

Evidence-based Means of Avoiding Lingual Nerve Injury Following Mandibular Third Molar Extractions

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Abstract

The aim of this paper is to alert dentists and maxillofacial surgeons that they must learn the variable anatomy of the lingual nerve in order to avoid damaging it during lower third molar extractions. Severe damage or severance of the lingual nerve can result in permanent numbness, loss of taste and dyesthesia of the anterior two-thirds of the tongue on the side of the mandibular third molar extraction, causing a lifetime of distress. The evidence for variation in the anatomical location of the lingual nerve and the technique of proper extraction of lower third molars are discussed with references in the literature. Knowledge of its location can lead the surgeon to prevent injury to the lingual nerve by an appropriate extraction method, or when not possible to avoid the lingual nerve, at the very least to identify and protect it with delicate retraction.

Key Words

Lingual nerve, taste, numbness, dyesthesia, anesthesia.

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During third molar extractions the incidence of injury and severance to the lingual nerve is far too prevalent. According to Kurt Thoma's textbook of Oral Surgery, third edition, injury to the lingual nerve is invariably caused by negligence. Thoma states that in ordinary cases any injury to the lingual nerve is gross negligence¹. In recent years many articles have been written to confirm the reason for this. Because there is enormous variation in the pathway of the lingual nerve, especially in the third molar area^{2,3,4,5}, oral surgeons from Thoma forward [for example, see Peterson Textbook of Oral and Maxillofacial Surgery⁶] developed techniques for 3rd molar extractions which limited extractions to a buccal approach, thereby giving a wide surgical berth to most variations of the lingual nerve. These variations are listed as running from the crest of the lingual bone to below the floor of the mouth. Sometimes one of the variations is the lingual nerve traversing the retromolar pad area^{2,4}. Staying away from the lingual bone during extractions, and the retromolar pad for incisions will keep the surgeon away from the multiple pathways the lingual nerve might take. If the dentist is cognizant of the lingual nerve variations, they will then know where to design the boundaries of the surgical field. If for some reason the dentist has no choice but to involve an area where the lingual nerve might be, then it is incumbent that the nerve be carefully dissected, identified and gently retracted to protect its integrity. If this is not done, various degrees of paresthesia, dysesthesia and anesthesia may result in the anterior two-thirds of the tongue, floor of the mouth and lingual gingiva. Severance of the lingual nerve will include a variable loss of taste because of the involvement of the chorda tympani nerve, which runs within the lingual nerve sheath⁷. Lingual nerve injury occurs by direct compression, incision or excision during third molar removal, periodontal surgery, tumor removal and also in cases of trauma whenever procedures are performed in the retromolar area. Alling⁸ lists the following reasons for lingual nerve damage by quoting Mozsary and Middleton⁹, "poor flap design, uncontrolled instrumentation or fracture of the lingual Plate. Poor flap design is an admission of lack of knowledge of anatomy of the surgical area. Uncontrolled instrumentation demonstrates a lack of care and caution in performing the surgery and fracture of the lingual plate shows an abandonment of knowledge of proper technique". During the seventies and eighties some articles were written and published by oral surgeons, trying to justify lingual nerve injuries resulting from the removal of impacted third molars. One author distributed a questionnaire to oral surgeons throughout the country, requesting reasons for how the lingual nerve could be injured. He got an enormous response in terms of numbers and eighteen causes for the damage, but no one described or explained how or why anesthesia occurred, and of course no one admitted to negligence⁵.

