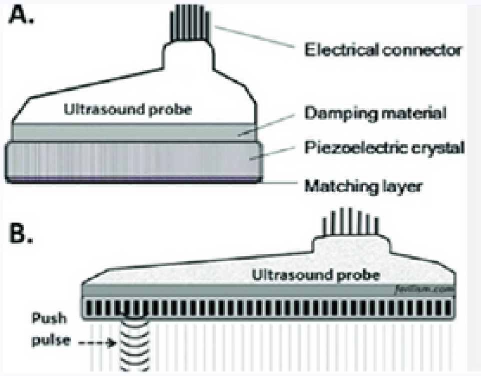
Phased Array Transducer Probe

Phased array transducer is an ultrasonic testing transducer that contains a series of elements that can be pulsed in unison to direct sound waves in a specific direction. Phased array transducer has a small footprint and low frequency ranging from 2.5 to 7.5 MHz. This transducer is named after the piezoelectric crystal arrangement which is called phased array.



The beam point is narrow but it expands depending on the applied frequency. The beam is triangular in shape and has a poor near field resolution. Phased array transducer has an imaging depth of 35 cm. Phased array transducer can be used for cardiac examination, trans-oesophageal examination, lungs, pleura between ribs and small places, abdominal and brain. The phased array transducer crystals are arranged in a stacked construction. It is mostly used in trans-cranial examination. Phased array transducer's another name is sector array. This transducer has a similar frequency range as the curvilinear probe. The advantage of this probe is that piezoelectric crystals are layered and packed in the centre of the probe making it easier to get in between small spaces such as the ribs (the extremely small pinpoint footprint on the ultrasound image below). This probe for cardiac scanning however can perform all of the applications the curvilinear probe can as well (with less lateral resolution).





Phased array probe produces an image like fan. These transducers have good depth penetration. It is ideal for scanning small windows such as the cranial window in the temple or for cardiac imaging. Cardiac transducer for Philips HD 15, cardiac probe of DC7 ultrasound machine, GE 3Sc-RS-Adult cardiac probe. Phased array has a smaller handle with a square shaped lens. Phased array probes will have greater depth in order to reach the heart and produce an image. Phased array transducer produces an image in sector form.

Applications of Phased Array Transducer Probe

- Evaluation of thoracic structures
- Echocardiography
- Lung ultrasound
- Evaluation of abdominal structures as an alternative to curvilinear probe
- Procedural guidance
- Thoracentesis
- pericardiocentesis

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Coronary CT Angiography Guided Management of Giant Coronary Artery Aneurysms in Atypical Kawasaki Disease – A Case Report and Review of Literature.

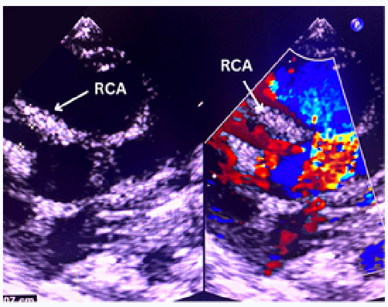
Dr. R. Jyothi Prakash*1, Dr. V. Rama Subramanyam Muddana2, **Hareesh Kumar Munugala2**, Dr. Krishna Shriram Dhanasekaran3
1 Department of Paediatric Cardiology, **2 Department of Radiology,** 3 Department of Research and Publications
Aster Ramesh Hospitals, Vijayawada, Andhra Pradesh, India – 520008.

Abstract:
Kawasaki disease (KD) is an auto-immune, acute febrile illness that mostly affects younger children. It may develop into vasculitis characterized by Coronary artery aneurysms (CAA) if not diagnosed and managed earlier. We present the case of a 21-month-old female child with a history of persistent fever for more than 10 days who further developed desquamations and presented for cardiac evaluation. Atypical Kawasaki disease was diagnosed and the development of giant CAA was assessed by Coronary CT Angiography and was managed. Timely diagnosis and appropriate treatment eventually avoid the risk of the development of CAA.

Keywords: Atypical Kawasaki disease, Intravenous immunoglobulin, Coronary artery aneurysm, Computed tomographic coronary angiography, Echocardiography.

