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SUBJECT ASSIGNMENT VIVA CR AND DR

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DESCIPLINE RADIOLOGY 4th SEMESTER

Q NO 1

Ans:

Digital substraction Angiography:-

Angio: The Angio Means Blood Vessels.

And angigraphy is the radiological study of blood vessel in the body after the introduction of iodinated contrast Media.

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Substraction:-

It is simply a technique by which bone structures images are substracted or canceled out from a film of bones plus opacified vessels, leaving an unobscured image of the vessels.

Digital Substraction Angiography:-

Digital Substraction angiography is a fluoroscopic technique used extensively interventional radiology for visualizing blood vessels. Radiopaque structures such as bones are eliminated (Substracted) digital from the image, thus allowing for accurate depiction of the blood vessels.

The acquisition of digital fluroscopy images combined with injection of contrast material and real time substraction of pre- and post contrast images to perform angiography is refered to as digital Substraction angiography

History:-

⇒ The portuguese neurologist Egas Moniz, (Nobel prize winner 1949) in 1927 developed the technique of contrast x-ray cerebral angiography

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to diagnose diseases, such as tumors and arteriovenous malformations.

→ The idea of subtraction images was first proposed by the Dutch radiologist Ziedses des plantes in the 1935, when he was able to produce subtracted images using plain films.

→ With the introduced of the Seldinger technique 1953, the procedure became safer as no sharp devices need to remain inside the vascular lumen.

Indications:-

- Endovascular aneurysm repair
- Arterial balloon angioplasty
- Arterial stenting
- Endovascular embolization
- Thrombectomy

Diagnostic:-

- Non traumatic subarachnoid Hemorrhage (SAH)
- Arterial dissection or laceration
- Aneurysm
- Pseudoaneurysm
- Thrombosis
- Artero-venous Malformation (AVM)
- Arterio-venous fistula (AVF)
- Tumor

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Therapeutic:-

- Embolisation
- Stenting
- Thrombolysis
- Thrombectomy

Contraindication:-

Renal insufficiency and hypersensitivity to iodinated contrast media are relative contraindications. Some centers use carbon dioxide as a contrast agent for these cases.

- poor renal reserve
- Deranged coagulogram
- Allergic to contrast media.

complication:-

The complication can be categorized into local and systemic complications, And also CNS complications.

- 0.16 % Major complication rate.

local complication:-

- Hematom
- Vessel laceration
- Pseudoneurysm
- AV Distula
- From the puncture site
- Thrombus formation
- local tissue damage

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Systemic complication:-

- contrast reaction
- Fever
- Sepsis
- Dehydration
- Throboembolism
- Air embolism
- Vessel dissection
- Contrast Mediated nephrotoxicity

Material Used:-

- Catheters
- Arterial Sheath
- Medicut
- Guidewires
- contrast
- connector / 100 cm. tubing
- Surgical blade
- Saline
- Disposable Syringes
- local anesthesia
- Heparin
- surgical gloves
- Elastoplast.

procedure:-

- Gaining arterial access
- Selective arterial Catheterization
- Image acquisition
- closure of arterial access
- post processing
- Hard copy

Q NO 2

Ans:

Digital radiography Artifacts:

Common Artifacts in Digital Radiography:

The common Artifacts are included.

- Flat-panel detector drops
- Detector image lag or ghosting
- Backscatter
- Debris in the x-rays field during clibration.
- Detector saturation or Underexposure
- collimation detection error.
- Latent image from previous exposure present on current exposure.
- Incorrect detector orientation i.e Upside-down Cassette.
- Spoke like radioopaque lines
- Electronics are visible on the exposed image.
- Increased radiation exposure require for portable DR examinations.
- stitching artifacts occur when two separate DR or CR. images are merged into a single image.
- over exposure
- Dead pixel artifacts.

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- Single dropout
- large areas of signal loss, due to detector drop.
- Specked radioopaq spots.
- Due to detector drop.
- Detector calibration limitation
- Faint radioopque striping in the background of an image, yet not evident on the anatomy.
- This artifacts should be carefully examined, if it does not interfere with the anatomy, it is not a detector failure cut OFF, rather limitation of the detector calibration.
- Often seen as lower exposure.
- Failure of detector offset correction
- Similar to ghosting, however, the digital detector not being calibrated when promoted is the cause.
- Electronic shutter failure.
- values of interest misread.
- Mid gray clipping
- Grid - line suppression Failure
- Grid - lines present on an image, with no grid cut off.

How to avoid this artifacts:-

If the artifacts are avoided then technician will know about every thing.

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To avoided artifacts they will give proper:

⇒ Exposure
⇒ proper collimation
⇒ proper patient positioning etc.

Q No 3

Ans:

Disadvantages of Digital Radiography :-

⇒ Many of the disadvantages of digital radiography can be over come by adequate training and having an understanding about how the system works.

⇒ As mentioned previously as an advantange, digital radiography has a wider dynamic range but hits. can also be seen as as disadvantages due to exposure creep - whilist cinder exposure will give us a grainy appearance, over exposure is automatically

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corrected by imaging software so there is a tendency to overexposure to ensure a good quality image. Manufacturers provide an exposure index for each anatomical area, so exposure judgement should not exposure index.

