

# Lingual Nerve Injury During Impacted Mandibular Third Molar Surgery

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## ABSTRACT

**Objective:** To determine the frequency of lingual nerve injury (LNI) during the surgical removal of mandibular third molar and the associated risk factors.

**Study Design:** Descriptive study.

**Place and Duration of the Study:** Department of Oral and Maxillofacial Surgery, Ayub Teaching Hospital, Abbottabad, from January to June 2021.

**Methodology:** A total of 121 patients were included in this study who had undergone impacted third molar surgery. Data were collected on a proforma *via* interview. Patients were followed up after 1 week, 1 month, and 3 months of duration. Frequency of LNI and its association with various surgical procedure steps were determined.

**Results:** This study shows that out of 121 patients, frequency of LNI was found to be 3.3% (n=4). The type of impaction (p=0.047), lingual flap retraction (p<0.001), tooth splitting (p=0.029), and longer duration of surgery were found to be significantly associated with it.

**Conclusion:** The frequency of LNI during mandibular impacted third molar surgery was 3.3% in this study, and significantly associated with horizontal impaction, lingual flap retraction, tooth splitting, and duration of surgery longer than 30 minutes.

**Key Words:** Lingual nerve injury, Tooth, Impaction, Third molar, Lingual flap retraction, Tooth splitting.

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## INTRODUCTION

Impacted mandibular third molar (M3M) surgery is one of the most frequently performed surgical procedures in dentistry. As frequently it is performed, it is accompanied by many complications *i.e.*, post-operation pain, trismus, alveolitis, haemorrhage, infection, and nerve injury. Most of these are temporary in nature and recover spontaneously. The most discussed and debated is the injury to peripheral branches of trigeminal nerve namely lingual nerve, inferior alveolar nerve, and long buccal nerve. Sensory supply of tongue is *via* lingual nerve and hence, it is responsible for tongue coordinated speech mastication, swallowing, taste sensation and any damage to these sensations can lead the patient to be psychologically and functionally affected.<sup>1-3</sup>

Lingual nerve (LN) lies just medial to the mandibular third molar crown at or near the mandible lingual alveolar bone,<sup>4</sup> which makes it susceptible to injury during its extraction.

The incidence of lingual nerve injury (LNI) was 4%, 5%, and 6% in three studies,<sup>1,4,5</sup> while the reported incidence of permanent lingual nerve injury was 0-2%.<sup>6</sup>

During third molar surgery, the factors that can cause injury to lingual nerve could be age, health and habits of the patient, degree of impaction, inaccurate inferior dental nerve block, amount of bone cutting during extraction, tooth splitting, lingual flap retraction, duration of surgery, and the experience of the surgeon.<sup>4,7,8</sup> Among those risk factors, age, type of impaction, lingual flap retraction, bone cutting, tooth splitting, and duration of surgery were observed in this study. Most of the time, the nature of the injury is temporary but sometimes can be permanent, which may cause temporary or permanent paresthesia, hypoesthesia or dysesthesia.<sup>2</sup>

The rationale of this study was to conduct a prospective analysis of the frequency of lingual nerve injury during impacted mandibular third molar surgery so to identify the surgical variables that can be avoided to prevent this complication. The results of this study will add to the existing body of knowledge and will help oral surgeons to minimise the risk of lingual nerve injury during third molar surgery, saving the patients from this complication.

The objective of this study was to determine the frequency of lingual nerve injury during surgical removal of mandibular third

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molar, and associated risk factors at the Oral and Maxillofacial Department, Ayub Teaching Hospital, Abbottabad, Pakistan.

## METHODOLOGY

The study was done in the Department of Oral and Maxillofacial Surgery, Ayub Teaching Hospital, Abbottabad, Pakistan. The study lasted from, January to June 2021. The sample size was calculated as 121. It was calculated through the WHO software for sample size calculation in health studies using a formula to evaluate proportion with absolute precision and following assumptions. Confidence level was 95%, anticipated proportion of frequency of LNI during impacted mandibular third molar surgery was 4%, and absolute precision was 3.5%.<sup>1</sup> The sampling technique used was non-probability consecutive sampling in which every patient presenting with LNI after impacted third molar surgery was taken as participant. All those patients of both genders between the age of 19 and 40 years, presenting with impacted mandibular third molar which required surgical extraction in which mucoperiosteal flap was elevated, were included. Patients with medically compromised conditions that affect wound healing like Diabetes mellitus, steroids use, anaemia etc., and the patients with squamous cell carcinoma or other pathologies like odontogenic cysts were excluded. Approval to carry out the study was sought from the institutional Ethical Review Committee at Ayub Teaching Hospital, Abbottabad, Pakistan. Informed written consent was taken from the patients.

