

## CASE REPORT

# Complications of an intra-arterial injection from an inferior alveolar nerve block

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**I**nferior alveolar nerve blocks can cause permanent alteration in sensation to the lingual nerve, inferior alveolar nerve or both nerves.<sup>1,2</sup> In addition to altered nerve sensation, permanent loss of vision has been reported in one case.<sup>3</sup> Oculomotor disturbances can occur with local anesthetic injections.

Rood<sup>4</sup> reported a case in which 1.5 milliliters of lidocaine with 1:80,000 epinephrine was injected in an inferior alveolar nerve block. Immediate loss of vision developed in the ipsilateral eye, along with upper-eyelid ptosis and medial strabismus, which resulted in double vision. The patient also developed ischemia of the palatal mucosa. Within five to 45 minutes, all symptoms disappeared.

Blaxter and Britten<sup>5</sup> reported several cases involving transient loss of vision, diplopia and amaurosis. They postulated that an intra-arterial injection of the inferior alveolar artery occurred, with the anesthetic traveling to the internal

maxillary artery, the middle meningeal artery and, finally, the lacrimal and ophthalmic arteries. Goldenberg<sup>6,7</sup> reported a similar case following a mandibular injection. The patient developed dizziness, diplopia and partial amaurosis, as well as total blanching of the forehead and upper eyelid ipsilaterally. The author traced the anesthetic to the lacrimal artery, which affected the sixth cranial nerve and innervated the lateral rectus

**Background.** Unintended intravascular injections from inferior alveolar nerve blocks result in frustrating complications, both systemically and locally. It is imperative that the dentist diagnose the complication and treat it appropriately. Sometimes, several reactions occur simultaneously.

**Case Description.** The authors present a case report that illustrates some of the many complications resulting from inferior alveolar nerve block injections. In this case, complications developed from intra-arterial injection of local anesthetic. The facial skin, intraoral structures and eye were affected. Within 60 minutes of the injection, all structures returned to their normal state. Prompt diagnosis and reassurance usually calm the patient.

**Clinical Implications.** Even when clinicians use the utmost care, by aspirating before the injection and noting anatomical landmarks, intra-arterial injections can occur during inferior alveolar nerve blocks. Fortunately, permanent damage to nerves, facial and oral tissues, and eyes is rare. The practitioner should diagnose and treat the problems appropriately to avoid any irreversible complications.

muscle. This muscle became anesthetized for about 20 minutes.

Dryden<sup>8</sup> reported a case following a Gow-Gates block injection. He used 2 percent lidocaine with epinephrine 1:100,000 after no material was aspirated. After a second injection, which was administered within 30 seconds of the first injection, the patient felt a burning sensation around the right eye and infraorbital region. Diplopia and ptosis of the right eye developed, as well as blanching of the skin coinciding with the infra-orbital artery. In addition, the patient experienced blanching on the right side of the hard palate that followed the distribution of the greater palatine artery.

## CASE REPORT

A 33-year-old woman was referred to one of us (B.W.) for endodontic treatment of the

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lower left first molar. Her general dentist (H.O.) had administered a traditional left mandibular block injection with 2 percent lidocaine and epinephrine 1:100,000. Within one minute, the patient felt dizzy and light-headed. The examination revealed that the left infraorbital region had turned white. This blanching extended to the left side of the nose, the lower eyelid and the lip. The upper eyelid and supraorbital region also were affected, although the skin was not blanched.

**Signs of numbness.** Overall, the patient reported feeling as if the entire left side of her head and face had become numb. Intraorally, the lower left lip had clinical signs of numbness. Vision was slightly blurred and there were no signs of strabismus, but the periorbital area was numb (Figure).

