



“बेटी बचाओ, बेटी पढ़ाओ”

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FACULTY OF PHYSIOTHERAPY & DIAGNOSTICS

Faculty Name : JV'n Ankita
Program : B.Sc. RT 5th Semester
Course Name : Modern Imaging in Diagnosis.
Topic Name : Computerized Tomography (CT) Scan. – (effect of M.R.I & C.T. and the cross sectional anatomy)

Program Outcome -

It plays an important role in health sector, provides knowledge about the Diagnostics of any injury , illness or disability in the human body by the help of various modalities or machineries.

Course Outcome-

- Develop an understanding of the subject.
- Understand the role of modern imaging.
- Understanding the practical aspects of Advancement of imaging..

Academic Day starts with –

Greeting with saying ‘**Namaste**’ by joining Hands together following by 2-3 Minutes Happy session, Celebrating birthday of any student of respective class and **National Anthem**.

Previous Session- **Computerized Tomography (CT) Scan(advantage, disadvantage & limitation).**

Topic to be discussed today- Today We will discuss about- **Computerized Tomography (CT) Scan. – (effect of M.R.I & C.T. and the cross sectional anatomy)**

❖ Lesson deliverance (ICT, Diagrams & Live Example)- ICT, Diagrams

➤ Diagrams

Introduction & Brief Discussion

COMPUTERIZED TOMOGRAPHY (CT) SCAN :-

EFFECT OF M.R.I.

Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) scan are both valuable medical imaging techniques, but they have different effects, advantages, and considerations:

1. Ionizing Radiation:

MRI: MRI does not use ionizing radiation, making it safer in terms of radiation exposure compared to CT scans.

CT: CT scans use X-rays, which involve ionizing radiation. While the doses are typically considered safe, repeated CT scans can accumulate radiation exposure over time.

2. Soft Tissue Differentiation:

MRI: MRI is particularly effective at distinguishing between different soft tissues, making it superior for visualizing structures like muscles, tendons, ligaments, and nerves.

CT: While CT scans provide better soft tissue differentiation compared to conventional X-rays, they may not offer the same level of detail as MRI for soft tissues.

3. Bone Imaging:

MRI: MRI is less effective at imaging bones and is generally used for assessing soft tissues.

CT: CT scans are excellent for visualizing bones and are often used for assessing fractures, bone density, and bone-related conditions.

4. Contrast Agents:

MRI: Contrast agents used in MRI are generally considered safe, but allergic reactions or adverse effects can occur in some individuals.

CT: Contrast agents used in CT scans carry a slightly higher risk of adverse reactions compared to MRI contrast agents.

5. Imaging Principle:

MRI: MRI uses powerful magnets and radio waves to generate images based on the body's response to these fields.

CT: CT scans use X-rays and computer algorithms to create cross-sectional images.

6. Patient Suitability:

MRI : MRI might not be suitable for patients with certain medical implants, devices, or conditions due to potential interactions with the magnetic fields.

CT : CT scans are generally more suitable for a wider range of patients, but precautions are taken for individuals with allergies or kidney issues when using contrast agents.

7. Image Quality:

MRI : MRI provides excellent soft tissue contrast, making it well-suited for assessing conditions like brain and spinal cord disorders, joint injuries, and tumors.

CT : CT scans offer good contrast for visualizing bones and are useful for diagnosing conditions like lung diseases, trauma, and vascular issues.

8. Scan Duration:

MRI : MRI scans can take longer than CT scans, which might be challenging for patients who have difficulty lying still.

CT : CT scans are generally quicker to perform compared to MRI scans.

9. Claustrophobia:

MRI : The confined space of the MRI machine can cause claustrophobia in some patients.

CT : CT machines are generally less confining and may be more suitable for claustrophobic patients.

10. Image Interpretation:

MRI : Interpreting MRI images requires expertise in recognizing different tissue characteristics and abnormalities.

CT : CT images are easier to interpret for many medical professionals due to their familiarity with X-ray images.

EFFECT OF CT SCAN :-

Ultrasonography (USG), commonly known as ultrasound, and Computed Tomography (CT) scans are both valuable medical imaging techniques, each with its own effects, advantages, and considerations:

1. Ionizing Radiation:

Ultrasound : Ultrasound does not use ionizing radiation, making it a radiation-free imaging technique.

