Al-Mustaqbal University College
Department of anesthesia

Lecture of anesthesia equipment

Teaching by

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Peripheral Venous Cannulation:

Intravenous (IV) cannulation is a common bedside medical procedure. It provides venous access for administration of IV fluid, drug administration, and transfusion of blood products. The procedure may be part of a planned intervention or investigation, or it might have to be carried out in an emergency situation.

In the IV cannulation procedure, a needle is used to gain access to the target vein so that a cannula can be placed. When the cannula is stable, needle is removed, and the cannula is fixed in place so that it cannot slide out.

Usually, an upper extremity like dorsum of hand or forearm is chosen for IV cannulation. The size of the IV cannula varies, depending on the size of patient, the condition of veins, and the purpose for which the IV cannulation is being performed. The larger the cannula size, the faster will be the rate at which fluids can be delivered.

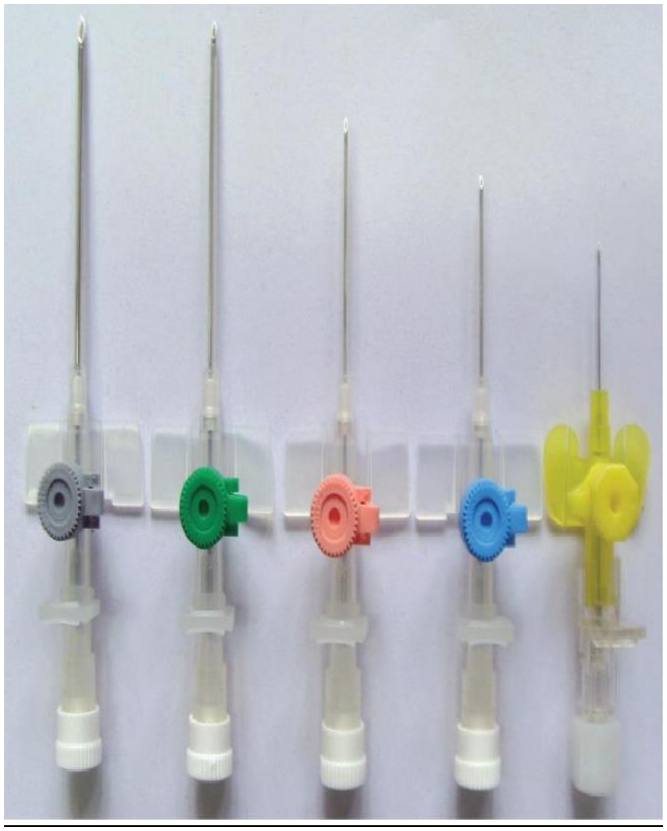
The implications of IV cannulation should not be underestimated. Introduction of a foreign body (i.e. IV cannula) inside any peripheral vein is an invasive intervention and carries infection risks. Hence, an aseptic non-touch technique should be employed throughout the procedure.

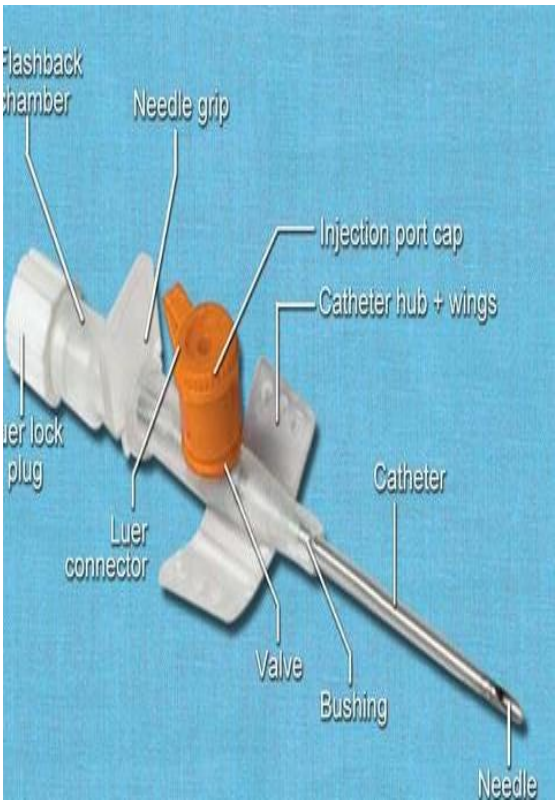
INDICATIONS:

- IV fluid therapy
- IV drug administration
- Transfusion of blood products
- Blood sampling
- IV administration of contrast agents for radiological interventions.

