CDA JOURNAL, VOL 38, Nº1

Ocular Complications After Inferior Alveolar Nerve Block: A Case Report

TAHANI AL-SANDOOK, BDS, PHD, AND AYAD AL-SARAJ, PHD

ABSTRACT Ocular complications, transient loss of vision and diplopia, and blanching of the skin of the infraorbital region were reported in a female patient after an inferior alveolar nerve block for extraction of the permanent mandibular left third molar tooth. Injection of the anesthetic solution into the maxillary artery could result to such complications. The anatomy related to this case, with suggestions for management of such a patient is discussed.

AUTHORS

Tahani Al-Sandook, BDS, PHD, is a professor in pharmacology and dean of Dentistry College, Mosul University, in Mosul, Iraq.

Ayad Al-Saraj, PHD, is an assistant professor in the anatomy department of Dental Basic Sciences, College of Dentistry, Mosul University, in Mosul, Iraq.

The inferior alveolar nerve block, commonly referred to as the mandibular nerve block, is the most frequently used and possibly the most important injection technique in dentistry. The most common complications of this block are: trismus, hematoma, and transient facial paralysis.[1]

Ocular complications are very rare but they can occur. Since 1960, 39 cases of ophthalmic complications have been reported in English literature. The main signs were transient loss of vision (amaurosis) and transient extraocular muscle palsy (diplopia). In all but three cases, the deficits were temporary.[2]

The most recent case of transient left lateral rectus nerve palsy and blanching of the upper lip was reported, following an inferior alveolar nerve block to enable the surgical removal of a permanent mandibular left third molar tooth.[3]

Transient loss of power of accommodation of the eye resulting in blurred vision was also noticed after routine inferior alveolar nerve blocks on the ipsilateral side. Clear vision returned within 10 to 15 minutes after completion of the block.[4]

The facial skin (blanching of the infraorbital region and upper lip), intraoral structures (blanching of hard palate) and eye (ptosis of upper eye lid) were affected after inferior alveolar nerve block, but within 60 minutes of the injection, all structures returned to their normal state.[5,6] Transient extraocular muscle palsy resulting from inferior alveolar nerve block was also noticed in children.[7]

This article documents the occurrence of ocular and cutaneous complications after an inferior alveolar nerve block. This paper also looks at the presenting factors, the anatomical considerations, and the management of the patient.

Case Description

A 28-year-old white female patient attended a private dental clinic for extraction of the permanent mandibular left third molar tooth. She was medically fit with a past dental history of apprehension and fainting after a local anesthetic injection, as well as manifesting a large broad mandible. An inferior alveolar injection was performed by using 2 percent lidocaine and epinephrine 1:100,000. Immediately after the injection, the patient felt dizziness, confusion, paleness, blanching, and numbness of the infraorbital region, diplopia, and blindness. After five minutes, the patient regained conscious but was still blanching in the infraorbital region. The patient was dismissed and booked for her next dental appointment. She left with a companion. On the next dental visit, the patient was fine, had no complaints, and the dental treatment was continued.

Discussion

A review of the literature revealed that most of the authors believed that the possible explanation for this phenomenon is the accidental injection of local anesthetic agents into the neurovascular bundle, which were carried via bloodstream to the orbital region but the exact mechanism is conflicted.[3-5]

One study mentioned that the injection of the local anesthetic into the inferior alveolar artery (branch from maxillary artery) traverses the middle meningeal artery (branch off the maxillary artery) and forms branches that anastomose with the ophthalmic and lacrimal arteries would account for diplopia.[5] This suggestion seems to unlikely because the inferior alveolar artery passes downward to enter the mandibular foramen and through it to mandibular canal for supplying the lower teeth.

Others suggested that the ocular complication would require the solution to spread from a site near the mandibular foramen in the infratemporal fossa where the inferior alveolar nerve is located.[8] Hence, the solution passes anteriorly to the pterygomaxillary fissure and the pterygopalatine fossa, and then through the inferior orbital fissure into the orbital cavity. Even within the orbit, the solution would have to pass through orbital fat and fascia and around densely packed structures to reach the nerves within the orbital cavity.

IMMEDIATELY AFTER the injection, the patient felt dizziness, confusion, paleness, blanching, and numbness of the infraorbital region, diplopia, and blindness.

