

The management of allergic reaction to venomous insect stings

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Insects that sting play a vital role in our ecosystem by consuming crop pests and by pollinating plants (Earth-Life Web Productions, 2004). Some of these insects, particularly bees and wasps (hymenoptera), can also deliver a painful and venomous sting. Their bodies contain a sac of venom attached to a stinger which is forced through the skin. The painful sting occurs when the sac contracts and venom is deposited in the tissues (Prodigy, 2004).

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The venom contains allergens that typically produce an intense, burning pain followed by erythema (redness) and a small area of oedema (up to 1cm) which usually subsides within a few hours (Ewan, 1998a).

Some people suffer more serious localised or systemic reactions including anaphylaxis. Every year in the UK between two and nine people die as a consequence of a severe allergic reaction to a bee or wasp sting (The Anaphylaxis Campaign, 2004).

Who is affected by sting allergy?

Stinging insect allergy is a relatively common problem but there are no criteria to identify people at risk of initial venom anaphylaxis (Reisman, 1998). Reactions may occur at any age and are unrelated to the time interval from previous stings. Most people who have insect sting anaphylaxis have tolerated previous stings without a reaction. Occasionally people have had venom anaphylaxis after the first known insect sting. This usually occurs in children (Reisman, 1998).

People who are allergic to wasp venom are rarely allergic to bee venom (Ewan, 1998a). Eich-Wanger and Muller (1998) note that the risk of allergy increases with risk of exposure to bee-sting venom, and it has

been documented that allergies to bee venom are usually found in beekeepers, their families, and their neighbours (Ewan, 1998a).

Having one anaphylactic reaction does not mean that individuals will have subsequent anaphylactic reactions (Reisman, 2004). The proportion of people with a history of anaphylaxis who have an anaphylactic reaction to a subsequent sting is very variable (20-80 per cent) (Ewan, 1998b). The problem is being able to predict those who are likely to suffer anaphylaxis again.

Novembre et al (1998) showed in their study that the prevalence of systemic reactions in children (0.34 per cent) is low in comparison with the prevalence reported for the general population (0.8-5.0 per cent). They found that children who are sensitive to other allergens including grass, milk, and egg are more likely to be sensitive to hymenoptera stings.

Removing the sting

Wasps will usually remove their stings as they are not barbed. If the sting remains in the skin, as is common after bee stings (which are barbed), it should be removed as quickly as possible.

Traditional advice is that the sting should be scraped off and never pinched. This avoids squeezing the sac and depositing more venom into the tissue. Reisman (1998) recommends flicking the sting to remove it. Visscher et al (1996) suggest that the method of removal is irrelevant; speed is more important as most of the venom is deposited very quickly after the sting.

Local reaction

Localised pain, swelling and erythema at the site of the sting are normal reactions to the allergens in the sting venom and usually subside within a few hours. The only treatment required is analgesics and cold compresses (for example, ice packs) (Reisman, 1994). The application of a topical steroid applied to the affected area may provide relief (Prodigy, 2004).

Localised allergic reactions

If a localised allergic reaction occurs, oedema will extend beyond the site of the sting. It evolves over several hours and may last up to seven days. The oedema is not dangerous unless it affects the person's airway (Prodigy, 2004). These local allergic reactions will usually respond to a course of oral antihistamine (Ewan, 1998b).

Generalised systemic sting allergy

Reisman (1998) notes a number of important facts about the incidence of systemic sting allergies:

- Its incidence in the general population is in the range of 0.4-3.0 per cent;

- Among individuals who have insect sting allergy, 33-40 per cent are atopic (have a tendency to develop hypersensitivity reactions in response to allergens, for example, from hayfever);

- Twice as many males as females have reactions. This is probably a reflection of exposure rather than gender specificity;

- The majority of reactions are in younger people under 20 years of age though fatalities are greater in adults.

Signs and symptoms of generalised systemic reactions Generalised (systemic) reactions vary in severity and the onset is usually rapid (Prodigy, 2004). One or more of the following may occur depending on the severity of the reaction:

- Generalised pruritis (itching) followed by urticaria (itching rash resulting from the release of histamines). Urticaria may not occur until 6-24 hours after the sting (Reisman, 1998);

- Rhinitis (inflammation in the mucus membrane of the nose), and conjunctivitis;

- Abdominal pain, vomiting, and diarrhoea;

- Erythema;

- Facial or generalised angio-oedema;

- A sense of impending doom;

- Abdominal cramps and nausea;

- Tachycardia;

- Hypotension (causing light-headedness, giddiness and fainting);

- Difficulty in breathing due to severe asthma or laryngeal oedema;
- Collapse and unconsciousness (Prodigy, 2004; Ewan, 1998a).

Generalised urticaria may be treated with oral antihistamines and a corticosteroid (Prodigy, 2004). However, mild symptoms can progress to a severe reaction and medical help should be sought if there is any progression in symptoms.

