ASSESSMENT AND INCIDENCE OF LINGUAL NERVE DAMAGE AND PARESTHESIA FOLLOWING THIRD MOLAR EXTRACTION AMONG SOUTH INDIAN POPULATION-A SYSTEMATIC REVIEW

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ABSTRACT:

BACKGROUND:
The incidence of lingual nerve paresthesia was more observed with lingually inclined tooth than buccal inclination.It is more prone on surgical removal of unerupted mandibular third molar. Commonly paresthesia is mostly prone with distoangular and horizontal-impacted third molar .Association of depth of impaction with lingual nerve paresthesia can be observed and found that third molar present below the cementoenamel junction of second molar is more significant for paraesthesia .If there is any fracture of the cortex due to excessive pressure while elevatin the tooth then also lingual nerve paresthesia or dysesthesia is observed.Lingual nerve paresthesia is a common concern for any oral and maxillofacial surgeon and a continuous discomfort for the patient after surgical removal of mandibular third molar .Although this is a rare complication , measures have to be taken to prevent this symptom .This review is to comprise all the possible reasons for lingual nerve paresthesia and to put forward some tips to avoid this complication.

KEYWORDS: Lingual nerve, paresthesia , mandibular third molar ,lingual flap.

INTRODUCTION:
Third molar surgery is one of the most common procedures performed by oral surgeons / oral and maxillofacial surgeons. There is a documented complication of inferior alveolar nerve and lingual nerve damage which leads to paraesthesia of the lower lip, chin and tongue. Extraction of the mandibular third molars is one of the most frequently performed procedures inoral and maxillofacial surgery(1).Despite improvement in the preoperative assessment of impacted lower wisdom teeth and techniques of removal; Inferior alveolar and lingual nerve damage remains a significant factor during 3rd molar surgery which has serious medical and legal implications.
Complications like pain, swelling, bruising and trismus is caused during surgical removal of mandibular third molar. Nerve damage (inferior alveolar and lingual nerve) is also a possible complication during this procedure. The lingual nerve is a branch of the mandibular division of the trigeminal nerve (CN V3), which supplies sensory innervation to the tongue(2) .It also carries fibers from the facial nerve, which return taste information from the anterior two thirds of the tongue, via the chorda tympani. The risk associated with wisdom tooth surgery is commonly accepted to be 2% temporary and 0.2% permanent.It has been reported that if the teeth are partially erupted, the risk of lingual nerve paresthesia is increased.
Impacted mandibular third molar teeth are in close proximity to the lingual, inferior alveolar, mylohyoid, and buccal nerves (3).During surgical removal, each of these nerves is at risk of damage, but the most troublesome complications result from inferior alveolar or lingual nerve injuries. The majority of injuries result in transient sensory disturbance but, in some cases, permanent paraesthesia (abnormal sensation).These sensory disturbances can be troublesome, causing problems with speech and mastication and may adversely affect the patient's quality of life. They also constitute as one of the most frequent causes of complaints (4).
Third molar disimpaction is one of the commonest procedures performed in oral and maxillofacial surgery. Because of high incidence of short-term morbidity (pain, swelling, trismus, postoperative infection) and potential long-term complication, such as damage to the inferior alveolar nerve and the lingual nerve, one is forced to reduce the frequency of this operation (5).The neurosensory disturbances to the inferior alveolar nerve during lower third molar removal presents paraesthesia or anaesthesia of the lower lip, chin and buccal gingival of the affected side. Its reported incidence of 1.3% to 7.8% and there is little evidence to suggest that surgical technique affects the frequency of this complication. (6) Lingual nerve deficits presents with numbness of ipsilateral anterior two third of the tongue and disturbed taste perception.
The incidence of lingual nerve damage, as reported in the literature, during lower third molar surgery ranges from 0% to 23% and it appears likely that the surgical technique markedly affect the frequency.(7)The majority of lingual nerve injuries which occur during lower third molar surgery result in transient disturbance, with recovery of normal sensation within 4-6 months. In these cases, it is likely that the injury results from manipulation of the tissue with the Howarth's periosteal elevator on the lingual side, resulting in either crush injury or temporary conduction block. In a small proportion of patients (approximately 0.5%) the sensory disturbance is permanent, with a variable level of recovery and symptoms which can include hypoesthesia (reduced sensation), paraesthesia (abnormal sensation) or, even worse, various forms of dysesthesia (unpleasant abnormal sensation). In these cases it

is likely that the injury often results from direct nerve damage by the rotating bur. It is also this group which is most distressed by the complication, report difficulties with speech and mastication.(8)The risk ratio for lingual nerve deficit with lingual flap retraction being 1.94 times more 4.The use of lingual retractors and rotating instruments may cause lingual nerve damage and the use of a lingual nerve retractor during third molar surgery was associated with an increased incidence of temporary nerve damage, but did not influence that rate of permanent nerve damage.(9)
However the goal of this study is to acquire information to render a clinical diagnosis, to aid in determining meaningful prognosis, and to determine beneficial therapy for the nerve injury. This study shall evaluate the incidence of lingual nerve injury during mandibular third molar surgery. It shall determine the incidence of persistent sensory disturbances of the lingual nerve after impacted mandibular third molar surgery (10).

