

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION



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A CASE REPORT**

Journal:	<i>The Journal of the American Dental Association</i>
Manuscript ID:	027-08
Manuscript Categories:	Clinical Practice□Case Reports
Date Submitted by the Author:	18-Jan-2008
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Keywords:	Anesthetics, Local, Anesthesia, Dental, Ischemia, Lip Diseases, Nerve Block

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A CASE REPORT**

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ABSTRACT

Background: The literature describes different local complications derived from local anesthetic penetration into a vessel, though we have only identified one other case similar to our own.

Case description: A 10-year-old girl was subjected to truncal block of the inferior alveolar nerve for dental restoration in the fourth quadrant. During the operation she developed paleness of the lower lip and right chin region that subsequently evolved towards surface ulceration. The lesion healed spontaneously after 15 days. Self-inflicted damage was discarded.

Clinical Implications: On the basis of the clinical manifestations and affected territory, skin necrosis secondary to vascular spasm of the terminal branches of the inferior alveolar artery was postulated, as a result of intravascular injection of the local anesthetic combined with a vasoconstrictor.

Key words: Inferior alveolar artery, skin necrosis, truncal block of the inferior alveolar nerve.

CLINICAL PRESENTATION

The present case corresponds to a 10-year-old girl with no relevant history of disease or allergies. She had no complications with local anesthesia in previous dental treatments. The pediatric dental surgeon performed truncal block of the inferior alveolar nerve as a prior step to composite filling of coronal destruction of the right first lower molar caused by caries (4.6). A 4% articaine cartridge was injected together with epinephrine 1:200,000 using a metal syringe and 27G needle measuring 25 mm in length. Aspiration prior to injection of the local anesthetic was apparently negative, and no abnormal pain was reported at the time of puncture. The indicated dental treatment was carried out without complications. The patient reported to our clinic three hours after dental treatment with paling of the skin of the lower lip and right chin region (Figure 1).

DIAGNOSIS

Since this was a young patient with anesthesia of the lower lip, tongue and skin of the chin on the right side for about three hours as a result of the anesthetic technique used, our first step was to question the patient and her mother about the possibility of self-inflicted injury, which both denied (the mother claiming to have watched the child closely in the hours after the intervention). It is very important to warn pediatric patients that the effects of anesthesia can persist for hours in soft tissue regions, particularly after inferior alveolar nerve block, since such patients may tend to nibble or bite the mucosa of the lower lip, cheek and/or tongue (1). However, in our patient none of these structures was affected, and the lesions were confined to the lower lip and right chin region. In principle we therefore discarded the possibility of self-inflicted injury.

Truncal block of the inferior alveolar nerve is one of the most widely used anesthetic techniques in dental surgery, and is associated with numerous both systemic and locoregional complications. The risk of intravascular injection of the administered product is higher than with any other intraoral anesthetic technique, with an incidence of between 2.6% and 22% (2). The main vascular structures that can be affected by this truncal technique are the maxillary artery, the inferior alveolar artery and vein, and the pterygoid venous plexus. In certain cases, the accidental intraarterial injection of a local anesthetic combined with a vasoconstrictor can produce a skin reaction (local ischemia) in the territory perfused by the vessel (3). This condition is caused by vascular spasm, which when prolonged in time can cause necrosis (4).

The inferior alveolar artery is a collateral branch of the first portion of the maxillary artery. It describes a descending and anterior trajectory until reaching the mandibular canal, where it accompanies the full course of the nerve of the same name, supplying bone and dental vascular branches. In the anterior portion of the canal the artery divides into two terminal branches: the incisor branch follows the same direction as the incisal nerve, and irrigates the incisor-canine sector, while the mental branch emerges from the mental foramen and distributes over the soft parts of the lower lip and chin. In this region it anastomoses with the submental artery and inferior labial artery - both of which are branches of the facial artery (5-8)(Figure 2).

Considering the anatomical territory involved and the fact that the local anesthetic solution contained epinephrine as vasoconstrictor, the latter was probably inadvertently injected into the inferior alveolar artery, resulting in spasm of the terminal branches of the vessel and skin necrosis of the right lower lip.

MANAGEMENT

Control of the lesion until complete healing was decided, and measures of hygiene were prescribed to prevent overinfection. After 24 hours, the affected zone turned red in color and caused itching (Figure 3). The sensitivity of the lower lip and of the skin of the chin proved normal. There were no alterations in pulp vitality of the teeth in the affected quadrant. Clinical evaluation after 6 days revealed crust formation the right lower lip region (Figure 4). After 15 days, the lesion had resolved completely, though slight hypopigmentation of the zone persisted. The patient presented no symptoms of any kind (Figure 5).