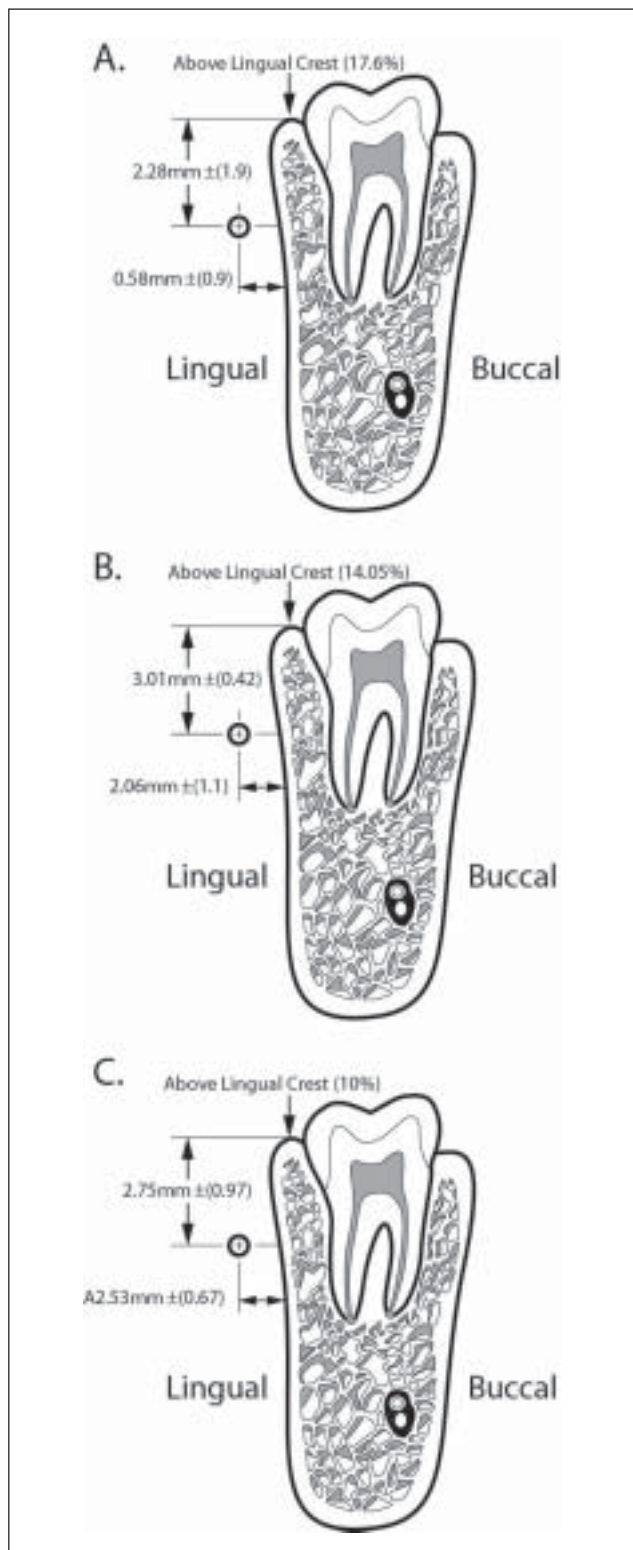


Figure 1 - A frontal/longitudinal view of a third molar, illustrating horizontal and vertical measurements of the lingual nerve in relationship to the lingual bone plate and crest, and the percentages of nerves found above the lingual alveolar bone crest
 A. After Kiesselbach (1984)²
 B. After Miloro (1995)³
 C. After Pogrel (2000)³

Other articles reported, paradoxically, that the anatomical variations in the course of the lingual nerve justified the injuries. Several attempts were reported in regard to stretching and compression of the nerve while retracting the lingual flap. Some articles assumed a trauma to the lingual nerve as a result of the anesthetic injections even the toxicity of the Lidocaine as causes of damage to the nerve, but there were no substantiation of these claims by any reliable scientific studies¹⁰.

There have been numerous articles that deny negligence based upon the assumed damage caused by penetration through or into the nerve by the injection needle. But in the Journal of the American Dental Association, Anthony Pogrel wrote "Direct trauma from the needle seems unlikely because it is known that most cases of trauma resulting from needle contact resolve spontaneously. It is difficult to envision how needle trauma can damage the whole nerve"¹⁰. Kraft and Hickel¹¹ reported that they gave 12,104 mandibular block injections without performing surgery and found there was not one case of complete permanent anesthesia. Of these cases, there were 18 cases of temporary anesthesia of the lingual nerve, indicating penetration into the nerve sheath with complete healing afterward. This was direct evidence that piercing the lingual nerve did not sever it¹¹. They wrote..."block anesthesia alone does not have a decisive impact on the incidence of lingual sensory disturbance in surgical third molar removal."

Because the buccal approach for extracting the lower 3rd molar is the method of choice in the United States, current Oral Surgery textbooks and the guidelines of the American Association of Oral and maxillofacial Surgeons (AAOMS) favor this procedure.