Introduction:
Kawasaki disease (KD) or mucocutaneous lymph node syndrome is an acute febrile illness [1]. It is an autoimmune inflammatory vasculitis, which mostly affects infants and children younger than 5 years of age affecting the coronary arteries, which may result in coronary artery aneurysms (CAA) with lifelong manifestations [2]. KD is of unknown etiology and diagnosed with a persistent fever of ≥ 5 days and 4 or more of the principal clinical manifestations including erythematous changes of the lips and oral mucosa, bilateral non-purulent conjunctivitis, a nonspecific rash, erythema and oedema of the feet and hands or periungual desquamation (sub-acute phase), and cervical lymphadenopathy (≥1.5 cm) [3,4]. Children, often have atypical (incomplete) presentations of KD and are most at risk for the development of CAA [5]. We report the diagnosis and treatment of atypical KD in a 21-month-old female child presented with persistent fever and thrombocytosis with the development of CAA detected by echocardiography and Computed tomographic coronary angiography (CTCA).

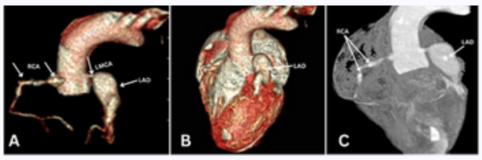
Case Presentation:
A 21-month-old female child, previously healthy, presented with a history of fever for 10 days with cold,dysuria and pedal oedema to a primary care clinic. Admission workup revealed levels of 8.8 g/dL of haemoglobin (↓) and 19400 cells/mm3 of total leukocyte count (TLC) (↑). The bacterial culture sensitivity test was sterile and IgG and IgM were positive on dengue serology. Thrombocytosis (Platelet count ↑ -9,50,000 cells/µL) was noted on day 9. The development of desquamation in periungual and perianal regions was noted in the second week of illness with persistent fever. Atypical Kawasaki disease (KD) was suspected using the aforementioned cardinal manifestations and haematological reports. The child was referred from the primary care clinic for cardiac evaluation to rule outatypical KD. Initial screening by 2D echocardiography noted an aneurysmal dilatation in the right coronary artery (RCA).



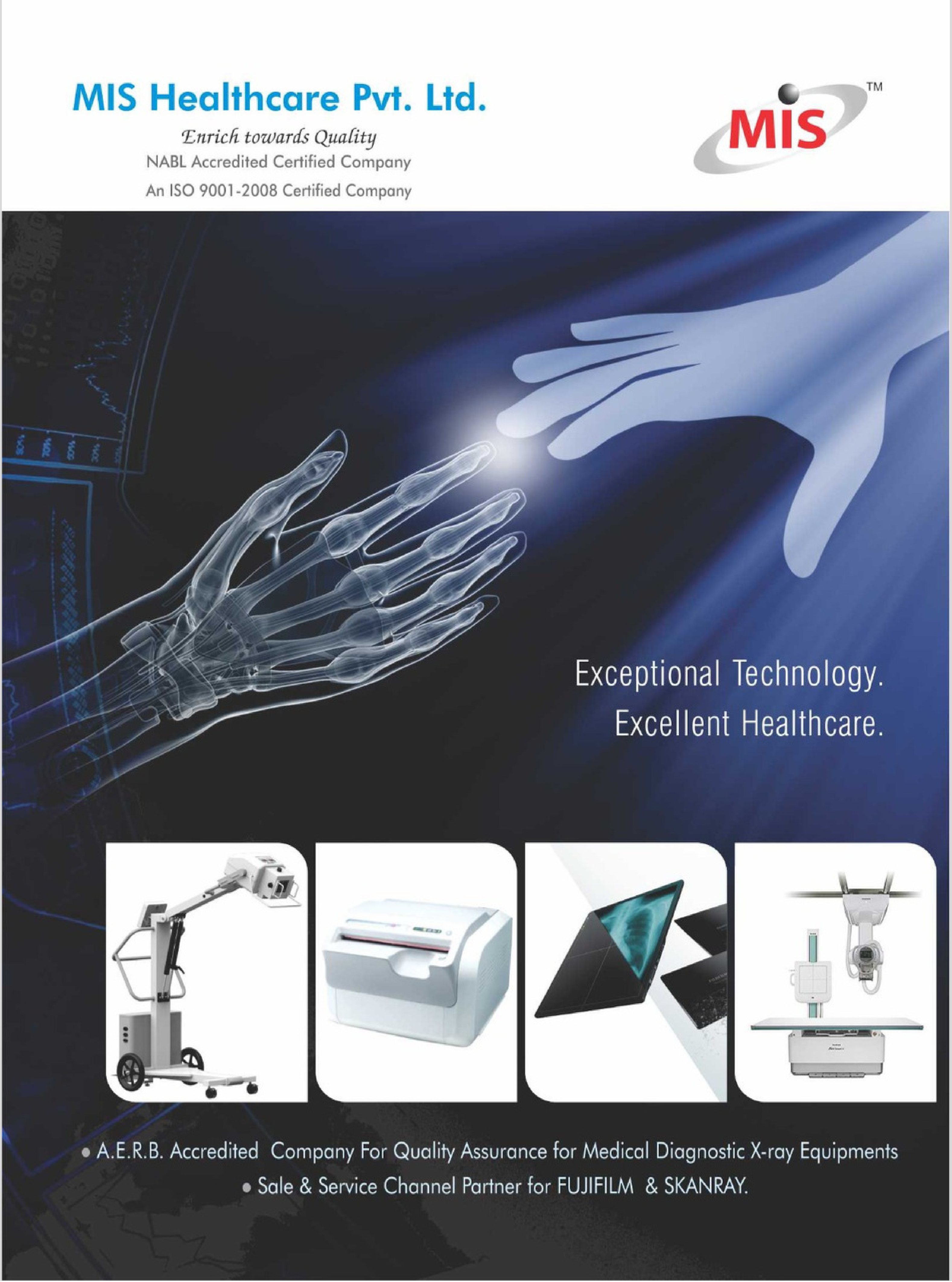
2D echocardiographic image depicting aneurysmal dilatation in the RCA (arrows).

