

Parental Routes

This means drug administration mainly for systemic use by injecting drugs intravascular routes (veins and arteries) or intramuscular and subcutaneous route has advantage and disadvantage.

All this procedure should under sterile condition and free of microbial contamination.

Indications:

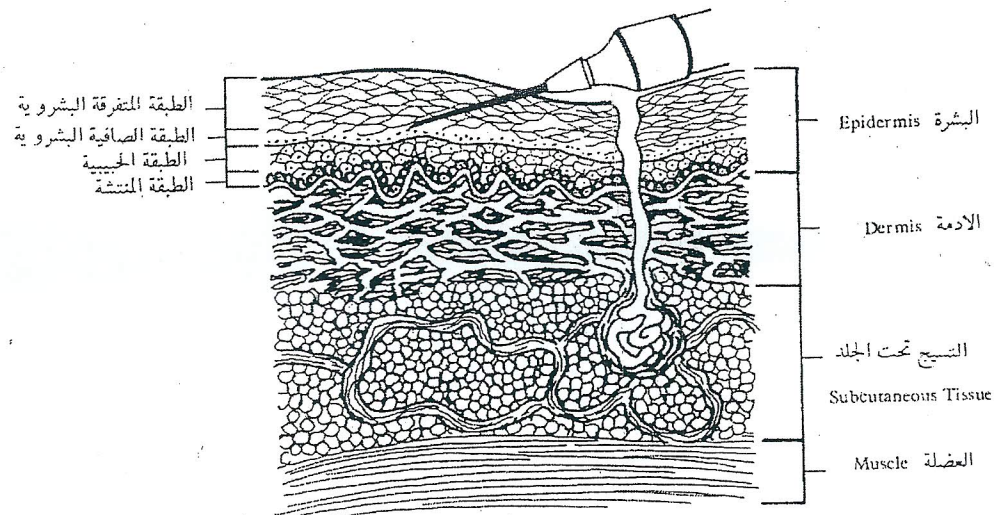
- a- Parenteral administration is used for drugs that are poorly absorbed from GIT.
- b- Parenteral administration is used for agents such as insulin, that are unsuitable in GTI.
- c- This method id used for treatment of unconscious patients, and under circumstances that requires a rapid onset of action.
- d- This method provides most control over the actual dose of drug delivered for the body.

Intradermal injection:

This means injection of drug between skin layers by special needle (fig ...). The most common site of injection is on the surface of forearm and skin of the back.

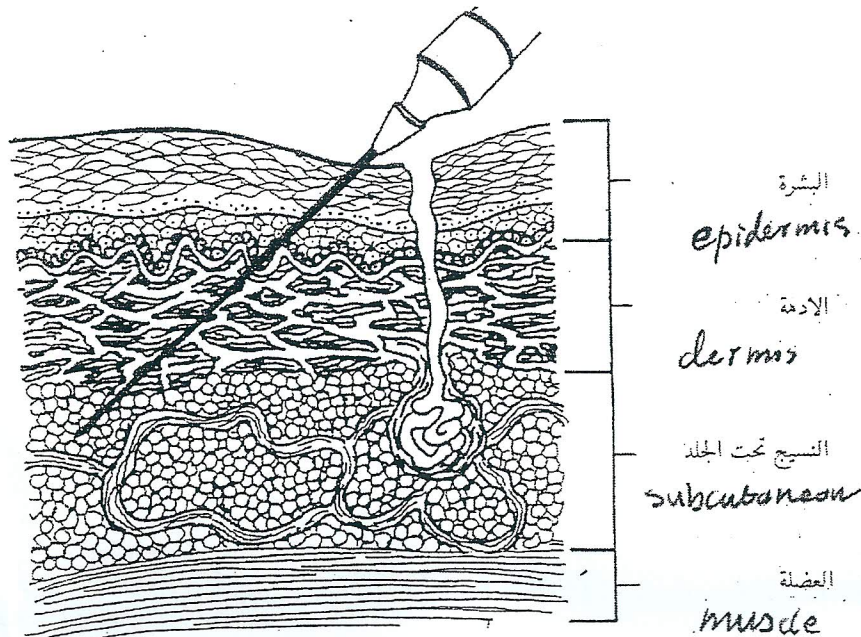
This method of administration requires use of small amount and drug absorption is very slow.

