

Lingual Nerve Damage After Mandibular Third Molar Surgery: A Randomized Clinical Trial

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Purpose: The objective of this study was to clinically evaluate the frequency, type, and risk factors for lingual nerve damage after mandibular third molar surgery with reference to lingual flap retraction.

Patients and Methods: A total of fifty-five patients referred for bilateral mandibular third molar removal were included in this study. Each patient was randomly allotted to have the procedure performed on 1 side (experimental group) with lingual flap retraction. On the opposite side (control group), the same procedure was performed without lingual flap retraction.

Results: Lingual nerve damage occurred in 9.1% in the experimental group in which lingual flap retraction was performed. In the control group, damage to the lingual nerve was not observed. The difference was statistically significant ($P < .001$) as measured by the Cochran test.

Conclusion: Lingual nerve retraction represented a risk factor to temporary lingual nerve damage during mandibular third molar surgery.

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Removal of lower third molars can result in sensorial disturbances with the percent of nerve damage to the lingual nerves following third molar surgery ranging

from 0.6% to 22%.^{1,2} Nerve lesions can be temporary or permanent, being classified as neurapraxia, axonotmesis, and neurotmesis. Clinically, sensory disturbance presents as hypoesthesia, hyperesthesia, anesthesia and dysesthesia (painful anesthesia). Buccal nerve damage is extremely rare.³⁻⁵ Many researchers⁶⁻⁸ have stated the intimate relationship between the lingual nerve and mandibular lingual plate around posterior areas. Robinson and Smith⁹ assert that most cases of lingual nerve damage are temporary and associated with lingual flap retraction. The exact mechanism of lingual nerve damage during third molar surgery is controversial and among the most cited causes are: lingual plate perforation and lingual flap trauma during ostectomy or tooth sectioning; usage of lingual flap retractor; usage of chisel by a lingual approach associated with lingual plate fracture and supra-crestal incision because the nerve can be located in this region in some cases and may be sectioned.¹⁰ The aim of the present investigation, a prospective randomized study, was to compare 2 techniques for third molar removal with and without lingual flap retraction regarding sensory disturbance of the lingual nerve.

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Materials and Methods

Fifty-five patients operated for third molar removal at the Department of Oral and Maxillofacial Surgery of the Faculty of Dentistry and Oswaldo Cruz Hospital, both from the University of Pernambuco, Brazil, from May to December 2000, were selected for study. The following inclusion criteria were established:

- Patients with bilateral mandibular impacted third molars, classified by the Winter system into mesioangular, vertical, or distoangular;
- Patients without any medical problems that could contraindicate the procedure;
- Complete fracture of the lingual cortex could not have happened during tooth removal;
- All procedures had to be performed by the same operator.

All patients were randomly allotted to have 1 side (group A) operated on mandibular third molar without lingual flap retraction and the opposite side (group B) using lingual flap retraction technique with a Free's elevator. A total of 110 procedures were performed.

Patients were operated under local or general anesthesia. Local anesthesia was also given to all patients under general anesthesia through regional blocks of the inferior alveolar, lingual, and buccal nerves.¹¹

To minimize the risks of lingual nerve injury, the retromolar incision was made in all cases over the most lateral aspect of the anterior border of the mandibular ramus because the nerve may be anatomically located closer to the lingual bone plate.⁶⁻⁸

A buccal flap was raised in all cases and an appropriate buccal retractor placed (Fig 1). In the experimental group, the lingual flap was then raised by



FIGURE 1. Buccal flap retraction (control group).

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FIGURE 2. Free's elevator in place showing lingual flap retraction (experimental group).

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means of a Free's elevator. Once an adequate lingual flap was raised, a Free's elevator was placed to fit the lingual contour of the mandible of the third molar region (Fig 2).

Osteotomy to remove buccal bone was performed in all cases. This procedure was carried out without removing lingual bone.

Sensory disturbance was evaluated after 24 hours and on the 7th postoperative day. Any complaint concerning sensory disturbance of the lingual gingiva and mucosa of the floor of the mouth and tongue was recorded. Pin prick test was used to confirm nerve injury and to classify the sensory disturbance (anesthesia, hypoesthesia, paresthesia, or dysesthesia). An oral and maxillofacial surgeon who knew the proposal of the study but did not know which side was an experimental or a control group performed this evaluation. All the needles used for regional block of the inferior alveolar nerve had their active end examined in the laboratory of Pathology of The Faculty of Dentistry/University of Pernambuco using monocular microscopy (28 ×). To achieve this, different needles were used for regional block of the inferior alveolar nerve on the right and the left side giving a total of

