Journal of Advances in Medicine and Medical Research

33(22): 253-259, 2021; Article no.JAMMR.77922
ISSN: 2456-8899
(Past name: British Journal of Medicine and Medical Research, Past ISSN: 2231-0614, NLM ID: 101570965)

Assessment of Lingual Nerve Paresthesia after Removal of Mandibular Third Molar

V. Usha [a], G. Rajabackiyam [a*], K. Prabhu Sankar [a], Varun Muthuraman [a], Aravind Christo [a] and Rajapandian [a]

[a] Best Dental Science College, Madurai, Tamilnadu, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2021/v33i2231177
Editor(s):
(1) Dr. Ashish Anand, GV Montgomery Veteran Affairs Medical Center, University of Mississippi Medical Center and William Carey School of Osteopathic Medicine, USA.
Reviewers:
(1) Jayakar Thomas, Chettinad Academy of Research & Education, India.
(2) Abhinav Kumar, Maharashtra University of Health Sciences, India.
Complete Peer review History, details of the editor(s), Reviewers and additional Reviewers are available here: https://www.sdiarticle5.com/review-history/77922

Original Research Article

Received 12 September 2021
Accepted 25 November 2021
Published 29 November 2021

ABSTRACT

Surgical removal of impacted mandibular third molars are the most commonly performed minor surgical procedures by maxillofacial surgeon. If not treated can lead to few complications like pericoronitis, root resorption of second molar, caries of second molar, cyst and tumours can arise from them. The common complications include swelling, hematoma, trismus and lingual nerve injuries. In this article 1000 cases of various types impactions were surgically operated and assessment of lingual nerve injury was done.

Keywords: Lingual nerve; imapacted mandibular third molar; lingual nerve paraesthesia; sensory testing.

1. INTRODUCTION

Impaction of mandibular third molars is a common condition related with different difficulty degree of extraction and risk of complications, including iatrogenic trigeminal nerve injury. The prevalence of third molar impaction ranges from 16.7% to 68.6%. Most studies have reported no sexual predilection in third molar impaction. Some studies, however, have reported a higher frequency in females than males.

**Corresponding author: E-mail: grajabackiyam15@gmail.com;*

Many theories have been proposed owing to high incidence of mandibular third molar impaction. One of the most popular theory is insufficient development of the retromolar space. Mandibular ramus growth is related to resorption at its anterior surface and deposition at its posterior surface, but in case of misbalance of this process, the mandibular third molars don't get enough space to erupt. Proper mandibular third molars eruption also depends on their favourable path of eruption.

Surgical removal of impacted mandibular third molars are the most commonly performed minor surgical procedures by maxillofacial surgeon. Impacted third molar can lead to pericoronitis, root resorption of second molar, caries of second molar, cyst and tumours can arise from them. It can also lead to periodontal problem and hence surgical removal advised.

Clinical assessment before surgical removal of third molar evaluates mouth opening, mandibular body length, elasticity of perioral soft tissue all these play a major role in the ease of removal of third molar. Radiological assessment usually performed with IOPA, OPG and CBCT also performed to assess the true relationship of mandibular third molar to inferior alveolar canal. Almost commonly performed radiological difficulty assessment WAR lines and WHARFE assessment. These difficulty assessment methods gives as an idea of difficulty of surgical procedures going to be based on which the patient explained about post-surgical complications and recovery.

Common complications after surgical removal of third molars includes swelling, hematoma and trismus while usually resolves in a week or two based on difficulty of surgical procedure. Nerve injuries associated with third molar removal includes IAN injuries and lingual injuries. IAN injuries can be anticipated based on the close relationship of the IAC, inferior alveolar neurovascular bundles to the root apex. However, lingual nerve injuries cannot be anticipated and usually present immediate post-surgical phase. Both IAN and lingual nerve injuries can be annoying for patient due to paraesthesia or loss of sensation along the course of the nerve.

Lingual nerve is one of the posterior branch of mandibular nerve of the trigeminal nerve (CN V_3) which supplies mucous membranes of the mandibular lingual gingiva, floor of the mouth and the ipsilateral two-thirds of the tongue. It also carries fibers from the facial nerve, which return taste information from the anterior two thirds of the tongue, via the chorda tympani [1]. The lingual injury may involve temporary or permanent lingual sensory disturbances (anaesthesia, paraesthesia and/or dysesthesia), sometimes accompanied by taste alterations in the anterior two thirds of the tongue causing problems like inability to chew properly or tongue biting. A method for assessing lingual sensation is described, comprising sensory testing, using touch and moving two-point discrimination and patient subjective reporting. Most cases of lingual injuries recover within 3 months period of time. Anticipation of lingual nerve injuries to the type of impacted tooth has not been assessed in literature. The purpose of this article is to identify the risk factors associated with the location, position of impacted tooth and risk of lingual nerve.

