An Unusual Complication with Local Anesthetic Injection

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This is a case report of a highly unusual skin reaction manifesting after the administration of local anesthesia. An Arthus-type phenomenon, a type III hypersensitivity reaction, is postulated as the cause of the skin lesion, and a brief discussion of possible pathogenic mechanisms is given. It has been estimated that only about 1% of adverse reactions caused by local anesthetics are true allergy. Although a few cases of true local anesthetic allergy have been documented, sensitivity to the preservative may be the more common cause of side effects. The probable offending agents in our case are the methyl paraben and bisulfite preservatives. Finally, to diagnose and manage similar cases properly, the authors suggest proper histological exams, skin testing, and a complete history review.

Introduction

Physicians and dentists commonly use lidocaine when treating patients for various purposes including local anesthesia and cardiac arrhythmias. Even though it is considered one of the safest drugs, clinicians should always keep in mind that it can still bring about detrimental consequences in certain patients. Complications due directly to lidocaine injections are numerous and well documented. Untoward reactions reported include: central nervous system stimulation manifested as nausea, vomiting, syncope, blurred vision, and convulsions, central nervous system depression, decreased tolerance, and allergic reactions. Allergic reactions, however, may not be related to the anesthetic itself but are more commonly caused by the additives therein. This report will document an unusual permanent complication related to the administration of local anesthetic and will offer a possible etiology for its occurrence.

Case Report

A six-year old Hispanic boy was seen in the outpatient clinic at the Woodhull Medical and Mental Health Center on November 8th, 1992 with a chief complaint of severe pain in the lower left jaw which started three days prior to the visit. The patient’s past medical history was unremarkable with no known drug allergies.

The patient was given a left inferior alveolar block with one carpule of 2% Lidocaine with epinephrine 1:100,000 (Xylocaine). A negative aspirate was obtained prior to injection. A rubber dam was placed and a pulpotomy was performed on tooth #L. At no time was any chemical applied either intentionally or accidentally to the patient’s face. Upon completion of the pulpotomy (60 minutes), the rubber dam was removed and a large 3-4 cm brown pigmented area was noted on the patient’s left chin. It was mildly raised and felt "leathery" (Fig. 1 and 2) to palpation. The patient had no motor or sensory deficit. At the one week follow-up, an eschar (a scab or a slough) had developed in the site. The patient was then lost to follow-up and returned on March of 1993 with a raised, hypertrophic,

Figure 1 Photo taken shortly after local anesthetic injection showing raised, discolored skin pigmentation of anterior chin.
jagged scar (Fig. 3) in the same area of previous pigmentation. To help alleviate the obvious cosmetic defect, the patient was scheduled for a scar revision, but failed to return.

**Discussion**

The reaction reported in this clinical case is almost identical to a series of four cases presented in the literature by Lederman et al. in 1980. In all four of his case reports, the patients received inferior alveolar block injections with 2% lidocaine with 1:100,000 epinephrine. All four patients developed "red patches" cutaneously, approximately two hours after the injection and in all cases the pigmented lesions resolved completely, with no permanent residual effects. The case reported here is unique in that it resulted in a permanent hypertrophic scar. Lederman et al., suggest that the lesions were due to an allergic reaction of the Arthus type, which is a type III hypersensitivity reaction. Type III hypersensitivity is defined as an acute inflammatory reaction in the tissues mediated by antigen-antibody complexes. There are two patterns of immune complex-mediated injury. In one, the complexes are deposited in various tissues of the body, thus causing a systemic pattern of injury. In the other, the injury is localized to the site of formation, within a single tissue or organ. The Arthus reaction belongs in the latter category. This phenomenon is easily produced experimentally but is not a common finding in clinical practice. A challenge injection in a previously sensitized person elicits a localized immune response consisting of antigen-antibody complexes in blood vessel walls which activate complement. This results in acute necrotizing vasculitis and localized tissue necrosis.

Classically, Arthus reactions occur directly at the site of injection and not at a distance away from it. Immune complexes are usually precipitated at the site of injections, especially within vessel walls, where the injected antigen is immediately bound to the circulating antibodies. However, in our case and the cases reported in Lederman et al., the reaction occurred at some distance from the injection site. In theory, the Arthus reaction described is due to some of the local anesthetic solution being injected intra-arterially, despite negative aspirations, with a significant amount of the antigen accumulating in the terminal skin branches of the inferior alveolar artery. This accumulation results in an antigen-antibody complex mediated reaction occurring in the dermis just as if the antigen were injected intradermally.

It is estimated that no more than 1 percent of the adverse reactions caused by local anesthetics are true allergy. Although a few cases of true local anesthetic allergy have been documented, sensitivity to the preservative may be the more common cause of adverse side effects. Paraben and bisulfites are widely used additives and well-documented antigenic stimulants. An allergic response to lidocaine on first exposure is unlikely, therefore, the methyl paraben and bisulfite preservatives are the probable offending agents.

Our case reported here appears to be clinically identical to the Lederman series, as the patient developed a delayed skin reaction following the injection of local anesthesia via an inferior alveolar block. A raised "leathery" pigmented area appeared, which is a similar feature to the classic "palpable purpura" of cutaneous necrotizing vasculitis, which closely resembles the clinical features of the Arthus reaction. For a definitive diagnosis, skin biopsy with histopathologic and immunopathologic testing could have been performed. But due to the unknown cause of the reaction and a potential for further scarring or cosmetic defect, a skin biopsy was not performed.
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Conclusion
A case report of an unusual skin reaction after the administration of local anesthesia is reported. An allergic Arthus reaction is suggested but could not be confirmed, as definitive skin testing was not performed. Most current local anesthetics in use in dentistry today still contain preservatives, with sodium metabisulfate being the most common type. It is important for the practitioner to be aware that allergic reactions, though rare, can occur at sites secondary to local anesthesia injection. To diagnose and manage these cases properly, a complete history must be taken to determine the nature of the reaction, as well as a proper histological evaluation and skin testing.

References