Intravenous and Intra-arterial Injections

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Intravenous injection

- **Diagnostic** - anatomical and functional exploration of an organ:
  - kidney: urography, renal scintigraphy
  - lung: pulmonary scintigraphy
  - phlebography
  - liver: hepatic scintigraphy

- For **therapeutic purposes**: hypertonic solutions, solutions in large quantities (infusions, transfusion of blood derivatives administration).
  - Very good way for the management of shocked patient
  - Not used for administration of suspensions or oil solutions

- **Advantages**:
  - The active substance gets quickly into circulation
  - Full absorption
  - Integral action
  - Injection of hypertonic solutions (which have necrotizing effect on other tissues)
  - Used for anatomic and functional exploration
Routes of administration

- **Superficial veins**: located at the fold of the elbow, forearm, dorsal aspect of the hand or foot (in theory any vein)

- **Deep veins**: femoral, jugular, subclavian vein

  - Syringes with needles 4-5 cm long, thicker, with short and sharp bizou.
  - The air in the syringe is mandatory to be evacuated.
Superficial veins of the upper limb
Superficial veins IV injection technique

- Highlighting the vein: application of the tourniquet and muscle contraction, maintaining latch member position
- Disinfection of the area
- With fingers I, II of the left (nondominant) hand, disinfected in advance, immobilize the vein
- Install the syringe needle (with the bizou upward)
- Enter in an acute angle to the plane of the region (25°), then advance the needle parallel to the skin and puncture the vein (the sensation of “break through into emptiness”).
- Advance the needle into the vein up to the bizou
- When we create vacuum the blood enters into the syringe
- After injection, gently massage the spot (this avoid formation of a hematoma)

- Areas of choice:
  - superficial veins from the fold of the elbow
  - any other superficial vein
I.v. injection times
Jugular vein puncture technique

- **External jugular vein**
  - Most commonly used for infusions in children, pre- and postoperatively in shocked patients
  - The body will be rotated so that the vein will be visible at the posterior border of sternocleidomastoid muscle
  - Aspiration is applied continuously during the insertion of the needle (pay attention to the risk of gas introduction)
Subclavian vein puncture technique

- It is used a long needle - 8cm
  - Puncture site: delto-pectoral groove where it can be identified the first chondro-costal joint
- The patient lies in supine position with the head rotated towards the opposite side
- The needle penetrates obliquely (slightly upward and medial) following the subclavian groove at an angle of 45°.
- Aspiration is applied continuously during the insertion of the needle.
Femoral vein puncture technique

- The groin area is shaved and disinfected
- Identify the femoral artery (pulses to palpation)
- 1 cm medial to the femoral artery, insert the needle and penetrate obliquely upward at an angle of 60-70°, easily aspiring and loading the vein on the needle
- After injection, a moderate local pressure is to be maintained for 2-3 minutes
Incidents and accidents

- Difficulties at puncture (obese patients, thin veins, children, vein sclerosis, collapse) → approach of a deep vein or preparation of a vein
- Parvenous injection: site pain, burning at the injection site, swelling
- Can go up to tissue necrosis → is necessary, in this case, another vein puncture and injection of lidocaine 1%
- Pain on injection: by irritating the endovenous layer → venous spasm → slow injection
- Embolism (gas, fat) → death
- Thrombophlebitis (repeated injections in the same vein)
- Incorrect puncturing:
  - arteries (femoral, subclavian)
  - pleura → subcutaneous emphysema ± fluidopneumothorax
Intra-arterial injection

- **Purpose of exploration**: administration of radiopaque substance (Odiston), radioactive substance (Xe, I)
- **Therapeutic purposes**:
  - Injection of vasodilators substances in arterial disease
  - Antibiotics in the distal infections of the lower limb
- **Injected only by doctors**
- **Elective location** - accessible arteries: femoral, carotid artery, abdominal aorta

- **Arteriography**
  - Using special syringes with special needles and devices, contrast substance is injected with constant flow (the Seldinger technique).
Femoral artery puncture technique

- Hair removal, disinfection of the area
- Disinfection of the left index and medius
- Tracking the femoral artery pulsation, in the groin area, between the two fingers
- Enter, with the needle installed to the syringe, between those two fingers and penetrate the skin perpendicular, then oriented gently upper oblique - light colored blood will enter the syringe.
- After injection the needle is removed and local compression is applied for 10-15 min
Radial artery puncture

Before carrying out the radial artery puncture, Allen test must be performed.

**Allen test:**

- it is used to assess the arterial blood flow at the hand level;
- first the radial and ulnar arterial pulse is palpated by deep compression of the anterior aspect of the forearm;
- the patient is asked to make a fist, then both arteries are compressed firmly between the two thumbs;
- next, the patient will be asked to open the fist and will notice that the palm is pale (the compression on arteries is maintained the whole time);
- the ulnar artery will be decompressed (the compression is maintained on the radial artery); If ulnar artery is patent, the normal hand coloration will be observed in 3-5 seconds;
- then the radial artery will be decompressed (the compression is maintained on the ulnar artery); If radial artery is patent, the palm will become red in seconds cause of the bloodflow;
- by this procedure, the maintenance of paleness after the decompression of one of the arteries indicates an occlusion at that level.
Radial artery puncture technique

- a rolled towel is placed under the patient's wrist to support it
- the artery is localized and palpate the pulse
- the puncture site is disinfected and is expected to dry the place
- the artery is palpate with the index and middle finger of one hand while the other hand is holding the syringe
- for radial artery puncture, the needle is oriented at an angle of 30-45°
- the skin and the arterial wall is punctured by a single motion which will automatically fill the syringe with blood
- after the puncture, compress firmly to stop bleeding (for at least 5 min). The time of compression shall be extended in patients on anticoagulant therapy or with bleeding disorders (10-15 min).
- an adhesive bandage will be attached after the bleeding stops
Aortography: percutaneous injection of abdominal aorta using Dos Santos technique

- The patient is placed in right lateral decubitus.
- Aortic puncture is made at half the distance between VII rib and the iliac crest, in general anesthesia.
- Use a long needle of 12 cm, 1mm in diameter, with short bizou mounted at a 20 ml syringe, the injection being made at an angle of 30°-45° from the sagittal plane.