Original Article
DOI: https://doi.org/10.70749/ijbr.v3i7.3014

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://ijbr.com.pk
ISSN: 2960-2793/ 2960-2807

Inferior Alveolar Nerve Damage after Mandibular Third Molar Surgical Extraction in Dental Patients Visiting 28 Military Dental Centre, Lahore

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ARTICLE INFO

Keywords: Mandibular Nerve Injury, Molar, Postoperative Complications, Third.

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Declaration
Authors' Contribution
All authors equally contributed to the study and approved the final manuscript

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 16-06-2025 Revised: 29-06-2025
Accepted: 07-07-2025 Published: 10-07-2025

ABSTRACT

Objectives: To determine the frequency of inferior alveolar nerve injury after mandibular third molar extraction. **Study design:** Descriptive case series. **Place and Duration of the study:** 28 Military Dental Centre, Lahore from December-2024 to May-2025. **Methodology:** A total of 250 patients were included who required extraction of impacted mandibular third molar tooth located nearby the inferior alveolar nerve with a Pederson scale difficulty index > 4. Patients were assessed on day two, day seven and at three months for damage to the inferior alveolar nerve. Frequency of the nerve damage was stratified by age & gender and post-stratification comparison was performed using Chi-square test. **Results:** In this study, 250 patients were included. Median age was 31.00 (9.00) years with 118 (47.20%) patients having age 20-30 years and 132 (52.80%) were aged 31-40 years. There were 116 (46.40%) male and 134 (53.60%) female patients. Among patients who underwent surgical extraction of the mandibular third molar, frequency of IAN damage was 12 (4.80%). **Conclusion:** Frequency of damage to inferior alveolar nerve after extraction of impacted mandibular third molar tooth was 4.80%.

INTRODUCTION

Third molar tooth is a morbidity related to the oral health which requires surgical correction since it is found to be impacted in majority of the cases. [1] Globally, this dental pathology has been found to be very common in general population with a reported prevalence of 36.9%. [2] Surgical correction of this dental pathology is important since it can result in a wide variety of complications to the surrounding structures of oral cavity. [3] These pathologies include distal periodontal pathology of mandibular second molar, caries of the mandibular second molar and pericoronitis. [3] Another important association of this dental pathology is the increased risk of having angular and condylar fractures of the mandible in case of a traumatic injury to this region. [4]

Extraction of the mandibular third molar, which is impacted, is a commonly performed surgery, however, despite advances in the medical equipment and surgical procedures, the risk of complications is still high. [5] Some of the complications related to this surgery include pain, trismus leading to difficulty to open the mouth wide, facioganthological oedema, dehiscence, alveolitis, and suppuration. [6] Another important complication of this surgical procedure is the injury to the mandibular nerve branches, particularly, the inferior alveolar nerve which lies in close proximity to mandibular third molar and is thus prone to be iatrogenically injured. [6, 7] Injury to this particular branch of mandibular nerve while extracting the third molar tooth which is impacted, can result in damaging IAN which can either be temporary or permanent. [8] In this instance, a study was conducted to assess the pattern of iatrogenic injury to the IAN in which it was found that the frequency of this particular complication was as high as 2.9%. [8] Similarly, in another study, it was found that amongst patients who had IAN injury due to the aforementioned surgical procedure, frequency of temporary nerve injury ranged from 0.26 to 8.4% and of permanent damage ranged from 0.3 to 0.9%. [9]

In Pakistan, latest data regarding the frequency of this particular operative complication in patients who had this impacted pathological tooth is not available. Therefore, this study was conducted to find out the recent IAN damage frequency after extraction of the third molar surgically, so that guidelines can be made to avoid this injury.

