Tackling Adverse Reactions to Local Anesthetics

Kristin St. John, PharmD, Daniel Woods, MD, and David Parra, PharmD, BCPS

This patient wanted to undergo an important procedure that required local anesthesia. With his history of an adverse reaction to such medication, however, this treating team had to decide a course of action.

Local anesthetics are used widely during diagnostic and interventional procedures in a variety of inpatient and outpatient settings. Although allergies to these medications have been reported, true hypersensitivity (at least to amide local anesthetics) is rare and accounts for less than 1% of all reported adverse reactions.[1]

Even so, it is important to thoroughly investigate an alleged adverse reaction to a local anesthetic. Although such investigation—and the subsequent task of determining an appropriate course of action—may seem daunting to clinicians, the steps are critical, as many patients may need to undergo future procedures in which administration of a local anesthetic is preferred.

Here, we describe a case in which lidocaine was used successfully in a patient with a previously reported adverse reaction to procaine. We then provide an overview of a logical approach to treating patients who report alleged adverse reactions to local anesthetics.

Dr. St. John is a clinical pharmacist at James A. Haley Veterans Hospital, Tampa Bay, FL. **Dr. Woods** is a cardiologist at West Palm Beach VA Medical Center (WPBVAMC), West Palm Beach, FL and a fellow of the American College of Cardiology. **Dr. Parra** is a clinical pharmacist in the patient support service at WPBVAMC.

INITIAL EXAM

An 83-year-old, white man presented to the emergency department (ED) after experiencing a sudden onset of weakness in his right arm and lower extremity. The patient's medical history was significant for dyslipidemia, hypertension, and a transient ischemic attack (TIA) that had occurred two years earlier. The patient's allergy profile had a notation indicating a previous adverse reaction of "fainting" to procaine, and "nausea and vomiting" to simvastatin.

During the patient's ED evaluation, it was noted that he had been nonadherent to all of his medications (including aspirin) for at least several weeks and, for all practical purposes, was taking no medications. The patient was admitted and underwent workup for possible myocardial infarction—the results of which were negative. An echocardiogram demonstrated mild pulmonary hypertension with normal left ventricular systolic function. A computed tomography (CT) scan of the head revealed no infarct.

The patient was diagnosed as having had another TIA and was discharged. His medications at discharge were aspirin 162 mg once daily and lisinopril 5 mg once daily.

The patient returned to the ED five days later with recurrent symptoms. He reported nonadherence to his aspirin and lisinopril therapy while at home. A CT scan was performed again, this time demonstrating areas compatible with ischemia, and he was admitted.

A transesophageal echocardiogram (TEE) was ordered to investigate whether a cardioembolic source was responsible for the recurrent TIAs. After reviewing the risk associated with the procedure, the patient provided informed consent to undergo the TEE. Given the patient's previous reported adverse reaction to procaine, careful consideration was given to whether it would be appropriate to use a local anesthetic and, if so, which one. Despite a thorough investigation into the patient's electronic medical record and close questioning of the patient and his family, little additional information was obtained regarding the nature and magnitude of the reported adverse reaction. After a review of the pertinent medical literature and pharmacology of the various local anesthetics, the medical team and patient decided that the benefits of the procedure

outweighed the risk of a serious allergic or other adverse reaction to an alternative local anesthetic to procaine.

TREATMENT COURSE

Viscous lidocaine was chosen as the alternative local anesthetic, and the patient underwent an uneventful TEE with no associated adverse reactions or complications. Preprocedural vital signs were documented as a blood pressure of 152/72 mm Hg, a pulse rate of 71 beats/min, a respiratory rate of 16 breaths/min, and a pain score of 0 (on a scale of 0 to 10). Medications administered during the procedure included midazolam 2 mg IV, fentanyl 25 µg IV, and 10 mL of 2% viscous lidocaine locally (orally gargled).

Postprocedural vital signs were documented as a blood pressure of 123/71 mm Hg, a pulse rate of 65 beats/min, a respiratory rate of 16 breaths/min, and a pain score of 0. Subsequent vital signs were all within normal limits, with no evidence of hypotension or hypertension, tachycardia, pruritis, rash, dizziness, lightheadedness, or other evidence of either an allergic reaction or other type of adverse reaction.

