

# Latex allergies and the operating theatre

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## Introduction

Throughout the world gloves are used to protect healthcare workers and it is estimated that over 40 billion medical gloves are used every year. A large proportion of these are latex and while the number of healthcare workers with latex allergies appears to have peaked, there are still both patients and staff who are allergic to Latex. The use of any products containing any Latex must be avoided with these individuals.

## A brief history of latex allergy

Latex items have been traced back to 1600 BC, but gloves and other latex products did not become routinely used until the 1900s. Even during the mid-1800s, physicians did not routinely wear gloves but it was around this time that doctors finally recognised that hand washing and wearing gloves could help prevent infections and death.

During the 20th century, increasing numbers of healthcare professionals began wearing latex gloves and using latex products. Along with this increased use were increased reports of reactions in the form of irritant contact dermatitis. With the spread of HIV in the 1980s, glove usage markedly increased and 'universal precautions' became the phrase used to encourage staff to protect themselves and their patients by wearing gloves and eye protection.

As latex gloves were used in increasing numbers the incidences of type I hypersensitivity reactions also grew. The first anaphylactic reaction traced to latex gloves was reported in 1984.

## What is latex?

Natural rubber latex comes from the rubber tree, *Hevea brasiliensis*. The tree originated from Brazil, but today's rubber primarily comes from Thailand, Indonesia, Malaysia, and Sri Lanka. Over the centuries, workers learned to tap the rubber trees and collect the milky sap without damaging trees.

This protein-rich sap is mixed with various chemicals during the curing and manufacturing process. The actual latex products (balloons, gloves, and condoms) are made by a dipping and low-temperature (100°-120°C) curing method that leaves the latex proteins intact and these are most likely to cause an allergic reaction.

While there are more than 250 different types of latex proteins, only about 20% are allergenic. Recently manufacturers have been increasing their leeching or washing of the gloves during various stages of the manufacturing process in an attempt to remove as much of the soluble protein as possible.

## Who is at risk of a latex allergy?

While the general population has a low incidence of latex allergy, between 1-6%, although certain groups are considered high risk. People who have been exposed to latex through a history of multiple surgeries face a higher risk of developing a latex allergy. Children born with spina bifida are included in this high-risk group. Approximately 30-65% of spina bifida patients have a sensitivity to latex.

Patients with long-term urogenital problems also may become sensitised to latex because of repeated urinary catheterisation. Health care professionals are also faced with an increased risk because of repeated exposures to latex products.

People with food allergies are another group who find themselves at a high risk an allergic response to latex. The four foods with the highest risk of cross-reaction to latex are banana, avocado, chestnut, and kiwi. A lower risk of latex cross-sensitivity occurs with foods such as apples, peaches, carrots, celery, tomatoes, potatoes, papayas, and melons.

Other risk factors for latex allergy also include those who have contact dermatitis of the hands, hives, and itching after wearing latex gloves or contact with a latex product.

## Routes of exposure

Direct exposure to skin happens when you wear latex gloves. Airborne latex particles can be inhaled and cause respiratory reactions. Direct exposure to mucous membranes occurs when a patient has a latex urinary catheter inserted. If the patient is allergic to latex and the theatre staff wear latex gloves during surgery, the patient could suffer an internal exposure. Another source of internal exposure would be if a latex device such as a drain was placed during surgery.

## Allergy testing

Allergy testing can be done for individuals suspected of having a latex allergy.

### **Use testing**

A “use” test is first done on a wet hand using a non-latex glove as a control. Then a latex glove is exposed to one finger for 15 minutes and if this preliminary test is negative, the whole hand is exposed for an additional 15 minutes. The test can produce contact urticaria if performed with highly allergenic gloves. Also to avoid false positive results in milk-allergic subjects, the “Use” test should be performed with a glove brand without casein. Although a reaction will identify the source material it will not identify a specific antigen.

### **Skin prick testing (STP)**

Considered the gold standard for latex allergy testing, it is a quick and inexpensive way of diagnosing Type I latex allergy. A skin prick test, involves a drop of latex extract diluted in saline which is placed on the skin, and the skin is pricked with a needle. If an individual is sensitised, a reaction of redness and swelling will develop in 15-20 minutes. The reaction is graded according its diameter at the test site. The test must be performed by medical personnel who are knowledgeable both of the testing technique and in interpreting the results. Emergency resuscitation equipment and drugs should be available to treat any possible adverse reaction. SPT may not be suitable for children who are needle-phobic, for patients receiving specific medications that may interfere with testing (e.g., immunosuppressant therapy) and for patients with severe dermatitis.

### **In vitro immunoassays**

They are safe, sensitive, and specific, but more expensive and not as readily available as skin prick testing. In vitro testing is done on a blood sample and has the advantage of not exposing the individual to the allergen. A positive test indicates sensitivity to latex protein, but does not mean that the individual will necessary experience a clinical reaction to latex.

## Latex allergy/anaphylaxis symptoms

Three types of reactions to natural latex rubber are:

Irritant contact dermatitis

Type IV (cell-mediated) hypersensitivity,

Type I (IgE-mediated) hypersensitivity reaction.

