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Q What are the differences between CT scan & MRI scan?

Answer 1

MRI Scan	CT scan
① → Designed for looking at soft tissues, tendons, ligaments, Spinal Cords, and the brain	① Better suited for imaging injuries from trauma, staging cancer, and diagnosing conditions in blood vessels.
② → Bony Structures less detailed Compared to CT. scan.	② Bony Structures are more clear and detailed.
③ Powered by strong magnetic field.	③ Powered by low doses of radiation.
④ Being inside an MRI is like being inside a large tube. This Causes Some people to experience Claustrophobia or anxiety due to the length of the exam.	④ Most people are Comfortable with a CT scan, as the machine is donut-Shaped and not fully enclosed.
⑤ Lasts at least 30 minutes	⑤ Lasts 5-10 minutes

⑤ MRI Machine make loud noise, so you will receive headphones or earplugs.	⑥ CT machines make soft, whirring noises and have flashing lights.
⑦ You may be asked to hold your breath from time to time.	⑦ Holding breath is not required as much
⑧ Patients with metal or certain medical implants are not able to undergo MRIs due to the magnetic field.	⑧ CT scan can be performed with no risk to medical implants or metal.
⑨ Higher Cost	⑨ Less expensive
⑩ Duration of time much longer	⑩ Duration of time is shorter than MRI scan.

Q 2 Which 3D reformation techniques are Commonly used in musculo-skeletal CT imaging? Explain them.

Answer:- Although MRI is the modality of choice for imaging the musculoskeletal

System, Spiral CT remains a viable alternative. Spiral CT is faster, less expensive, easily available and has the potential to evaluate a wide range of musculoskeletal diseases, thus making it an important diagnostic tool. The availibility of new algorithms & better Computer generated software for multiplanar and 3-D image reconstruction has further enhanced the importance of spiral CT in musculoskeletal imaging.

The use of 3-D reconstructions of spiral CT in the musculoskeletal system is of ~~items~~ tremendous advantage to patients in whom CT is desired to delineate the presence and extent of congenital anomalies, traumatic injuries, tumor, infection & inflammation. It has specific role in postoperative evaluation, especially when the results of plain

radiography fail to answer the doubts of the orthopaedic surgeon regarding satisfactory alignment of complex fractures. 3-D CT imaging is able to compensate for streak artifacts due to the presence of metallic implants such as plates, pin, & prostheses & because of this it is an establish modality for post operative cross-sectional imaging in orthopaedic patient also.

The various anatomic region studied using 3-D spiral CT are deposited. To achieve best results with accurate illustration of the musculoskeletal anatomy and pathology, examination techniques need to be optimized, & to acheive this, imaging protocols that were followed. ~~are~~

Using the protocols described above axial CT data obtained was reconstructed at 0.5 to 1mm intervals with segmented interpolation & a restricted field of view of 16 to 18 cm. This yielded 180 to 320 images which were done using shaded surface display (SSD) & volume rendering (VR) algorithms.

Thus Spiral CT is a powerful modality for evaluation of the musculoskeletal system, particularly when coupled with advanced 3-D imaging features. This modality of imaging has become an important part in the evaluation of musculoskeletal disease & its inclusion in routine musculoskeletal imaging protocols has changed the diagnosis and management in a significant number of cases.

Q3 What is the function of "Surestart" in CT imaging?

Ans: The use of state-of-the-art helical CT scanners allows for ultra fast examination of larger regions of the body. Due to the short examination time, optimum utilization of the intravenous contrast medium bolus is of extreme importance. The Sure Start function grants this in a very simple way.

A low dose planning Scan is obtained on the Aquilion 64, Toshiba's 64-row CT, to define the start and end of the spiral Scan, identify the widest dimension of the heart, and place the sure start. The start position is placed just above the origins of the coronary arteries using the left atrial appendage orientation. The Scan ends just below the heard, and can be

Stopped manually. The surestart is placed at the start of the Spiral Scan, by positioning the active line exactly over the upper boundary of the scan. The Surestart should not contain the coronary arteries or be placed too high. Careful planning of the scan is essential for achieving an optimal result while minimizing radiation exposure.

