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Viva : CR and DR

Question: 1

Answer:

Digital subtraction angiography :

Digital subtraction angiography is fluoroscopic technique used extensively in interventional radiology for visualizing blood vessels. Radiopaque structures such as bones are eliminated (subtracted) digitally from the image.

thus allowing for accurate depiction of blood vessels.

History:

first described in 1952.

Digital subtraction angiography whereby a pre-contrast image is acquired, then subtracted from subsequent post-contrast image was made possible in the 1970s.

Indications:

There are numerous indications for angiography and their number has been on the rise ever since interventional radiology has been shown to successfully supplant many open vascular procedures.

Contraindications:

renal insufficiency and hypersensitivity to iodinated contrast media are relative contraindications.

Procedure

Preprocedural evaluation

Patient evaluation should include, but is not limited to:

- presence of atherosclerotic disease.
- Diabetes.
- Renal Function status.
- Medications.

Positioning/room set up

The angiography suite must be equipped with a crash cart and monitoring equipment. Patient heart

rate and blood oxygenation and monitored continuously while blood pressure is measured intermittently via a self-inflating cuff.

Equipment :

The fluoroscopy unit consists of C-arm unit that can be rotated axially and sagittally around the floating-top table. The distance between X-ray tube and image intensifier can be adjusted as can collimation and several other parameters.

Technique

DAS technique :

Digital subtraction angiography is used to produce images of the blood vessels without ~~the~~ interfering shadows from overlapping tissues.

This provides a clear view of vessels and allows for a lower dose of contrast medium.

Procedural technique :

For every purpose there is at least one technique but common to them all is the application of DSA for visualization.

Question - 2

Answer

Common artifacts in DR:

Image Receptor Artifacts

- Dust, dirt, scratches.
- Pixel malfunction.
- Ghost images.

Software Artifacts

- Histograms.
- Range / scaling.
- Image compression.

Object Artifacts

- patient positioning.

collimator / positioning.
Back scatter.

7

Image Receptor Artifacts:

Digital image receptor artifacts can suffer from rough handling, scratches, and dust.

- Artifacts produced by dust can be corrected easily with proper cleaning unless the dust is internal to the optics of a computed radiography imaging system.

Digital radiography artifacts :

- Detector image lag or ghosting. latent image from previous exposure present on current exposure.
 - Incorrect detector orientation
i.e. upside-down cassette.
 - Backscatter.
 - Stitching artifacts.
 - Over exposure.
 - Dead pixel artifact.
 - Signal dropout.
 - Speckled radiopaque spots.
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Question-3

9

Answer

Disadvantages of DR:

- Any exposure to radiation no matter how small has the potential to cause harmful biologic changes.
- Can cause permanent damage to living cells and tissues.
- Genetic Mutation.
- Can cause cancer.

Training and learning curve:

- Must learn machinery, ¹⁰ technology and positioning.
- Must still adhere to good technique for acquiring images.

Equipment cost :

- Initial cost is high compared with traditional radiography.
- Other technology costs associated digital radiology.

- Initial expenditure high.
 - X-ray receptor in I-O systems - susceptible to rough handling.
 - Risk of system become obsolete.
 - Difficult to send to other departments.
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Question-4

11

Answer

Conventional :

With good quality well-maintained conventional systems and digital radiography are compared there is little difference in the actual diagnostic quality of the resulting images. In fact good conventional systems have slightly higher spatial resolution. In reality however, operator error and poor equipment maintenance commonly result in poor radiographic quality of conventional

Radiographs.

Image contrast and latitude also depends on many factors, including the type of film, processing and the exposure factors, where high KV settings result in a relatively low-contrast image and low KV settings in higher contrast an effect used for image optimisation in thoracic and abdominal radiography.

Digital :

One of the digital radiography's biggest advantages is that it is somewhat less dependent on exposure settings and maintenance. This is mainly

due to the wider dynamic range which allows a larger range of exposure factors. The amount of radiographs that have to be taken due to poor exposure selection can be dramatically decreased. However severe over or underexposure cannot be corrected and these result in artefact formation.

Although spatial resolution can be inferior to conventional film, digital radiography's advantage is the more independent relationship between contrast and latitude, resulting in higher contrast, resolution. Furthermore more kV and mAs settings have less influence

14

on contrast and latitude and consistent and less poor film development does not occur due to electronic processing.

Question-5

Answer

Digital image receptor:

Digital image receptor is the device that intercepts the x-ray beam after it has passed through patient's body produces an image in digital form that is a matrix of pixels each with a numerical

value. It replaces the cassette containing intensifying screens and films that is used in conventional film screen radiography.

Digital image receptor is in the form of a matrix of individual pixel elements which work based on certain technologies like solid state technology and photostimulable phosphor plate technology.

When a pixel area is exposed by X ray is in the form of analogue data that is then converted into digital

numbers stored as one pixel in an image.

PSF consists of a phosphor coated on top of a plate in which latent image is formed after x-ray exposure. Latent image is converted to a digital image by scanning device through stimulation by laser light. It is also referred to as storage phosphor on the basis of notion that image formation is temporarily stored within the phosphor.
