

Numbness of the ear following inferior alveolar nerve block: the forgotten complication

W. C. Ngeow¹ and W. L. Chai²

IN BRIEF

- Orofacial structures away from the oral cavity ie the ear can be anaesthetised following the provision of a standard inferior alveolar nerve (IAN) block.
- Describes possible explanations for this unexpected problem.
- Recommends that dentists warn patients of possible numbness elsewhere in the orofacial region following IAN blocks.

This article presents a distant complication in the auricle following the administration of a standard inferior alveolar nerve block. The patient experienced profound numbness of the auricle on the ipsilateral side of the injection that lasted for about an hour following unintended injection to the auriculotemporal nerve.

INTRODUCTION

The administration of local anaesthetic agent is a safe procedure, yet various localised, distant and systemic complications have been reported.¹ Localised complications most often resulted from direct injection around or into the neurovascular bundle, while systemic complications mostly relate to allergic reaction and toxicity of the agents used.¹ Structures further away from the oral cavity have also been reported to be affected by intraoral local anaesthesia. This includes the middle ear,² eye³⁻⁹ and the face.^{1,10}

These distant complications happened as the local anaesthetic agents affect other nerves apart from the intended target. Among the cranial nerves that have been reported to be affected by local anaesthetic agents injected as inferior alveolar nerve blocks are the optic (CN II), oculomotor (CN III), trochlear (CN IV), abducens (CN VI), facial (CN VII) and even other branches of the trigeminal (CN V) nerve.^{3-7,9-11} These complications, among others, resulted in temporary paralysis of the cranial nerves that bring about and affect eye movement and in rare instances, the eye's vision and power of accommodation.^{3,5,6,8,9} The facial

movement and appearance is affected when the CN V and VII are affected.^{10,11} The following case reports of a distant complication that affects the auriculotemporal nerve after the administration of local anaesthetic using standard inferior alveolar nerve block technique.

CASE REPORT

A 30-year-old medically-fit Chinese female was given an appointment to have her mandibular left wisdom tooth removed under local anaesthesia after experiencing pericoronitis. She had experienced having her deciduous teeth removed without complications but never had any inferior alveolar nerve block before this.

A standard inferior alveolar nerve block of two cartridges (4.4 mls) 2% lignocaine with 1:80,000 adrenaline was injected to the left mandible of the semi reclined patient, followed by surgical removal of the tooth without any difficulty. Just before leaving the clinic, the patient informed the first author that she still felt very numb around the left auricular area, especially the left external ear. Further questioning revealed that the left temporomandibular joint, left auricle and part of her left temple were numb. Her description seemed to suggest that the area supplied by the left auriculotemporal nerve was blocked. This was confirmed clinically with a pin prick test. She felt uncomfortable about this sensation, especially the feeling of 'fullness' in the external auditory meatus.

The patient was assured that this altered sensation was short-lasting, and right

enough, it only lasted for about an hour. Recovery was uneventful and she was discharged after having the sutures removed one week later.

DISCUSSION

The auriculotemporal nerve is a sensory branch of the trigeminal (CN V) that is usually blocked together with inferior alveolar, lingual and long buccal nerves following the provision of a Gow-Gates injection,¹² but is otherwise spared following the administration of a standard, Halstead inferior alveolar nerve block. A review of ten textbooks on dental local anaesthesia and clinical anatomy in the authors' library found none mentioning the possibility of anaesthetising this nerve following standard inferior alveolar nerve block. Kim *et al.*, in a study that evaluated cutaneous anaesthetic sensation following the administration of a standard inferior alveolar nerve block however, found that the distribution of anaesthesia of the facial and tongue regions varied significantly between individuals, with the auriculotemporal nerve being affected in some cases.¹³ In all, the auriculotemporal nerve was affected in eleven (22%) of their subjects, with nine subjects (18%) reporting the loss of sensation on the mental, buccal, and auriculotemporal nerve territory and two subjects (4%) reporting the loss of sensation on the mental and auriculotemporal nerve territory.