CT : CT scans use X-rays, which involve ionizing radiation. There is a potential radiation risk associated with CT scans.

2. Soft Tissue Differentiation:

Ultrasound : Ultrasound provides good soft tissue differentiation, particularly for organs, blood vessels, and pregnancy-related imaging.

CT : While CT scans offer better soft tissue differentiation compared to conventional X-rays, they may not provide the same level of detail as ultrasound for certain soft tissues.

3. Bone Imaging:

Ultrasound : Ultrasound is not as effective at imaging bones and is generally used for soft tissue imaging.

CT : CT scans are excellent for visualizing bones and are often used for assessing fractures, bone density, and bone-related conditions.

4. Contrast Agents:

Ultrasound : Contrast agents are used in some ultrasound examinations, but they are less commonly used compared to CT scans.

CT : Contrast agents are more commonly used in CT scans to enhance visualization of blood vessels and certain tissues.

5. Imaging Principle:

Ultrasound : Ultrasound uses high-frequency sound waves to create images based on their reflections from within the body.

CT : CT scans use X-rays and computer algorithms to create cross-sectional images.

6. Patient Suitability:

Ultrasound : Ultrasound is generally well-tolerated and suitable for a wide range of patients, including pregnant women and children.

CT : CT scans have a wider range of applications but may not be suitable for pregnant women and individuals with certain medical implants or allergies.

7. Image Quality:

Ultrasound : Ultrasound provides real-time imaging, making it useful for observing moving structures like the heart or fetus.

CT : CT scans offer detailed anatomical information and are valuable for diagnosing conditions involving bones, organs, and soft tissues.

8. Scan Duration:

Ultrasound : Ultrasound scans are generally quick and real-time, making them ideal for observing dynamic processes.

CT : CT scans are also relatively quick, but the scan time can vary based on the complexity of the study.

9. Cost and Availability:

Ultrasound : Ultrasound machines are generally less expensive and more widely available than CT scanners.

CT : CT scanners can be more expensive to operate and maintain.

10. Operator Skill:

Ultrasound : Operator skill plays a significant role in obtaining high-quality ultrasound images.

CT: CT scans are more automated, requiring less operator input for image acquisition.

CROSS SECTIONAL ANATOMY OF HUMAN BODY :-

Here are some of the key cross-sectional anatomical features that can be visualized using CT scans:

Brain and Skull:

Brain lobes, ventricles, and basal ganglia, Skull bones, sinuses, and cranial sutures.

Neck:

Throat structures: trachea, esophagus, thyroid gland, Cervical vertebrae, vertebral discs, and spinal cord.

Chest and Thorax:

Heart chambers, valves, and blood vessels (coronary arteries, aorta, pulmonary arteries) Lungs, bronchi, and pulmonary veins, Rib cage, sternum, and thoracic vertebrae.

Abdomen and Pelvis:

Liver, gallbladder, pancreas, spleen, and kidneys, Stomach, intestines, and abdominal blood vessels (aorta, vena cava), Reproductive organs (ovaries, uterus, prostate), Pelvic bones, bladder, and pelvic musculature.

Spine and Spinal Cord:

Vertebrae, intervertebral discs, and spinal cord, Spinal nerve roots and associated structures.

Extremities:

Upper extremities: bones (humerus, radius, ulna), joints (shoulder, elbow), muscles.

Lower extremities: bones (femur, tibia, fibula), joints (hip, knee, ankle), muscles.

Blood Vessels:

Arteries and veins throughout the body, including vascular structures in the brain (CT angiography)

Joints:

Articular surfaces and structures in joints, such as cartilage, ligaments, and synovial fluid

Soft Tissues:

Muscles, adipose tissue (fat), and various organs in the body

Head and Face:

Facial bones, sinuses, orbits, nasal passages

Anatomical Landmarks:

Anatomical landmarks used for reference and orientation in medical imaging

University Library Reference-

- The Physics Of Radiology and Imaging by K. THAYALAN
- Textbook of Radiology for Residents and Technicians by S. K. BHARGAVA
- Suggestions to secure good marks to answer in exam-
 - Explain answer with key point of the answers

Questions to check understanding level of students-

- ❖ What are the effect of M.R.I. ?
- ❖ What are the effect of U.S.G. ?
- ❖ Describe the cross sectional Anatomy of human body ?

Next Topic- N.A.

National song' Vande Mataram'