2. MATERIALS AND METHODS

A total 1000 impactions were performed by a single operator. Patient was selected by random sampling. It includes 300 mesioangular impacted tooth, 130 vertically impacted teeth, 310distoangular impacted tooth, 260 horizontally impacted teeth.

3. STATISTICS AND RESULTS

During 3rd postoperative day lingual nerve injury was assessed by sensory prick test [2]. Of all paraesthesia were encountered in 8 patients which includes 1 mesioangular impacted tooth, 4 vertically impacted teeth,1 horizontal impaction,2 distoangular impacted teeth.

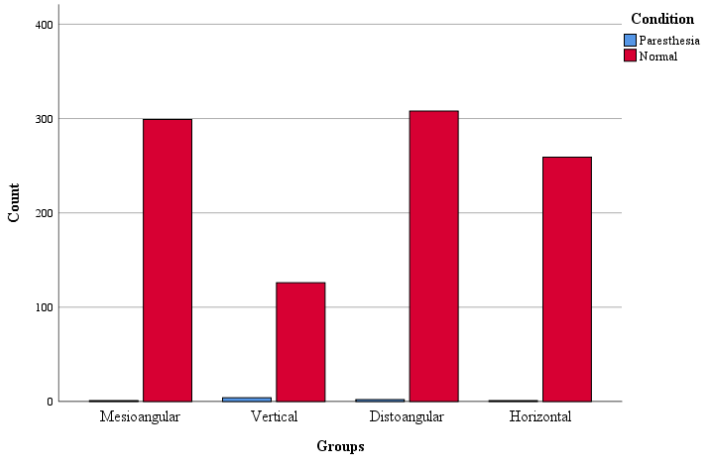
The data was entered in MS excel 2017 and descriptive statistics were performed using statistical package for social science (SPSS) software, IBM corporation, version 26.0 (Table 1).

4. DISCUSSION

Lingual nerve injury can be an inexpressible annoying complaint for the patients following surgical removal of lower third molars. Irrespective of safety factors taken by the surgeon and proper preoperative assessment, inadvertent injury to the lingual nerve can even happen to the experienced surgeon and correct technique too. Classification of nerve injuries by Seddon and Sunderland serves as a guideline for prognosis and treatment and important for the success of microsurgical repair [3,4].

Table 1. Types of impaction and clinical condition

Type of impaction	Clinical condition	
	Normal n(%)	Paresthesia n (%)
Mesioangular	299 (99.7)	1 (0.3)
Vertical	126 (96.9)	4 (3.1)
Distoangular	308 (99.4)	2 (0.6)
Horizontal	259 (99.6)	1 (0.4)



Graph 1. Incidence of lingual nerve paraesthesia

Study carried out on the effects of surgical, operator, and anatomical variables on the incidence and duration of lingual dysesthesia after the surgical removal of impacted lower third molars under general anaesthesia by Mason in 1988 and found recovery within six months [5].

Review of literature on lingual nerve injury shows that two methods of bone removal ie. Chisel and bone drills can lead to permanent damage of both lingual and inferior alveolar nerves and found that while using drills even the use of Howarth's periosteal elevator provided no significant protection. In 1992, the incidence of temporary lingual nerve dysesthesia was more i.e. 12.8% with lingual split technique than with drills which was only 2.3% [6,7].

Anatomical factors such as lingual angulation of the third molar, lingual flap retraction or tooth sectioning vertically, and surgeon's inexperience all increase the risk of lingual nerve damage, although permanent lesions seem to be very rare. Incidence of lingual nerve paraesthesia was more prone on surgical removal of unerupted mandibular third molar. Distal ostectomy may be causative factor for paraesthesia in this patient, as supported by Valmeseda-Castellon [8].

