

NAME : HUMA NAWAZ

ID NO : 15037

ASSIGNMENT : CR AND DR

SUBMITTED TO : MAM MAHEEN
GUL

DATE : 10 July, 2020

INU PESHAWAR :

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QUESTION NO: 3

What are disadvantages of DR?

⇒ DISADVANTAGES OF DIGITAL RADIOGRAPHY:

1. Initial cost
2. Sensors can be bulky for patients
3. Need a computer or network
4. Lack of Hard copy without additional equipment.
5. Integration of radiographic software into practice software can be difficult.
6. Poor spatial resolution
7. Artifacts due to imaging plate, image processing algorithms etc.
8. Non availability of post-processing functions.
9. Increased sensitivity to scattered radiation
10. More expensive than screen-film radiography.

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12. Lack of familiarity to radiologists and radiographers.
13. The ability to manipulate the images for fraudulent purposes.
14. The intraoral sensor cannot be sterilized.
15. High patient radiation dose.

QUESTION NO: 1

What is digital subtraction angiography?

ANSWER:

**DIGITAL SUBTRACTION ANGIOGRAPHY:
(DSA)**

⇒ INTRODUCTION:

It is a fluoroscopy technique used in interventional radiology to clearly visualize blood vessels in a bony or dense soft tissue environment.

⇒ WHY DSA IS USED:

It is used to provide an image

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of the blood vessels in the brain to detect a problem with blood flow.

⇒ The procedure involves catheters (a small thin tube) into an artery in the leg and passing it up to the blood vessels in the brain.

⇒ INDICATIONS:

- Endovascular aneurysm repair
- arterial balloon angioplasty
- arterial stenting
- thrombectomy

⇒ CONTRAINDICATIONS:

→ Renal insufficiency and hypersensitivity to iodinated contrast media are relative contraindications.

⇒ EQUIPMENTS:

- Collimator and filters for dose reduction
- pulsed fluoroscopy with a variety of frame rates
- masks
- landmarks

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⇒ TECHNIQUE :

- ⇒ The patient lies on the angiography table
- ⇒ Local anesthesia is administered at the intended puncture site
- ⇒ Ultrasound is often used to visualizing the vessels.
- ⇒ Micro-introducer access kit is used for access

⇒ COMPLICATIONS:

Local complications:

- Thrombus formation
- local tissue damage

Systemic complications:

- Thromboembolism
- air embolism
- vessel dissection

QUESTION NO: 4

Compare the image quality of screen film radiography and DR, which one is superior?

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* FILM BASED IMAGE QUALITY

⇒ Film based imaging consists of x-ray interaction with electrons in the film emulsion.

⇒ Through chemical processing we transform the latent image into visible.

COMPARISON:

1: DENSITY:

- The overall degree of darkening of an exposed film.

2: CONTRAST RESOLUTION:

- The differences in densities between various areas on a radiograph. High contrast images have

* DIGITAL IMAGE QUALITY

⇒ Digital imaging is the result of x-ray interaction with electrons in electronic sensor pixels

⇒ Conversion of analog data to digital data, computer processing and display of the visible image on a computer screen.

1: DENSITY:

- Digital equivalent to density or overall degree of image quality.

2: CONTRAST RESOLUTION:

- The ability to differentiate small differences in density as displayed on an image.

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few shades of gray between black and white while low contrast will demonstrate more shades of gray.

3: LATITUDE

- measure of the range of exposure that will produce usefully distinguishable densities on a film.

4: RESOLUTION:

- Ability to distinguish between small objects that are close together measured in Lp/mm .

5: RADIOGRAPHIC MOTTLE NOISE

- Appearance of uneven density of an exposed film or graininess.

3: DYNAMIC RANGE

- The numerical range of each pixel in visual terms it refers to the number of shades of gray that can be presented.

4: SPATIAL FREQUENCY:

- Measure of resolution expressed in Lp/mm .

MTF:

- Measure of image fidelity as a function of spatial frequency how close the image is to the actual object.

5: BACKGROUND ELECTRONIC NOISE:

- Small electrical current that conveys no information but serves to obscure the electronic signal.

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- Digital radiography is superior than screen film radiography.
- Because image can be adjusted after exposure.
 - Able to see soft tissue and bony detail in single image.
 - Computer manipulation of the digital image is possible.

QUESTION NO: 2

What are common artifacts in DR?
How you will avoid them.

ANS:

COMMON ARTIFACTS IN DR:

1: IMAGE RECEPTOR ARTIFACTS:

- Digital image receptors can suffer from rough handling, scratches and dust.

Digital radiographic image receptors have unique artifacts associated with

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pixel failure.

- Dust on any section of the CR optical path, mirrors and lenses cannot be corrected by the radiologic technologist.

HOW TO AVOID THEM:

- 1: Artifacts produced by dust can be corrected easily by proper cleaning unless the dust is internal to the optics of CR imaging system.
- 2: Require professional service.
- 3: Scratches or a substantial malfunction of pixels likely will require replacement of the image receptor.

2: SOFTWARE ARTIFACTS:

Histograms
Range / scaling
Image Compression

AVOIDANCE :

We can avoid software artifacts by using flatfielding software

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Use interpolation
Several manipulations of the output of an image receptor may be necessary to correct artifacts.

3: OBJECT ARTIFACTS.

- Patient positioning
- Collimator/partition
- Backscatter
- Histogram

AVOIDANCE:

The back side of the image receptor should be shielded to reduce backscatter x-rays.

Automatic radiation field recognition is essential for artifact-free images.

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QUESTION NO: 5

ANSWER :

DIFFERENCE BETWEEN IMAGE RECEPTOR
USED IN CR AND DR :

IMAGE RECEPTOR USED IN
DIGITAL RADIOGRAPHY :

1: CCD (Charged Coupled device) :

- ⇒ Made up of thin layer of silicon
- ⇒ Electrons are then attracted towards the positive site in the device creating a "charge packets".
- ⇒ Pixel size varies from 20 microns to 70 microns.
- ⇒ Smaller pixel increases the cost of the receptor.
- ⇒ CCD have also been made in linear arrays of a few pixels wide and many pixels long for panoramic image.

2: FLAT PANEL DETECTOR :

Used for medical imaging, extroral imaging device

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- ⇒ Provide large matrix with pixel of less than $100\mu\text{m}$.
- ⇒ Allows imaging of larger areas including head

3: CMOS Complementary metal oxide semiconductors.

- ⇒ Each pixel is isolated from its neighbouring pixels and connected to transistor
- ⇒ Electron hole pair generated within pixel.
- ⇒ Charge transfer to transistor in form of voltage.
- ⇒ Stored and displayed as digital gray value.

4: PHOTOSTIMULABLE PHOSPHOR PLATES:

- ⇒ Also known as (SPP) or image plates.
- ⇒ Flexible, wireless indirect receptors
- ⇒ Available in the same sizes as intraoral films.

IMAGE RECEPTORS USED IN CONVENTIONAL RADIOGRAPHY:

Direct action or non-screen film
(Wrapped or packet film) sensitive

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primarily to x-ray photons.

- ⇒ Indirect-action or screen film it is used in combination with intensifying screens in a cassette.
- ⇒ This type of film is sensitive primarily to light photons, which are emitted by the adjacent intensifying screen.
- ⇒ The receptor used for most radiographic procedures contains two intensifying screens mounted on each side of double emulsion film.

END OF ASSIGNMENT....!