INTRAVENOUS CANNULA: SELECTION OF APPROPRIATE SIZE:

Intravenous cannulae are available in various sizes mentioned as gauge (16–24 G), lengths (25–44 mm), compositions, and designs. the flow rate of an IV cannula is directly proportional to its radius and inversely proportional to its length. In general, the smallest gauge of IV cannula should be selected for any prescribed therapy; in adult patients IV cannula of 18 G or 20 G is the usual choice, while in pediatric patients the usual choice is 22 G or 24 G. However, in emergency situations requiring large fluid volumes to be infused quickly, the largest gauge cannula (14 G or 16G) is used.



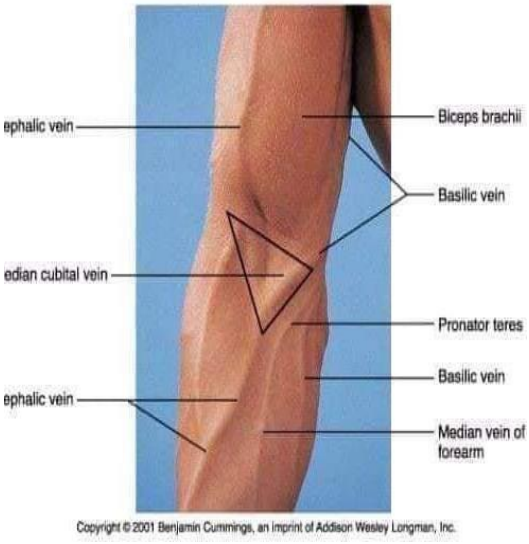


Gauge	Color-code of cannula	Maximal flow rate (mL/minute)
24G	Yellow	13
22G	Blue	31
20G	Pink	67
18G	Green	103
16G	Gray	236
14G	Orange	270

TECHNIQUE OF INTRAVENOUS CANNULATION:

1. Prepare the patient: Explain the procedure to the patient and take informed consent. Consider using local anesthesia.

2. Select site of venous cannulation: Commonly used positions for venous cannulation are the dorsal hand, forearm, or antecubital fossa. Apply a tourniquet proximally and encourage fist clenching to engorge the veins. Look for a straight, wide, "spongy" vein, with no evidence of valves.



3. Clean the site of venous cannulation with alcohol antiseptic and allow it to dry before cannulation.

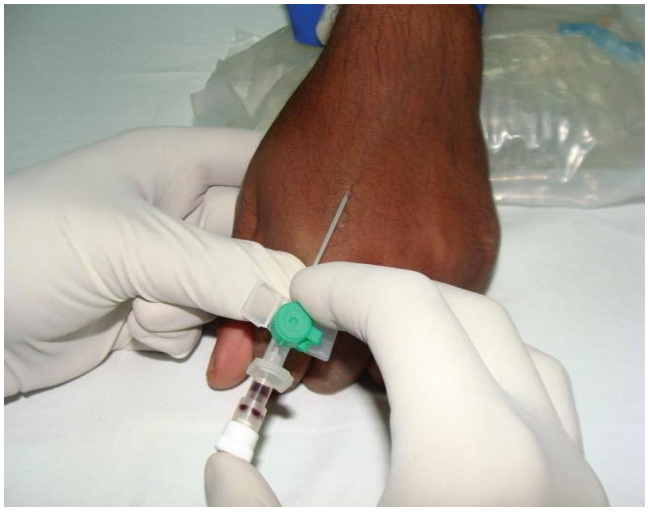
4. Before starting the procedure, warn the patient that there would be "sharp sting".

