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Q1: Which contrast is ideal for IV administration? What are its favourable characteristics to be used as IV contrast?

Ans: IODINATED CONTRAST AGENTS:

The non-ionic dimers are the most ideal contrast agent intravenous administration. As they are very less toxic and delivers more iodine with the least effect on osmolality.

Almost all radiological procedure are performed with the injected contrast agent which involve the administration of the iodine-containing compounds.

Using those compound that are iodine containing are related with low toxicity and have great radio-opacity.

There are also some characteristic by which this contrast media is considered much better then the compound with higher atomic number.

It is from the intravenous contrast media which contain iodine and enhances the visibility of the vascular organ and structure during radiographic examination. There are some pathologic which have improved visibility upon using an iodinated contrast, such as cancer.

Iodinated contrast media are differentiated in:

- **Ionic contrast agents:**
    1. Ionic dimer.

2. Ionic monomer(high-osmolar contrast media)

- **Nonionic contrast agents:**
    1. Nonionic dimer (low or iso-osmolar contrast media)
    2. Nonionic monomer (low-osmoalr contrast media)

CHARACTERISTIC:

It is given by the intravenous route because of the following characteristics.

- It highlight blood vessels
- It enhance the tissue structure of organ
- It spread throughout the body easily
- Immediately after injection, the contrast agent begins to diffuse directly into the water and extravascular space
- Adverse effect of these contrast media are usually mild or self-limiting
- Maximizing the clinical benefits
- Intravenously contrast media are commercially available at a wide range

Q2: How is venography performed? Explain in detail

ANS: VENOGRAPHY:

Venography (also called phlebography or ascending phlebography) is a procedure in which an x-ray of the veins, a venogram, is taken after a

special dye is injected into the bone marrow or veins. The dye has to be injected constantly via a catheter, making it an invasive procedure.

Venography is an x-ray examination that uses an injection of contrast material to show how blood flows through your veins. Your doctor may use it to find blood clots, identify a vein for use in a bypass procedure or dialysis access, or to assess varicose veins before surgery.

Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, medications you're taking, and allergies, especially to iodinated contrast materials. You may be instructed to not eat or drink anything several hours before your exam. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown.

Common Uses of Procedure:

A venogram is commonly used to:

- assess the status of a vein or system of veins
- find blood clots within the veins
- assess varicose veins before surgery
- find a vein in good condition to use for a bypass procedure or dialysis access
- help a physician place an IV or a medical device, such as a stent, in a vein
- guide treatment of diseased veins.

Patient Prepare:

Other than medications, your doctor may tell you to not eat or drink anything for several hours before your procedure.

You may be allowed to drink clear liquids on the day of your procedure.

You should inform your physician of any medications being taken and if there are any allergies especially to iodinated contrast materials. Also inform your doctor about recent illnesses or other medical conditions.

Equipment:

The equipment typically used for this examination consists of a radiographic table, one or two x-ray tubes and a television-like monitor that is located in the examining room. Fluoroscopy, which converts x-rays into video images, is used to watch and guide progress of the procedure. The video is produced by the x-ray machine and a detector that is suspended over a table on which the patient lies.

Other equipment that may be used during the procedure includes an intravenous line (IV), ultrasound machine and devices that monitor your heart beat and blood pressure.

Procedure Work:

X-rays are a form of radiation like light or radio waves. X-rays pass through most objects, including the body. Once it is carefully aimed at the part of the body being examined an x-ray machine produces a small burst of radiation that passes through the body recording an image on photographic film or a special detector.

Different parts of the body absorb the x-rays in varying degrees. Dense bone absorbs much of the radiation while soft tissue, such as muscle, fat and organs, allow more of the x-rays to pass through them. As a result,

bones appear white on the x-ray soft tissue shows up in shades of gray and air appears black.

Procedure Performed:

This examination is usually done on an outpatient basis.

A venogram is done in a hospital x-ray department.

A venogram is performed in the x-ray department or in an interventional radiology suite, sometimes called special procedures suite.