ANATOMICAL VARIATIONS OF LINGUAL NERVE :

Anatomical factors such as lingual angulation of the third molar, surgical maneuvers such as retraction of the lingual flap or vertical tooth sectioning, and surgeon inexperience all increase the risk of lingual nerve damage, although permanent lesions seem to be very rare.
Anatomical variations might be responsible for unexpected and unexplained symptoms after a surgical procedure (11). Sensory disturbance of the lingual gingiva and mucosa can be caused on floor of the mouth and tongue surgeries.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 sheath. It may also result in permanent numbness, loss of taste and dysthesia of the anterior two-thirds of the tongue on the side of the mandibular third molar extraction, causing a lifetime of distress.Enormous variation in the pathway of the lingual nerve, especially in the third molar area,oral surgeons 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(12).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 . 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.

CAUSES OF LINGUAL NERVE DAMAGE :

Dental paresthesia is one possible postoperative complication associated with wisdom tooth removal, or in some cases receiving a dental injection .It involves a situation where tissues or structures in or around the mouth (lip, tongue, facial skin, mouth lining, etc...) experience prolonged or possibly permanent altered sensation due to nerve trauma that's been created(13).This damage might be the result of bruising, stretching, crushing or even severing the nerve.Beyond surgical procedures, some cases of paresthesia are caused by routine dental injections.The wisdom teeth extraction may cause lingual nerve damage that leads to numbness of the ipsilateral anterior two-thirds of the tongue and taste disturbance .Sometimes the elevation of lingual flaps and the experience of the operator are significant factors contributing to lingual nerve paraesthesia.(14)

Paraesthesia is a sensory-only phenomenon and not accompanied by muscle paralysis.In most cases, the nerve damage is not identified during the dental procedure but instead as a postoperative complication.The patient will notice altered, diminished, or even total loss of sensation in the affected area. One or more senses may be involved (taste, touch, pain, proprioception or temperature perception). In the case of the mandibular or lingual nerves, that means some aspect the person's lip, chin, mouth lining or tongue. (15)Sometimes tooth itself as it's forced against the nerve. Improper instrumentation during the procedure is the most common cause of lingual nerve paresthesia.(16)

LINGUAL NERVE AND ITS DAMAGE:
The lingual nerve is morphologically very different from the inferior alveolar nerve. At the usual site of injury (adjacent to the lower third molar) the nerve is covered with only a thin layer of soft tissue and mucosa, rather than being in a bony canal. Consequently, if sectioned, the cut nerve ends retract apart and, if the adjacent soft tissue is also distorted, the nerve ends may become misaligned and trapped or constricted by scar tissue(17). Regeneration of axons across a gap will be less successful than if the nerve ends remain in apposition. In addition, the presence of a range of functionally distinct nerve fibre types in this nerve (e.g. mechanosensitive, thermosensitive, gustatory, vasomotor and secretomotor) may make successful regeneration of the axons back to the correct receptor/ effector and location less likely .
There is a wide range in the reported frequency of lingual nerve injuries during third molar removal, with 0.2–22% of patients reporting sensory disturbances in the early post-operative period and 0– 2% a permanent disturbance . There are several possible explanations for the wide range in incidence. First, the variation may reflect differences in the time interval between tooth removal and the assessment of the sensory impairment; early assessments will report many transient sensory changes that recover rapidly and completely, and which would be missed if assessment takes place after a longer recovery period(18). Secondly, the incidence of nerve injury may depend upon whether the sensory deficit was established objectively by the clinician or was based on a subjective patient assessment. Finally, it may reflect differing surgical techniques; several studies have shown that the raising and retraction of a lingual mucoperiosteal flap is associated with an increased frequency of lingual nerve damage.Two recent studies and a systematic review have concluded that raising and retracting a lingual periosteal flap is not necessary and is best avoided (19).In addition to the surgical technique, other risk factors have been identified. Lingual nerve damage is particularly associated with deeply impacted teeth when the surgery is consequently difficult, particularly if distal bone removal is required.The results of studies comparing the incidence of lingual nerve injury during surgery utilizing bone removal with burs or

chisels are unclear.It is possible that the elevation of a lingual mucoperiosteal flap when chisels are utilized is of more importance than the method of bone removal itself (20).