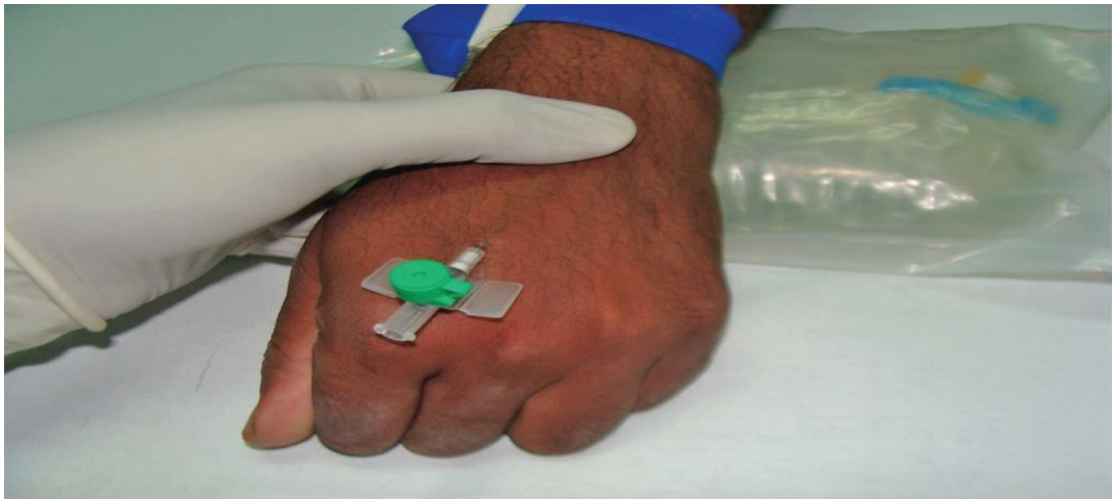
5. Stretch the skin overlying the vein with non-dominant hand and insert cannula with your dominant hand as follows:

- With the bevel facing up, slide the cannula through the skin and into the vein until flashback of blood is seen; this indicates that the needle tip has penetrated the vein**.**

- Advance the cannula a few millimeters further to ensure the catheter as well as needle tip enters the vein; withdraw the needle and advance the cannula inside the vein.

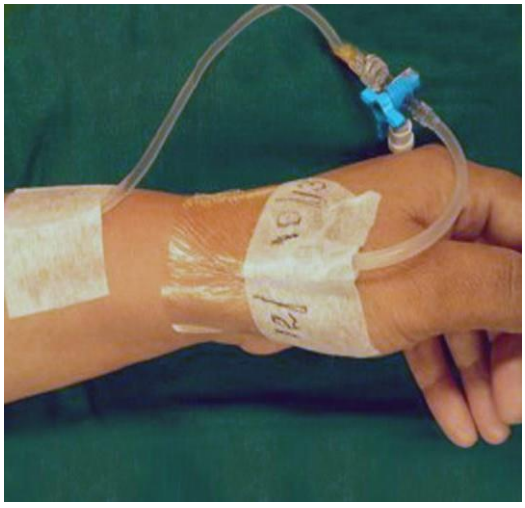
- Apply digital pressure of left thumb over the catheter tip, remove the needle, and put stylet in to the cover of cannula held in non-dominant hand, fix 10 cm extension line at the end of cannula**.**

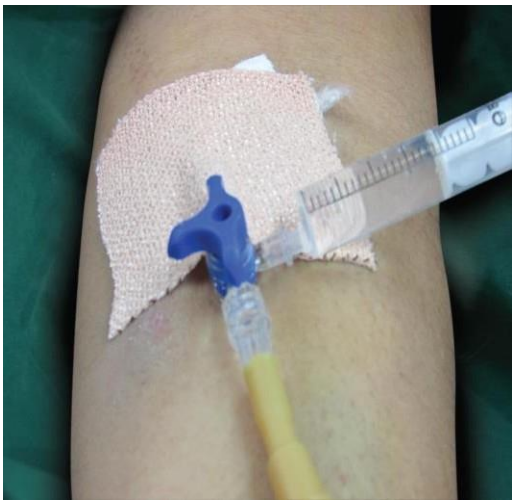




Pull the cannula 1–2 mm backward or downwards and apply sterile and transparent dressing (such as TegadermTM) over the cannula with and write down date of cannulation over the dressing.

Flush the cannula with 0.9% saline to confirm placement, watching for extravasations of fluid.