You will lie on an x-ray table. Depending on the body part being examined (e.g., the legs), the table may be situated to a standing position. If the table is repositioned during the procedure- you will be secured with safety straps.

The physician will insert a needle or catheter into a vein to inject the contrast agent. Where that needle is placed depends upon the area of your body where the veins are being evaluated. As the contrast material flows through the veins being examined- several x-rays are taken. You may be moved into different positions so that the x-rays can take pictures of your veins at different angles.

After the Procedure:

You will be asked to remove some of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, removable dental appliances, eye-glasses and any metal objects or clothing that might interfere with the x-ray images.

You will feel a slight pinch when the needle is inserted into your vein for the IV line and when the local anesthetic is injected. Most of the sensation is at the skin incision site. This is numbed using local anesthetic. You may feel pressure when the catheter is inserted into the vein or artery. However, you will not feel serious discomfort.

As the contrast material passes through your body, you may feel warm. This will quickly pass.

Veins cannot be seen on an x-ray; therefore, an iodine-based contrast material is injected through an IV line into veins to make them visible on the x-ray.

A venogram takes between 30 and 90 minutes to perform. Fluids will be run through your IV to remove the contrast material from your veins. You will also be instructed to drink a lot of fluids for the next day. After the catheter is removed, a bandage will be placed on the IV site. Then you will be observed for any signs of complications, such as bleeding from the injection site, infection or an allergic reaction.

Result:

A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will analyze the images and send a signed report to your primary care or referring physician, who will discuss the results with you.

Follow-up exams may be needed. If so, your doctor will explain why. Sometimes a follow-up exam is done because a potential abnormality needs further evaluation with additional views or a special imaging technique. A follow-up exam may also be done to see if there has been any change in an abnormality over time. Follow-up exams are

sometimes the best way to see if treatment is working or if an abnormality is stable or has changed.

Possible Risks:

- There is a very slight risk of an allergic reaction if contrast material is injected.
- In rare cases, a venogram can cause a deep vein thrombosis (blood clot).
- Any procedure that places a catheter inside a blood vessel carries certain risks. These risks include damage to the blood vessel, bruising or bleeding at the puncture site, and infection. The doctor will take precautions to mitigate these risks.
- There is always a slight chance of cancer from excessive exposure to radiation. However, the benefit of an accurate diagnosis far outweighs the risk.
- The effective radiation dose for this procedure varies. See the Radiation Dose in X-Ray and CT Exams page for more information about radiation dose.

Because children are more sensitive to radiation exposure than adults, equipment and procedures will be monitored in order to deliver the lowest possible dose to young patients.

Q3: What is loopogram? Explain

Ans: Loopogram:

Those with a stoma could possibly have one of these carried out. The loopogram is carried out to primarily ascertain any issues you may be having with your stoma, i.e. blockages, scar tissue or chronic inflammation for those of us with IBD.

I had one of these carried out in May of last year and I completely forgot to blog about the ins and outs of the procedure itself.

Loopogram Procedure:

- Fluoroscopic imaging is done with a contrast called X-ray Dye.
- The contrast Dye show up on the image and allows the radiologist to clearly see and check the internal organs.

1. Patient lies supine on the examination table.
2. The stoma bag will be removed.
3. The radiologist will clean the urostomy stoma and insert a catheter.
4. Contrast (x-ray dye) will be injected through the catheter and several images will be taken.
5. This exam usually takes about 30 minute to 1 hour.

After the Procedure:

You will need to put on a new stoma bag and off you go. You may experience a bloated feeling as the bowel is distended with contrast during the procedure, but it should not be painful. Minor bleeding can occur from the sinus/fistula. The risk of infection is small. You will normally get the results about two to four weeks after the procedure.

I hope this is a help for those who may be requiring this procedure.

Loopogram Examination Show:

- Show the examination shows:
  - Kidneys
  - Ureters
  - Ileum(the loop of bowel that the ureters are now attached to)
  - Stoma(the opening on the outside of your abdomen)

- It is done to ensure that the conduit and surrounding organs are functioning efficiently.