ASSESSMENT OF INJURY:

1. Subjectively by asking the patient if the tip of the tongue or the lateral border of the tongue is numb or not.
2. Objectively by instrumentation, using the periosteal elevator and applying pressure on the lingual gingiva and also lateral border of tongue.

REVIEW OF LITERATURE:

Steven et al in 2003 did a study in 25 patients with impacted mandibular third molars and subjected them for surgical removal.They found 6.5%incidence of lingual nerve paresthesia .they concluded that the lingual nerve paresthesia depends on the surgeon's experience, procedure methodology, and certain patient-specific factors during the procedure.(21)

Jeevan lata et al did a study in 15 patient with impacted mandibular third molars and subjected them for surgical removal.They found 4.6%incidence of lingual nerve paresthesia.They concluded that the lingual nerve paresthesia can occur with or without reflection of lingual flap in spite of all the measures taken to protect it.(22)

Vikas Sukhadeo Meshram et al in 2013 did a prospective study in 147 patient with impacted mandibular third molars and subjected them for surgical removal.They found, 62 (42.1%) patients had mesioangular type of impaction, 37 (25.1%) were horizontal, 36 (24.4%) were vertical, 10 (6.8%) patients had distoangular impaction, and 1 (0.68%) patient each of linguoversion and inverted type of impaction. They had found lingual nerve paresthesia in patient which had a linguoversion. (23)

Kenji Nakamori et al in 2014 did a study on "Clinical significance of computed tomography assessment for third molar surgery". This study reveal low incidence of complications during third molar surgery. To resolve these issues, multi-institutional studies and development of a uniform protocol are needed(24).

Marcelo Breno Meneses Mendes et al in 2013 did a study on "Anatomical Relationship of Lingual Nerve to the Region of Mandibular Third Molar".This study says about the unless adequate protection of the lingual nerve is acquired by following an adequate surgical technique, the lingual nerve will always be vulnerable to damage during surgical intervention or manipulation in this region(25).

H. S. Charan Babu et al in 2013 did a Prospective Clinical Study on "Factors Influencing Lingual Nerve Paraesthesia Following Third Molar Surgery". This study says that The age of the patient, depth of impaction, lingual flap retraction and longer duration of surgery are significant risk factors for LNI during mandibular third molar surgery. Greater care should be taken to avoid the morbidity and patients should be informed well ahead about the probable complications.(26)

POSSIBLE MEASURES TO AVOID LINGUAL NERVE DAMAGE:
1)Adequate surgical training .
2)Proper radio graphic evaluation on level of impaction and difficulty score.
3)Proper surgical technique with proper intrumentation.

DISCUSSION:
A lingual nerve that is knowingly transected during wisdom tooth removal should be immediately repaired using epineurial sutures. Again, this may not be possible in practice, and immediatereferral to an appropriate experienced maxillofacial surgeon is indicated. In the majority of patients, the injury is only discovered post-operatively.
At early review, the presence of some sensation in response to stimulation of the tongue suggests that the nerve is at least partially intact; no treatment is indicated but sensory monitoring is required. As described above, complete anaesthesia could be caused by both a crush or section injury, and so surgical intervention is not indicated initially(27). However, the absence of progressive sensory recovery by 3–4 months post injury is an indication for surgical exploration at an appropriate maxillofacial unit. If, at the time of surgery, the nerve is found to be intact and of fairly uniform thickness but merely constricted by scar tissue, it should be freed (external neurolysis) and the wound closed. This is unusual, however, and more commonly the nerve is found to have been divided. If a neuroma has developed, this can be seen as a marked expansion at the site of the injury and must be excised, together with the damaged segment of the nerve. The severed ends of the nerve can then be mobilized and repair of the nerve should be performed using 8/0 or 9/0 epineurial sutures (28). A segment of 10–15 mm in length can be excised without causing excessive tension at the repair site and without the need for any form of nerve graft. The results of surgery are very variable; some patients regain good sensation, while others show little if any improvement (29). However, the multicentre retrospective study of LaBlanc & Gregg30 revealed a success rate of 80% and a recent prospective study has shown that the majority of patients consider the surgery worthwhile.Surgery should therefore be offered to all patients with lingual nerve injury who show few signs of spontaneous recovery (30).

CONCLUSION :

With evidence found various reviews from literature and also the authors experience ,lingual nerve paresthesia is an un avoidable rare complication following surgical removal of mandibular third molars.This solely depends on the level of imp action surgeons experience and proper surgical technique with necessary instrumentation.