The main purpose of this method is for diagnostic purpose.



Subcutaneous injection (SC):

This useful method where drug is injected subcutaneously in lipid region.



This route of administration, like that of IM injection, requires absorption and it is somewhat slower than the IV route. Subcutaneous injection minimize the risks associated with intravascular injection. [Note: minute amounts of epinephrine are sometimes combined with a drug to restrict its area of action. Epinephrine acts as a local vasoconstrictor and decreases removal of a drug, such as lidocaine, from the site of administration.] Other examples of drugs utilizing SC administration include solids, such as silastic capsules containing the contraceptive levonorgestrel that are implanted for long-term activity, and also programmable mechanical pumps that can be implanted to deliver insulin in some diabetics.

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Indications:

- 1- In case drug oral administration is not possible.
- 2- In case drug is destroyed by gastric acidity or liver of GID enzymes where taken orally.
- 3- In case rapid onset of action faster than when drug given orally is required.

Site of administration:

- a- Abdomen.
- b- Upper outer side of the arm.
- c- Thighs.
- d- Buttox.

Notices:

- 1- In case of repeated injection, site of injections must be changed each time to avoid tissue changes that decrease drug absorption, particularly in diabetic patients, who are using insulin.
- 2- Increase body activity during sudden body exercise may lead to increase blood circulation under the skin leading to increase (insulin) absorption which may cause drug side effects due to increase drug concentration in blood.

Intramuscular injection (IM):

Drugs administered IM can be:

A- Aqueous solutions.

B- Specialized depot preparations - often a suspension of drug in a non-aqueous vehicle, such as a polyethylene glycol.

Absorption of drugs in aqueous solution is fast, whereas that from depot preparations is slow. As the vehicle diffuses out of the muscle, the drug precipitates at the site of injection. The drug then dissolves slowly, providing a sustained dose over an extended period of time. An example is sustained-release haloperidol decanoate, the slow diffusion of which from the muscle produces an extended neuroleptic effect.

Indications:

The drug is injected between muscle layers (fig 4).

This method is used in the following situations:

- 1- To obtain rapid and immediate effect of the drug in case intravenous injection is undeniable, the drug is rapidly absorbed because muscles are rich in blood supply.
- 2- In case of drug formula cannot be injected intravenous or by subcutaneous injection.
- 3- In case of large amount of drug to be slowly absorbed and over a long period of time (drug depot).

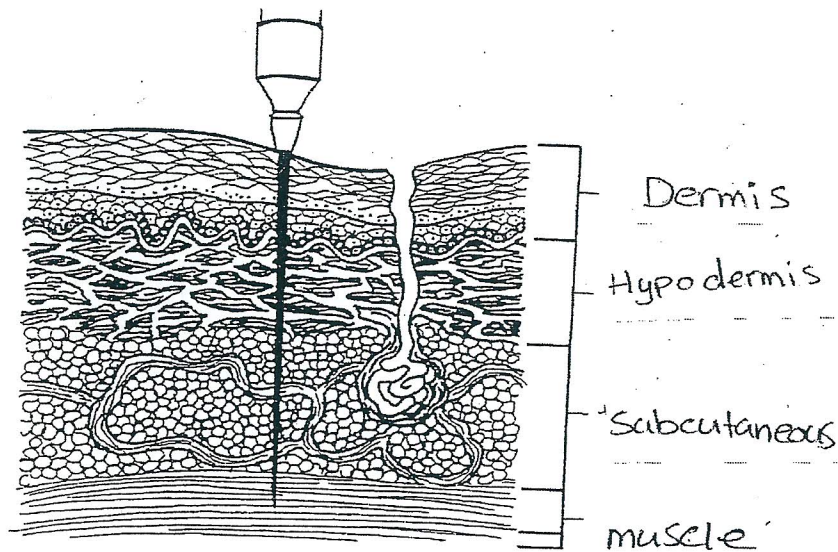


Fig (): Intramuscular injection, notice the length and angle of the needle, the needle must pass the skin layer and leads the muscle.

