**Iqra National University Peshawar**

**Online exam 2020**

**Paper no (3)**

**Paper (CT SCAN)**

**I’d (14075)**

**Total question (5)**

**Total answer (5)**

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**Q No3** what are the symptoms of an idiosyncratic reaction to contrast media? What are symptoms of chemotoxic reaction? into which category do the delayed reaction belong?

Ans

Idiosyncratic reaction;

Symptoms;

* Flushing, metallic taste in month, nausea, seezing, cough and tingling are common and related to dose and speed of injection.
* Perineal burning, a desire to empty the bladder or rectum and a spurious feeling of having been incontinent of urine are more common in women.
* Urticaria
* Angioneurotic oedema Most commonly effect the face.
* Rigors
* Necrotizing
* Bronchospasm
* Non-cardiogenic pulmonary oedema
* Arrhythmias
* Hypotension
* Abdominal pain
* Delayed-onset reaction-rashes, headaches, itching and parotid gland swelling.

Symptoms of chemotoxic reaction;

Chemotoxic reaction are matching of chemicals, properties of radiocontrast agent,

* It depends upon dose and infusion rate.
* Such as arrhythmias, seizure, nausea, renal, toxicity, hypotension.
* Delayed hypersensitivity rection to contrast media are those reaction that showed between 1 hour and 7 days after the intate of contrast media.

**Q No 2** list the qualities of an IV access sites that would make it ideal for administrating contrast media?

Ans IV access site

1. Cubital fossa;

* Median antecubital, cephalic and basilic veins.
* Median antecubital, cephalic and basilic veins are easy to hit and tend to last quite well if splinted properly.
* These veins are the preferred sites for insertion of percutaneous central venous catheter.
* These should be avoided unless absolutely necessary in any infant likely to need long term IV therapy/

1. Leg;

* Saphenous vein at the knee.
* The saphenous vein runs just behind the medial aspect of knee and as it curves around the top of the tibia. Access is easily and lost well if properly splinted.

1. Foot;

* Dorsal arch
* Dorsal arch vein is small but easily cannulated and last surprisingly well.
* The vein on the lateral aspect, running below malleolus is easy to access.
* But must be splinted carefully and watches for infiltration.

1. Head;

* Dorsal arch vein
* Dorsal arch veins are best seen on the back of the hand but are usually larger and easier to see and palpate over the back of the wrist.
* Skin entry should be more distally.
* IV inserted here are easily splinted and any infiltration easily spotted, so these vines are the performed sites.

**Q No 1** Describe the three general phases of tissue enhancement?

ANSWER:

GENERAL PHASES OF TISSUE ENHANCEMENT:

* General phases of tissue enhancement is predominantly determined by the rate at which the contrast material is delivered and the time that elapses from the start of the injection and when scanning is initiated.
* The phases are compared by the arteriovenous iodine difference (AVID).
* There are three general phases of tissue enhancement that are discussed in CT.

1. The bolus phase(arterial)
2. The non-equilibrium phase (venous)
3. The equilibrium phase (delayed)

THE BOLUS PHASE:

* The bolus phase is that at which immediately follows a contrast injection means an IV bolus injection.
* In bolus phase arterial structures are filled with contrast and venous structures aren’t yet.
* It is characterized by an attenuation difference of 30 HU or more Hounsfield Units between the inferior vena cava (IVC) and aorta.
* In this phase arterial structures are filled with contrast medium and brightly displayed on the image.
* This phase is also called arterial phase.
* CT angiography images are taken in this phase.

ORGANS ENHANCED DURING BOLUS PHASE:

* Most organs that have an arterial blood supply:

PACREAS:

* 5-15 sec after peak aortic enhancement.

KIDNEY:

* Peak enhancement is 8-120 sec after injection, and will also excrete contrast.

LIVER:

* Liver has dual blood supply, portal venous scans occur 60 sec after a bolus injection.

BRAIN SCANNING DURING BOLUS PHASE:

* It is done for metastases and peripheral nervous system tumours.
* Enhancement is due to disruption in the BBB injection rate is of no importance.
* Scan delay is about 4 mins or longer.
* CT angiography or brain perfusions scenes must follow routine protocol injections which is done for strokes.

THE NON-EQUILIBRIUM PHASE:

* The second phase is the non-equilibrium phase.
* It follows the arterial or bolus phase and is characterized by a difference of 10-30 HU AVID>
* Contrast agent is still brighter in the arteries than the parenchyma of organs but now venous structures are opacified.
* It is also called venous phase.
* This phase begins approximately 1 min after the start of the bolus injection and lasts only a short time, approximately 1 min which depends on volume and flow rate of injection.
* Most routine images are taken while contrast is in the non-equilibrium phase.

THE EQUILIBRIUM PHASE:

* The last phase of tissue enhancement is the equilibrium phase which follows an intravenous (IV) injection of contrast medium.
* This phase is also called delayed phase.
* It can starts as early as 2 mins after bolus injection or phase.
* In this phase a larger amount of contrast media is emptied from the arteries and greatly diluted from the veins and has soaked the organ parenchyma.
* It is characterized by an attenuation difference between the aorta and the inferior venacava of less than 10HU.
* This phase is the worst or poor phase for liver scans.
* Compared with non-contrast exams the visualization of tumors in the liver is improved in both the bolus and non-equilibrium phase but not in the equilibrium phase.