- ❖ This procedure is also known as lleal conduitogram and lleal loopography.

Benefits:

This examination will help your doctor to make a correct diagnosis about your treatment.

Associated Risks:

It is an x-ray procedure, so there are some risks associated with radiation. But the radiation should be kept as minimum as possible.

Q4: What is the role of Radiologic technologists in performing fluoroscopic procedures?

Ans: **Radiologic Technologists Perform**

Explaining procedures to patients and answering questions.

Preparing equipment for use as needed.

Preparing examination rooms for patient exams.

Positioning patients for imaging exams.

Monitoring patients during exams.

Documenting information with computers.

Reporting important information to the physician.

Ensuring safety of patients during exams.

Producing diagnostic images of soft tissues.

Using sound waves to obtain images of organs and tissues in the body.

Administering targeted doses of radiation to the patient's body to treat cancer or other diseases.

Fluoroscopic Procedure:

Technologist is responsible for the following parts of the medical imaging procedure:

Reviewing the patients clinical history to ensure the proper imaging procedure has been ordered.

Preparing the patient for the procedure

Selecting the proper imaging equipment and associated accessories.

Positioning patients to best demonstrate the anatomy of interest.

Immobilizing patients as necessary.

Preparing and administering medications, such as contrast agents, prescribed by a licensed practitioner.

Determining the radiographic exposure technique, while applying principal of radiation protection to the patient and staff.

Q5: What are catheters and guidewires? Why and how are they used? What are their types?

Ans: Catheters:

Catheter is a thin tube made from medical grade materials serving a broad range of functions. Catheters are medical devices that can be inserted in the body to treat diseases or perform a surgical procedure. By modifying the material or adjusting the way catheters are manufactured, it is possible to tailor catheters for cardiovascular, urological, gastrointestinal, neurovascular, and ophthalmic applications.

Catheters can be inserted into a body cavity, duct, or vessel. Functionally, they allow drainage, administration of fluids or gases, access by surgical instruments, and also perform a wide variety of other

tasks depending on the type of catheter.[1] The process of inserting a catheter is "catheterization". In most uses, a catheter is a thin, flexible tube ("soft" catheter) though catheters are available in varying levels of stiffness depending on the application

TYPES:

Angiographic catheters:

•Used for diagnostic and therapeutic invasive intra-vascular procedures.

•Are of various shapes and tip configurations

•Usually have one end-hole for selective injections

•Usual size: 2Fr – 8Fr

Drainage catheters:

•Used for percutaneous drainage of fluid/collections

•Usual shape is straight tip or “pigtail” or a mushroom (Malecot).

•Usually have multiple holes in the “pig” for optimal drainage

•Usual size: 6Fr to 32Fr

Angiographic catheters:

• usually made of plastic (polyurethane, polyethylene, Teflon, or nylon)
• exact catheter material, construction, coatings, inner diameter, outer diameter, length, tip shape, side -hole pattern, and end -hole dimensions are determined by the intended use

• Diameter is outer size described in French gauge (3F = 1 mm) and inner lumen is in hundredth of an inch

• Length described in centimeters (usually between 65 and 100 cm)

• usually have fine metal or plastic strands incorporated into the wall ("braid") which enables the catheter tip to be responsive to gentle rotation of the shaft

Microcatheters:

• Small catheters (3F or smaller outer diameter) that are specially designed to fit coaxially within the lumen of a standard angiographic catheter

• Soft and flexible; typically 2F to 3F in diameter, with 0.010 - to 0.027 - inch inner lumens

• Advanced over specially designed 0.010 - to 0.025 -inch guidewires

• Designed to reach far beyond standard catheters in small or tortuous vessels (super -selective position & procedures)

• Technologically advanced with wide range of characteristics, such as stiffness, braiding, flow rates, and hydrophilic coatings

• The small inner lumen and long length result in a high resistance to flow ◊ not used for routine angiography.

