Allergy to Local Anaesthetic Agents used in Dentistry – What are the Signs, Symptoms, Alternative Diagnoses and Management Options?

Abstract: This paper addresses the signs and symptoms of local anaesthetic hypersensitivity, differential diagnoses and the management of a patient with suspected allergy to local anaesthetics.

Clinical Relevance: While allergy to anaesthetic is rare, knowledge of other causes of similar symptoms is important.

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Following the administration of a local anaesthetic, a minority of patients may suffer one of a range of unwanted symptoms. Some of these symptoms can be mistaken for hypersensitivity or allergy and the patient may be unnecessarily told that he/she is allergic to the anaesthetic; this is not the case in the majority of patients. Mislabelling of patients as allergic to local anaesthetics can lead to problems for dental practitioners with patients unable to undergo routine dental treatment.

Local anaesthetic agents can be categorized into two classes:
- Amide (lidocaine, bupivacaine, prilocaine, ropivacaine, articaine, mepivacaine); and
- Ester (benzocaine, cocaine, procaine, tetracaine).

True allergy to an amide local anaesthetic is exceedingly rare. Local anaesthetics of the ester type are more likely to produce allergic reactions as they are metabolized to para-aminobenzoic acid (PABA), which is an allergenic compound.

The only ester local anaesthetic used in primary care dentistry is benzocaine, which is used in topical preparations applied prior to administration of local anaesthetic injections. An allergy to one ester local anaesthetic rules out the use of another ester, as the metabolism of all esters yields PABA. Patients are unlikely to show cross-sensitivity to amide local anaesthetics as these are not metabolized to PABA. An allergy to one amide local anaesthetic does not rule out use of another amide local anaesthetic. However, it would be unwise to use another amide local anaesthetic without hypersensitivity tests.

Local anaesthetics are considered relatively safe but, given the high number of injections that are administered, adverse reactions are inevitable. Adverse systemic reactions to local anaesthetics can be divided into three categories:
- Toxic;
- Psychogenic; and
- Allergic.

What are the signs and symptoms of local anaesthetic hypersensitivity?

A true allergy to local anaesthetics may be either type I or type IV.

Type I

Type I is an immediate anaphylactic reaction mediated by IgE antibodies. Signs and symptoms of type I allergy tend to occur within minutes of giving the injection:
- The lips and periorbital areas swell (angioedema);
- The patient may become agitated and there is generalized urticaria and pruritus, particularly of the hands and feet. Other symptoms include abdominal cramps, nausea and diarrhoea;
- Tightness of the chest, with wheezing and
difficulty in breathing may occur;  
- There may be a fall in blood pressure  
  and a rapid thready pulse, which may be  
  accompanied by flushing of the skin or a rash.

Type IV 
Type IV is a delayed  
hypersensitivity reaction mediated by  
sensitized lymphocytes with typical features  
as follows:  
- Usually localized to the injection site;  
- Commonly expressed as a contact dermatitis.6

Alternative diagnoses 
Genuine hypersensitivity  
reactions to local anaesthetics are extremely  
rare. It has been estimated that true allergic  
reactions to local anaesthetics account for  
less than 1% of all adverse reactions to local  
aanaesthetics.6,8 It is unclear where this figure  
originates from or the number of patients  
this represents, as the incidence of adverse  
reactions occurring in patients who have  
received local anaesthetics is not reported.  
Adverse reactions commonly mistaken for  
hypersensitivity reactions include syncope (fainting), panic attacks and toxic effects  
due to inadvertent entry of the drug into  
the circulation.7 The following are possible  
differential diagnoses and their symptoms.

Allergy 
Many allergic reactions involving  
local anaesthetic preparations are due to  
other constituents in the injection solution  
rather than to the drug itself. Excipients,  
such as preservatives (eg benzoates – used  
in multidose vials) and antioxidants (eg  
metabisulphites – used in local anaesthetic  
solution containing adrenaline), can cause  
allergic reactions.6,9  
Allergy to latex contained in  
rubber bungs, natural rubber latex gloves,  
rubber dams and other dental materials  
should also be considered.4  
Historically, the most sensitizing  
components in local anaesthetic solutions  
were preservatives such as methylparabens.  
Parabens are no longer added to dental local  
aanaesthetic solutions available in the UK.3,9

Psychogenic 
Psychogenic reactions  
(originating in the mind, an emotional  
response) are one of the most common  
adverse reactions associated with local  
aanaesthetic use in dentistry. They may  
manifest in many ways, the most common  
being syncope, but other symptoms include  
panic attack, hyperventilation, nausea,  
vomiting and alterations in heart rate or  
blood pressure, which may cause pallor. They  
can be misdiagnosed as allergic reactions  
and may also mimic them with signs such  
as flushing of the skin, blotchy red rash,  
oedema and bronchospasm.9 All patients  
have some degree of autonomic response to  
injections, ranging from slight tachycardia  
and sweating to syncope.10

