



Special Radiological Procedures Of The Head ,Breast And Respiratory System

CT Of The Brain

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قسم تقنيات الاشعة والسونار

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المرحلة 3

محاضرة رقم 3

الجانب النظري

Lecture No.3.

Theoretical

تدريسي المادة : م.م خيرات رحيم لهمود

Brain CT Scan

- A Brain CT scan is a complex scan of internal structures that are located inside that head and produces multiple images that are used to diagnose a range of conditions.
- The cross-sectional images generated during a CT scan can be reformatted in multiple planes. They can even generate three-dimensional images. These images can be viewed on a computer monitor, printed on film or by a 3D printer, or transferred to a CD or DVD.
- Brain CT scans are ordered when there a patient suffered serious symptoms in the head area, like severe headaches or dizziness, as well as when a patient suffers an accident with head-related injuries. They are used to diagnose a range of conditions, including aneurysms, bleeding in the brain, strokes, and brain tumors.

How Do Brain CT Scans Work?

Brain CT scans are the same as other types of CT (computed tomography) scans, except they are taken of the head region. They are a diagnostic medical image test that generates multiple images of the skull, brain and blood vessels.

During a brain CT, a **donut-shaped** device will circle the head and captures pictures of it from various angles. The images that the scan generates are cross-sectional images, which means the images produced are sliced through the middle of the structure.

Indications For A Brain CT

- Brain tumours
- Brain aneurysms
- Bleeding of the brain
- Fluid build up in the skull (known as hydrocephalus)
- Brain atrophy
- Structural anomalies
- Brain infection
- Abnormal blood vessels of the brain (known as arteriovenous malformation)
- Other brain conditions

CONTRAINDICATIONS

- Pregnancy
- Hypersensitivity to iodinated contrast media.
- Blood Urea and serum creatinine (Creatinine $>1.5\text{mg/dl}$)

Benefits

- CT scanning is painless, noninvasive and accurate.
- A major advantage of CT is its ability to image bone, soft tissue and blood vessels all at the same time.
- Unlike conventional x-rays, CT scanning provides very detailed images of many types of tissue as well as the lungs, bones, and blood vessels.
- CT examinations are fast and simple; in emergency cases, they can reveal internal injuries and bleeding quickly enough.
- CT is less sensitive to patient movement than MRI.
- CT can be performed if you have an implanted medical device of any kind, unlike MRI.
- No radiation remains in a patient's body after a CT examination.

Risks

- There is always a slight chance of cancer from excessive exposure to radiation. However, the benefit of an accurate diagnosis far outweighs the risk.
- CT scanning is, in general, not recommended for pregnant women unless medically necessary because of potential risk to the baby.
- IV contrast manufacturers indicate mothers should not breastfeed their babies for 24-48 hours after contrast material is given.
- The risk of serious allergic reaction to contrast materials that contain iodine .

Contrast-enhanced CT (Optional)

The purpose of contrast in the setting of head imaging is to evaluate the physiological and pathological processes that alter the permeability of the blood-brain barrier that causes abnormal contrast enhancement.

- **Therefore, contrast-enhanced CT allows the identification of abnormal contrast enhancement including :**
- [brain metastases](#): variable enhancement of the lesion post-contrast
- [meningioma](#): solid intense enhancement of the lesion post-contrast
- [brain abscesses](#):
 - [double rim sign](#): hypodense outer rim and a hyperdense inner rim
 - single rim of hyperdense or isodense
 - fluid/pus: hypoattenuating center
- necrotic neoplasm (e.g. [glioblastoma](#)) or [abscess](#): outer enhancing ring surrounding a necrotic center
- [meningitis](#) and meningoencephalitis: [Leptomeningeal enhancement](#)
- [multiple sclerosis](#): contrast enhancement of plaques
- [lymphoma](#): enhancement of lesion post-contrast
- [ependymitis](#) and [ventriculitis](#): thin linear enhancement of the margins of the ventricles

How To Prepare For Your Brain CT Scan

- You will be asked not to eat or (drink) anything for a few hours beforehand, if contrast material will be used in your exam. You should inform your physician of all medications you are taking and if you have any allergies.
- To prepare for your appointment you will need to remove all metal objects, like jewelry, piercings, a watch, hairpins and removable hearing aids.

Position

- **Patient Position:** supine with their arms by their side
- with the head in the head holder. Center the table height such that external auditory meatus (EAM) is at center of the gantry. To decrease the ocular lens exposure, the scan angle should be parallel to a line created by the supraorbital ridge and the inner table of the posterior margin of the foramen magnum.
- **Topogram Direction:** Craniocaudal
- **Scan Type:** Axial
- **Position/Landmark:** 2-3cm (20-30mm) above the vertex.
- **Start Location:** Skull base.
- **End Location:** Skull vertex.
- **scan geometry**
 - slice thickness: <5 mm
 - slice increment: 0.5 mm

contrast injection protocol

non-contrast performed first

delayed phase post-contrast acquisition

- 50 cc hand injection or 1 cc/s pressure injection $\pm$ saline chaser
- delayed acquisition: ≥ 5 minutes post-contrast injection

QUIZ

Q1/What is a **Brain CT scan**, and how is it similar to and different from other types of CT scans?

Q2/ Name three conditions that a Brain CT scan is used to diagnose. Q3/Besides diagnosing specific conditions, when are Brain CT scans generally ordered for a patient?

Q4/How does a Brain CT scanner generate images, and what type of images are produced?

Q5/Describe the Patient Position for a Brain CT scan, including the position of the head.

Q6/What specific measures are taken during the procedure to decrease ocular lens exposure?

Q7/ What are the typical Start and End Locations for an Axial Brain CT scan?

Any questions?

*Thank
You*