The child was started with intravenous immunoglobulin (IVIG), low molecular weight heparin (LMWH) and aspirin. At her first review after a week, a repeated 2D echo revealed the development of a new aneurismal dilatation in the left main coronary artery (LMCA) and worsening of the previous aneurysm in the right coronary artery (RCA). Hence, cardiac computed tomographic angiography (CCTA) was performed for a detailed diagnosis. The three-dimensional (3D) volume rendered (VR) (Figure 2A, 2B) and the maximum intensity projection(MIP) (Figure 2C) imaging analyses on CCTA revealed extensive and diffuse coronary artery dilatations, i.e., coronary artery aneurysms (CAA) in more than one vessel.result from the differing radio sensitivities of these organ systems

Giant CAAs of grade 3 over a length of 26mm were noted on the distal left main coronary artery (LMCA) and the proximal and mid-left anterior descending artery (LAD) (Figure 2). The proximal and mid part of the right coronary artery (RCA) was also noted with aneurysmal dilatations of 10mm and 8mm in length respectively.



Complete cardiac evaluation by CCTA revealed: (A) 3D volume rendered image of the aortic root and coronary vessels; (B) 3D volume rendered image of the heart; (C) outline MIP image of the heart; demonstrating several aneurysms in the proximal and mid-RCA (arrows and stars) and distal LMCA (arrow) and giant aneurysms in the proximal and mid LAD (arrows and stars).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Post-cardiac evaluation, the child was therapeutically managed with standard IVIG at a dose of 18g (2g/kgbody weight), LMWH and aspirin at the primary care clinic as advised. The child was discharged stably following a defervescence after 24 hours of IVIG administration and was switched to an oral anti-coagulant i.e., nicoumalone (2mg). The parents were advised to bring her for regular follow-up visits for cardiac evaluation and frequent monitoring of prothrombin time/international normalized ratio (PT/INR) to achieve the desired INR target between 2 to 2.5.

Discussion:

KD is an acute systemic vasculitis of unknown origin mainly affecting children between 6 months and 8years of age [6]. The diagnosis is characterized by persistent fever for more than 5 days and four out of five cardinal features (conjunctivitis; erythematous rash; desquamation or erythema or cracking of lips, oral cavity, palms and soles; polymorphous exanthema of the trunk and cervical lymphadenopathy) or less thanfour in case of echocardiographic or coronary angiographic findings with coronary artery involvement[3,4,6,7]. In our case, the infant had a persistent fever for a 2-week period, with the aforementioned desquamations with echocardiographic and angiographic findings of CAA. Findings like decreased haemoglobin and hematocrit, leukocytosis and thrombocytosis were noted. In our case, the echocardiographic imaging initially revealed aneurysmal dilatations or CAA only in the RCA.