• Contrast and flush solutions most easily injected through these catheters with 3 - mL or smaller Luer -Lok syringes.

Guide catheters:

• Class of catheters designed to make selective catheterization and interventions easier

• Used in some situations to help position and stabilize standard catheters

• They are non -tapered catheters with extra -large lumens and a simple shape that accepts standard -sized catheters and devices.

USES:

Placement of a catheter into a particular part of the body may allow:

- urinary catheter: draining urine from the urinary bladder as in urinary catheterization, e.g., the intermittent catheters or Foley catheter or even when the urethra is damaged as in suprapubic catheterisation.[2]
- drainage of urine from the kidney by percutaneous (through the skin) nephrostomy
- drainage of fluid collections, e.g. an abdominal abscess
- pigtail catheter: used to drain air from around the lung (pneumothorax)
- administration of intravenous fluids, medication or parenteral nutrition with a peripheral venous catheter
- angioplasty, angiography, balloon septostomy, balloon sinuplasty, cardiac electrophysiology testing, catheter ablation. Often the Seldinger technique is used.
- direct measurement of blood pressure in an artery or vein
- direct measurement of intracranial pressure
- administration of anaesthetic medication into the epidural space, the subarachnoid space, or around a major nerve bundle such as the brachial plexus
- administration of oxygen, volatile anesthetic agents, and other breathing gases into the lungs using a tracheal tube
- subcutaneous administration of insulin or other medications, with the use of an infusion set and insulin pump
- A central venous catheter is a conduit for giving drugs or fluids into a large-bore catheter positioned either in a vein near the heart or just inside the atrium.

- A Swan-Ganz catheter is a special type of catheter placed into the pulmonary artery for measuring pressures in the heart.
- An embryo transfer catheter is designed to insert fertilized embryos from in vitro fertilization into the uterus. They may vary in length from approximately 150 to 190 mm (5.9 to 7.5 in).

GuideWries:

Guidewires (solid wires navigated within the vascular system / extra-vascular tract) act as a lead point for catheters, allowing operators totraverse along a given vessel / track.

TYPES:

• **Starting guidewires** - used for catheter introduction and some procedures.

• **Selective guidewires** - used to cannulate side branches or cross critical lesions.

• **Exchange guidewires** - are stiffer and used to secure position as devices are passed over the wire.

Guidewires:

Length

•Must be long enough to cover the distance both inside and outside the patient.

•Must also account for access well beyond the lesion, so that access across the lesion will not

be lost intraoperatively.

•Usually varies from 145 to 300 cm.

Diameter

•Vascular catheters are designed with a guidewire port of specific diameter.

•Most procedures are performed with O35 guidewires (0.035 in.).

•Small-vessel angiography requires 0.018–0.014 in. guidewires.

Stiffness and Coating

•Most guidewires have a tightly wound steel core that contributes to body stiffness.

•A surrounding layer of flexible material prevents fracture during use.

•Teflon or silicone coatings are often used to reduce friction coefficient and allow smooth advancement within a vessel.

Tip Shape

•The shape of the guidewire tip often reveals the function of the guidewire.

•Floppy tip wires reduce the potential for vessel injury during access.

•Selective cannulation wires may be employed to traverse bends and curves and may be curved or angled to help the operator steer in a certain direction.

USES:

The guidewire is the device used to guide the catheter into place during CVC insertions. The purpose of a guidewire is to gain access to blood vessels using a minimally invasive technique. It is part of the Seldinger Technique (39) and consists of plastic housing, a straightener-sleeve that facilitates the wire's insertion into the needle hub and a curved J wire at the tip that helps prevent vessel perforation by enabling the wire to "bounce" off vessel walls.

The stylet is used to add stiffness to the catheter during insertion. After placement, the stylet is removed from the catheter.

A stylet is not a guidewire. It is a single straight wire with a hub at one end which is inserted into the catheter prior to placement.

Administering trace amounts of radiopharmaceuticals to a patient to obtain functional information about organs, tissues and bone.

Measuring bone mineral density at a specific anatomical site.