Planning the individual scan delay on the Aquilion 64 using the Sure Start bolus tracking tool is illustrated. The Selected scan plane, just above the origin of the coronary arteries. is chosen to start the Scan at the optimal time by monitoring the arrival of the contrast bolus in a region of interest placed in descending aorta. Important landmarks in this plane are the sternum anteriorly & the descending aorta

posteriorly. Also seen in this plane are a segment of the pulmonary trunk & a portion of anterolateral chest wall. The ROI in the descending aorta is used to monitor the increase in Hounsfield Unit (HU) after initiation of contrast injection.

Q4 what are the major difference blw Single Slice CT & multislice CT?

Answer:-

Multislice technology increases the efficacy of CT procedures & offers new promising applications. The expanding use of MSCT, however may result in an increase in both frequency of procedures & level of patient exposure. It was, therefore, the aim of this study to gain an overview of MSCT examinations conducted in Germany 2001. All MSCT facilities

were requested to provide information about 14 standard examinations with respect to scan parameters & frequency. Based on this data, dosimetric quantities were estimated using an experimentally validated formilism. Results are compared with those of a previous survey for Single Slice Spiral CT Scanners. According to the data provide for 39 dual-and 73 quad-Slice systems, the average annual number of patients examined at MSCT is markedly higher than that examined at ~~MSCT~~ SSCT Scanner (5500 vs 3500). The average effective dose to patients was changed from 7.4 & mSv at Single-Slice to 5.5 mSv & 8.1 mSv at dual & quad-Slice Scanners, respectively. There is a considerable potential for dose reduction at quat-Slice systems by an optimisation of Scan protocols

and better education of the personal. To avoid an increase in the collective effective dose from CT procedures, a clear medical justification is required in each case.

Multi Slice CT Scan:

The 1980s saw incremental development of CT Scanner technology. Shorter scan times and increased matrix sizes, until by the late 1980s scan times were down to only 3 seconds & matrix sizes were up to 1024 x 1024. Development continued through the 1990s, with the introduction of spiral (continous) scanning in the early 1990s and the development of multi-slice scanners, with 4-slice scanners & 0.5 second scan times being state of-art by end of the century.

Part of the Multi Slice CT scan:-

- Gantry
1) x-ray tube
2) High voltage generator
3) Cesser Light
4) Cooling System
5) Rows of detectors
6) Variable collimator
- Control penal

Single Slice CT Scan:-

1) The single Slice Ct scan had an x-ray source & a Single detector
2) Data acquisition involved moving both the tube & detector across the scanning plane to acquire a Serious of transmission measurements.
3) All data collected through a 180° rotation.

Parts of Single Slice CT Scanner

1) Gantry
   - X-Ray tube
   - High voltage Generator
   - Detector
   - Pre Patient collimator
   - Post Patient Collimator
2) Table
3) Ops
4) Control Panel.

Q5 What are the general protocol for performing CT Contrast studies?

Answer:- CT Protocol.

→ Creatinine Testing Prior to injecting Intravenous Iodinated Contrast Media.

→ Iodinated Contrast Administration Patient receiving metformin

→ Management of Acute Contrast reaction.

→ IV Contrast Extravasation

→ Patient Sedation
→ Guidlines for periprocedural Coagulation Management.
→ Post Mortem CT.

* Using many CT examinations, patient may be asked to take a special contrast agent (orally, rectally or via injection).

Intravenous, oral & rectal CT Contrast are pharaceutical agents (liquids) & are sometimes referred to as "dye". CT Contrast is used to make specific organs, blood vessels & (or) tissue types "stand out" with more image Contrast to better show the presence of disease or injury. Thus CT Contrast highlights specific areas of the resultant CT image or "dyes" it.

A much less common type of Contrast used in CT is inhaled as a gas and used for special lung and brain

imaging. This techniques is only available at a small number of locations throughout the world and is only performed for rare cases.

CT Contrast Given through I.V Injection.

I.V Contrast is used in CT to help highlight blood vessels & to enhance the tissue structure of various organs such as brain, spine, liver & kidneys. "I.V" means that the contrast is injected into a vein using a small needle. Some imaging exams of the abdomen & gastrointestinal system use both the I.V iodine & orally administered barium contrast for maximum sensitivity.

The intravenous CT contrast is clear like water & has a similar consistency. It is typically packaged in glass bottle or vial. A sterile syring is

is used to draw of it from the bottle or a power injector is used to administer the contrast. Typically b/w 75cc to 150cc of contrast is used depending upon the patient age, weight, area being imaged & Cardiovascular health.