ABOUT THE CONDITION

Local anesthetics are made up of three components that contribute distinct properties to these agents. These components include an aromatic ring, a terminal amine, and an ester or amide chain that links the aromatic ring to the terminal amine. Whether this intermediate chain is an ester or amide determines the classification of the molecule into an amino amide or an amino ester local anesthetic.[2]

Local anesthetics in the amide group primarily are metabolized in the liver and include lidocaine, bupivacaine, mepivacaine, and ropivacaine. Local anesthetics in the ester class principally are hydrolyzed in the plasma by cholinesterases and include cocaine, procaine, chloroprocaine, and tetracaine.[1,2] Esters are derivatives of para-aminobenzoic acid, which is known to be allergenic. While the amide local anesthetics are not derived from the same allergenic compound, multidose vials may contain a preservative called methylparaben,

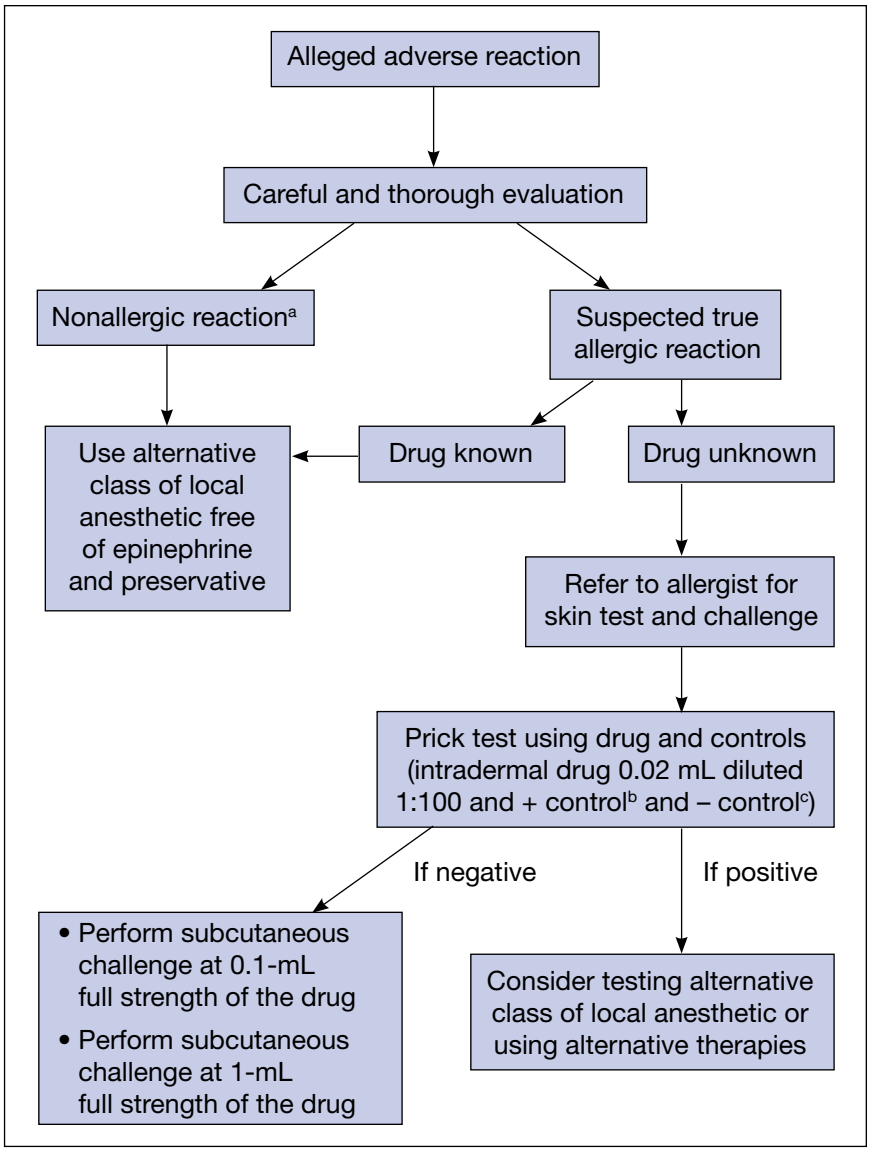

Figure. Approach to managing an alleged adverse reaction to a local anesthetic.[2,11] [a]These reactions could include an idiosyncratic or psychogenic reaction, a toxic effect of the drug, or simply the occurrence of an event unrelated to the local anesthetic (such as a vasovagal response, tachycardia/palpitations related to concomitant epinephrine, or a complication of the procedure). [b]+ control = 1.8 mg/mL histamine base. [c]– control = phosphate-buffered saline. Adapted with permission from: deShazo RD, Kemp SF. Allergic reactions to drugs and biologic agents. *JAMA*. 1997;278(22):1895–1906.[11]

which is structurally similar to para-aminobenzoic acid and may cause allergic reactions in some patients.