Pre cautions:

- 1- Avoid injection subcutaneously in the lipid layers instead of intramuscular injection.
- 2- Notice the age, size, sex, type of injected drug and it's formula, and health state of the patient, and drug must be injected in the suitable muscle.
- 3- Avoid injection in or around veins or nerves.
- 4- Avoid injection at painful sites or nodular areas.

Site of injection:

a- Deltoid muscle:

The best area of injection of small volume of drug; not more than 2 milliliters.

Drug absorption is rapid because this muscle is rich with blood supply.

Drug injection is very limited in case of repeated injection and in children; because of small site of muscle.

b- Dorsal gluten, Gluteus media, posterior gluten:

The best choice of injection in adults and children, cautions must be taken to avoid large veins and sciatic nerve, muscles must be relaxed during injection, absorption from this site is the slowest among the muscular sites. But the site of large volume about 5 ml.

c- Rectus femoris:

This thigh muscle mostly used in lactating baby, avoid large veins and nerves.

d- Vastus lateralis:

This muscle lies between front half and luteal part of thigh.

There are no large veins but there are large nerve bands, injection 6-8 ml in lactating babies.

Avoid site of injection in patients of the long bed rest for long times.

Hypodermically:

Injection of large volume of solutions subcutaneously, mainly used in young children, overweight patients and old patients with high atherosclerosis of veins where it is very difficult to inject drug intravenously.

The injection solution must be similar to the plasma to avoid side effects. E.g. hypotension and shock.

Sites:

- Upper site of the thigh.
- Abdomen.
- Under breasts.
- Chest lateral site

Intraperitoneal injection:

Injection of drug and solutions inside peritoneal cavity.

Intravascular:

Intravenous (IV) injection Fig (?), is the most common parenteral route

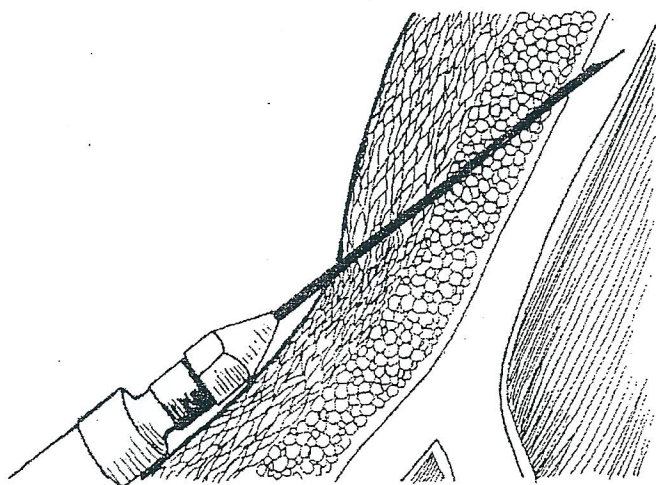


Fig (?): intravenous injection, notice site and position of needle and site of solution entry. Tip of needle must be inside the vein and drug must not leak outside vein and cause side effects.

Advantages & indications:

- 1- For drugs that are not absorbed orally.
- 2- With IV administration, the drug avoids the GI tract and, therefore, first-pass metabolism by the liver.
- 3- This route permits a rapid effect and a maximal degree of control over the circulating levels of the drug used in emergency.

Disadvantages:

- 1- Unlike drugs in the GI tract, those that are injected cannot be recalled by strategies such as emesis or binding to activated charcoal.
- 2- Intravenous injection may inadvertently introduce bacteria through contamination, at the site of injection.
- 3- IV injection may also include hemolysis, or cause other adverse reactions by the too-rapid delivery of high concentrations of drug to the plasma and tissues.

Sites and volume of injection:

Injection inside veins, fig (?), and blood volume is small or large volumes, according to the patients need.

The drug may be injected in the following veins:

- 1- Antecubital vein and other veins of forearm and back of hand.
- 2- Longitudinal sinus in lactating babies, where needle injected in the anterior fontanel.

Notice:

- In case of continuous infusion, suitable cannula can be inserted in veins of front arm; to allow flexible movement for patients.
- Drug infusion intravenously is used to inject large volume of solution (saline, dextrose) over a long period of time.