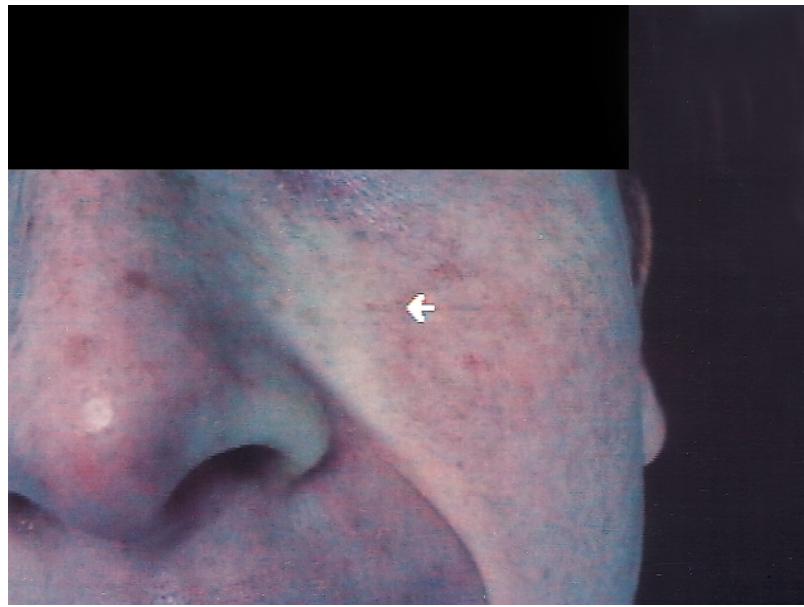
The patient was apprehensive and began to panic. She did not understand what was happening. After the examination and being reassured, the patient calmed down.

#### **Intra-arterial injection of anesthetic.**

According to Malamed,<sup>9</sup> the most frequently observed emergencies in the dental office are syncope, allergy, angina pectoris, postural hypotension, seizures, acute asthma, hyperventilation, epinephrine reaction and hypoglycemia. After ruling out all of the above, we determined that the patient was responding to an intra-arterial injection of anesthetic. She was alert and conscious, did not break out in an allergic rash, did not have shortness of breath or chest pains, and was breathing normally, although faster. The patient had no medical history of diabetes or any other systemic diseases.

Clinicians need to keep in mind the basic life-support measures: position, airway, breathing, circulation and definitive care (that is, PABCD).<sup>9</sup> In particular, they need to observe the patient's breathing and circulation (look for blanching).

After about 20 minutes, our patient felt calmer and began to feel the effects of the anesthetic subsiding on her external facial areas. She elected to proceed with the endodontic procedure since she was well-anesthetized, but requested a one-visit procedure to avoid a similar experience. Within 45 minutes of the injection, the blanching of the infraorbital region had dissipated. No diplopia or ocular changes remained. Numbness of the supraorbital and infraorbital regions and nose was completely gone. After about four hours, the effects of the local anesthetic on the inferior alveolar nerve had worn off.



**Figure.** The arrow points to the blanched skin, indicating vasoconstriction of the peripheral branches of the infraorbital artery.

#### **DISCUSSION**

The blood supply to the head and face is via the external carotid artery, which branches off to form the internal maxillary artery. Further branching forms the infraorbital artery to the skin of the orbital area and the greater palatine artery to the roof of the mouth. The middle meningeal artery branches off the internal maxillary artery and forms branches that anastomose with the ophthalmic and lacrimal arteries. The inferior alveolar artery branches off the internal maxillary artery and descends to the mandibular foramen.

Injection of the local anesthetic into the inferior alveolar artery traversing the aforementioned arterial branches would account for the deviation of the eye, with temporary anesthesia of the lateral rectus muscle. The epinephrine works peripherally on the  $\alpha$ -adrenergic receptors of the skin and mucosa, resulting in constriction of the blood vessels. This would account for the blanching of the skin localized to the infraorbital foramen area, resulting from decreased blood flow. Epinephrine is a vasopressor that works by stimulating both  $\alpha$ - and  $\beta$ -adrenergic receptors. It increases blood pressure by stimulating the cardiac  $\beta_1$  receptors of the myocardium, which increases its ventricular contraction strength and the heart rate, as well as by peripheral vasoconstriction.

**CONCLUSION**

The most important steps in managing a reaction to an intra-arterial injection of local anesthetic are to promptly diagnose the problem and reassure the patient. If other symptoms occur, such as syncope or heart palpitations, clinicians should initiate additional appropriate treatment. It is essential that the dentist explain to the patient what is happening and reassure him or her that the extended anesthesia is temporary. It also may be necessary to have someone accompany the patient home if his or her sight is not completely restored by the end of the procedure. Follow-up telephone calls and possibly an examination by an ophthalmologist may be necessary for medicolegal reasons and to demonstrate concern for the patient. ■

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