



Patrick J Phillips

MBBS, MA(Oxon), FRACP, MRACMA, GradDipHealthEcon(UNE), is Senior Director, Department of Endocrinology, The Queen Elizabeth Hospital, South Australia. patrick.phillips@nwaahs.sa.gov.au

Warren Weightman

MBBS, FRACP, FACD, is Director of Dermatology, The Queen Elizabeth Hospital, Woodville, South Australia.

Is it insulin allergy?

■ 'I'm allergic to that insulin you gave me. The injections sting and leave marks that last more than a week'. When Joe pulls up his shirt you can see the marks (*Figure 1*).

Figure 1. Joe's abdomen



Question 1

What are the marks and how are they caused?

Question 2

How can Joe avoid getting them in the future?

Question 3

What other problems can be associated with insulin injections?

Answer 1

These are superficial bruises caused by intradermal injections of insulin. If the injection needle, particularly a short needle, is inserted at too acute an angle, the insulin is injected intradermally. This can cause pain, a lump at the injection site, and later, bruising associated with damage to the blood vessels. The needle should be positioned at right angles to the skin and inserted to the 'hilt'.

Answer 2

Joe should visit a diabetes educator and learn how to give insulin injections correctly. There are three important principles:

- insulin should be injected into the subcutaneous fat. This increases the consistency of insulin absorption. Injection into muscle speeds, and injection intradermally slows, insulin absorption

- during the injection the needle should not move. The needle has sharp edges and can cut, causing bruising and inflammation which speeds insulin absorption
- the injection should be given in the same anatomical area but at different sites. This increases consistency of absorption as insulin absorption differs between different anatomical areas. Using different sites in the same anatomical area reduces the risk of local reactions to the insulin (see below).

The general recommendation is to inject the abdomen moving from side to side and up and down in the area outlined by the costal margin and inguinal ligament (*Figure 2*). (For more detailed guidance for your patients visit www.diabetesaustralia.com.au).

Figure 2. Recommended site rotation



Answer 3

The most common problem is associated with repeated injections in the same site. This usually causes fat hypertrophy (insulin is anabolic) and scarring (from the damage of repeated injections) and local lumps develop. Less commonly, fat atrophy occurs causing hollows in the abdominal wall. This was more common with older insulins (less pure and of animal origin) but can still occur if cold insulin is injected (see below). Patients may find these unsightly, however they also find it convenient to inject into the lumps. Injections may also cause less discomfort (because of nerve damage). However, injecting into these lumps is not recommended, as insulin absorption may be variable – the injection may be into a scarred area and the insulin slowly absorbed on one day, on another, the injection may be into an unscarred area with normal absorption.

Bruising is the second most common problem – usually not identified by the patient but easily identifiable by checking injection sites. This can be caused by intradermal injection (as in Joe's case) but also

from subcutaneous injection if the syringe moves while it is in the subcutaneous fat, causing cuts. If a person is on antiplatelet agents or anticoagulants the bruising can be extensive.

The third most common problem is pain. Usually only the sharpness of the needle is felt, and often the injection is totally painless with only a sensation of pressure as the needle passes through the skin. The newer needles are very fine, 27–31 gauge, compared to the usual 19–21 gauge needles for venipuncture or 15 gauge for intravenous therapy.

If injection causes pain, particularly when the insulin is being injected (ie. as the plunger is being depressed) something is wrong.

- Pain as the needle passes through the skin
 - wet alcohol on the skin. Alcohol swabs are still sometimes used even though they are not necessary
- Blunt needles from repeated use
 - needles should be single use but patients often 'economise'. Repeated use, particularly if insulin is drawn up from a vial and the needle has to pass through the rubber bung many times, blunts the needle and causes 'jags'
- Pain as the insulin is injected
 - cold insulin. The stored insulin is kept in the refrigerator but the insulin in use should be kept at room temperature
 - Glargine (Lantus), an acid, can 'sting'. Usually patients get used to this and don't consider it a problem.

Only rarely does allergy occur either to the insulin itself (more commonly in the past with impure and animal insulins) or to other ingredients in the formulation. Allergy is usually associated with a flare of erythema and minor induration that fades within days.

If allergy is suspected, insulin manufacturers can provide guidance on appropriate testing procedures. Switching to another brand or form of insulin (eg. between manufacturers or from regular to analogue or vice versa) may solve the problem.

Finally, and very unusually, a local reaction may occur either because the insulin has been degraded by excessive heat (eg. being kept in the dashboard compartment of a car during summer) or infected. The authors have yet to see either of these but such incidents have been recorded.

Conflict of interest: none declared.