LATEX ALLERGY

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Introduction
Latex is a protein, processed from the sap of the rubber tree (Hevea brasiliensis). Not all products that are labelled as "latex" contain this product and therefore may not induce allergy in susceptible individuals. Susceptibility is determined by cumulative life exposure to one or more latex proteins or the chemicals used in its manufacture. Hospital workers and patients having frequent operations, for spina bifida for example, have high cumulative exposure and risk of allergy.

Latex allergy was first identified in the 1970s but, with more prevalent use of latex products in hospitals, the prevalence of latex allergy has increased. Adoption of universal precautions for prevention of blood-borne infections may have contributed to this increase. Prevalence rates as high as 17% are quoted amongst hospital workers and, although numerous papers indicate prevalence rates between 1 to 12% in the general population, the true prevalence is likely to be at the lower end of this range.

Pathology
Latex extracts contain up to 14 antigenic proteins, which may be altered during processing of the latex for commercial use. In addition to direct contact, exposure to latex particles may occur by actions such as opening theatre packs or taking off a pair of gloves. Intravenous and mucosal routes are also important; particles released into the air may induce anaphylaxis or exacerbate pre-existing conditions such as asthma.

Common reactions to latex are type I and type IV hypersensitivity reactions. Type IV (T-cell mediated) hypersensitivity produces delayed contact dermatitis, 2-3 days after exposure. Type 1 reactions are more serious, are IgE-mediated, and are associated with immediate systemic release of histamine causing mast cell degranulation, release of tryptase, prostaglandins and leukotrienes, and systemic manifestations. Symptoms and signs include itching, sneezing, coryza, red itchy tearing eyes, urticaria, nausea, sore throat, bronchospasm, wheeze, shortness of breath or full-blown anaphylaxis. The extent of the reaction is unpredictable and early recognition of these symptoms is important. Anaphylactoid reactions are clinically indistinguishable from anaphylaxis, but are not mediated by sensitising IgE antibody. Whether a reaction is called anaphylactic or anaphylactoid may depend on whether it is investigated, the means by which it is investigated and how the results are interpreted.

Management
Management involves identification of at-risk patients, use of suitable latex-free equipment, vigilance for signs of anaphylaxis perioperatively and thorough investigation following suspected reactions.

Prevention
The main strategy for tackling latex allergy focuses on preventing exposure by using non-latex products. Taking and documenting a clear history is paramount; clinicians should ask about any previous reactions to latex, foods, and latex products such as washing up gloves. In addition to the multitude of hospital products (including stethoscopes, blood pressure cuffs, packs, gloves) latex is found in many commercially available products such as balloons, condoms, elastic and washing-up gloves.

The allergy is cross-reactive with many foods, in particular avocado, banana, kiwi fruit and chestnuts. Risk factors for latex allergy include:

- Occupational exposure (healthcare workers)
- Multiple operations (particularly laparotomy)
- Repeated bladder catheterisation (60% incidence in spina bifida)
- History of allergy to food with cross-reactivity with latex
- Women are at greater risk than men.

Patients with risk factors may be anaesthetised in a standard fashion but the anaesthetists should maintain a high index of suspicion for the development of anaphylaxis.

Latex-free equipment
Latex-sensitive patients should be managed in a latex-free environment and put first on elective lists, since there should be less airborne latex particles from other cases. Ward equipment (blood pressure cuffs, stethoscopes) should be latex-free.

Communication is important, with clear identification of the risk communicated between healthcare workers and clearly identified on the patient notes, the theatre list and using an alert bracelet, worn by the patient. Latex-free gloves should be worn by all staff and thorough handwashing is essential if latex containing gloves have been worn for previous cases. Some centres have used premedication with steroids and antihistamines, but anaphylaxis has still occurred and this practice is not recommended.

Precautions in theatre include:

- All latex containing equipment should be removed from theatre
- Bacterial and viral breathing circuit filters should be changed between cases (latex particles may be adsorbed to the filter)
- Laminar flow is desirable, if available
- Alert signs should be posted at the door of the theatre.

Use of latex-free equipment is facilitated by prior compilation of a list of safe equipment and consumables, or preparation of a latex-free trolley or box. Most equipment is now latex-free and readily identifiable as such, but it may be necessary to contact the manufacturer. Be aware that not all syringes have latex-free plungers, and some intravenous giving sets have latex-containing injection ports. In addition, the stoppers of some drug ampoules contain latex. The anaesthetist should also be vigilant that appropriate surgical equipment is used.

Early detection of anaphylaxis

Patients should remain in recovery for at least one hour, since anaphylaxis is not always immediate and may take 20-60 minutes to develop. Slow-onset anaphylaxis has been described with onset several hours after exposure. The signs and symptoms are variable and may be attenuated by other anaesthetic drugs (e.g. epinephrine-containing local anaesthetic).

Management of anaphylaxis

If life-threatening exposure occurs, management is guided by standard protocols for the management of anaphylaxis. In the UK, the guidelines of the Association of Anaesthetists are followed, with removal of agent, administration of oxygen, early administration of epinephrine (adrenaline), fluids and steroids (guideline available at: www.aagbi.org/publications/guidelines/docs/anaphylaxis03.pdf). Latex constitutes a family of water-soluble proteins, so hand-washing and washing areas of exposure may be beneficial. It is also important to make sure provision is made on emergency crash trolleys for latex sensitive individuals, so that exposure is not compounded during an arrest.

Investigation of suspected anaphylaxis

Latex sensitive individuals should be fully investigated after an event, counselled about their risks and advised to carry relevant information on their person at all times (e.g. alert bracelets). An internet link to a list of latex allergy links is included below.

It is vitally important that the sequence of events is clearly documented, including the timing of exposure to each possible allergen. Whilst further investigations are undertaken, this information should be made available to the patient's usual doctor or general practitioner and to the patient themselves. It is the responsibility of the anaesthetist to ensure that all necessary information is made available and that referral for formal investigation proceeds.

Anaphylaxis is confirmed on clinical history and measurement of blood mast cell tryptase levels after the reaction. 10ml clotted blood should be sent as soon as possible after the reaction, one hour after the beginning of the reaction and 6 - 24 hours later. This will usually as soon as possible after the reaction go to a regional centre. Mast cell tryptase is the principal protein content of mast cell granules and is released, together with histamine and other amines, in anaphylactic and anaphylactoid reactions. Its concentration in the plasma or the serum is raised after reactions which involve mast cell degranulation. Approximately 99% of the body's total enzyme is located within the mast cell. It is not present in red or white cells and therefore plasma concentrations are not affected by haemolysis. The basal tryptase concentration is 0.8 to 1.5ng/ml with the normal value usually <1 ng/ml. The half life is approximately 2.5 hours with maximum concentrations occurring rapidly.

Formal diagnosis and identification of the likely trigger agent requires immunological testing. This may involves skin-prick or patch testing with latex extracts, or in-vitro immunoglobulin-E testing with enzyme-linked immunosorbent assay (ELISA), the radioallergosorbent test (RAST) or ImmunoCAP systems. Unfortunately these tests have a high false-negative rate so the patient's history is often the key factor. The Association of Anaesthetists of Great Britain & Ireland guidelines state: 'There is no valid predictor of drug anaphylaxis at present. Claims that any form of screening will predict anaphylaxis are without foundation.'

Further reading

Arellano R, Bradley J, Sussman G. Prevalence of latex sensitization among hospital physicians occupationally exposed to latex gloves. *Anesthesiology* 1992; 77: 905-8.

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http://www.latexallergylinks.org/prot.html