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UIVA Assignment

of CR And DR

Submitted to #

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Q No 1

ANS:-

Digital

Subtraction Angiog

raphy:- (DSA):-

→ it is a fluoroscopic technique used extensively in interventional radiology for visualising blood vessels.

→ Radiopaque structures such as bones are eliminated (~~or subtracted~~) digitally from the image thus allowing for accurate depiction of the blood vessels.

→ images are produced using contrast medium by subseq/ subtracting a "pre-contrast image" or mask from subsequent images, once the contrast medium has been introduced into a structure.

HISTORY:-

Subtraction angiography was first described in 1935 and in English sources in 1962 as a manual technique.

→ it is practical available in 1970s

INDICATION:-

There are numerous indication for Angiography and there

number has been on the rise ever since interventional radiology has been shown to successfully supplant many open vascular procedures

- Arterial stenting
- arterial balloon angioplasty
- Endovascular aneurysm repair
- thrombolysis

Contraindication:-

- Renal insufficiency
- Hypersensitivity to iodinated contrast media

Pre procedural

evaluation:-

Patient evaluation should include

But is not limited to

- Renal Function Status
- Medication
- Presence of Atherosclerotic
- Diabetes
- Allergies to iodinated contrast media

Positioning:

The patient can be positioned with their head on either end of the bed to facilitate convenience of vascular access and for the interventional radiologists.

→ The Angiography suite must be equipped with a crash cart and monitoring equipment.

Equipments:-

- Fluoroscopic Unit-
- consist of C-arm unit that can rotate axially and sagittally around the floating top table-
- Collimators
- Filters
- Pulsed Fluoroscopy with a variety of frame rates for close reduction
- Road mapping and land marking-
- masks

Technique:- (DSA):-

- it is used to produce images of the blood vessels without interfering shadows from overlapping tissues-

→ Proton Density Steady State view of the vessels.

→ lower dose of contrast medium are used.

→ First the non contrast image (mask image) of the region is taken to show only the anatomy.

→ It is done before the contrast is injected.

→ To see any vascular space or region bodies (surgical clips, stents, etc)

→ When contrast material is being injected.

→ Contrast images are taken in a succession.

→ The mask image is then subtracted from the contrast images pixel by pixel.

The resulting subtraction images show the filled vessels only.

→ Recording can continue to provide a sequence of subtracted images based on the initial mask.

→ The subtraction images can be viewed in real time.

Procedural technique:-

→ The patient lies on the angiography table

→ Local anaesthesia is administered at the intended puncture site

→ In certain procedure general anaesthesia is performed (Cerebral Angiography).

→ The Seldinger technique is used to gain access to a blood vessel.

→ Standard access kit includes a straight 18g needle and 0.35 guide wires.

→ Ultrasound is often used for visualizing the vessel in real time.

→ For puncture

→ On procedure completion, haemostasis is applied to the puncture site.

Care:-

= Patient should be immobilised for 4-6 hours and keep on supine position.

→ Frequent observation should be done to look for puncture site haematomas, this is the commonest complication.

Complication:-

Local = complication:-

- Thrombus formation
- Local tissue damage
- From the puncture site:-
- Arteriovenous fistula

Systemic Complication:-

- Air embolism
- Thromboembolism
- Contrast mediated nephrotoxicity.
- Vessel dissection.



Q No 2

ANS:- Common

Artifacts in DR:-

→ There are three
Common Artifacts
of DR which are as
follow

(1) Image Receptor artifacts

(2) Software artifacts

(3) object Artifacts-

d) image Receptor

Artifacts:-

image
receptor Artifacts can
occur when digital
receptor

is suffering from rough handling, scratching or dust particle.

→ Artifacts produce is corrected easily with proper cleaning unless the dust is internal to optics of a CR imaging system.

→ Dust on any section of CR optical path cannot be corrected by technologists, and will require professional service.

How to Avoid it:-

→ To avoid the image receptor artifacts the following things may done.

→ Avoid the IR from dust

→ Avoid from worse
Handling means handle
it with care.

Software artifacts

→ Digital Radiographic
image obtain as raw
data set.

→ For processing image
are manipulated into
for presentation.

→ Image that the radiologic
technologists can use
for QC and for
interpretation by radiologists

→ Before image is prepared
for processing several
manipulation is necessary
to correct potential artifacts
because of dead pixels

or dead rows or column
of Pixel-

How to Avoid it

Avoid dead Pixel

Avoid rows and column
of Pixel

→ it can be corrected by
flat fielding.

it is a software correction
which is used to equalized
the response of each pixel
to a uniform x-ray
beam.

→ Interpolation.

(3) object artifacts!

This
type of error ~~error~~ arise
from the technologists in
Patient Positioning, x-ray

Beam and histogram Selection.

→ Lots of scattering material present behind image receptor. So Back Scatter radiation can cause a phantom image.