To reduce the occurrence of lingual nerve injury careful assessment is a must. Also documentation and early referral to the specialist is necessary. Low grade injuries do resolve spontaneously but at times grave injuries do need microsurgical techniques [9]. A study was done in relation to anatomical position of lingual nerve in third molar region in relation to atrophic mandibular crest and found that distance from nerve to molar region decreased [10]. Age of the patient, gender, side of operation, angulation of the tooth, elevation of the lingual flap, vertical or horizontal tooth division, experience of the operator are the factors to be considered. A 4-year prospective study of 2134 consecutive mandibular third molar operations in 1384 consecutive day case patients was done which revealed incidence of temporary and permanent nerve injury as 1 and 0.3%. Factors determining the prediction of temporary nerve injury were perforation of the lingual plate, exposure of the nerve and increased difficulty of operation, age, depth of application, difficulty of operation and operative techniques used. The factors determining permanent injuries were perforation of the lingual plate, surgeon, increased difficulty of operation, exposure of the nerve and increased age of the patient. Surgeon, patient

and dental factors also contributed to the injury [11].

Pichler JW, Beirne, lingual nerve injury is 8.8 time more likely to occur in buccal approach with lingual retractor than buccal approach without lingual retractor. Various study reported that the incidence of transient nerve injury is more frequent with lingual flap reflection but it decreases the chance of permanent nerve injury the use of a lingual nerve retractor during third molar surgery was associated with an increased incidence of temporary nerve damage and was neither protective nor detrimental with respect to the incidence of permanent nerve damage [12]. Pogrel et al. [6] and Green wood *et al* (2004) support the lingual flap reflection and use broader retractors to protect the lingual nerve [13].

The study done in 2005 by Gomes et al concluded that lingual nerve retraction was a risk factor to temporary lingual nerve injury. Lingual nerve should be protected and not retracted [14]. Distoangular impaction had more risk of lingual nerve injury [15].

Healing potential of lingual nerve post injury was done and simple neurosensory examination was done which included the perception of tactile, thermal stimuli and location of stimulus, as well as two-point discrimination, pain and the presence of a neuroma at the lesion site. Considering the vulnerability of lingual nerve being close to the surgical site focus on sparing the lingual nerve [16]. A review of literature was done regarding the diagnosis, assessment, classification, microsurgical management, and outcome assessment of trigeminal nerve injuries that result from third molar removal [17].

Invariable postoperative sequelae of third molar surgery included trismus, swelling and pain and other complications of third molar surgery included alveolar osteitis, postoperative infection, haemorrhage, oro-antral communication, damage to adjacent teeth, displaced teeth, and fractures. Age, gender, medical history, oral contraceptives, presence of pericoronitis, poor oral hygiene, smoking, type of impaction, relationship of third molar to the inferior alveolar nerve, surgical time, surgical technique, surgeon experience, use of perioperative antibiotics, use of topical antiseptics, use of intra-socket medications, and anaesthetic technique also taken in account with this extensive knowledge lingual and inferior alveolar nerve injury demands special attention [18]. Long term complications may affect the quality of life of the patients, impact on profession, education and research but not known [19].

It was analysed if there was a possible association between paraesthesia and bony-impacted mandibular third molars, use of bur to remove bone during the surgical extraction, position of impaction and state of eruption. Various study reported that the incidence of transient nerve injury is more frequent with lingual flap reflection but it decreases the chance of permanent nerve injury. Pogrel et al. [18] and Green wood *et al* (2004) support the lingual flap reflection and use broader retractors to protect the lingual nerve. If on clinical examination or radiographic presentation, preoperative assessment reveals the chance of lingual nerve injury should be informed to the patient to avoid litigation [20].

Care should be taken and patient informed about probable complications as age of the patient, depth of impaction, retraction of lingual flap and longer duration of surgery always pose a risk for the patient for this minor surgery done under local anaesthesia in day to day practice often though seems secure procedure [21,22]. Age and cortical line interruption were significantly associated with the risk of developing sensory dysfunction [23].

Adequate anatomy knowledge of the mandibular nerve, apt technique usage, minimum handling of lingual flaps and ability to make evidence based diagnosis is essential and found to be the best method to avoid nerve injuries during third molar removal [24].

Lingual flap retraction, tooth sectioning and buccal guttering do affect the outcome of surgery concluded by a study in 2014 [25]. A case was reported with unilateral loss of fungate papilla following removal of third molar [26].

Retraction of lingual flap poses 3.4 times increased risk of lingual nerve damage during extraction of mandibular third molar when lingual flap is retracted but the nature of damage is reversible as per a study done in 2015 [27].

