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**Final assignment # CR & DR**

**QUESTION No # 1**

What is digital subtraction angiography? Explain.

**Answer No # 1 :**

**Digital subtraction angiography :**

Acquisition of digital fluoroscopic images combined with injection of contrast material and real time subtraction of pre and post contrast images to perform angiography is referred to as digital subtraction angiography.

**DSA development :**

- DSA was developed to improve vessel contrast.
- Technique that uses a computer to subtract two images, obtained before and after contrast media is injected into the vessels of interest.
- Anatomical structures that are the same in two images can be removed and the resulting image shows the vessels only.

**Diagnostic :**

- Non traumatic subarachnoid hemorrhage ( SAH)
- Arterial dissection
- Laceration
- Aneurysm
- Thrombosis

**Therapeutic :**

- Embolisation
- Stenting
- Thrombolysis
- Thrombectomy

**contra indications :**

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

**Contrast media :**

- Blood vessels are not normally seen in an xray image, because of low tissue contrast.
- To increase image contrast, contrast agents, which are dense fluids with elements of high atomic numbers, such as iodine are injected into a blood vessel during angiography. Because of its higher density and high atomic number iodine absorb photons more than blood and tissue.
- Create detailed images of the blood vessels in real time

- First contrast media used for intravascular injection were called high osmolar contrast media ( HOCM).

**Material used :**

- Catheters
- Arterial sheath
- Medicut
- Guidewires
- Contrast
- Surgical blade
- Saline
- Local anesthesia
- Heparin
- Surgical gloves

**preparation :**

- Nil orally 4-6 hrs.
- On trolley
- In hospital gown
- Groin shave
- Records
- Should be well hydrated
- Should void before procedure
- Peripheral pulses marked
- I. V line in place
- Informed consent

**Procedure :**

- Gaining Arterial access
- Selective arterial catheterization
- Image acquisition
- Closure of arterial access
- Post processing
- Hard copy
- Patient may be sedated to reduce anxiety
- Monitor of vitals
- Local ansthesia used in the area where the catheter is to be inserted
- Most common femoral artery
- Small incision given medicut is inserted into the artery
- Fluoroscopy is used to guid the needle to the proper position
- Catheter is then inserted along the guid wire through the sheath
- Images are acquired during contrast injection
- Injections can be made directly into the artery of interest ( selective arteriography).

**Complications :**

- Local Complications : hematoma, vessel laceration, dissection, pseudoaneurysm, AVfistula

- Systemic Complications : contrast reaction, fever, sepsis, dehydration, death
- CNS Complications : aggravation of preexisting complaints, neurological deficit.

**QUESTION No # 2**

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

**ANSWER No # 2 :**

The common artifacts of digital radiography are :

- 1) Image receptor artifacts
- 2) Software Artifacts
- 3) Object artifacts

**Image receptor artifacts :**

- Dust
- Dirt
- Scratches
- Pixel malfunction
- Ghost images

**Software Artifacts :**

- Histograms
- Range/scaling
- Image compression

**object Artifacts**

- Patient positioning
- Collimator /partition
- Backscatter.

**Avoid :**

- Flatfielding is a Software correction that is performed to equalize the response of each pixel to a uniform xray beam.
- Lossless compression up to 3:1 generally is considered acceptable and helpful in digital radiographic image management.
- A Histogram is a graph of frequency of occurrence versus digital value intervals.
- Automatic radiation field recognition is essential for artifact free images.
- Proper collimation and centering prevent histogram errors that can lead to artifacts.

**QUESTION No # 3**

What are disadvantages of DR ?

**ANSWER No # 3 :**

**Disadvantages of DR :**

- Poor spatial resolution
- Artifacts due to the imaging plate, image processing algorithms etc
- Non - availability of post processing functions
- Increased sensitivity to scattered radiation
- More expensive than screen film radiography
- Lack of familiarity to radiologists and radiographers.

- Image can be adjusted after exposure
- Need for retakes are minimized
- Computer manipulation of the digital image is possible
- Able to see soft tissue and bony detail in single image
- Studies show that digital films are equal or better than traditional film for evaluating most body parts.
- Greater thickness than conventional films

#### **QUESTION No # 4**

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

#### **ANSWER No # 4 :**

- Digital images can be numerically modified ( not possible in screen film radiography)
- Digital images can be easily transmitted through networks and archived
- Attention should be paid to the potential increase of patient dose due to a tendency to :
- Produce more images than needed
- Produce higher image quality not necessarily required for the clinical purpose.

#### **QUESTION No # 5**

Difference between image receptors used in conventional radiography and digital radiography?

#### **ANSWER No # 5 :**

- The aim of the study was to compare the image clarity between conventional and digital intraoral radiograph. Methods: Digital and conventional radiographs were captured the image of an extracted maxillary incisor with constant setting of the x-ray source at 70 kVp and 5mAs. Then three series of the digital radiographic of the same specimen was captured at 66 kVp, 63 kVp, 60 kVp. Images were presented to 46 fourth year dental students to evaluate the image quality considering the clarity of tooth pattern. The percentage of observers determined which images were superior or same among digital or conventional were recorded. Results: Digital setting at 66 kVp images were rated as the most superior among all the 4 settings by 67.4% of observers followed by 65.2% for voltage setting 70 kVp, 63.0% for voltage setting 63 kVp and 56.5% for voltage setting 60 kVp. Although the percentage of choosing the most superior image started to be decreased in digital setting in 70 kVp and after 66 kVp however, it was still better than conventional method. Conclusion: Digital radiographic image taking on extracted tooth specimen with the setting of 66 kVp was the most superior among other setting. Conventional radiography showed inferior to digital image at any setting. This study suggested that the image of digital radiography was superior to conventional radiographic.

**THE END**