⇒ Image Histogram:

→ It is very important for digital image production.

→ A histogram is a graph of frequency of occurrence versus digital value intervals.

How to Avoid object Artifacts:

→ The most important things to avoid ~~the~~ ^{the} object artifacts

Those technologists which is not professional -

→ The technologists must correct the position of Patient

→ To correctly using x-ray Beam

→ Correctly selection of history histogram will be required

→ All this should be avoided by technologists

→ technologists should be avoid their error -



Q No 3

Disadvantages

of DR:-

Ans:-

Following are the disadvantages of Digital radiography-

(1) Spatial resolution:-

The spatial resolution of DR image recording system is lower than that of film screen image recording system. However the impact of such spatial resolution on clinical performance is not significant.

(2) COST:-

Digital radiography have

high cost depends upon
manufacture and features-

(3) Artifacts :-

→ Unique to CR and
DR can be introduced
in digital image acquisition
and in retrieval process.

4 Technology changes :-

→ System may become
absolute and no longer
has support.

(5) Dose Creep

Exposure latitude is
wide, high exposure
technique may be used
which increase patient
radiation dose which is
called dose-creep.

This can be reduced
by exposure indicator.

or exposure index which gives the user feedback about actual dose

- 6 → Any exposure to radiation no matter how small has the potential to cause harmful biological changes
- And can cause permanent damage of living cells and tissue
 - Genetic mutation
 - Can cause cancer critical organ like
 - Skin
 - Lense of eye
 - Bone marrow
 - Thyroid Gland

- 7 → Digital radiography is a form of x-ray imaging where digital sensors are used instead of traditional photographic film.

8 → There is ~~no~~ also
Tendency for Loziness
and poor collimation
knowing. This will be
Corrected during Process
Radiation safety and
abduct on exposure index
including more required
in collimation field can
lead to inadequate
exposure index.

9 → The ability to magnify
images means there is
Potential risk for over
interpretation.

10 No availability of Post
processing function

11 Disadvantage of DR
in Dentistry are lack
of ~~form~~ familiarity to
radiologist and radiographer

12 → More expensive than
Screen Film Radiography

13 → increased sensitivity
to scatter radiation.

14 Artifacts due to image
plate, image processing
algorithm etc.

(15) Training and Learning

CURVE :-

→ must learn machinery,
technology and positioning

→ must still adhere to
good technique for
acquiring images.

16 The disadvantage of DR
in Dentistry is cross
infection control, Reduce
sensor dimension, And
Cost -

Q No 4

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,
with the aid
of magnifying
glass

These radiograph
can be viewed
on a monitor
or printed
on film

Spatial resolution

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 DR

In conventional radiography high image contrast (a less difference between gray scale) is ~~invariably~~

Spatial

resolution is better in digital radiography by an order

compared with film screen.

→ in digital radiograph it is possible to display an image with wide latitude while preserving high image contrast

associated
with a narrow
latitude (allow
number of
grey steps

The independent
relationship
between contrast
and latitude

image Quality Radiographic Faults

many film
faults are
caused by
over and
under exposure

→ over exposure
under exposure
also reduce
the quality
of DR

and under
development

but over processing
rebound artifacts

→ error including
film fogging
exclamation
marks, stamp
mark

Quantum mottle
and tissue chop-
out are unique
to DR

dirt and
screen artifact

these can
interfere
with interp-
relation of
film

Date _____

Day M T W T F S

The development time, length process lower the quality of film screen radiography

immediate development with short process increase the image quality in DR

Digital radiography can be valuable and affordable imaging technique that can offer some advantages over conventional radiography.

→ There for, the digital radiography is superior than screen film radiography.

Q Nos

Difference:

Digital
image receptor

Conventional
image
Receptor

(1) The digital receptor is the device that intercepts the x-ray beam after it has passed through the patient's body and produces an image in digital form.

The conventional image receptor is the cassette containing intensifying screen and film.

(2) The radiation response of digital image receptor is greater than screen film.
(2400)

The radiation response of conventional image receptor is small than digital image receptor.

3 it has high sensitivity for radiation

it has low sensitivity for radiation

(4) it has much wider dynamic range

it has limited dynamic range

(5) it converts the image into digital form

it cannot convert the image into digital form

(6) it is pixel limited

it does not have pixel

6) The digital image receptor response is linear

The screen film receptor response is curve

7) it is small in size

it is large in size

8) it absorbs more ~~and~~ x-rays

it absorbs less x-rays

9) it has four decades of radiation response

it has three decades of radiation response

10) The image receptor in DR is charged electronic device.

The image receptor of conventional film-screen is photosensitive phosphor plate-

11 The latent image in DR is recorded on the electronic device.

The latent image in conventional is formed in sensitivity centre (Silver Halide crystal)

12 The image is stored in in pixel

The image is stored in PSP screen

The

END