Under Your Skin or In the Muscle: Pros and Cons to Subcutaneous and Intramuscular Injections

Subcutaneous (SC) and intramuscular (IM) are two methods for administering drugs to a patient. Subcutaneous refers to under the skin, where medication is delivered into the fatty layer below the dermis of your skin. Intramuscular injections, however, are administered directly into the muscle through all three areas of the skin: the epidermis, dermis, and subcutaneous layer.

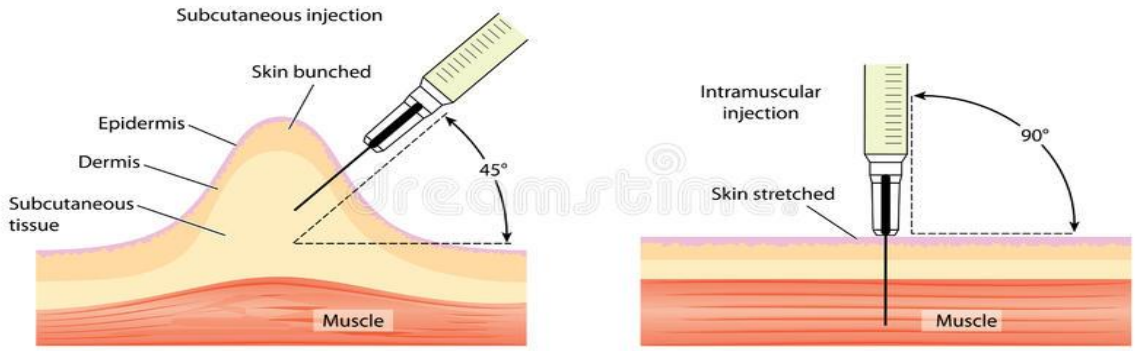

Figure 1: A subcutaneous and an intramuscular injection[1]

Intramuscular Injections

Intramuscular injections are used for medications that are readily soluble, and it does not cause any form of irritation to the surrounding soft tissues; this type of delivery is usually done with small doses. The types of medications delivered this way are: vaccines, antibiotics, antiemetic, analgesics and sedatives[2]. There are 5 sites that are commonly used with intramuscular injections[2]:

- Upper arm - deltoid muscle: this is the most accessible and commonly used site for vaccines.
- Upper outer quadrant of the buttocks - dorsogluteal site: this is most popular site for deep intramuscular injections. However, you have to be careful as there are important nerves and arteries nearby that can be damaged.
- Lateral aspect of the thigh - vastus lateralis: Easily accessible, and more commonly used if the patient is unable to turn onto their side.
- Anterior aspect of the thigh - rectus femoris: Most commonly used for self-administration of injections and is also used in infants.
- The ventogluteal site - gluteus medius: this is an alternative site to the dorsogluteal site. It is one of the safest IM injection sites.

Subcutaneous Injections

In this type of injection, a small short needle is used to inject the drug into the tissue layer between the skin and the muscle. The rate of absorption of subcutaneous is lower than intramuscular however there are advantages to its use[2]. This type of injection is used when other methods of administration aren't effective. For example, some medications can't be taken orally because acid and enzymes in the stomach would break them down. SC injection is of use for medications that are highly soluble to prevent irritation of the soft tissues. The main sites of injection are[2]:

- Abdomen – avoiding the navel area
- The front of the thigh, midway to the outer side
- Upper area of the buttocks, right behind the hip bone.
- Outer area of the arm

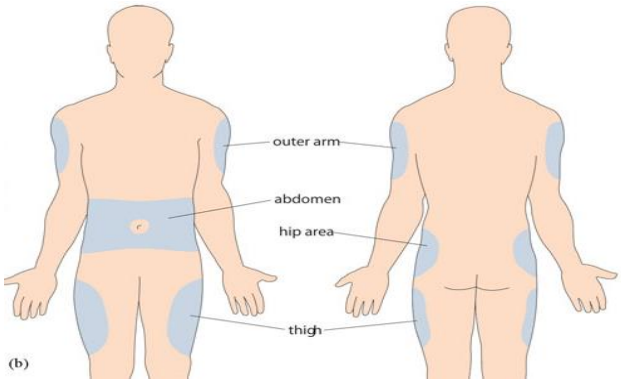

Figure 2: Areas for a subcutaneous injection[3]

Both of these injections types have similar side effects that include: local infections or abscesses if the needle wasn't sterilised, a hardening of cells from repeat injections, or pain and discomfort where you were injected.

Subcutaneous Drug Example

Insulin is one of the most well-known drugs given as it is needed for a major disease; Diabetes mellitus types 1 and 2. Insulin is a fast acting drug that designed for use around mealtime where its effects need to be seen fast as insulin is what helps to regulate absorption of carbohydrates, fats, and proteins found in food. The absorbed glucose from the food is converted into either glycogen or triglycerides. Normally, a person will be able to produce their own insulin but in patients with diabetes, they either cannot produce it or become resistant to its effects so they need an injection to help[4].

Intramuscular Drug Example

Morphine is a very commonly used pain medication; it is injected straight into your muscle where it diffuses out into your bloodstream. Morphine is an opiate, meaning it acts on opioid receptors found in your body; in this case the μ–δ-opioid receptor found throughout the brain. This agonistic response with these receptors is what lowers the patient's pain levels. Unfortunately they can be quite addictive and can have a wide range of side effects, making them not always the best choice[5].

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