DISCUSSION

It has been reported that the injection of a vasoconstrictor into an artery can give rise to ischemia / necrosis of the territory irrigated by the vessel (3). This phenomenon is due to stimulation of the vascular alpha-adrenergic receptors, with contraction of the smooth muscle within the arterial wall (1). If such vascular spasm is prolonged in time, it may cause tissue necrosis (4). Normally, soft tissue necrosis tends to occur in the zone in which the local anesthetic is deposited. Giunta et al. (9) reported an unusual necrotic phenomenon resulting from truncal mandibular block and occurring at the puncture site. However, this type of complication usually occurs in the hard palate after very traumatic anesthesia.

Delgado-Molina et al. (10, 11) reported an incidence of positive blood aspirations during truncal block of the inferior alveolar nerve of between 8.7% and 8.9%. It is therefore essential to aspirate prior to anesthetic block of any kind, in order to avoid both systemic and locoregional complications secondary to intravascular injection of the anesthetic solution. In our case, aspiration was performed prior to the anesthetic technique, and apparently no blood appeared within the carpule. What may

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3 have happened is that aspiration (proving negative) was carried out with the needle tip
4 located extravascularly, though subsequent injection of the anesthetic solution took
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6 place with the needle tip located within the vascular lumen, following movement of the
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8 syringe (12). Alternatively, aspiration may have yielded a false negative result. This can
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10 happen when the needle bevel is lodged within the vascular endothelium; on aspirating,
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12 the endothelium suctioned by the pressure occludes the needle lumen, and no blood is
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14 aspirated into the carpule (11).
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20 Some authors consider that the best way to lessen puncture pain is to use small
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22 caliber needles, and this may have been the reason why a 27G needle was used in our
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24 case. However, Malamed (13) considers that when there is a high risk of positive
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26 aspirations, as in the case of truncal block of the inferior alveolar nerve, the needle
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28 caliber should be at least 25G. Cooley and Robinson (14), in an *in vitro* study,
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30 concluded that the smaller the needle caliber, the greater the potential for error with the
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32 aspiration test. However, other authors (10, 12) have reported no relationship between
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34 the number of positive aspirations and the caliber of the needle used.
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40 In some individuals the maxillary artery can trace a loop and be found about 9
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42 mm above the mandibular foramen (in extreme cases the distance can be as little as 4
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44 mm) – the usual distance being approximately 17 mm. This anatomical variant has led
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46 some authors (1, 15) to postulate the possibility of injecting the local anesthetic directly
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48 into the mentioned artery in the course of truncal mandibular block. Other authors (16,
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50 17) suggest that intravascular injection may be made directly into the inferior alveolar
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52 artery, and that the local anesthetic is able to circulate retrogradely, reaching the
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54 maxillary artery and distributing through its branches. Malamed (13) and Gasteier (18)
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56 reported that retrograde circulation is only possible when the injection is carried out at
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high pressure and velocity, since the local anesthetic must travel against both arterial pressure and the force of gravity.

The literature describes different locoregional vascular complications secondary to truncal mandibular block. These effects in turn depend on the implicated branches of the maxillary artery. In this sense, different ophthalmological alterations have been reported due to involvement of the middle meningeal artery, with ischemia at both facial skin level (due to involvement of the infraorbital artery) and intraorally (due to involvement of the descending palatine artery) (15, 16, 19). We have only found one case in the literature with characteristics similar to our own, in which the affected tissues were irrigated by the branches of the inferior alveolar artery (20). Kruger and Nehse (20) reported the case of a 30-year-old woman subjected to truncal mandibular block and infiltrating anesthesia of the mental nerve for restorative treatment in the third quadrant. A total of three carpules of 4% articaine combined with epinephrine 1:100,000 were injected – this being slightly greater than the amount administered in our case. Posteriorly, the authors observed crust formation in the left lower lip region, with transient sensory alteration of the area innervated by the ipsilateral mental nerve branch. A hematoma was also observed in the vestibular mucosa at 3.2, 3.3 and 3.4 level. In this case the vascular and nerve structures were probably affected during the mental nerve infiltration technique (20).

In the case of our patient there were no complications other than the right lower lip lesion, and the zone where the mental nerve emerges was not infiltrated. We therefore believe that the local anesthetic was injected directly into the inferior alveolar artery. The anesthetic solution possibly flowed in the direction of the bloodstream, since injection was carried out with the correct pressure and velocity.