The CTCA findings provided a detailed diagnosis of giant CAA involving distal LMCA, proximal and mid LAD and several aneurysms in the proximal and mid-RCA. Echocardiography is the first-line imaging for evaluation of coronary artery involvement in KD as recommended by the American Heart Association (AHA)[8,9]. Nevertheless, echocardiography is highly operator-dependent and the available acoustic windows limit the evaluation of the mid and distal coronary artery segments [10]. But, CTCA is sensitive and specific in depicting even small aneurysms [11].

The CTCA imaging in KD has been performed for a detailed evaluation of coronary artery involvement when the echocardiographic images is unclear or difficult to locate the aneurysm. It is mostly used in both acute and chronic phases of KD. Newer generation CT scanners provide detailed information on the arterial location, size, structure and number of CAA with improved spatial resolution and better image quality [2,12,13]. As per the technical advancements in imaging, the radiation dose used was significantly lower for imaging with a 256-slice CT scanner at a heart rate (HR) of 132bpm. IV contrast media of 8ml (Iohexol350mg) was injected manually and 3D post-processing was performed.

In our case, after the fever reduced following an IVIG infusion, the infant was switched from LMWH to oral nicoumalone on discharge advising a follow-up. Similarly, an infant treated by Dodi et al. [14] received an IVIG infusion (2g/kg) in a single dose for 12 hours and aspirin (100mg/kg in 4 doses) immediately started with LMWH. The clinical status improved rapidly with a significant decrease in inflammatory markers and platelet count. A complete normalization 20 days after IVIG infusion was observed. LMWH was then switched to warfarin [14]. A delay in diagnosis with incomplete clinical manifestations mostly leads to the development of CAA. So, medical professionals must remain vigilant for KD symptoms, especially in young children with prolonged fever and cardinal features.

In children, a persistent fever for more than 5 days should be suspected of Kawasaki Disease (KD). Despite the presentation of fewer classical symptoms, a delayed diagnosis could be avoided by combined evaluation of inflammatory markers and coronary artery involvement. Atypical presentations always need aggressive management with IVIG, steroids, or Infliximab (5mg/kg). Timely diagnosis and appropriate treatment prevent the development of serious coronary artery aneurysms (CAA) in Kawasaki Disease (KD).

In conclusion, early recognition and prompt initiation of appropriate therapies are key factors in managing KD and preventing potential life-threatening complications.

By employing advanced imaging techniques like CCTA, clinicians can accurately assess coronary artery involvement and tailor treatments to improve affected children's long-term prognosis and overall well-being. Further research and awareness efforts are essential to better understand and effectively manage this challenging vasculitis.

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MIBG scan

Muhammed Rashid M K, Radiology Technologist and Radiology Faculty

MIBG scan is a imaging test. It uses a radioactive substance (called a tracer). MIBG scan is commonly used for detection of neuroendocrine tumours, such as neuroblastoma and phaeochromocytoma. These are types of tumors that affect nerve tissue.

Preparation

- You will need to sign an informed consent form.
- wear a hospital gown or loose-fitting clothes
- Remove jewelry or metal objects before each scan.
- Consult your health care provider which of your regular medicines you may need to stop taking before the test.
- You must lie still during the scan

How Performed

A radioisotope (MIBG, iodine-131-meta-iodobenzylguanidine, or iodine-123-meta-iodobenzylguanidine) is injected into a vein. This compound attaches to specific tumor cells.

An MIBG scan is usually done in the nuclear medicine department The test is done in stages and takes 2 to 4 days to complete.

On the first day you will have the radioactive MIBG (meta-iodobenzylguanidine) injected into a vein in your arm or hand. It needs about 24 hours to travel throughout your body and get absorbed by the cells. You will be given a time, usually for the next day, to return to the department for a scan.
When having the scan, you lie very still on a table while a special camera or scanner moves over your body and takes pictures. It usually takes 1 to 2 hours to complete.

Another scan might be done 48 hours after the injection. In some cases a scan may also be done 72 hours after the injection.

It will take a few days for the radioactive material to leave your body through your urine or stool. You won’t notice any changes to your urine or stool. Drinking lots of fluids after the test will help flush it from your body. You will probably be told to wash your hands thoroughly after going to the bathroom.

How the Test will Feel

You will feel a sharp needle prick when the material is injected. The table may be cold or hard. You must lie still during the scan.