How to Reduce Incidence of Infection?

• Wipe your hands with antiseptic solution such as spirit, alcohol

• Pull cannula backward or downward to prevent tugging of cannula against wall of vein as it will cause pain while passing of fluid or injecting drug.

• Do not fix the cannula with sticking plaster, Elastoplast® or any unsterile dressing.

• Use extension line instead of bivalve as movements while handling does cause pain during handling or injecting.

METHODS OF REDUCING PAIN ON INTRAVENOUS CANNULATION:

The pain experienced during venous cannulation has both **somatic** and **psychological** components. Pharmacological measures, such as the application of local anesthetics, treat only the somatic component of pain, whereas, attention diverting measures (e.g. cough trick) address only the psychological component of pain.

Two widely acceptable approaches to minimize this pain include application of local anesthetic cream and second is direct intradermal injection of local anesthetic at the site of venous cannulation. A comparison of intradermal injection and local anesthetic cream found them to be equally effective in relieving venipuncture pain.

*Various other methods have been tried to minimize venous cannulation pain with variable success ethyl chloride spray, nitrous oxide inhalation, distraction techniques and “cough trick”

*Pain relief prior to venous cannulation using topical analgesics is a growing practice as healthcare providers strive for a painfree and pleasant hospital stay for patients. EMLA is widely used topical analgesic since the early 1980s. Each gram of EMLA contains 25 mg of lignocaine and 25 mg of prilocaine.

EMLA has its associated disadvantages like delayed onset of action, a potential for complicated venous cannulation due to blanching of the

skin, short duration of action, and risk of methemoglobinemia in children below 1 year of age.

*We recommend performance of Valsalva procedure in adults by blowing into sphygmomanometer tubing as an effective method to reduce the incidence and severity of venipuncture pain.

*We also recommend that inflation of a balloon during venipuncture in pediatric patients reduces both the incidence and severity of venipuncture pain.

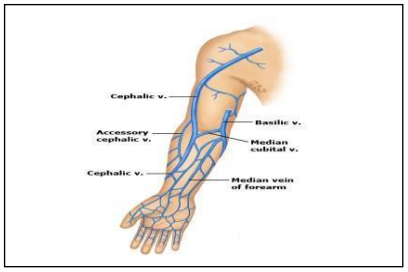
*Diclofenac patch applied at the venipuncture site 1 hour prior to venous cannulation reduces both the incidence and severity of venipuncture pain.

COMMON PRObLEMS ENCOUNTERED IN INTRAVENOUS CANNULATION:

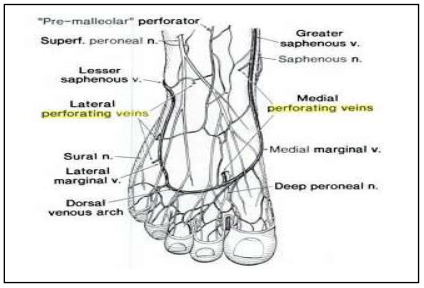
Difficulty in finding vein:

1- A common problem especially in patients after multiple cannulation during prolonged hospitalization; few solutions of this problem are to opt for any of the following alternative sites:

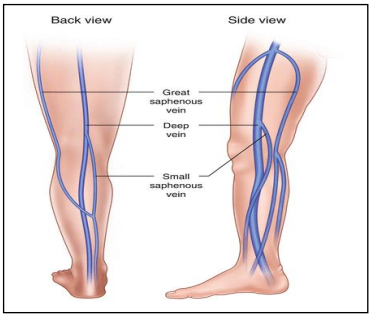
. Ventral forearm



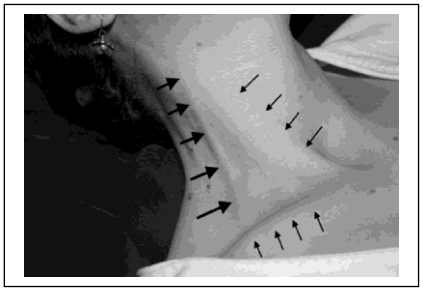
. Feet



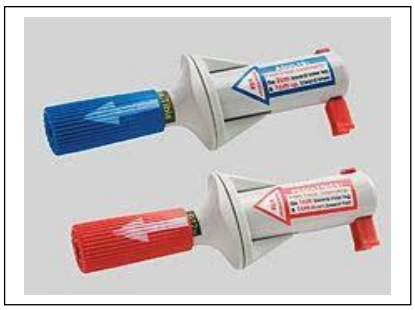
. Long saphenous vein



. Neck



. Intraosseous



2- Hematoma at the site of cannulation: this means that the needle has gone outside through the vein with extravasation of blood into the surrounding tissues