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The injection of anesthetic solution into an artery is not without systemic and
locoregional risks. It is therefore essential to perform aspiration before injecting the
solution. Even so, a negative aspiration test is not an absolute guarantee against
intravascular injection.

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FIGURE LEGENDS

Figure 1: Paling of the skin of the lower lip and right chin region three hours after truncal block of the inferior alveolar nerve.

Figure 2: Anatomical dissection of the left chin region. **A:** Superficial view where we can observe the depressor anguli oris muscle; **B:** Deep view where we can observe the emergency of the mental nerve and vessels through the mental foramen.

Figure 3: Skin reddening in the same region after 24 hours.

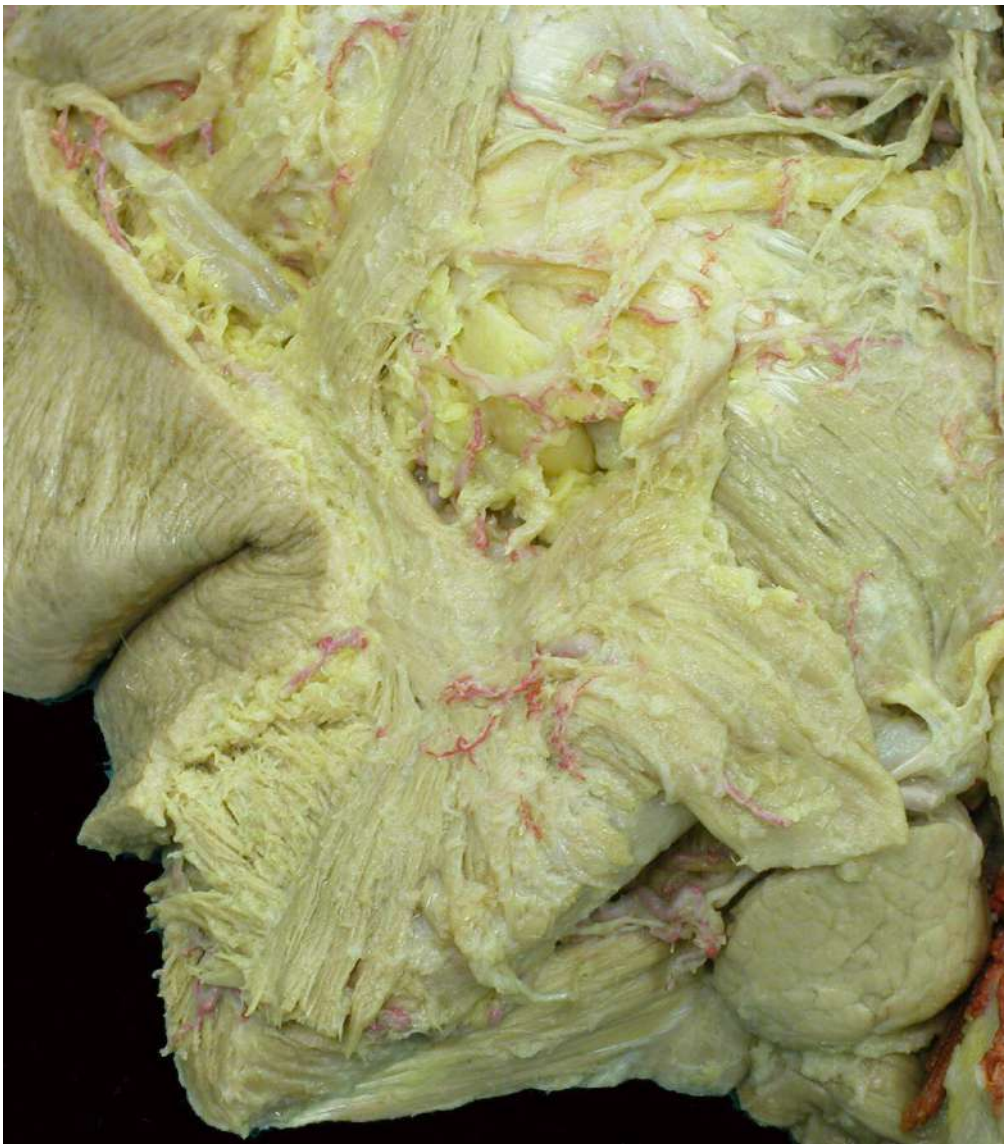
Figure 4: Crust formation after 6 days.

Figure 5: Residual hypopigmentation after three months.



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