Why the Test is Performed

This test is done to help diagnose pheochromocytoma. It is done when an abdominal CT scan or an abdominal MRI scan does not give a definite answer. It is also used to help diagnose neuroblastoma and can be used for carcinoid tumors.

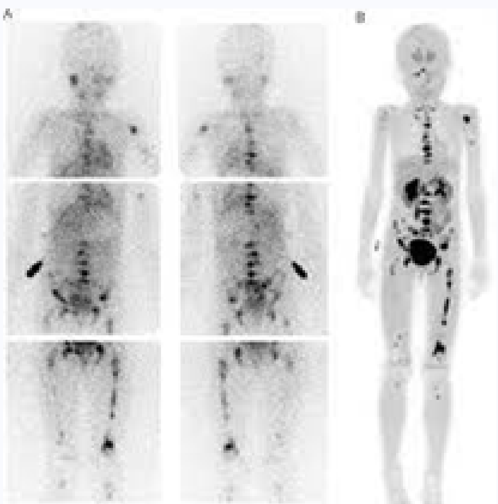
Side effects

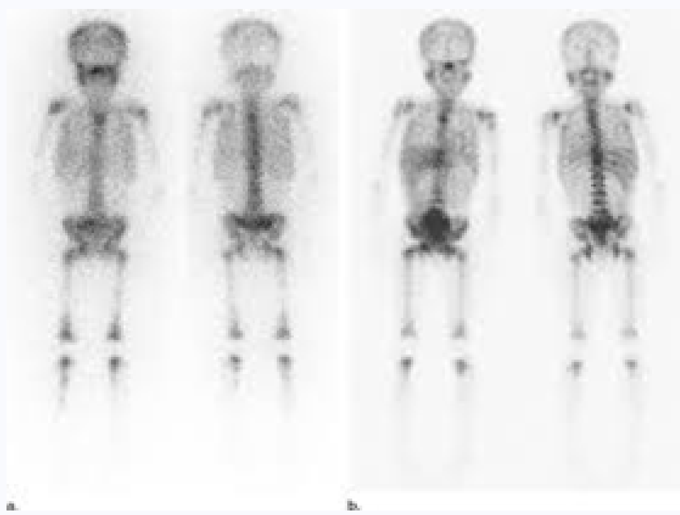
There are rarely any side effects from an MIBG scan. The injection of the radioactive MIBG can cause high blood pressure, but this is very rare. Your blood pressure might be checked after the injection to make sure it is normal.

Results

- Spots on the images that show where the MIBG has collected. These spots can show where tumours have started and if they have spread anywhere else in the body
- Abnormal results may indicate: Pheochromocytoma ,Multiple endocrine ,neoplasia Carcinoid tumor ,Neuroblastoma

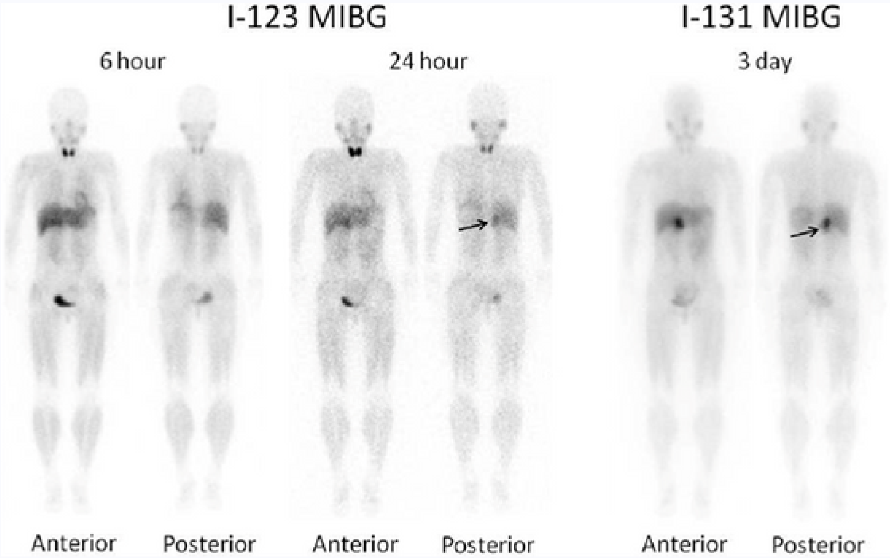
After the final scan, it usually takes a couple of days to get results. A radiologist will analyze the images, looking for spots where the tracer collected, which may indicate a tumor. They’ll write a report for the healthcare provider who ordered the test. The healthcare provider will discuss the results with you and recommend next steps.
The results of an MIBG scan are relatively reliable, with about 85% accuracy.