**Irritant contact dermatitis** is not an immune system response to an allergen and should not be called a latex allergy. An irritant contact dermatitis results from frequent hand washing, sweating, and irritation from powder lubricants. Symptoms of an irritant contact dermatitis include: itchy, dry reddened, cracking skin. The symptoms will not extend past the contact area. If surgical gloves are the source irritant, the symptoms are only where the gloves touch skin. This condition may not be necessarily attributable to contact with latex, as other products (e.g. cleaning supplies) may also be responsible for this type of skin reaction.

**Delayed hypersensitivity: Type IV hypersensitivity** (cell-mediated), also known as delayed cutaneous hypersensitivity, is an allergic response to an allergen. Type IV hypersensitivity is a delayed immune reaction mediated by T-cell lymphocytes. This dermatitis occurs with exposure to the chemicals used in manufacturing. The reaction may take 24-48 hours to develop. Symptoms include: erythema with papules, vesicles, and oozing skin areas. If theatre staff repeatedly comes in contact with the allergen, this rash may become a chronic problem. This delayed allergic reaction may also occur in combination with a type I (IgE-mediated) reaction.

**Immediate hypersensitivity: Type I hypersensitivity** (IgE-mediated) allergic reactions are life-threatening, potentially anaphylactic reactions. This reaction is triggered by skin or mucosal contact or inhalation of latex proteins. The body reacts to the latex allergen (within 5-30 minutes of initial contact) by releasing an antibody called IgE. Symptoms vary greatly, but may include the following:

- skin: itching, redness, and urticaria
- airway: itching and swelling of lips and/or tongue, throat tightness and hoarseness
- lungs: cough, wheezing, difficulty breathing, and bronchospasm
- gastrointestinal: vomiting, diarrhoea, and cramps
- cardiac symptoms: weak pulse, dizziness, and fainting.

## Treatment of latex allergy/anaphylaxis

Therapy is individualised for each of these conditions, but essentially involves avoidance of the offending source that causes the reaction.

The treatment of a patient in the theatre with a type I hypersensitivity reaction/anaphylaxis involves immediate intervention. A severe acute reaction to latex should be treated as any other case of anaphylaxis.

Some patients may develop anaphylaxis 30 to 60 minutes after being exposed to latex (via absorption of airborne allergens or with mucous membrane exposure) during surgery.

Anaphylaxis when it occurs can present a diagnostic challenge during anaesthesia and surgery because the symptoms may resemble other medical conditions, such as extensive sympathetic blockade. Also, anaphylaxis may be missed in patients who are draped during surgery. Incorrect diagnosis and delayed treatment of anaphylaxis can cause severe health consequences and even death. Bronchospasm and cardiovascular collapse can be the first signs of an anaphylactic reaction.

The initial steps include:

- stopping the procedure and removing all sources of latex in the immediate vicinity
- securing the patient's airway, give 100% O<sub>2</sub>, resuscitating the patient as necessary, and stabilizing cardiovascular function
- administering drugs for resuscitation and treatment of anaphylaxis (typically adrenaline)
- changing gloves and instruments and once the patient is stabilised, and if it is considered appropriate, complete the surgery avoiding all latex products.

## Providing a latex-safe environment for patients

### **Pre-operative Assessment**

All patients should be assessed for latex allergy before anaesthesia. A detailed patient history must be obtained to identify patients at risk, including:

- Any history of latex allergy.
- Relevant occupation/employment history.
- The presence of symptoms, such as itchy, swollen eyes, runny nose, and sneezing. Some people may develop asthma after contact with latex-containing products (e.g., allergic reaction after blowing a balloon).
- Any history of fruit allergy.
- Spina bifida and multiple surgical procedures during childhood.

If any of the above symptoms are present, patients should be treated as if they are potentially allergic to latex.

### **Preparing the Operating Theatre**

In facilities that are not latex-free the theatre should be prepared the night before in order to avoid the release of latex particles. Patients should receive scheduling priority in the morning. The anaesthetist and assistants involved in the case should be informed that the patient has a latex allergy. The patient's latex allergy also needs to be documented in case notes.

## Treating Latex Allergic Patients in the Operating Theatre

All items containing latex must be removed from the patient care area. Only non-latex medical supplies should be used including, but not limited to:

- Gloves
- Catheters
- IV equipment
- Surgical tape
- Tourniquets
- Ventilation and airway equipment  
(from 2000 all major manufactures should have latex free machines and monitoring.)
- Medication containers without latex stoppers

Preoperative prophylaxis of latex allergy patients with antihistamines and corticosteroids has been recommended in the past but many are moving away from this. The rationale for not using pre-treatment was that it may lessen an early immune response. This may result in anaphylaxis being the first sign of an allergic reaction and prevent early diagnosis.

## Working in a latex-safe environment

A latex-safe environment should be provided and appropriately managed in all healthcare facilities. Many hospitals are now virtually latex free. However, maintaining a latex free environment is not always easy as it involves considerable resources in terms of time and money. Leadership, organisational readiness for change, and continued education are equally important in creating and maintaining a latex free environment.

Theatre staff are at increased risk of developing a latex allergy if they often wear latex gloves. One way to decrease their exposure to latex is to switch to latex-free gloves. In addition to latex gloves, the glove inventory can include latex-free gloves made from nitrile, vinyl, neoprene, or polymer.

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