⇒ There is also tendency for laziness and poor collimation, knowing this will be corrected during processing. This has two implication, radiation safety and effect on the exposure index. Including more than required in the collimation field can lead to an inadequate exposure index.

⇒ The ability to magnify images means there is a potential risk for over interpretation as structures are viewed at a much large scale than with conventional radiography. Some images with digital imaging can also be misinterpreted by halo artifacts around implants giving the impression that the implant is loosening.

⇒ One of the main disadvantages of digital radiography is the high start-up cost but generally this is accepted

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due to the long term benefits of having the system and recouping costs over time

⇒ Digital radiography does have its limitation, Due to the size / thickness of the imaging plates, obtaining intra-oral radiographs is usually only possible in large breeds of dog. systems are available for intra-oral use but this requires the purchase of dental size imaging plates and a reader, or dental size CCDs leading to additional costs.

⇒ with computed radiography systems, images need to be processed almost immediately as any delay will results in loss of image information due to trapped electrons returning to a lower energy state. This tends to be more of a problem in field radiography where images are required away from the practice.

⇒ poorer spatial resolution
⇒ Artifacts due to the imaging plate image processing algorithms etc
⇒ Non-availability of post processing functions.
⇒ Increased sensitivity to scattered radiation.

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- More expensive than screen film radiography.
- Lack of familiarity to radiologist and radiographers.
- cost: High initial cost of system.
- Medicolegal: The ability to manipulate the images for fraudulent purposes.
- cross-infection control: The intra-oral sensor can not be sterilized.
- Sensor dimensions: The sensor is bulky in size
- Unknown life expectancy of CCD sensor
- Rigidity and thickness of the sensor
- Decreased of resolution.
- CCDs can not be Sterilized
- Hard copy images fade with time.
- Technology changes system may become obsolete and no longer has support.
- Artifacts unique to CR/DR can be introduced in the digital image acquisition and retrival process.

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→ The spatial resolution of DR image recording systems is lower than F/S image recording system however. The impact of such a lower spatial resolution system on clinical performance is not significant.

→ Dose - Creep: since > exposure latitude is wide high exposure technique may be used which increase, the patients dose which is called dose-creep. This can be reduced by exposure indicator or exposure index which gives the user feedback about the actual dose.

Q No 5

Ans:

Difference between Image receptors used in coventional radiography and Digital Radiography:

	Digital Image Receptor	Conventional Image Receptor
1.	The radiation response of Digital image Receptor is greater than screen film (400)	1. The radiation response of conventional image Receptor is smaller than Digital image Receptor
2.	It has high sensitivity for radiation	2. It has low sensitivity for radiation
3.	It converts the image into digital form	3. It can not convert the image into Digital form
4.	It has much wider dynamic range	4. It has limited dynamic Range

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5.	It is pixel limited	5. It does not have pixel
6.	The Digital image Receptor is the devia that intercepts the x. ray beam After it has passed through the patients body and produces an image in Digital form.	6. The Conventional Image Receptor the cassett containing intensifying screen and film
7.	The Digital image Receptor response is linear	7. The screen film receptor response is curve
8.	It is small in size	8. It is large in size
9.	It absorb more x. rays	9. It absorb less x. rays
10.	It has four decads of radiation response	10. It has three decads of radiation response
11.	The image Receptor in Digital is charged electronic devick	11. The image Receptor of Conventional film screen is Photosensitive Phosphor plate

Q No 4:

Ans:

Compare the Image Quality of Screen Film radiography and Digital radiography:

Conventional Radiography Image Quality:	Digital radiography Image Quality:
Conventional film have to be viewed on a light box, will the aid of magnifying glass	1. These radiography can be viewed on a monitor or printed on Film
Spatial radiation is less in conventional radiography due to operator error and poor equipment maintenance but in high quality well maintained Conventional system Spatial resolution is relative high than Digital Radiography.	2. Spatial resolution is better in digital radiography by an order of magnitude compared with Film screen

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3.	In coventional radiography high image contrast (a large difference between gray scales) is inevitably associated with a narrow latitude (a low number of gray steps)	3. In digital radiography it is possible to display an image with wide latitude while preserving high image contrast, the independent relationship between contrast and latitude.

Image Quality radiographic fault:

4.	Many film Fault are caused by over and under exposure, and under development error including film	4. over exposure under exposure also reduce the quality of DR but

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	Fogging, exlarmus movies, cromp movie, dirt and screen artifacts. These can interfere with interpretation of Film.	over processing rebound artifacts, Quantum mottle, and tissue drop - out are unique to Digital Radiography.
5.	We can not achive high Quality image with less radiation dose in screen Film radiography	5. We can achive high Quality image with less radiation dose in Digital Radiography.
6.	Archiving of Film recquires storage space Film may misedpile mislaid or lost	6. Digital Radiography electronic storage system saving and storage space can be significant.