Prodigy (2004) recommends that anyone who has suffered a systemic allergic response should be referred to an allergy clinic or immunologist for advice about future management.

Other symptoms that occur as part of a generalised reaction (for example, vomiting, abdominal or uterine cramps, or wheezing) should be treated with intramuscular adrenaline and the patient should be admitted to hospital immediately (Prodigy, 2004).

Anaphylaxis

Cardiovascular and respiratory symptoms associated with an insect sting may result in anaphylaxis (Giltay and Berendsen, 2001).

A hymenoptera sting contains a complex mixture of pharmacologically active substances such as enzymes, kinins, serotonin, and histamine. Specific immunoglobulin E (IgE) (antibodies) are produced by the body in response to the sting. These bind to mast cells which degranulate (break open) and release potent biochemical mediators including histamine (Ewan, 1998a). The characteristic symptoms of anaphylaxis include:

- Laryngeal oedema causing upper airway obstruction;
- Lower airway obstruction due to bronchospasm;
- Increased intraluminal secretions in the respiratory tract;
- Submucosal oedema;
- Vascular congestion;

- Influx of inflammatory cells (Giltay and Berendsen, 2001).

Anaphylactic symptoms usually occur within minutes of a sting. In general, the shorter the interval between the insect sting and the onset of symptoms, the greater the severity of the reaction (Reisman, 1998). Most deaths are caused by respiratory dysfunction (Vetter et al, 1998).

Prompt treatment is required for systemic reactions with symptoms of respiratory difficulty and/or hypotension (anaphylaxis) (Box 1).

Long-term management for insect sting anaphylaxis

Reisman (1998) notes that a subsequent sting reaction will occur in about 60 per cent of people who have had sting anaphylaxis and have positive skin venom tests. Re-reactions to stings are more likely to occur in adults than in children, and in people who have had more severe anaphylactic symptoms.

Wherever possible, people who have had an anaphylactic reaction to insect sting should be given the appropriate drugs so that they can initiate management if a reaction occurs again. People who have had a systemic reaction may be prescribed a pre-loaded adrenaline syringe and a written treatment plan (Ewan, 1998a).

Desensitisation or venom immunotherapy is another option. In the UK this is used conservatively because of the high incidence of spontaneous improvement and the adverse effects of the desensitisation treatment (Ewan, 1998b). Rueff et al (2004) found venom immunotherapy highly effective in protecting people with hymenoptera venom allergy from further systemic anaphylactic reactions to insect stings. The immunotherapy is given every four to eight weeks and it may be possible to make the interval even longer. Rueff et al (2004) point out that while this may provide protection for most patients, it may be insufficient for others. Venom immunotherapy is generally reserved for those patients who have had sting anaphylaxis and have positive skin venom tests.

Reisman (1998) comments that the duration of treatment that is required for venom immunotherapy to achieve permanent protection is still an unresolved issue. Conversion to a negative skin test appears to be an absolute criterion for discontinuing treatment. A period of three to five years is usually sufficient to achieve this but people who have had severe reactions, such as loss of consciousness, may require indefinite therapy.

The venom skin test is an accurate assessment of clinical sensitivity for the majority of people who have reactions to insect stings, however, it does not detect all clinically allergic people (Reisman, 2004). Serum antibody assays are recommended for those with repeat negative skin tests, but who have had life-threatening anaphylactic reactions and are unable to manage an adrenaline syringe.

Beekeepers are particularly at risk and Eich-Wanger and Muller (1998) recommend that those who have an allergy are given immunotherapy with bee venom as they can tolerate it better than the general population. They also advise that emergency medication must be available in the house of every allergic beekeeper, even after immunotherapy.

Preventing stings

Bee and wasp stings are never a pleasant experience and are best avoided if possible as the consequences may be serious. Adult wasps and bees live on nectar, pollen, and rotting fruit so care should always be taken around these substances and rubbish bins.

Bees will only sting to defend themselves but wasps are more dangerous as they also attack other insects to feed their larvae. Anecdotal evidence suggests that fizzy drinks pose a particular problem as they are particularly attractive to wasps. Stings in or around the mouth are not uncommon in these circumstances.

People who are at risk of allergic reaction should wear shoes as well as trousers and long-sleeved shirts, preferably in colours that are less likely to attract insects (Reisman, 1998; 1994). Cosmetics, perfumes, and hairspray attract insects and should be avoided (Reisman, 1998; 1994).

Individuals at risk of anaphylaxis are advised to carry adrenaline in pre-loaded syringes, for self-administration. A 'medic-alert' bracelet or necklace will alert others to the need for rapid action. (See the Anaphylaxis Campaign website for more information at www.anaphylaxis.org.uk).

Conclusion

For the majority of people an insect sting is a painful but transitory episode. However, for a small number of people a sting can have fatal consequences. Nurses need to be aware of the potential complications of insect stings and the management options that are available to them.