METHODOLOGY

This descriptive case series was conducted at 28 Military

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Dental Centre, Lahore from December-2024 to May-2025 after getting approval from research evaluation unit of College of Physicians and Surgeons (REU/CPSP), Pakistan (Ref No: CPSP/REU/DSG-2021-083-3904). Sample size calculation was performed using Raosoft ® sample size calculator using following formula:

$$n = \frac{z^2_{1-\alpha/s} P(1-P)}{d^2}$$

Sample size calculation was performed by using confidence level of 95%, margin of error of 3.5% and anticipated frequency of IAN damage to be 0.84%. [9] This gave a sample size of 250 which was selected by using non-probability consecutive sampling technique.

Patients aged 20 – 40 years of either gender, who required surgical removal of the third mandibular molar which was impacted and had a proximity (of about 2-4mm) with IAN, confirmed by using Cone Beam Computed Tomography (CBCT), with a difficulty index of greater than 4 (moderately difficult impacted third molars), based on the Pederson scale were included. Patients with history of systemic disease (uncontrolled diabetes, hyperthyroidism, epilepsy, chronic obstructive pulmonary disease and ischemic heart disease), any pathology associated with the tooth (cystic or neoplastic), intake of steroid therapy and pregnant females were excluded.

Baseline characteristics including age and gender were documented. Possible risks/benefits of the procedure were explained to all the patients. Written informed consent was taken. ln each surgical procedure, one mandibular third molar was extracted. The operative removal was performed using local anaesthesia comprising lignocaine having a strength of 2% mixed with epinephrine at a dilution of 1:100,000. The surgeon elevated a buccal mucoperiosteal flap. A sterile slow-speed handpiece and sterile saline solution were utilized for the osteotomy and crown splitting procedures. After tooth removal, the socket was thoroughly irrigated with sterile saline and curettage was performed to remove any debris. After achieving haemostasis, wound closure was done by 3-0 silk sutures. An antibiotic and a non-steroidal anti-inflammatory drug were prescribed (oral tablet Ansaid ™ l00mg, two times daily for five days and oral Augmentin ™ 625mg, three times daily for three days). Along with this, patients were advised to rinse their mouth using Chlorhexidine Gluconate three times a day for seven days with a strength of 0.12%. After seven days, the surgeon removed the sutures.

Subjective assessment was performed by asking the patients about feeling of paraesthesia, anaesthesia, dysesthesia, hyperesthesia, or hypoesthesia and the objective assessment was done through neurosensory testing (NST). These assessments were carried out on day two, day seven and at three months follow up visits after surgery. If both subjective and objective assessments were different from the non-affected side, IAN was labelled as damaged.

Data was analysed using Statistical Package for Social Sciences (SPSS) version 22. Quantitative variable (age) was presented as median interquartile range (IQR) after checking normality of data by Shapiro-Wilk test which showed that it was not distributed normally. Qualitative variables (gender and IAN damage) were presented as frequency and percentages. Frequency of IAN damage was stratified by age and gender. Post-stratification comparison was performed using Chi-square test. A p-value of ≤ 0.05 was considered as statistically significant.

RESULTS

In this study, 250 patients were included. Median age was 31.00 (9.00) years with 118 (47.20%) patients having age 20-30 years and 132 (52.80%) were aged 31-40 years. There were 116 (46.40%) male and 134 (53.60%) female patients. Patient demographics are given in Table-I:

Table I

Patient demographics (n = 250)

Demographic	Median (IQR); n (%)
Median age	31.00 (9.00) years
Age group	
20-30 years	118 (47.20%)
31-40 years	132 (52.80%)
Gender	
Male	116 (46.40%)
Female	134 (53.60%)

Among patients who underwent surgical extraction of the mandibular third molar, frequency of IAN damage was 12 (4.80%) while in remaining 238 (95.20%) patients, IAN remained protected. Frequency of damage to the IAN damage after removal of the mandibular third molar surgically is given in Table-II:

Table II

Frequency of damage to the IAN damage after removal of the mandibular third molar surgically (n = 250)

Damage to IAN	n (%)
Yes	12 (4.80%)
No	238 (95.20%)