Risks

- This test should not be done on pregnant women. The radiation can pose danger to the unborn baby
- There is some exposure to radiation from the radioisotope , The radiation from this radioisotope is higher than from many others.
- You may need to take extra precautions for a few days after the test. Your provider will tell you what actions to take.
- Before or during the test, you may be given an iodine solution. This will keep your thyroid gland from absorbing too much iodine. Usually people take potassium iodide for 1 day prior and 6 days after. This blocks the thyroid from taking up the MIBG.



Logo Design Contest for the National Commission for Allied and Healthcare Professionals

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With the Aim to get India's first logo which symbolize the Allied and Healthcare Professionals which comes under the National Commission for Allied and Healthcare Professions (NCAHP). NCAHP is an autonomous body under Ministry of Health and Family Welfare. NCAHP in collaboration with MyGov, organizing a logo contest where citizens of India can submit their Logo entries, which should be unique and elegant, showing 56 types of Professionals of Indian Healthcare force.

This commission is unique in nature as it is first commission in India, which regulate education, training etc. policies of 56 different professionals. Generally, one commission regulate one type of profession. Allied and Healthcare Professionals are the backbone of Indian healthcare system.

They includes Radiological Technologist, Physiotherapist, Dietician, Medical Lab Technologist, EEG/ECG technicians, Behavioral workers, Optometrist etc.

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Gratification:

The best logo entry will receive the winning amount of ₹5000/- and certificate signed by Chairperson, NCAHP/ICAHP.

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MRI Anal Fistulogram

Shubham Takate (BPMT student), **Ravindra Gangurde** (Senior radiographer)
Dr. Vasantrao Pawar Medical College And Research Center, Adgaon,Nashik

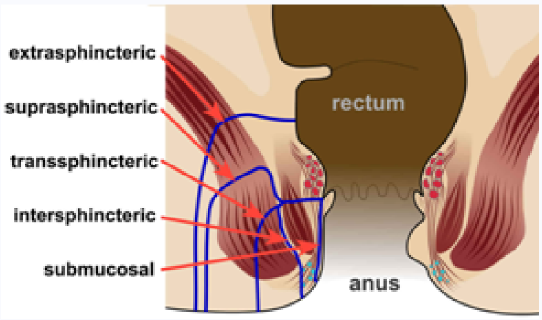
Fistula overview :-
A fistula is an abnormal connection or passageway that forms between two organs or tissues in the body. These connections are typically not supposed to exist and can cause various health problems and complications. Fistulas can occur in various parts of the body and can be congenital (present at birth) or acquired (developed due to injury, infection, or other medical conditions).

Anal Fistulas: Anal fistulas are abnormal connections that form between the anal canal and the skin around the anus. They are often associated with conditions like anal abscesses and Crohn's disease.

An anal fistula is a small tunnel-like tract that forms in the anal region, typically connecting the inside of the anal canal to the skin around the anus. It is a relatively common condition and is often associated with other anal or rectal conditions.

Causes:
Anal fistulas usually develop as a result of an infection in an anal gland. The infection can lead to the formation of an abscess (a pocket of pus) near the anus. Over time, the abscess may burst or be surgically drained, but often a small tunnel remains, creating the fistula.

Types:
There are different types of anal fistulas, depending on their path and location:



1.Inter-sphincteric Fistula: This type of fistula is located between the two sphincter muscles in the anus.
2.Trans-sphincteric Fistula: It passes through one of the sphincter muscles.
3.Supra-sphincteric Fistula: This type runs above both sphincter muscles.
4.Extra-sphincteric Fistula: It extends beyond the sphincter muscles into the surrounding tissue.