TIME FACTORS FOR THREE PHASES:

PHARMACOKINETIC:

* Dose

PATIENT:

* It includes:
* Age
* Cardiac output
* Body habitus

EQUIPMENT:

* Depends on:
* System speed

Describe how a patient can be positioned so that data can be acquired of the head in the coronal plane?

ANSWER:

* There are two methods of getting or achieving coronal position for head scanning

PATIENT POSITIONING:

FIRST METHOD:

* One method is that to place the patient prone on the scanning table.
* Then after this ask the patient to extend their chin forward.

SECOND METHOD:

* An another way is to place the patient supine and ask the patient to drop his head back as far as possible.
* This position also requires a special head holder to prevent patient from head moving.
* If the patient cannot extend his/her neck fully then the gantry may be angled to get or obtain more coronal plane.
* The image that obtained in either prone or supine, the coronal position is essentially the same.

QUESTION NO 6:

**Q No 5** Describe the appearance of intracranial hemorrhage on the CT image?

ANSWER:

* CT is the most frequently used initial examination for imaging of intracranial hemorrhage (ICH).

APPEARANCE OF INTRACRANIAL HEMORRHAGE ON CT IMAGE:

* The appearance of intracranial haemorrhage will change with time to time or with the passage of time.
* This is because the red blood cells present in the haemorrhage begins to degenerate within several hours after leaving the vasculature.
* As a general rule intracranial haemorrhage will appear hyperdense to normal brain tissue for approximately 3 days, after which its density will gradually decrease.
* This density loss begins at the periphery of the hematoma.
* As density decreases, portions of the hematoma become isodense to brain tissue.
* This continuously loss of density continues until the whole hematoma will finally become hypodense to brain tissue.
* Intracranial haemorrhage can be expected to appear hyperdense from onset to 3 days.
* From 4 to 10 days it contains a hyperdense centre surrounded by concentric areas of hypodense tissue.
* From 11 days to 6 months it is likely to contain an isodense centre surrounded by areas of hypodense tissue.
* By 6 months the intracranial haemorrhage will be hypodense to brain.
* Although most patients of intracranial haemorrhage are seen through the emergency department where images are reviewed by radiologists and reported on quickly.

**Q NO 4:**

When performing a CT study of the brain, what effect will moving the patient’s chin up or down have?

ANSWER:

EFFECTS:

* When CT study of brain is performing the angle of slice or slice angle is obtained by the position of gantry.
* During procedure if the patient chins up or down, it will produce motion artifacts.
* The patients chin up or down have also make image noisy and the image will be rough and noisy.
* The slices of the brain is parallel to the supra orbital meatal line reduce the radiation exposure to reach the lens of the eye.
* Sometimes for routine brain imaging axial techniques are used.
* A disadvantage of more multidetector CT system is to be tilted when there is helical mode.

QUESTION NO 2:

List the qualities of an IV access site that would make it ideal for administrating contrast media?

ANSWER:

* Adequate vascular access is required for the management of patients with trauma to provide a route for medications, resuscitative fluid, as well as intravenous contrast for diagnostic procedures.

IV ACCESS SITES:

1. HAND:

DORSAL ARCH VEINS:

* Dorsal arch veins are best seen on the back of the hand but are usually larger and easier to see and palpate over the back of the wrist.
* IVs inserted here and easily splinted and any infiltration are spotted easily.

CEPHALIC VEIN :

* The cephalic vein is often quite large and can often be felt better than it can be seen.
* Cannulas in this position tend to last quite well, making this a good secondary site.
* It can be used for insertion of percutaneous central venous catheters.

1. WRIST:

VOLAR ASPECT:

* Veins are easily seen on the volar side of the wrist.
* They are usually quite small and fragile and whlist easily cannulated, do not last well.
* They are useful secondary sites but must be carefully watched when noxious substances are infused, as they are prone to burn.

1. CUBITAL FOSSA:

MEDIAN ANTECUBITAL, CEPHALIC AND BASILIC VEINS:

* Median antecubital, cephalic and basilica veins are easy to hit and tend to last quite well if splinted properly.
* These veins are the preferred sites for insertion of percutaneous central venous catheters.

1. FOOT:

DORSAL ARCH:

* Dorsal arch veins are small but easily cannulated and last surprisingly well.
* The vein on the lateral aspect, running below malleolus, is easy to access but must be splinted carefully and watched for infiltration.

SAPHENOUS VEIN, ANKLE:

* The saphenous vein runs just anterior to medial malleolus and is large and straight.
* It is easy to access and lasts well although is not always readily visualized.
* These veins are also good sites for insertion of percutaneous central venous catheters and should again be avoided in an infant likely to need long term IV access.

1. LEG:

SAPHENOUS VEIN AT THE KNEE:

* The saphenous vein runs just behind the medial aspect of the knee and is often visible behind the knee and as it curves around the top of the tibia.
* Access is easy and lasts well if properly splinted.
* This vein is a good site for the insertion of percutaneous central venous catheters and should be avoided if possible, in any infant likely to need long term IV access.

1. SCALP:

SUPERFICIAL TEMPORAL VEIN:

* The superficial temporal vein runs anterior to the ear and is accessible over a distance of 5-8 cm in most babies and lasts well if secured appropriately.
* This vein is also a good site for the insertion of percutaneous central venous catheters and should be avoided if possible in infants likely to need long term IV access.