3- Highly mobile vein: Seen in elderly population due to degradation of subcutaneous connective tissue; skin has be fixed tightly in these patients, to immobilize the vein, during cannulation.

4- Venous valve prevents cannula advancement: Valve in the lumen of vein may stop the cannula; cannula can be advanced by flushing the saline through cannula and simultaneously advancing the cannula. The hydrostatic pressure opens the valve and helps the cannula in crossing the valve.

Complications of Intravenous Cannulation

• Pain and induration

• thrombophlebitis

• Infection

• Extravasation of fluids or drugs

• Swelling around the site of venous cannulation due to extravasation of fluids or drugs

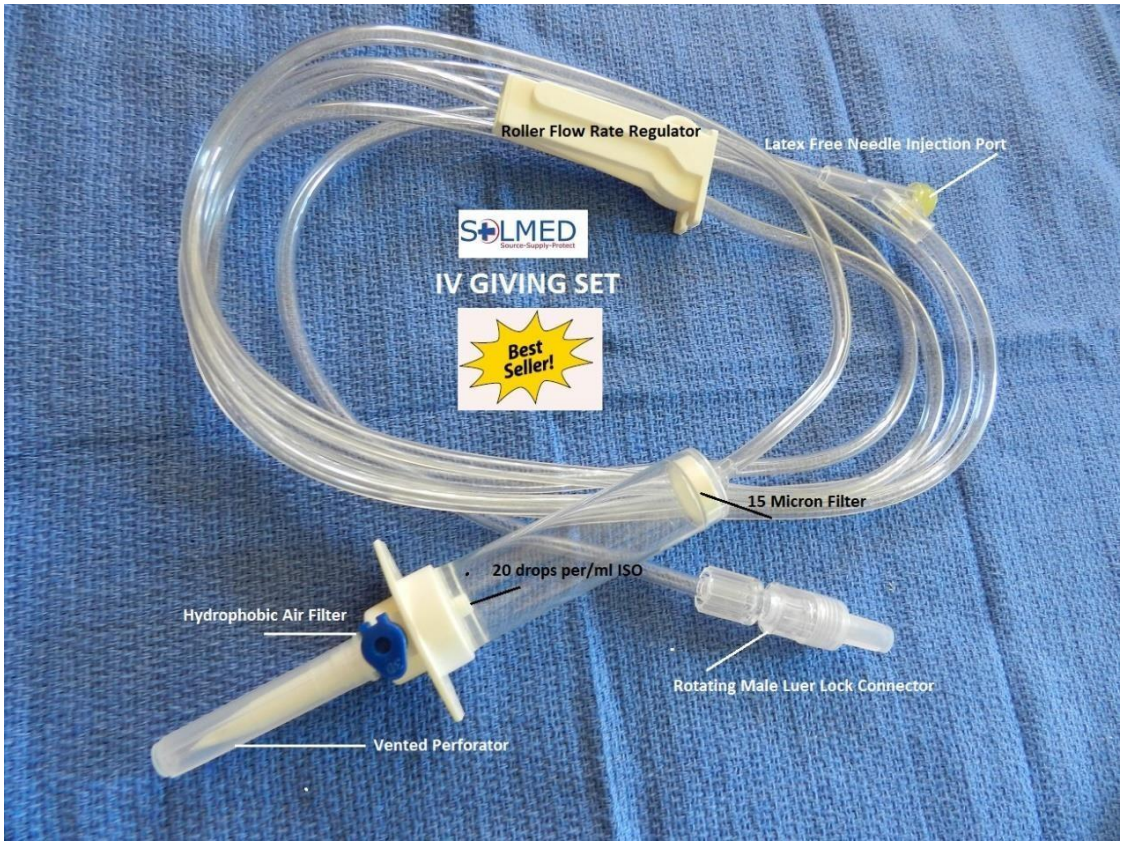
• Hematoma at the site of cannulation

