

# Anaphylaxis

## Definition

**Anaphylaxis is an extremely dangerous and life threatening condition, caused by a massive over-reaction of the body's immune system. This reaction can result in respiratory and/or circulatory collapse.**

Severe anaphylactic reactions can develop slowly, or can occur very quickly depending upon how the individual was exposed to the allergic substance, the route of administration, and their own response. In general, the more rapid the onset of the reaction, the more serious it will be. The most common reactions are to insect stings, food products, drugs and latex.

In dentistry, possible allergens include natural rubber latex and drugs such as penicillins or non-steroidal anti-inflammatory medications such as ibuprofen. The injectable local anaesthetic agents used today are highly unlikely to cause an allergic reaction. However, some topical local anaesthetics (the ester containing agents) such as amethocaine (tetracaine) and benzocaine can cause an allergic reaction (although these reactions tend to be less severe).

The immune system is part of the body's natural defence system against harmful substances such as bacteria. Lymphocytes (white blood cells) recognise these 'foreign' proteins and release natural chemicals, one of which is histamine. In order to experience an anaphylactic reaction the individual will have had a previous exposure to a particular allergen and become sensitised to it. If they then suffer a repeat exposure there will be a massive release of histamine. Histamine has several effects on the body when it is released in such massive quantities:

- Blood vessels dilate
- It constricts the bronchioles in the lungs
- Blood capillary walls become 'leaky' to fluids causing severe swelling and oedema
- Blood becomes thick and sluggish due to fluids passing out of the bloodstream
- It weakens the strength of the heart's contractions
- It can make the skin very itchy
- It can make the skin appear red and blotchy

As a result of the circulatory system becoming leaky to fluid, the fluid then can pass out of the bloodstream and into the tissues. This reduces the effective blood volume which produces a drop in blood pressure, the blood itself becomes thick and sluggish, and the tissue spaces fill with fluid, which produces obvious swelling, particularly of the airways and face. This swelling can cause potential airway blockage and the lungs effectively begin to fill with fluid, thus reducing the oxygen exchange.

## Possible signs and symptoms

A casualty may show some or all of the signs and symptoms listed below. The allergic reaction can happen in seconds, so fast recognition is essential:

- Sudden swelling of the face, tongue, lips, neck and eyes
- Difficult, wheezy breathing and a 'tight chest' due to oedema of airways
- Rapid weak pulse
- Hypotension (profound drop in blood pressure)
- Red, blotchy flushing of the skin
- Abdominal pain, vomiting and diarrhoea
- Itching
- Altered sensations, numbness and tingling of hands and feet
- Loss of consciousness

Essentially an anaphylactic reaction will result in one or both of the following:

- A profound drop in blood pressure
- Respiratory distress

Both the respiratory difficulty and circulatory collapse can result in loss of consciousness and, if untreated, death. If there is any suspicion that a patient may be beginning to suffer from an anaphylactic reaction the emergency services must be called immediately. People who have experienced anaphylaxis often describe a feeling of 'impending doom'.

## Management

Although the ideal treatment would appear to be administration of an 'antihistamine' to reverse the histamine effects this is actually too slow. The initial treatment is to stop and hopefully reverse the capillary dilation and fluid leakage. This is why it is essential to administer adrenaline as soon as possible as this will cause immediate vasoconstriction. This consists of giving adrenaline (epinephrine) intramuscularly (anterolateral aspect of the middle third of the thigh) in a dose of 500 microgrammes (0.5ml adrenaline injection 1:1000). This dose can be repeated at 5 minute intervals if necessary.

**Note:** It is strongly advisable to receive a practical demonstration to show the technique of any type of injection, and so for that reason it will not be discussed within this article.

### Paediatric doses for adrenaline (epinephrine)

- 12 years and above: 500mcg (0.5ml of 1:1000) I/M (intramuscular)
- 6-12 years: 300mcg (0.3ml of 1:1000) I/M
- Under 6 years: 0.15mcg (0.15ml of 1:1000) I/M

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## Management (continued)

Patients who are considered to be at a significant risk of developing anaphylaxis may carry an auto-injector which will deliver a dose of 300mcg (0.3ml adrenaline 1:1000) for self-administration. This can be an acceptable alternative if immediately available. These auto-injectors are single-use only.

For further clarification the dental team can refer to the Resuscitation Council (UK) guidelines and 'frequently asked questions' on their website [www.resus.org.uk/pages/faqAna.htm](http://www.resus.org.uk/pages/faqAna.htm)

High flow oxygen is also a priority as this helps to increase the inspired concentration to compensate for the lungs inefficiency. The other essential is to raise the blood pressure and the easiest way to do this is to lay the casualty flat, and elevate the legs. However, care needs to be taken if the casualty is struggling to breath, in which case it is better to allow them to sit up. If at any time the casualty feels faint – do not sit them up. If the patient is unconscious and the tongue is swelling then an oropharyngeal airway will be advisable. (A demonstration of how to insert an airway should be done when CPR training is delivered.)

The administration of an antihistamine and steroids are given to help stabilise the casualty's condition. These drugs do not work immediately, so therefore constitute 'second line' treatment so are not essential in the dental surgery setting.

## Prevention

Every patient should always be questioned carefully about any history of possible allergic reactions and any known allergen must be avoided. As mentioned earlier, if the patient has been prescribed an auto-injector then this must be recorded within the medical history notes. Before any treatment begins it is important to ensure that they have it with them. The patient will have received training in how to use their auto-injector and if it is needed if possible they should administer the injection themselves. Remember that the dosage of an auto-injector will only be 300mcg and that you cannot give a second dose. It may, however, buy you vital time until you can prepare your own adrenaline. It is always recommended that any drugs that are to be injected should be in pre-filled syringes. This will make it easier to prepare and ensures that the correct dosage is given.

There are certain allergens that can produce an anaphylactic reaction that are very relevant to dental treatment, and include penicillins, cephalosporins, natural rubber latex (NRL), aspirin and intravenous general anaesthetic agents. Food allergies are often important because there are associations between certain allergies to fruits and nuts that are associated with NRL. These food items include chestnuts, kiwi fruit and bananas. If any patient gives a history of multiple allergies it is advisable to be extremely cautious when prescribing medications.

It is also worth remembering that some of the newer haemostatic agents are produced from shellfish, which is a common food allergy. Wherever there is uncertainty about the true nature of an allergy reported by a patient further information or advice should be sought. If the patient's medical practitioner is uncertain as to the patient's allergy history regarding a product that a dentist is likely to use then the patient may need to be referred to an allergist or immunologist for further testing.

As NRL is a well-known allergen it is best practice to avoid purchasing items of dental equipment that are known to contain NRL and instead use the NRL-free alternatives which are readily available.