Abbreviations: IAN = Inferior alveolar nerve

Upon stratification of frequency of IAN damage by age it was found that in patients aged 20-30 years (n = 118), IAN damage occurred in 6 (5.08%) patients while in patients aged 31-40 years (n = 132), it occurred in 6 (4.55%) patients, (p = 0.842). Upon stratification of frequency of IAN damage by gender, it was observed that among male patients (n = 116), IAN got damaged in 5 (4.31%) patients while in female patients (n = 134), it got damaged in 7 (5.22%) patients, (p = 0.736). Stratification of frequency of IAN damage by age and gender is given in Table-III:

Table III

Stratification of frequency of IAN damage by age and gender (n = 250)

Stratification by age			
IAN damage	**20-30 years (n = 118)**	**31-40 years (n = 132)**	**p-value**
Yes	6 (5.08%)	6 (4.55%)	0.842*
No	112 (94.92%)	126 (95.45%)	
Stratification by gender			
IAN damage	**Male (n = 116)**	**Female (n = 134)**	**p-value**
Yes	5 (4.31%)	7 (5.22%)	0.736*
No	111 (95.69%)	127 (94.78%)	

Abbreviations: IAN = Inferior alveolar nerve
* Chi-square test

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DISCUSSION

Iatrogenic injuries to the surrounding structures of surgical field are amongst the most common operative complications encountered, particularly in surgical procedures of the oral cavity, gingiva and teeth. [10, 11] Present study focused on one such type of injury, which was the damage to the IAN while performing the extraction of mandibular third molar. This specific nerve damage was focused because it has been found to be at high risk of getting damaged during the aforementioned surgical procedure of the oral cavity. [12, 13]

In present study, for making diagnosis of impacted mandibular third molar and to find its close proximity to IAN, CBCT was used. This investigation has been found to be highly accurate to assess the proximity of this prone to injury nerve to the tooth planned for being extracted surgically. [14, 15] For assessing the difficulty index of the surgical procedure, Pederson scale was used which is is well validated tool for finding out the possible difficulty which the operting surgeon has to face while extracting the pathologically impacted tooth. [16, 17]

Upon assessment of the age of patient who presented with this oro-dental pathology, it was observed that average age of presentation was 31 years with most patients aged between thirty one and forty years. Similar to this, a study conducted by Gebeyahu et al. [18] reported approximately similar age range of the patients who presented with this condition. Additionally, regarding the gender distribution, it was observed that there was a slight predominance of females for having this pathology with females constituting more than half of the affected population. Similar to this, multiple previous studies have demonstrated that this condition is much more prevalent in females as compared to the males. [19, 20] The possible reason behind this female predominance is the difference between the two genders in the mandibular arch shape and jaw dimension (with smaller jaw in females). [18, 21]

Regarding the frequency of IAN damage, it was observed that in present study damage to this mandibular nerve brach occurred in 4.8% of the patients. In addition, the frequency of damage to this nerve was influenced neither by age of the patients ($p = 0.842$) nor by their gender ($p = 0.736$). Compared to this, a study was conducted by Maqbool et al. [22] in which it was observed that among patients who underwent the surgical procedure similar to the one being performed in present study, the frequency of damage to IAN was observed to be 1.2% which is much lower compared to present study. In another study conducted by Chai et al. [8], this frequency of IAN damage was reported to be at 2.98% which was lesser but comparable to present study. Contrarily, one study conducted by Pippi et al. [23], among patients who underwent removal of their third mandibular molar tooth, damage to IAN occurred in 10.9% patients which is much higher compared to present study. This difference between previously conducted studies and present study can be explained by the difference in the sample sizes of these studies and the possible difference in the surgical expertise of the surgeons performing the surgeries in these studies.

Based on the results of present study, it is evident that the chances of IAN to get damaged in relatively difficult surgical extraction of third mandibular molar is considerable. Therefore, it is important to keep a close look on the anatomical location of this nerve to help avoid damage to this structure. There were no limitations of present study.

CONCLUSION

In conclusion, frequency of IAN damage was 4.80% in patients who underwent removal of the third mandibular molar surgically.

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