Another alleged allergen is a chemical known as metabisulfite, which is present in local anesthetic solutions containing epinephrine. Sulfites are inorganic compounds that have no relation to immunogenicity attributed to para-aminobenzoic acid–related compounds. Sensitivity to bisulfites is possible, however, and there is a possibility of cross-sensitization reactions because many other medications, foods, and beverages contain such preservatives as metabisulfites and hydroxybenzoates.[2]

When investigating an alleged allergic reaction to a local anesthetic, the initial step should be to obtain a detailed history from the patient to ascertain the signs and symptoms of the reaction. The purpose is to determine whether it was truly an allergic reaction or another type of adverse reaction. These latter adverse reactions could include an idiosyncratic or psychogenic reaction; a toxic effect of the drug; or an event unrelated to the local anesthetic, such as a vasovagal response, tachycardia/palpitations related to concomitant epinephrine, or a complication of the procedure.[1,2]

An important factor to consider is whether the patient experienced drug toxicity, which may result from the administration of large amounts of local anesthetic. These toxic effects may occur secondary to inadvertent intravascular injection; excessive use of local anesthetic when attempting repeated introduction of a TEE probe or other instrumentation; or repeated administration during specific procedures, such as liposuction. Initial symptoms of local anesthetic toxicity include those of central nervous system (CNS) excitation, such as agitation, disorientation, nausea, apprehension, slurred speech, tremors, and convulsions. These symptoms may be followed by signs of CNS and myocardial depression, including lethargy, respiratory depression, and hypotension.[2]

Loss of consciousness and tachycardia are considered psychomotor reactions, frequently occur in anxious or apprehensive patients, and should not be considered an adverse reaction to the local anesthetic. True allergic reactions to local anesthetics may have local or systemic manifestations. Allergic symptoms, which are usually limited to the injection site, may include mild rash, erythema, swelling, and urticaria. Less common systemic anaphylactic reactions may be life threatening and can include angioedema, hypotension, bronchospasm, dyspnea, and general urticaria.[1]

While true allergic reactions to local anesthetics do occur, investigations of alleged allergies consistently have demonstrated that the majority of these are not reproduced during formal testing.[3–10] These studies also have demonstrated that skin tests and subcutaneous challenges are safe and reliable. Data from these investigations support the use of an alternative local anesthetic in patients who have undergone a careful and thorough evaluation of the reported allergy. Such an approach has been previously described (Figure).[2,11] Because of the uncertainty of the role of preservatives in alleged adverse reactions to local anesthetics, such solutions are best avoided since alternatives are readily available.[3] Of course, all necessary resuscitation equipment, intravenous access, and trained help should be available—particularly for a patient whose medical history suggests a reaction of a true allergic nature. These patients also may benefit from more formal testing prior to administration of the alternative local anesthetic. In the event that an alternative anesthetic is not feasible, other therapies may include treatment with diphenhydramine, opioids, or general analgesia.[1]

REVISTING THE CASE

With regard to our patient, performance of a skin prick test was not warranted. The patient's initial reaction was typical of a nonallergic adverse response and had occurred when an ester-type local anesthetic was administered, suggesting that the patient could safely and successfully be treated with the amide-type local anesthetic lidocaine.

Data...support the use of an alternative local anesthetic in patients who have undergone a careful and thorough evaluation of the reported allergy.

Author disclosures

The authors report no actual or potential conflicts of interest with regard to this article.

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CASE IN POINT

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This article may discuss unlabeled or investigational use of certain drugs. Please review complete prescribing information for specific drugs or drug combinations—including indications, contraindications, warnings, and adverse effects—before administering pharmacologic therapy to patients.

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