Toxic 
Toxic reactions may occur if high  
levels of anaesthetic enter the bloodstream.  
Local anaesthetics can reach the systemic  
circulation as a result of repeated injections,  
inadvertent intravascular administration,  
or overdose in those patients who have  
problems eliminating or metabolizing  
the anaesthetic.10,11 Toxic side-effects are  
predominantly neurological and  
include excitability or agitation, sedation,  
light-headedness, slurred speech, mood  
alteration, diplopia, disorientation and  
muscle twitching. Higher blood levels may  
result in tremors, respiratory depression and  
seizures.3,11

Vasoconstrictor agents, such as  
adrenaline, may also cause adverse effects.  
Adrenaline toxicity can result in symptoms  
such as anxiety, restlessness, trembling,  
pounding headache, palpitations, sweating,  
pallor, weakness, dizziness and respiratory  
distress.3  
Toxic reactions can be minimized by  
staying within safe dosage parameters  
and using safe injection techniques.10

Management of a patient who  
suffers an adverse reaction in the surgery

Psychogenic reaction 
If a fall in blood pressure  
occurs or the patient feels faint, laying the  
patient flat and elevating the legs should  
be sufficient to help restore the blood  
pressure.13 Any tight clothing around the  
neck should be loosened.14 Once conscious,  
the patient should be given a glucose  
drink.13 Calm the patient and reassure  
them.

Toxic reaction 
Symptoms caused by toxicity  
will be short-lived in most patients. The  
pharmacokinetics of the local anaesthetic  
agents used in dentistry suggest that  
the drug will be eliminated from the  
bloodstream within a couple of hours,  
but may be as long as 12 hours in some  
individuals. Reassure the patient that he/  
she will feel better after several hours and  
inform him/her that, although the reaction  
is unpleasant, it should not happen again,  
and it is not necessary to avoid that local  
aanaesthetic in the future.
Management of a patient when local anaesthetic allergy is strongly suspected

If symptoms suggestive of a true allergic reaction occur (localized reaction consisting of swelling, erythema, an itchy rash or systemic features such as dyspnoea, wheezing, widespread skin rash or circulatory collapse), the patient should be given emergency treatment following the Emergency Treatment of Anaphylaxis guidelines (see Medical Emergencies in Dental Practice in the Prescribing in Dental Practice section of the current BNF or the Medical Emergencies and Resuscitation Standards for Clinical Practice in General Dental Practice guidelines: www.resus.org.uk/pages/MEDental.pdf for details). If the patient feels unwell, his/her condition is deteriorating, or they are very distressed, they should be transferred to hospital.

The patient should be referred for further investigation to confirm if the local anaesthetic or another possible allergen (eg excipient, latex) was the cause of the adverse effects. First, consider alternative diagnoses, as discussed above. If further clinical input is needed to establish the diagnosis, contact a local hospital dental department. For patients in whom a true allergic reaction is strongly suspected, patients can be referred by the dentist or GP directly to the allergy clinic at their local hospital, if this service is available.

Very rarely, allergy to the local anaesthetic is confirmed. In these cases, immunological testing should be extended to other local anaesthetics in order to identify a safe alternative for future dental procedures.

Management of patients who report to be allergic to local anaesthetic agents

New patients who claim to have had an allergic reaction to a local anaesthetic should be carefully questioned to obtain a history of past events. These details may be more reliably obtained from the patient’s previous dentist.

Questions to ask the patient or dentist include:

- What symptoms did the patient experience?
- What explanation for the symptoms was given at the time? Who told them this?
- Have they ever had any other dental treatment or surgery in the past that required them to have a local anaesthetic agent? What happened?

Management

- If further information obtained strongly suggests an allergy, but no details are available, refer the patient for allergy testing.
- If further information strongly suggests a psychogenic reaction, proceed with care and address the patient’s anxiety.
- If further information strongly suggests toxicity, proceed with care, starting with low doses of local anaesthetic/vasoconstrictor.
- If no information is available from the patient or dentist, contact the GP who may have information about previous local anaesthetic exposure or other relevant knowledge.
- If it is strongly suspected that the patient has previously suffered an allergic reaction to a local anaesthetic and emergency dental treatment is required, consider contacting a local hospital dental department to discuss management and referral to a unit that has full resuscitation facilities available.

Summary

Allergy to amide local anaesthetics is rare. Allergic reactions are most likely to occur with the ester local anaesthetic agents; these are not used routinely in dentistry. Adverse effects experienced after administration of local anaesthetics may be mistaken for allergic reactions, but often there is another explanation for the symptoms. True allergic reactions to local anaesthetics are either immediate (type I: angioedema, urticaria, pruritus, tightness of the chest, wheezing, fall in blood pressure) or delayed (type IV: localized reaction at the injection site, contact dermatitis) hypersensitivity reactions.

Owing to the rarity of local anaesthetic allergy, if a patient experiences signs and symptoms suggestive of an allergic response, consideration should be given to other possible causes of the symptoms, eg toxicity (sedation, light headedness, slurred speech, mood alteration, delirium, disorientation and muscle twitching) or a psychogenic reaction (anxiety, flushing of the skin, blotchy red rash, bronchospasm, sweating, tachycardia, syncope, hyperventilation, nausea and vomiting).

Where local anaesthetic allergy is strongly suspected, patients should be referred for allergy testing for confirmation.

References