REFERENCE:

1)Robinson PP. Nerve injuries resulting from the removal of impacted teeth. Textbook and Colour Atlas of Tooth Impaction, Copenhagen: Munksgaard. 1997:469-90.
2)Howe GL. Prevention of damage to the inferior dental nerve during the extraction of mandibular third molars. Br Dent J. 1960;109:355-63.
3)Kipp DP, Goldstein BH, Weiss WW. Dysesthesia after mandibular third molar surgery: a retrospective study and analysis of 1,377 surgical procedures. The Journal of the American Dental Association. 1980 Feb 1;100(2):185-92.
4)Wofford DT, Miller RI. Prospective study of dysesthesia following odontectomy of impacted mandibular third molars. Journal of oral and maxillofacial surgery. 1987 Jan 1;45(1):15-9.
5)Rood JP, Shehab BN. The radiological prediction of inferior alveolar nerve injury during third molar surgery. British Journal of Oral and Maxillofacial Surgery. 1990 Feb 1;28(1):20-5.
6)Seward GR. Radiology in general dental practice. British Dental Assoc.; 1963.
7)Carmichael FA, McGowan DA. Incidence of nerve damage following third molar removal: a West of Scotland Oral Surgery Research Group study. British Journal of Oral and Maxillofacial Surgery. 1992 Apr 1;30(2):78-82.
8)Lyons CJ, Bruce RA, Frederickson GC, Small GS. Age of patients and morbidity associated with mandibular third molar surgery. The Journal of the American Dental Association. 1980 Aug 1;101(2):240-5.
9)Mason DA. Lingual nerve damage following lower third molar surgery. International journal of oral and maxillofacial surgery. 1988 Oct 1;17(5):290-4.
10)BlackburnCW,BramleyPA.Lingualnerve damage associated with the removal of lower third molars. Br Dent J 1989; 167: 103–107.
11)Gargallo-AlbiolJ,Buenechea-ImazR,Gay-EscodaC. Lingual nerve protection during the surgical removal of lower third molar.A prospective randomised study. Int J Oral Maxillofac Surg 2000; 29: 268–271.
12)RobinsonPP,SmithKG.Lingualnervedamage during third molar removal.A comparison of two surgical methods. Br Dent J 1996; 180: 456– 461. 13)PichlerW,BeirneOR.Lingualflapretractionand 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: 395–401.
14) RentonT,McGurkM.Evaluationoffactors predictive of lingual nerve injury in third molar surgery. Br J Oral Maxillofac Surg 2001; 39: 423– 428.
15)WilliamsPL.In:Gray'sAnatomy,38thed.London: Churchill Livingstone, 1995: p.1237.
16)HendyCW,RobinsonPP.Thesensory distribution of the buccal nerve. Br J Oral Maxillofac Surg 1994; 32: 384–386.
17)HendyCW,SmithKG,RobinsonPP.Surgical anatomy of the buccal nerve. Br J Oral Maxillofac Surg 1996; 34: 457–460.
18)MerrillRG.Prevention,treatment,and prognosis for nerve injury related to the difficult impaction. Dent Clin North Am 1997; 23: 471–488.
19)Seddon HJ. Three types of nerve injury. Brain 1943; 66: 237–288.
20)Sunderland S. A classification of peripheral nerve injuries producing loss of function. Brain Res 1951; 74: 491–516.
21)SunderlandS.NervesandNerveInjuries,2nded. London: Churchill Livingstone, 1978; 133–141.
22)Tal M.A role for inflammation in chronic pain. Curr Rev Pain 1999; 3: 440–446.
23)OchoaJ,DantaG,FowlerTJ.Natureofthe nerve lesion caused by a pneumatic tourniquet. Nature 1971; 233: 265–266.
24)HollandGP,RobinsonPP.Peripheralnervedamage and repair. In: Clinical Oral Science. Harris M, Edgar M, Meghji S, eds.Wright, 1998; pp. 274–289. 25)LubinskaL.Regionoftransitionbetween preserved and regenerating parts of myelinated nerve fibres. J Comp Neurol 1979; 113: 315–335.
26)Horch KW. Guidance of regrowing sensory axons after cutaneous nerve lesions in the cat.J Neurophysiol 1979; 42: 1437–1449.
27)Robinson PP, Smith KG, Johnson FP, Coppins DA. Equipment and methods for simply sensory testing. Br J Oral Maxillofac Surg 1992; 30: 387–389.
28)Labanc JP,Van Boven RW. Surgical management of inferior alveolar nerve injuries. Oral Maxillofac Surg Clin North Am 1992; 4: 425–437.
29)Robinson PP, Loescher AR, Smith KG. A prospective quantitative study on the clinical outcome of lingual nerve repair. Br J Oral Maxillofac Surg 2000; 38: 255–263.
30)LaBlanc JP, Gregg JM.Trigeminal nerve injuries. Basic problems, historical perspectives, early successes and remaining challenges. Oral Maxillofac Surg Clin North Am 1992; 4: 277–283.