Symptoms:

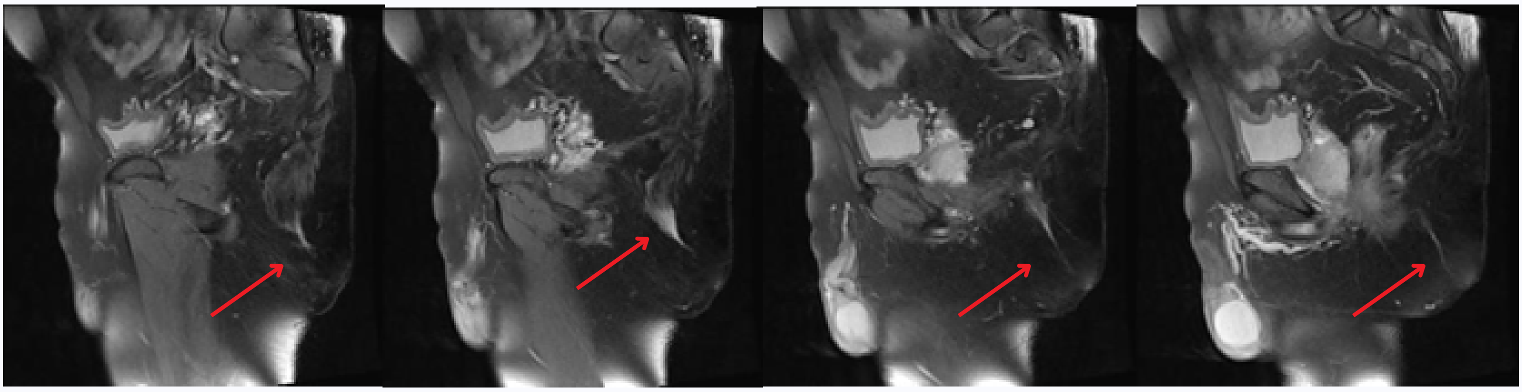
- Recurrent anal pain or discomfort, often worsened during bowel movements.
- Pus or fluid discharge from an opening near the anus.
- Swelling, tenderness, or redness around the anus.
- Itching or irritation around the anus.

Diagnosis:
Diagnosis typically involves a physical examination by a healthcare provider. In some cases, imaging studies like MRI or ultrasound may be used to determine the exact path of the fistula and its relation to the anal sphincter muscles.

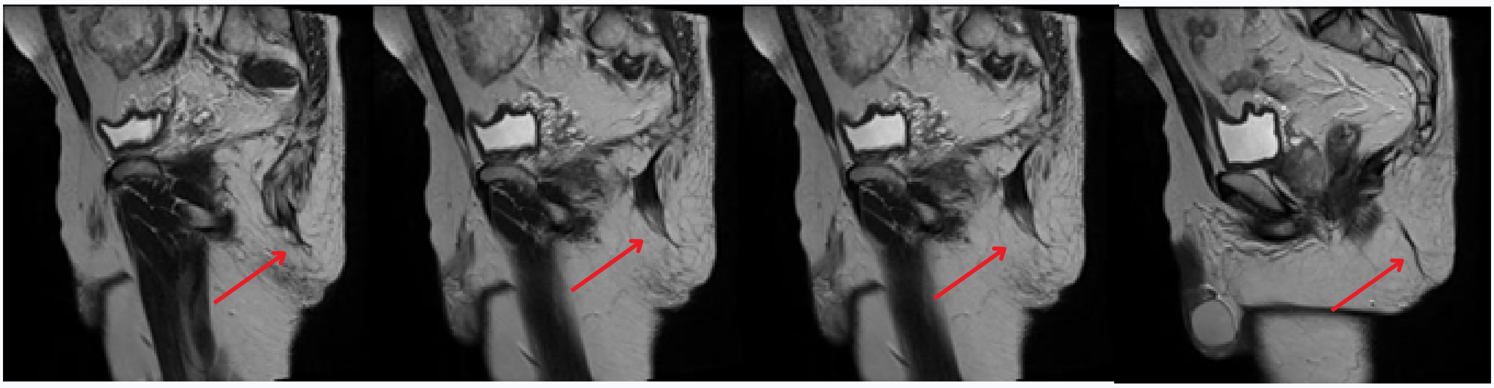
How an MRI fistulogram is performed:
1.Patient Preparation: Patients may be asked to fast or avoid eating before the procedure, depending on the area being imaged and the specific instructions from the healthcare provider.
2.MRI Scan: The patient is positioned inside the MRI machine. The MRI scanner uses powerful magnets and radio waves to create detailed images of the internal structures. Multiple images are taken from different angles to provide a comprehensive view of the fistula and its surrounding anatomy. The contrast agent helps to highlight the fistula tract and any associated complications.
3.Image Evaluation: Radiologists interpret the MRI images to assess the size, shape, location, and any complications associated with the fistula. They can determine if there are abscesses, inflammation, or other abnormalities related to the fistula.
4.Diagnosis and Treatment Planning: The MRI fistulogram helps in diagnosing the nature and extent of the fistula, which is crucial for determining the appropriate treatment plan. Treatment options may include medical management, surgical intervention, or other therapeutic approaches.