The auriculotemporal nerve originates from the mandibular branch of the trigeminal (CN V) and arises as two roots which

¹Lecturer, Department of Oral & Maxillofacial Surgery;

²Lecturer, Department of General Dental Practice and Oral & Maxillofacial Imaging, Faculty of Dentistry, University of Malaya, 50603 Kuala Lumpur, Malaysia

*Correspondence to: Mr Wei Cheong Ngeow
Email: ngeow@um.edu.my

embrace the middle meningeal artery before uniting to be situated medial to, and then behind, the condyle of the mandible. It supplies the temporomandibular joint and parotid gland before it passes upward in the substance of the gland. From here on, it takes an auricular distribution to supply the skin of the upper half of the pinna and the anterior half of the external auditory meatus. Another distribution, the cutaneous distribution, supplies part of the skin of the scalp.¹⁴ The description and clinical examination of the patient reported here was consistent with anaesthetic blocking of this nerve. The nerve might have been inadvertently blocked because of two possible reasons: variation in the anatomical structure of the mandible and its innervation and the iatrogenic introduction of the dental needle toward the condyle, mimicking a Gow-Gates injection.

Variations in the location of the auriculotemporal nerve and the presence of communicating branches with other cranial nerves have been reported (Fig. 1). Among possible variation is a low origin of the auriculotemporal nerve from the mandibular nerve trunk that is close to the inferior alveolar nerve.¹⁵ This, in addition to the presence of a connecting nerve branch with the inferior alveolar nerves, is a possible reason for achieving anaesthesia in the area supplied by the auriculotemporal nerve when a standard inferior alveolar nerve block is given.^{15,16} There is also a possibility that the local anaesthetic agent spread via the masticatory fascial space through which run the inferior and lingual nerves. This fascial space communicates with the pterygoid fascial, which contains the auriculotemporal nerve and portions of the pterygoid plexus, thus the anaesthetic may have got to a higher location than was intended.

The auriculotemporal nerve consistently communicates with the temporofacial division of the facial (CN VII) nerve within the capsule of the parotid gland (Fig. 1), a fact that is somehow rarely mentioned in anatomical textbooks. This happens because some authors regarded these communicating branches as part of the superficial temporal branch of the auriculotemporal nerve. Irrespective of their nomenclature, they innervate the parotid, the upper muscles of facial expression and the temple, hence explaining numbness

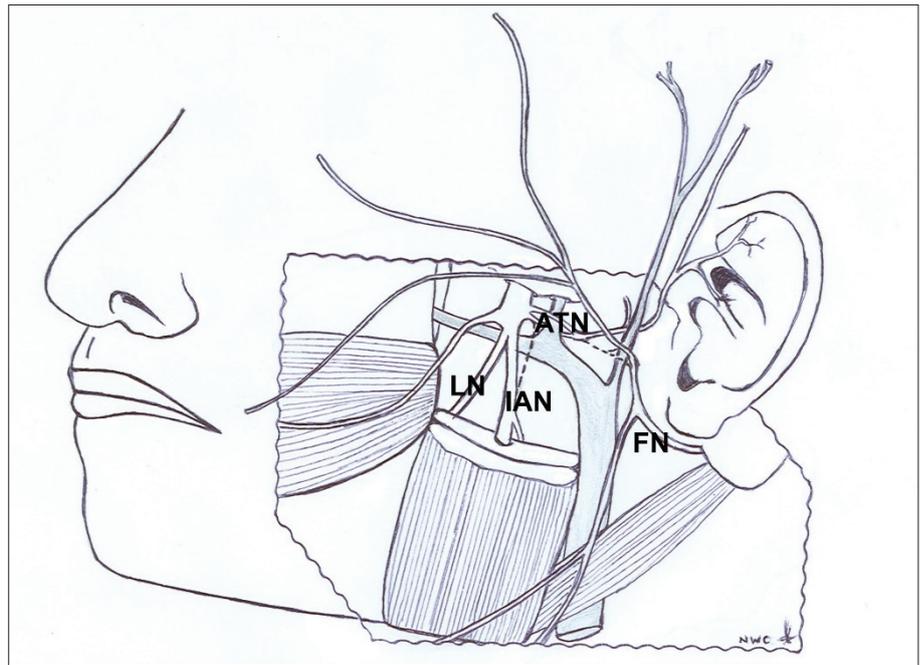


Fig. 1 Diagrammatic illustration showing the relationship of the auriculotemporal nerve (ATN) to various nerves in the infratemporal fossa. It normally forms a loop around the middle meningeal artery. On some occasions, there may be communicating branches (dotted line) with the inferior alveolar nerve (IAN) or the facial nerve (FN)

as reported here.¹⁷ There is a possibility that the patient reported here might also have not been able to wiggle her ear as the motor fibres from facial (CN VII) also arise and emerge in this part of the capsule to travel to the small muscles that move the ears. We did not check whether this happened, though.

The patient was concerned with the feeling of 'numbness' around her auricle as the anaesthesia was distant from the oral cavity where she received treatment. Fortunately, as this abnormality only involved a change of sensation in the region affected, it was easy to diagnose and explain to the patient. She was cautioned not to inflict any trauma to the region concerned, especially trying to 'remove' whatever she thought was blocking her external auditory meatus that caused the sensation of 'fullness'.