This study showed that the clinical neurosensory testing algorithm is a reliable diagnostic test to rule in and rule out lingual nerve injuries. The tests are easy, non-invasive, inexpensive, and can be performed chair side in a short time, its

routine use should be encouraged for lingual nerve injuries patients. The clinical neurosensory testing algorithm will need to be carefully looked at in the future in light of better testing methods for lingual nerve injuries [28].

No detailed data were found on the actual incidence of lingual nerve injury resulting from local anaesthesia by injection. Permanent lingual nerve damage did not show statistically relevant differences between the simple buccal approach and the buccal approach plus lingual flap retraction, although the latter was statistically associated with an increased risk of temporary damage. Lingual spit technique was statistically associated with an increased risk of temporary nerve damage than the buccal approach with or without lingual flap retraction. For permanent damage, no statistically relevant differences were found between the lingual split technique and the buccal approach with lingual flap retraction. Compared with tooth sectioning, the ostectomy was strongly statistically associated with permanent lingual nerve damage Tooth sectioning could decrease the extent of the ostectomy or even, in some cases, prevent it, potentially acting as a protective factor against lingual nerve injury. Try to avoid lingual flap elevation as much as possible [29,30].

Batarseh et al evaluated a modified flap design for removal of lower third molars with avoidance of lingual flap elevation and its effect on postsurgical lingual nerve sensory impairment. However, that the investigated flap design can be safely used to remove lower third molars for different patterns of impaction without jeopardizing the lingual tissues thus providing optimum protection for the lingual nerve since it provided adequate exposure to remove the tooth without the reflection of a lingual flap.

Sharanya et al concluded that possible measures to avoid lingual nerve damage: 1) Adequate surgical training. 2) Proper radiographic evaluation on level of impaction and difficulty score. 3) Proper surgical technique with proper instrumentation [29,30].

5. CONCLUSION

In our study we encountered lingual nerve paraesthesia in 0.8% of the total cases of which the most commonly involved tooth was vertically impacted tooth. Of the 126 vertically impacted tooth operated lingual nerve paraesthesia accounted for 3.1%(4 cases), 299 mesioangular impacted tooth accounted for 0.3%(1 case), 308 distoangular impacted tooth accounted for 0.6% (2 cases), 259 horizontally impacted tooth accounted for 0.4% (1 case) . Inability to assess the distolingual portion of the vertically impacted tooth has been suggested as the surgical difficulty and reason for inadvertent injury to the lingual nerve. We suggest sectioning of the distal half of the crown to assess the distolingual bone thereby preventing inadvertent cutting on the distolingual portion of the impacted tooth that leads to lingual nerve paraesthesia. Vertical impacted tooth that are lingually tilted and tooth located below the cervical level of the 2nd molar pose greater difficulty in surgical removal and greater care has to be taken to protect the lingual nerve in these situation.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Text book of BD Chaurasia's , Human anatomy for dental students. Third edition.
2. Blackburn CW. A method of assessment in cases of lingual nerve injury. British Journal of Oral and Maxillofacial Surgery. 1990;28(4):238-45.
3. Rood JP. Degrees of injury to the inferior alveolar nerve sustained during the removal of impacted mandibular third molars by the lingual split technique. British Journal of Oral Surgery. 1983;21(2):103-16.
4. Mommaerts M, Jacobs W. Lingual nerve injury during extraction of lower wisdom teeth. Revue belge de medecine dentaire. 1991;46(3):27-46.
5. Mason DA. Lingual nerve damage following lower third molar surgery. International journal of oral and maxillofacial surgery. 1988;17(5):290-4.
6. Rood JP. Permanent damage to inferior alveolar and lingual nerves during the removal of impacted mandibular third

molars. Comparison of two methods of bone removal. British dental journal. 1992;172(3):108-10.