Third molar surgery was performed by a surgeon having at least 3 years of performing this surgery. Local anaesthesia was given, the ward's incision was taken and mucoperiosteal buccal flap was raised. Bone cutting *via* no 8 bur was carried out using Moore Gillbe Collar Technique, and then sectioning of tooth was done with high-speed fissure bur to facilitate its removal. Lingual flap was elevated only in cases where buccal flap could not provide enough exposure. Then flap was approximated and closed with an interrupted 3/0 silk suture, and patients were followed up after 1 week and the assessment of lingual nerve injury was done at that time. The patients showing signs of LNI were assessed at 1 month, if no improvement was observed, they were followed again at 3 months. Patients having normal lingual nerve sensation were not followed up at 1 month and 3 months. The patients were assured regarding the maintenance of the confidentiality of their personal and other data collected from their records.

Statistical analysis was performed by using statistical package of the social sciences (SPSS) version 21. Quantitative variable like age was described as mean and standard deviation. Categorical variables like gender, lingual flap elevation, bone cutting, splitting of tooth, the type of impaction, and LNI status were described as frequencies and percentages. Outcome variable was stratified by gender, lingual flap elevation, bone cutting, splitting of tooth, and the type of impaction. Chi-square and Fischer's exact tests were used at a 5% level of significance

with a p-value of <0.05 to determine the differences by lingual flap elevation, type of impaction, bone cutting, and splitting of tooth with respect to the outcome variables.

## RESULTS

A total of 121 patients were included in this study. Sixty-six (54.5%) patients were below the age of 28 with mean age distribution of  $28.85 \pm 5.5$  years. Seventy-three (60%) were males and 48 (40%) were females.

The frequency of LNI among 121 patients was calculated to be 3.3% (n=4). Twenty-five percent of the LNI cases (n=1) were temporary, while the other three were permanent.

All the patients with LNI were males, but this finding was not statistically significant ( $p=0.099$ ). The age does not seem to influence the frequency of LNI. Considering the type of impaction, the incidence of LNI was more in horizontal and vertical impaction and found to be statistically significant ( $p=0.047$ ). Lingual flap retraction was not done in 117 patients and only 1 patient had LNI. But in four patients in which lingual flap retraction was done, LNI was found in three cases. Lingual flap retraction was significantly associated with LNI ( $p<0.001$ ). Bone cutting was done in 100 cases and was not significantly associated ( $p>0.99$ ) with LNI, while tooth splitting which was done in 47 cases was significantly associated ( $p=0.029$ ) with LNI. Regarding duration of surgery, duration >30 minutes was not found to be a significant factor ( $p=0.054$ ) in causing LNI (Table I).

Overall analysis reveals that age >28 years, gender, bone cutting, and duration of surgery were not statistically significant factors for LNI. While the type of impaction, lingual flap retraction, and tooth splitting was found to be significant factors for LNI.

## DISCUSSION

Lingual nerve (LN) lies just medial to the mandibular third molar crown at or near the mandible lingual alveolar bone,<sup>9</sup> which makes it susceptible to injury during its extraction.<sup>6,10</sup>

The frequency of LNI in this study was found to be 3.3% (95% CI; 0.13-6.47%) in which 25% was temporary which is similar to the results conducted by a number of studies.<sup>1,4-8,11-13</sup> The study done by Meyer *et al.* showed contrasting results.<sup>9</sup>

Higher age did not seem to significantly influence the occurrence of LNI in this study which is in contrast with the study of Babu *et al.*<sup>1</sup> While all cases of LNI were found in males, but the results were not statistically significant as in the study of Babu *et al.*<sup>1</sup>

Mesioangular type of impaction was found to be the most common among other types in this study, which was analogous to the study of Juodzbalsys *et al.*<sup>13</sup> Higher frequency of LNI was found in patients with horizontal type of impaction followed by vertical impaction. The type of impaction was found to be a significant factor in this study.