If this explanation is accepted, this means that with the increased use of inferior alveolar nerve block, there is likely to be an increased incidence of ophthalmologic complications owing to its increased diffusion properties. Also expected is that the local anesthetic solution would have affected the other nerves in the region, such as the infraorbital and zygomatic branches of the maxillary nerve, as they travel through the inferior orbital fissure, or other motor branches supplying the extra-ocular musculature.[3]

Most probably, the local anesthetic solution could be injected into the maxillary artery and from it to the middle meningeal artery, which would enter the cranial cavity through the foramen spinosum. The terminal branches of the middle meningeal artery anastomosis with the branches of the opthalmic artery such as the lacrimal, ciliary, and even the central artery of retina.[9] Through this route, the anesthetic agent would reach the abducent, occulomoter, and optic nerves, as well as the ciliary ganglion. Therefore, the ocular signs appear as diplopia, ptosis, amaurosis, and loss of accommodation, respectively.

This possible precise anatomical explanation is supported by a study that mentioned the proximal portion of the maxillary artery crossed the posterior ramus of the mandible at a level that is closer to the level of the mandibular foramen. The same study showed a significant incidence of inferiorly looping of the maxillary artery immediately above the level of the mandibular foramen.[10]

Another study has shown that in a high percentage of cases, the maxillary artery passes laterally to the inferior alveolar and lingual nerves in the superior region of the infratemporal fossa adjacent to the mandibular ramus.[11] A large broad mandible may act as a predisposing factor for such complications.

The infraorbital artery is a branch of the terminal part of the maxillary artery that has passed from the infratemporal fossa to the pterygopalatine fossa, then emerges from the infraorbital foramen to supply the upper lip, lower eyelid, and the lateral aspect of the nose.[3,9] Injection of the local anesthetic into the maxillary artery allows the anesthetic agent to reach the skin of the infraorbital area through the infraorbital artery. As the epinephrine works peripherally on the adrenergic receptors of the skin and mucosa, the result is constriction of the blood vessels. This would account for the blanching of the skin localized to the infraorbital area, resulting from decreased blood flow.[5]

Conclusions

Ocular and cutaneous complications could occur when a local anesthetic solution is injected into the maxillary artery during inferior alveolar nerve block. Therefore, the dentist should always aspirate prior to depositing the local anesthetic solution. Treatment should be stopped when any ocular sign appears. The dentist also should reassure and explain to the patient that these effects are temporary. It is better for the patient to be escorted home and advised against driving and operating machinery until normal sight returns. It may be necessary for an ophthalmologist to follow-up with the patient.

Current studies show a more detailed knowledge of the branching of the various nerves and arteries of the head region. A thorough understanding of these neuroanatomical concepts and the potential variations in innervation are necessary for dentists to induce profound dental local anesthesia on a more consistent basis. ■■■■

REFERENCES

1. Malamed F, Handbook of local anesthesia, fifth ed., Elsevier Mosby, St. Louis, Mo., pages 228, 234, 2004.
2. Horowitz J, Almong Y, et al, Opthalmic complications of dental anesthesia: Three new cases. *J Neuroophthalmol* 25(2):95-100, June 2005.
3. Scott JK, Moxham BJ, Downie IP, Upper lip blanching and diplopia associated with local anesthesia of the inferior alveolar nerve. *Br Dent J* 202(1):32-3, Jan. 13, 2007.
4. Ngeow WC, Shim CK, Chai WL, Transient loss of power of accommodation in one eye following inferior alveolar nerve block: Report of two cases. *J Can Dent Assoc* 72(10):927-31, December 2006.
5. Webber B, Orlansky H, et al, Complications of an intra-arterial injection from an inferior alveolar nerve block. *J Am Dent Assoc* 132(12):1702-4, December 2001.
6. Uckan S, Cilasun U, Erkman O, Rare ocular and cutaneous complication of inferior alveolar nerve block. *J Oral Maxillofac Surg* 64(4):719-21, April 2206.
7. Spierer A, Spierer S, Transient extraocular muscle palsy resulting from inferior alveolar nerve block in children. *J Clin Pediatr Dent* 24(1):29-30, Fall 1999.
8. Penarrocha-Diago M, Sanchis-Bielsa JM, Ophthalmological complications after intraoral local anesthesia with articaine. *Oral Surg Oral Med Oral Pathol Radiol Endod* 90:21-4, 2000.
9. Snell RS, Clinical anatomy, seventh ed., Lippincott Williams & Wilkins, page: 831, 2004.
10. Lacouture C, Blanton PL, Hairston LE, The anatomy of the maxillary artery in the infratemporal fossa in relationship to oral injections. *Anat Rec* 205:104A, 1983.
11. Pretterklieber ML, Skopakoff C, Mayr R, The human maxillary artery reinvestigated, I: topographical relations in the infratemporal fossa. *Acta Anat* 142:281-7, 1991.

TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE CONTACT Ayad Al-Saraj, PhD, at ayad-rehman@hotmail.com.