• Skin and soft tissue necrosis around the site of cannulation

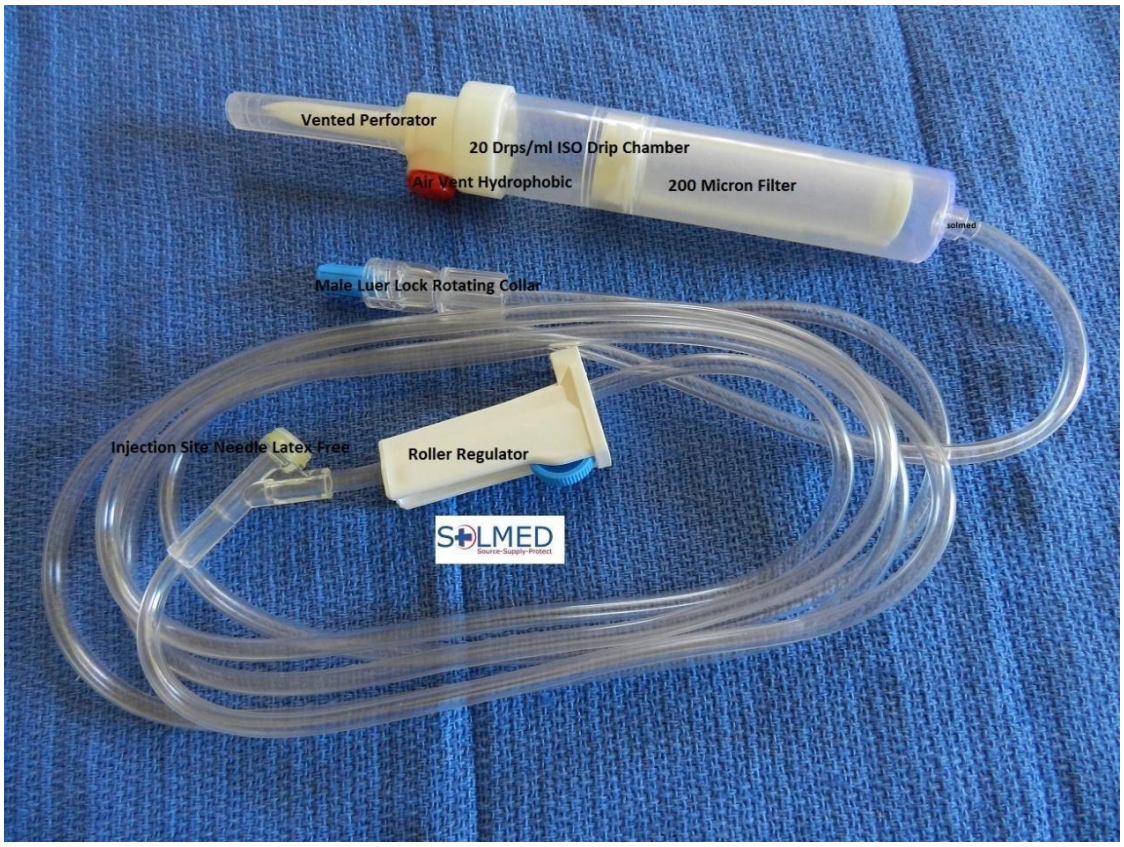
• Arterial puncture (rare).

Note: Intravenous cannula should be removed when no longer required, after 72–96 hours of insertion, or if there are any signs of phlebitis or infiltration or extravasation.

Giving set and device for intravenous infusion:



- **Type**
- A Crystalloid giving set (basic IV giving set) (Standard Gravity IV set)
- Blood giving sets
- (Burette systems).



This contains a 170-200 micron filter net to remove debris from blood components

• Debris is derived from WBC's and platelets which are no longer functional and also from cold insoluble protein and occasionally small clots

Deliver 60 drops per ml Allows closer monitoring of fluid and electrolytes

Thank you