**Table I: Association of lingual nerve injury (LNI) with surgical variables during mandibular third molar surgery.**

		LNI (n=121)		X <sup>2</sup>	p-value
		Present N (percentage %) 4 (3.3)	Absent N (percentage %) 117 (96.7)		
Gender	Male	4(5.4)	69(94.6)	2.72	0.099
	Female	0(0)	48(100)		
Type of impaction	Mesioangular	0 (0)	70 (100)	7.940	0.047
	Horizontal	2 (8.6)	21 (91.4)		
	Distoangular	1 (16.6)	5 (83)		
	Vertical	1 (4.5)	21 (95.5)		
Lingual flap retraction	YES	3 (75)	1 (25)	66.520	<0.001
	NO	1 (0.85)	116 (99.14)		
Bone cutting	YES	4 (3.8)	100 (96.2)	0.676	>0.99
	NO	0 (0)	17 (100)		
Duration of surgery in minutes	<30	0 (0)	62 (100)	4.347	0.054
	>30	4 (6.7)	55 (93.3)		
Tooth splitting	YES	4 (7.8)	47 (92.2)	5.678	0.029
	NO	0 (0)	70 (100)		
Age in years	<28	1 (1.5)	65 (98.5)	1.456	0.329
	>28	3 (5.4)	52 (94.5)		

Hypothesis tests: Chi-square test, Fischer exact test applied for cell count less than five.

One study showed higher incidence for horizontal impaction,<sup>1</sup> while another had higher incidence for distoangular impaction.<sup>9</sup> That may be because of increased susceptibility of LNI in that position of impaction. Careful preoperative assessment and keeping a buccal approach can reduce its incidence.

Lingual flap retraction was found to be a highly significant risk factor. Some studies support the use of lingual flap retraction,<sup>4</sup> while some are against its use.<sup>14</sup> Studies that advocate its use propose that though it causes transient LNI, yet it can prevent permanent LNI.<sup>4,15</sup> Others suggest that the Howarth retractor does not effectively prevent LNI, so lingual flap should be best avoided whenever possible.<sup>14</sup>

Bone cutting and duration of surgery greater than 30 minutes does not seem to be a significant risk factor in this study, while tooth splitting are significant risk factors which is comparable with previous studies.<sup>1,14</sup>

To avoid LNI during tooth splitting, tooth sectioning should be done in a manner with high- speed handpiece that leaves a thin section of dental tissue near the nerve trunk, then cautiously fracture the diaphragm as advocated by La Monaca *et al.*<sup>14</sup>

The strengths of this study are prospective data collection, follow-up, and consideration of many factors such as impaction type, lingual flap retraction, tooth splitting, and duration of the surgery.

There were some limitations of this study. There was no comparison group, so it was difficult to address etiological questions. Sampling was non-random so the cases were not representative of the population. The aspects of management after LNI were not covered in this study. Positive cases for the condition were too few hence, a much larger sample size should have been used. Future research can be carried

out regarding the risk factors of LNI with larger samples and management options.

## CONCLUSION

The frequency of LNI during impacted M3M surgery was found to be 3.3% and associated risk factors were found to be impaction type, lingual flap retraction, tooth splitting and duration of surgery longer than 30 minutes. The careful surgical techniques can minimise the frequency of LNI.

## ETHICAL APPROVAL:

Ethical approval was obtained from the Ethical Committee of Ayub Hospital Complex, Abbottabad, to conduct this study prior to its start.

## PATIENTS' CONSENT:

Informed consent were obtained from patients regarding publishing this article and they were assured of the anonymity of their data and no personal information was shared.

## COMPETING INTEREST:

The authors declared no competing interest.

## AUTHORS' CONTRIBUTION:

AR: Literature search, conceptualisation of study design, data collection, data analysis, data interpretation, and manuscript writing.

IA: Conceptualisation of study.

NSK: Data analysis and proofreading.

AR: Proofreading.

All the authors have approved the final version of the manuscript to be published.

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