Procedures in Practice

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SETTING UP A DRIP

Indications

The many indications for setting up a drip fall into three main groups.

- (1) To introduce or replace fluids into the circulation—for example, blood, blood fractions, colloids, or electrolyte solutions.
- (2) To provide a route for administering parenteral medication or nutrition, usually in intensive care.
- (3) To permit monitoring of central venous pressures: in this case a long flexible catheter is used to reach along the peripheral vein into the vena cava.

Precautions

No absolute contraindications exist, but particular care is necessary under some circumstances.

- (1) If heart failure is present or incipient an extra circulating fluid load may result in severe pulmonary oedema. If a blood transfusion or intravenous infusion is essential this problem may be alleviated by giving diuretics simultaneously.
- (2) In renal failure it is important that the fluid and electrolyte loads, as well as the amount of drugs given, do not exceed the excretory capabilities of the kidneys.
- (3) If small veins with inadequate blood flow are cannulated toxic or irritant substances may pool at the infusion site, causing inflammation or necrosis.
- (4) In patients with impaired immune responses or damaged heart valves a drip site is an important portal for the entry of potentially fatal infection. Strict attention to asepsis and restriction of the time for which the cannula is in situ are necessary. If prolonged use of a long catheter is expected the outer end should be drawn through a skin "tunnel," so that the site of the skin puncture is several centimetres from the vein—for example, Broviac or Hickman catheters. The stab wounds are closed with a stitch when the catheter is in position, and the giving-set connection is outside the tunnel, strapped to the chest wall.

Equipment

Sterile fluid and giving set—The fluid or blood is usually presented in collapsible bags or bottles, but it is sometimes in rigid bottles, which need an air inlet to prevent a vacuum from forming when the fluid flows out into the giving set. To prepare the giving set close the adjustable valve before pushing the connector firmly into the bag or bottle outlet. Squeeze the drip chamber to obtain a fluid level in it. Raise the Luer connector, with its sterile cover, above the fluid level and open the valve. The fluid will fill the plastic tubing up to the level in the drip chamber, and by lowering the Luer connector to that level the whole tubing will be filled, without the formation of bubbles. Any small bubbles will float to the fluid surfaces if the tube is held vertical and tapped sharply. Turn off the valve; the set is ready for use.

Cannulae (for example, Medicut, Venflon, Abbocath)—Long catheters are flexible plastic or silicon, with radio-opaque markers. They are passed through previously inserted metal or plastic cannulae, which are withdrawn from the skin after use. Great care must be taken when inserting catheters through metal cannulae, as the sharp needle may sever the catheter if it is accidentally withdrawn. The severed part may then embolise to the heart or lung. Care is also needed to insert long catheters with a suitable sterile technique. Detailed instructions are provided and should be studied before the procedure is begun.

Procedure

Choice of vein—The most convenient site is the left forearm (or the right in a left-handed patient). This permits comfortable mobility of the left arm and leaves the right free for writing, washing, etc. Veins at the elbow should be avoided, as the joint would then require immobilisation to avoid repeated kinking of the cannula or catheter with resulting fracture and leakage. The site may, however, be dictated by the availability of suitable veins. Leg veins may be used in restless patients, as it is easier to splint a dressing on the leg than the arm. The experienced operator may cannulate the jugular, subclavian, or saphenous vein, or a scalp vein in a baby. Veins are much easier to cannulate at a site where they penetrate fascia, or at a confluence, as they are then fixed and cannot roll sideways away from the needle point. The cephalic vein is extremely difficult to cannulate with a long catheter, since it is angled at the shoulder; the basilic vein is much easier.

Venepuncture—After clothes have been removed from the limb a tourniquet should be applied to distend the veins. Careful sterile procedure is important; a generous area around the chosen site should be cleaned with isopropyl alcohol swabs or iodine in alcohol solution. Heavy hair growth should be shaved before this is done. When long catheters are to be used sterile drapes and gloves make the procedure easier and safer. The needle and cannula should first be inserted through the skin, beyond the shoulder of the plastic part. The metal needle is then adjusted until it is touching the vein, with the flat side of the bevel pointing to the surface. Sharp oblique pressure causes the bevel to enter the vein, and pressure is continued until the plastic shoulder of the cannula has followed. Blood will then enter the chamber or may be drawn into the syringe. The metal needle is then withdrawn from the cannula, while leakage of blood is prevented by pressing the finger on the vein over the tip of the cannula; the giving set is connected and the tourniquet removed.

Fixing and dressing—The cannula must be fixed securely, as movement may damage it and lead to leakage and inflammation. A crêpe bandage may be applied overall and helps to warm the fluid as it flows towards the vein. Splints should be avoided if possible, as movement of the limb discourages stasis of blood and possible thrombosis.

The site should be examined daily for inflammation, as a skin puncture always allows micro-organisms to enter the tissues and hypertonic glucose and amino-acid solutions are excellent culture media. Adding 500 units of heparin to each 500 ml of fluid infused reduces the incidence of catheter-associated sepsis. All short cannulae should be resited at two- or three-day intervals before infection reaches the circulation. Giving sets should be removed after three or four days and immediately after a blood transfusion, as clot remains in the filter chamber and may harbour micro-organisms.

Problems

No veins are visible or palpable—A “cut-down” technique may be performed: a vein is exposed by blunt dissection of subcutaneous tissues through a small incision and is cannulated under direct vision. Alternatively, an experienced operator may cannulate the subclavian or jugular vein.

Failure to penetrate the vein—This is common when elderly patients have fibrous or calcified veins. Remove the tourniquet and apply pressure to the venepuncture site in case the vein is leaking. Anaesthetists do many venepunctures and may succeed when all others have failed.

Failure to flow—Check that the tourniquet has been removed, that the giving-set valve is open, and that rigid bottles have an adequate air inlet. The appearance of a large bleb of subcutaneous fluid shows that the cannula is not in the vein lumen and should be resited. Finally, the cannula should be vigorously flushed with fluid in case it is blocked by a clot.

Appearance of inflammation—The cannula must be resited, as local antiseptics or systemic antibiotics will be useless while a foreign body is in position. The cause of unexplained fever in the patient may be infection at the venepuncture site.

Careful attention to siting, dressing, and managing a drip can make the difference between wellbeing and misery for the patient, and is very rewarding for the little time that it takes.

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