7. Pogrel MA. Permanent nerve damage from inferior alveolar nerve blocks-an update to include articaine. CDA. 2007;35(4):271.
8. Valmaseda-Castellón E, Berini-Aytés L, Gay-Escoda C. Lingual nerve damage after third lower molar surgical extraction. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2000;90(5):567-73.
9. Ramadas Y, Sealey CM. Third molar removal and nerve injury. The New Zealand Dental Journal. 2001;97(427):25-8.
10. Hölzle FW, Wolff KD. Anatomic position of the lingual nerve in the mandibular third molar region with special consideration of an atrophied mandibular crest: an anatomical study. International journal of oral and maxillofacial surgery. 2001;30(4):333-8.
11. Bataineh AB. Sensory nerve impairment following mandibular third molar surgery. Journal of oral and maxillofacial surgery. 2001;59(9):1012-7.
12. Pichler JW[1], Beirne OR, Lingual flap retraction and prevention of lingual nerve damage associated with third molar surgery: A systematic review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2001;91(4):395-401.
13. Pogrel MA, Goldman KE. Lingual flap retraction for third molar removal. Journal of oral and maxillofacial surgery. 2004;62(9):1125-30.
14. Gomes AC, do Egito Vasconcelos BC, e Silva ED, da Silva LC. Lingual nerve damage after mandibular third molar surgery: A randomized clinical trial. Journal of oral and maxillofacial surgery. 2005;63(10):1443-6.
15. Tolstunov L. Lingual nerve vulnerability: risk analysis and case report. Compendium of continuing education in dentistry (Jamesburg, NJ: 1995). 2007;28(1):28-31.
16. Hillerup S, Stoltze K. Lingual nerve injury in third molar surgery: I. Observations on recovery of sensation with spontaneous healing. International journal of oral and maxillofacial surgery. 2007; 36(10):884-9.
17. Ziccardi VB[1], Zuniga JR Nerve injuries after third molar removal Oral Maxillofac Surg Clin North Am. 2007;19(1):105-15, vii.
18. Bouloux GF, Steed MB, Perciaccante VJ. Complications of third molar surgery. Oral and Maxillofacial Surgery Clinics. 2007;19(1):117-28.
19. Jerjes W, Upile T, Shah P, Nhembe F, Gudka D, Kafas P, McCarthy E, Abbas S, Patel S, Hamdoon Z, Abiola J. Risk factors associated with injury to the inferior alveolar and lingual nerves following third molar surgery—revisited. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2010; 109(3):335-45.
20. Lata J, Tiwari AK. Incidence of lingual nerve paraesthesia following mandibular third molar surgery. National journal of maxillofacial surgery. 2011;2(2):137.
21. Babu HC, Reddy PB, Pattathan RK, Desai R, Shubha AB. Factors influencing lingual nerve paraesthesia following third molar surgery: a prospective clinical study. Journal of maxillofacial and oral surgery. 2013;12(2):168-72.
22. Meshram VS, Meshram PV, Lambade P. Assessment of nerve injuries after surgical removal of mandibular third molar: a prospective study. Asian Journal of Neuroscience. 2013;2013.
23. Kjølle GK, Bjørnland T. Low risk of neurosensory dysfunction after mandibular third molar surgery in patients less than 30 years of age. A prospective study following removal of 1220 mandibular third molars. Oral surgery, oral medicine, oral pathology and oral radiology. 2013;116(4):411-7.
24. Kaushalya Kanagasabapathy, Dr. Brigit Eapen periapical nerve damage following removal of mandibular third molar : causes & prevention IOSR Journal of Dental & Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN:2279-0861. 2014;13(1) Ver. VI:98-102.
25. S. Yadav A, Verma A Sachdeva. Assessment of lingual nerve injury using different surgical variables for mandibular third molar surgery: a clinical study. Ijomfs. 2014;43(7):889–893.
26. Martos-Fernández M, de-Pablo-Garcia-Cuenca A, Bescós-Atín MS. Lingual nerve injury after third molar removal: Unilateral atrophy of fungiform papillae. Journal of

Clinical and Experimental Dentistry. 2014; 6(2):e193.

27. Shad S, Shah SM, Abbasi MM. Frequency of lingual nerve injury in mandibular third molar extraction: a comparison of two surgical techniques. Journal of Ayub Medical College, Abbottabad: JAMC. 2015;27(3):580-3.
28. Zecha PJ, Stegenga B. Nerve injury during mandibular third molar surgery. The importance of preoperative diagnosis and surgical skill. Nederlands tijdschrift voor tandheelkunde. 2004;111(6):239-42.
29. Pippi R, Spota A, Santoro M. Prevention of lingual nerve injury in third molar surgery: Literature review. Journal of Oral and Maxillofacial Surgery. 2017;75(5):890-900.
30. Bataineh AB, Ra'ad AB. The effect of modified surgical flap design for removal of lower third molars on lingual nerve injury. Clinical oral investigations. 2017;21(6): 2091-9.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/77922