Table 1. DISTRIBUTION OF SURGICAL PROCEDURES ACCORDING TO LINGUAL FLAP RETRACTION AND LINGUAL NERVE DAMAGE

Lingual Flap Retraction	Lingual Nerve Damage				Total	
	Yes		No		N	%
	N	%	N	%		
Yes	5	9.1	50	90.9	55	100.0
No	-	-	55	100.0	55	100.0
Total	5	4.5	105	95.5	110	100.0

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Table 2. DISTRIBUTION OF PATIENTS ACCORDING TO AGE AND LINGUAL NERVE DAMAGE

Age	Lingual Nerve Damage				Total	
	Yes		No			
	N	%	N	%	N	%
14-19	2	6.3	30	93.7	32	100.0
20-24	2	12.5	14	87.5	16	100.0
25-29	-	-	2	100.0	2	100.0
30-36	1	20.0	4	80.0	5	100.0
Total	5	9.1	50	90.9	55	100.0

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110 needles. This evaluation was carried out by a professional who did not know the surgical procedure performed in the experimental or in the control group.

Results

The percentage of sensory disturbance was higher among patients operated under general/local anesthesia (13.8%) than among patients operated under local anesthesia only (3.8%), even though the difference was not significant ($Z = -1.281$ and $P = .2002$). Buccal flap retraction was performed in all cases (110) and lingual flap retraction in 55 cases (25 to mandibular left third molar, 30 to mandibular right third molar). Ostectomy to remove buccal bone was performed in all cases (110), with 51 (92.7%) to mandibular left third molar and 50 (90.9%) to mandibular right third molar. This procedure was carried out without removing lingual bone. No tooth sectioning was performed in any case and there was no incidence of pain during tooth removal. Among 55 surgical procedures, in which lingual flap retraction was used, there were 5 (9.1%) cases of lingual nerve sensory disturbance (Table 1), whereas no case was observed in the control group. The difference was statistically significant ($P < .001$) as confirmed by the Cochran test. Of 5 cases where sensory disturbance was registered, 4 were classified as paresthesia and 1 as hypoesthesia. Of 5 cases where sensory disturbance was registered, needle end deformation was seen in only 1 case. All cases were classified as temporary disturbance because all patients recovered the sensation from affected nerves within 3 months postoperative. Ages of the patients presenting with lingual nerve complications were: 18, 19, 21, 23, and 32 years (mean age 22.60; standard deviation 5.59 years; coefficient of variability 24.75%). Among the 50 pa-

tients without lingual nerve complications, the mean age, standard deviation, and coefficient of variability were 20.24, 4.91 years, and 24.26%, respectively (Table 2).

Discussion

The results of the present investigation were similar to Carmichael and McGowan's¹ findings, where a significant increase in incidence of lingual nerve deficit was found when a lingual flap retractor was used. Conversely, Pogrel et al,⁶ Rud,¹² and Yeh¹³ assert that lingual flap retraction allows a higher protection to lingual nerve from permanent lesions despite the possibility of temporary lesions. Rud¹² and Yeh¹³ advocate the lingual split technique to avoid lingual nerve injury, especially for third molars angled toward the lingual. In the present study, lingual bone plate was preserved in all cases, which was responsible for a higher degree of difficulty during the procedure, especially in deeper impactions. Pogrel et al⁶ and Greenwood et al¹⁴ support the use of broad retractors because the Howarth's retractor is not able to protect the nerve over the lingual plate or may even be responsible for periosteum tearing during insertion.⁹ However, Walters¹⁵ emphasizes the relationship between lingual nerve injury and handling of the elevator over lingual region or using broad retractors. Free's elevator was used in this study, which is similar to the Howarth's retractor and it was observed that it provides a reliable and easy adaptation. Concerning the lingual nerve injuries and lower third molar position, all 5 cases were classified according to Pell and Gregory as class II. Using the system related to occlusal plane, 4 cases were classified as position C and 1 as position B. These results show a greater degree of difficulty for tooth removal, leading to more requirements for ostectomy that may increase the risk of lingual nerve injury.¹³ The percentage of injuries was higher among patients under general anesthesia plus local anesthesia (13.8%) compared with patients that underwent only local anesthesia (3.8%). However, this difference was not significant ($P = .2002$). As many researchers⁵ refer to needle-end trauma during local anesthesia as 1 of the causes of nervous injury, this study analyzed, postoperatively, all needle-ends through monocular microscopy (28 × magnification). The aim of this analysis was to verify needle-end deformation and correlate this with nerve injury. There was only 1 case of needle-end deformation out of 5 cases of lingual nerve injury. It must be emphasized that all cases with nerve damage in the present investigation were temporary, because after 3 months post operation there was spontaneous recovery.

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