"This won't hurt, will it?"

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A 26-year-old male presents to the emergency department with a scalp laceration. He is healthy, but indicates he has an allergic reaction to lidocaine, with symptoms including throat swelling, an itchy rash, and difficulty breathing. The patient has undergone allergy testing in the past, and was found to be allergic to lidocaine, and possibly other local anesthetics. Unfortunately, he has lost his medical alert bracelet recently, and sutures are needed to close the laceration.

Questions:

1. What is the classification of local anesthetics?
2. How common are local anesthetic allergies?
3. How can adequate analgesia be provided?
4. What followup should be provided?

Answers:

1. What is the classification of local anesthetics?

Local anesthetics are made of a lipophilic aromatic benzene ring and a hydrophilic amine ring. These elements are joined by either an ester or an amide linkage. Those joined with an ester linkage are classified as esters, while those joined using an amide linkage are in the amide family (Table 1).

2. How common are local anesthetic allergies?

Toxicity from local anesthetics are uncommon, but are more frequent when the maximum suggested dose is exceeded. The exact maximum dose should be calculated, however, most single-use vials contain less than the maximum dosage for the average 70-kg male.

The exact maximum dose can be calculated. For example, using the maximum dosage of lidocaine without epinephrine, a 70-kg male can receive a maximum of 280 mg of lidocaine (4 mg/kg x 70 kg = 280 mg). A 1% lidocaine solution contains 10 mg/mL lidocaine, so a 70-kg male can receive a maximum of 28 mL.

Local anesthetic allergies are rare, occurring in < 1% of the population. The incidence of amide allergies is even less than that of ester allergies. Most patients experiencing true allergic symptoms with use of local anesthetics are actually experiencing a reaction to a preservative in the solution, commonly methylparaben.

Some patients describing "allergic reactions" are describing the clinical effects of the epinephrine combined with many local anesthetics. These effects include anxiety, palpitations, and tachycardia.

Many local anesthetics are Class 1 antiarrhythmics, and so, toxic effects are directly related to increasing plasma doses of local anesthetic (Table 2). For this reason, when injecting any local anesthetic, it is advisable to proceed slowly and to aspirate in order to check for intravascular entry.

3. How can adequate analgesia be provided?

Patients with an allergy to preservatives can safely be given cardiac lidocaine, which is preservative free. Patients with a true allergy to local anesthetics should be questioned as to which class of drugs they are allergic to. This may be documented on a medical alert bracelet, or the patients themselves may be aware. If a patient has a known allergy to an amide, a drug in the ester class can safely be adminstered. Similarly, those allergic to esters can safely be given an amide. Often, patients are not aware of the specific allergen, in which case, it is best to avoid all local anesthetics.

Table 1
Local anesthetics

Drug name	Class	Duration	Maximum dose	Maximum mL**
Procaine 4% (Novocaine)	Ester	15–45 min	7 mg/kg (8 mg/kg)*	50mL (60 mL)*
Tetracaine (Pontocaine)	Ester	2–3 hrs	Topical eye anesthetic	
Lidocaine 1% (Xylocaine)	Amide	1–2 hrs	4 mg/kg (7 mg/kg)*	28 mL (50 mL)*
Bupivacaine 0.25% (Marcaine)	Amide	3–8 hrs	2 mg/kg (3 mg/kg)*	40 mL (60 mL)*
Mepivacaine 1% (Carbocaine)	Amide	2–2.5 hrs	7 mg/kg	50 mL

*Maximum dose with epinephrine
**Of concentration indicated for 70-kg patient

Patients with a true allergy to local anesthetics can receive effective analgesia with subcutaneous diphenhydramine. Diphenhydramine has a structure similar to lidocaine, but allergic cross-reactivity has not been reported. Diphenhydramine should be diluted with normal saline to a concentration of 0.5% to 1% before infiltration. This can be done by diluting 1 mL of 50 mg/mL diphenhydramine with normal saline to a total volume of 5 mL to 10 mL. Concentrations of > 1% have been associated with tissue necrosis. Diphenhydramine should be avoided in areas with poor collateral circulation, (*i.e.*, fingers, toes, penis, pinna, nose). Although diphenhydramine infiltration has been found to provide effective analgesia, pain during infiltration may be slightly greater than that of lidocaine.

Table 2
Toxic effects of local anesthetics

Local	Systemic
Neurotoxicity	Tongue numbness
Myotoxicity	Light headedness
	Visual/auditory hallucinations
	Muscular twitching
	Coma
	Seizure
	Respiratory arrest
	Circulatory collapse

4. What followup should be provided?

All patients with a potential allergy to local anesthetics should be referred for allergy testing. The documentation and delineation of their allergy is important for future treatment. Once their allergy is clearly defined, patients should be advised to get a medical alert bracelet. Dx

Suggested Readings
1. Marx JA, Hockberger RS, Walls RM, et al.: *Rosen's Emergency Medicine, Concepts and Clinical Practice.* Mosby, St. Louis, 2002.
2. Green SM, Rothrock SG, Gorchynski J: Validation of diphenhydramine as a dermal local anesthetic. Ann Emerg Med 1994; 23(6):1284-9.

This department covers selected points to avoid pitfalls and improve patient care by family physicians in the ED. Submissions and feedback can be sent to diagnosis@sta.ca.

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