The articles, which report on the various reasons as to how the lingual nerve can be inadvertently damaged, are attempts to cover up negligence. None of those reasons are legitimate in terms of justifying the damage that could occur during the operation, and are not within the standard of care.

Technology and instrumentation today has made the surgery significantly simpler than it was four decades ago when Thoma wrote his book.

Dental surgeons have education, training and experience. They have learned anatomy and other pertinent basic sciences, and should be fully conscious of the structures that are encountered in doing any procedure. No surgeon should ever attempt to perform an operation without the capability of doing it properly and successfully completing the task.

Because current oral surgery textbooks and discourse in university classrooms favor the buccal approach in the removal of impacted third molars, the external oblique ridge is used as a marker for the incision going distally and buccally, and begins at the distobuccal angle of the second molar, bearing in mind that the ramus of the mandible flares laterally

and posteriorly. This portion of the incision is continuous with the vertical buccal release incision alongside the first or second molar. This usually allows the surgeon to gain adequate access to the lower wisdom teeth, impacted or not, and carefully manage the lingual flap which might include the retromolar pad without endangering the lingual nerve. If a straight line is drawn through the central fossae of the premolars and the molars, and it is extended through the retromolar pad, this line would end on the lingual or medial surface of the ramus, almost exactly where the lingual nerve usually comes down between the medial surface of the mandible and the hyoglossus muscle on its way anteriorly and inferiorly through the lingual mucosa to the lateral border of the sub-mandibular gland and the floor of the mouth. An incision directed in any of these areas could very likely cause a severance of the lingual nerve.

Obviously, the lingual flap has to be carefully retracted with a safe type of retractor when it is necessary to remove occlusal bone covering an impacted mandibular third molar in order to protect the flap, remove bone, section the tooth, and elevate sectioned portions of the tooth. Uncontrolled instrumentation is negligence and is one of the causes of damaging or severing the lingual nerve. Bone removal and tooth sectioning with a relatively high speed drill is another cause of nerve damage and severance, especially when the lingual bone is pierced or cut. Again, this can be avoided with careful, adequate, deliberate retraction, controlled instrumentation and direct vision of the surgical field.

In summary, with the buccal approach under direct vision, proper incision, careful bone removal, management and protection of the flap during drilling, and elevation of the tooth structure, the lingual nerve can be preserved during the surgery of mandibular third molars. In addition, with the proper incision, there is properly positioned tissue to permit safe placement of the sutures. Following the accepted technique of the buccal approach, using the external oblique ridge as a marker and making a buccal incision with a full mucoperiosteal flap, one can gain sufficient access to the third molar, if it is partially or fully impacted. Variations of the course of the lingual nerve made clear by anatomical dissections indicate that it occasionally passes through the retromolar pad^{2,7}. This reinforces the obligatory use of the buccal incision.

A new major surgical problem occurs when it is necessary to remove bone covering the distocclusal portion of the tooth before removing the tooth. This requires great care in gaining access to the area. The lingual flap has to be retracted to expose the bone to be removed by drilling or chisel. It is of the utmost importance that this lingual flap be protected at all times by means of a properly placed and designed retractor so that the lingual flap is not damaged or excessively compressed because this is an area where the lingual nerve

might be encountered.

Pichler and Beirne report that the "Various types of lingual retractors, such as Howarth's, Ward's, Meade's, Hovell's and Rowe's retractors have been used for this purpose. During Third Molar extractions recently, attention has been focused on the safety of lingual flap retractors, with some studies particularly critical of the narrowness of the Howarth's periosteal elevator"^{12,13}.

Other articles have also shown that though lingual nerve retraction during third molar removal may cause transient damage, it is not associated with permanent damage, and it has been suggested that lingual nerve retraction should be used in the removal of third molars when necessary. Because a periosteal elevator may not be a broad enough retractor to totally protect the nerve, special retractors have been developed for this purpose^{10,14,15}. Greenwood et al.¹⁶ showed that a broader lingual retractor as compared to a Howarth's elevator was much less likely to be associated with sensory loss.

Most oral surgeons and experienced dentists never sever the lingual nerve. They do not because they follow the rules of proper extraction of 3rd molars, and therefore always practice within the standard of care.

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