This case illustrates that unexpected complications such as numbness of the ear may cause concern to patients as they only expect the oral cavity to be numbed. Often, we warn patients, especially parents of children and caregivers of those with learning disabilities, to ensure they do not inflict injury to the lip, but we tend to forget about other regions like the face and ear. This may be because such a complication is 'forgotten' or taken as not

important as it is just an altered sensation that is of temporary nature. However, the loss of sensation in another region apart from the oral cavity, in this instance the ear, may result in unexpected complications should the patient start pinching this area with sharp nails, or have their ear accessories entangled with clothing. Worse, if they thought that something was blocking their external auditory meatus and started digging it with a cerumen loop or hair pin.

So, it is advisable to give a simple reminder to the patient that it may not only be the oral cavity that is anaesthetised but other regions of the face, such as the ear, can be affected as well. The parents of children and the caregivers of those with learning disabilities should be advised to carefully observe the patient for the expected duration of anaesthesia.

CONCLUSION

Unintended injection to the auriculotemporal nerve when giving inferior alveolar nerve blocks will result in numbness of the auricle. It is imperative that dental surgeons warn patients of this potential complication so that they do not inflict any iatrogenic injury to structures such as the external auditory meatus and the auricle.

The authors wish to thank Dr W. E. Shankland II for helpful discussion and critically reading the manuscript.

1. Malamed S. *Handbook of local anesthesia*, 4th ed. St. Louis: Mosby, 1997.
2. Brodsky C D, Dower J S, Jr. Middle ear problems after a Gow-Gates injection. *J Am Dent Assoc* 2001; **132**: 1420–1424.
3. Blaxter P L, Britten M J. Transient amaurosis after mandibular nerve block. *Br Med J* 1967; **1**: 681.
4. Wilkie G J. Temporary uniocular blindness and ophthalmoplegia associated with a mandibular block injection. A case report. *Aust Dent J* 2000; **45**: 131–133.
5. Tomazzoli-Gerosa L, Marchini G, Monaco A. Amaurosis and atrophy of the optic nerve: an unusual complication of mandibular-nerve anesthesia. *Ann Ophthalmol* 1988; **20**: 170–171.
6. Goldenberg A S. Transient diplopia as a result of block injections. Mandibular and posterior superior alveolar. *NY State Dent J* 1997; **63**: 29–31.
7. Webber B, Orlansky H, Lipton C, Stevens M. Complications of an intra-arterial injection from an inferior alveolar nerve block. *J Am Dent Assoc* 2001; **132**: 1702–1704.
8. Ngeow W C, Shim C K, Chai W L. Transient loss of power of accommodation in 1 eye following inferior alveolar nerve block: report of 2 cases. *J Can Dent Assoc* 2006; **72**: 927–931.
9. Rood J P. Ocular complication of inferior dental nerve block. A case report. *Br Dent J* 1972; **132**: 23–24.
10. Paul R, Anand R, Wray P, D'sa S, Brennan P A. An unusual complication of an inferior dental nerve block: a case report. *Br Dent J* 2009; **206**: 9–10.
11. Keetley A, Moles D R. A clinical audit into the success rate of inferior alveolar nerve block analgesia in general dental practice. *Prim Dent Care* 2001; **8**: 139–142.
12. Gow-Gates G A. Mandibular conduction anesthesia: a new technique using extraoral landmarks. *Oral Surg Oral Med Oral Pathol* 1973; **36**: 321–328.
13. Kim H K, Lee Y S, Kho H S, Yum K W, Chung S C. Facial and glossal distribution of anaesthesia after inferior alveolar nerve block. *J Oral Rehabil* 2003; **30**: 189–193.
14. Roberts D, Sowray J. *Local analgesia in dentistry*, 3rd ed. Oxford: Wright; 1987.
15. Gülekon N, Anil A, Poyraz A, Peker T, Turgut HB, Karaköse M. Variations in the anatomy of the auriculotemporal nerve. *Clin Anat* 2005; **18**: 15–22.
16. Anil A, Peker T, Turgut HB, Gülekon IN, Liman F. Variations in the anatomy of the inferior alveolar nerve. *Br J Oral Maxillofac Surg* 2003; **41**: 236–239.
17. Namking M, Boonruangsri P, Woraputtaporn W, Güldner F H. Communication between the facial and auriculotemporal nerves. *J Anat* 1994; **185**: 421–426.