Signal characteristic on MRI :

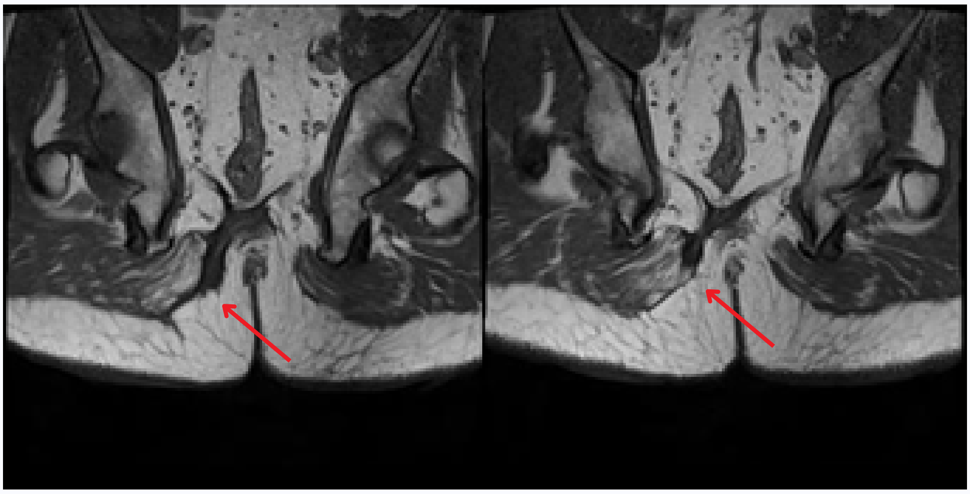
1. PD Fat Saturation Sag Sequences: In some cases, fat saturation sequences are used to suppress the signal from fat tissue, which can help enhance the visibility of the fistula tract, especially if it is near fat-rich structures.



2. Hyperintensity on T2-weighted Sag images: Fistulas often appear as areas of increased signal intensity on T2-weighted MRI sequences. This hyperintensity is due to the presence of inflammatory tissue, fluid, or pus within the fistula tract. T2-weighted images are particularly useful for delineating the course and extent of the fistula.



3. Hypointensity on T1-weighted Coronal images: While the surrounding tissues appear with normal signal intensity on T1-weighted images, the fistula tract typically appears as an area of decreased signal intensity. This is because the contents of the fistula have lower water content and therefore lower signal intensity on T1-weighted sequences.



4.Inflammatory Changes: MRI can reveal signs of inflammation in the surrounding tissues, which can be important for understanding the extent of the infection or inflammatory process associated with the fistula.

The St. James's University Hospital classification of perianal fistula's
The St. James's University Hospital classification is a widely used system to categorize perianal fistulas based on their complexity and the presence of multiple tracts. In this classification system, perianal fistulas are graded from Grade I (simple) to Grade IV (complex), with Grade III representing a moderately complex fistula. Here's a brief overview of Grade 3 perianal fistulas according to this classification:

Grade III Perianal Fistula:
Complexity: Grade III fistulas are considered moderately complex. They often have multiple tracts or branches and may involve areas of the anal sphincters, making them more challenging to treat compared to Grade I and Grade II fistulas.
Characteristics: Grade III fistulas may have one or more of the following characteristics:

1. Multiple tracts: These fistulas have more than one tunnel-like path or connection between the anal canal and the surrounding tissue.
2. High location: They may extend into the deeper tissues, sometimes reaching the higher portions of the anal canal or rectum.
3. Involvement of sphincters: Grade III fistulas may affect the anal sphincter muscles, which control bowel movements, increasing the risk of incontinence.

Treatment: The management of Grade III perianal fistulas often requires a more complex surgical approach. Treatment options may include procedures such as seton placement, advancement flap repair, or more specialized techniques performed by colorectal surgeons. The choice of treatment depends on the specific characteristics of the fistula and the patient's overall health.

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