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ASSESSMENT OF THE COMPLICATIONS ENCOUNTERED DURING AND AFTER SURGICAL REMOVAL OF MAXILLARY THIRD MOLAR

Dr. Amsal Moten[*1], Prof. Dr. Muhammad Shahzad[2], Dr. Naeem Mustafa[3], Dr. Maheen Syed[4], Dr. Anusha Qureshi[5], Dr. Eshnawar Ishaque[6]

[*1]*Liaquat University of Medical and Health Sciences (LUMHS) Resident of Oral and Maxillofacial Surgery, FCPS*
[2]*Liaquat University of Medical and Health Sciences (LUMHS) Chairman and Professor MFDS, RCS(Glasgow), FFDRCS (Ireland), FDS, RCS (England), BDS, FCPS*
[3]*Bibi Aseefa Dental College (BADC), Larkana Lecturer BDS, MSc*
[4]*Isra University (IU) Resident of oral and maxillofacial surgery, MSc*
[5]*Liaquat University of Medical and Health Sciences (LUMHS) Lecturer BDS, MPHIL*
[6]*Fatima Jinnah Dental College (FJDC) BDS, MSc*

[*1]amsalmunaf786@gmail.com, [2]dentistshahzad@gmail.com, [3]naeem.mustafa1212@gmail.com, [4]dr.maheenhayee@yahoo.com, [5]dr.anushaqureshi@gmail.com, [6]dreshnawarishaque092@gmail.com

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Corresponding Author: *
Dr. Amsal Moten

Abstract

OBJECTIVE: *To determine the frequency of intraoperative and postoperative complications of maxillary third molar removal surgery.*

METHODOLOGY: *This descriptive cross-sectional research was performed within the Department of Maxillofacial Surgery, Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro, with an enrollment of 231 patients presented for maxillary third molar removal surgery. Eligible participants aged 18 to 60 years, of either gender was included to determine the intraoperative (root fracture) and postoperative complications (hemorrhage, postoperative pain, delayed wound healing). The data was analyzed through SPSS version 26, employing descriptive statistics with a p-value of ≤ 0.05 considered statistically significant.*

RESULTS: *Among a cohort of 231 individuals undergoing the extraction of maxillary third molars, the average age was calculated at 32.4 ± 11.0 years; 64.5% of the participants were identified as female, while 35.5% were categorized as male. Intraoperative complications were observed, including root fractures (3.5%) and tuberosity fractures (1.7%); conversely, postoperative complications encompassed hemorrhage (2.6%), pain (3.0%), and instances of delayed wound healing (6.9%). Notably, complications were significantly more prevalent in patients exceeding the age of 30 years ($p < 0.05$) and in males, with root fractures (75%, $p = 0.025$) and hemorrhage (83.3%, $p = 0.022$) exhibiting particularly elevated rates.*

CONCLUSION: *The surgical removal of maxillary third molars is associated with a low frequency of complications, with root fracture and delayed wound healing being the most common. Age and gender were significant factors influencing complication rates. These findings highlight the importance of careful*

surgical planning and patient-specific risk assessment to minimize intraoperative and postoperative complications.

INTRODUCTION

Surgical removal of third molars is one of the most common oral surgical procedures performed on young adults aged between 16 to 21 years [1]. The procedure for third molar extraction is usually simple and complication-free, but postoperative reaction may happen including swelling, pain, infection and dysphagia with complication rates for mandibular third molar extractions ranging from 2.6% to 30.9% [2]. This large variation has sparked ongoing debate over the necessity of prophylactic removal of asymptomatic third molars. Preparation To extract maxillary third molars the common indications include preventing dental crowding, correcting ectopic eruption, periodontal disorders and removal of teeth associated with pathologic changes[3].

Complication rates vary between studies, due to multiple influencing factors including patient age, general health, sex, degree of impaction, surgeon skill, smoking habits, contraceptive use, oral hygiene, and type of surgery performed [4]. Of these variables, the degree of impaction and age of the patient have the highest correlation with the incidence and severity of complications. Hemorrhage and pain are the most frequently reported postoperative complications, while less frequent complications include severe trismus, injury to the neighboring second molar, and fracture of the mandible by surgical trauma [5]. Because they are the last teeth to erupt, third molars are particularly prone to eruption-related problems due to space limitations in the dental arch [6].

Factors identified as being associated with complications of third molars comprise age, gender, medical history, oral contraceptive use, presence of pericoronitis, poor oral hygiene, smoking, type of impaction, the anatomical relationship of the third molar to the inferior alveolar nerve, duration and technique of surgery, surgeon's experience, number of teeth extracted, administration of perioperative antibiotics, application of topical antiseptics, use of intra-socket medications, and anesthetic methods [7].

Sayed et al. in their investigation documented that the intraoperative and postoperative complication rates during third molar extractions were 3.7% and 8.3%, respectively. Root fractures occurred most frequently (12%), followed by hemorrhage (8%). Tuberosity fractures were observed in 6% of patients [8].

Salik et al. examined the frequency of complications arising during and after maxillary third molar extractions and reported a complication incidence of 26.08%. They noted that tuberosity fractures constituted the most frequently encountered complication, observed in 31.66% of patients. Delayed wound healing (18.33%) and postoperative pain (16.66%) represented other significant complications [9].

Rivis et al. also investigated the complications associated with maxillary third molar extraction and reported that intraoperative complications were identified in 33% of patients, with root fractures being the most common (7%) [10]. The literature clearly indicates that the extraction of maxillary third molars is associated with considerable intraoperative and postoperative complications [11]. It is imperative for the surgeon to apprise the patient of the statistical likelihood of complications prior to the surgical procedure, thereby enabling the patient to make an informed decision regarding the necessity of surgery. Any complications that arise should be addressed promptly and effectively by the surgeon [12-13].

The extraction of third molars constitutes a prevalent surgical intervention; however, it is frequently associated with considerable complications stemming from the heightened incidence of third molar impaction. Adverse events occurring during or subsequent to the surgical extraction of maxillary third molars can lead to an extended treatment duration, as well as social and economic hardships, ultimately resulting in a diminished quality of life for the patient [14].

The objective of this investigation is to evaluate the prevalence of various complications encountered during and following the surgical removal of maxillary third molars, thereby assisting clinicians in optimizing patient management strategies. To date, no research has been conducted within the context of local hospital settings, and this study endeavors to address the deficiency of local scholarly literature.

METHODOLOGY

This descriptive cross-sectional study was conducted in the Department of Maxillofacial Surgery at Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro, over a period of six months. A total of 231 patients were enrolled using non-probability consecutive sampling. Patients aged 18 to 60 years of either gender, presenting for maxillary third molar removal surgery, and providing written informed consent were included. Patients were excluded if they had medical contraindications to extraction, were pregnant, on anticoagulant therapy or other medications increasing bleeding risk, had a history of head and neck radiation, active oral infections, substance abuse, or known allergies to anesthetics or surgical medications.

Each patient underwent a preoperative assessment that included a detailed history, clinical examination, and radiographic evaluation using orthopantomogram (OPG) and periapical radiographs. All procedures were performed under local anesthesia using the posterior superior alveolar nerve block technique with two 1.8 mL cartridges of 2% xylocaine with epinephrine (1:100,000). Under standard aseptic precautions, a straight elevator was used to luxate the tooth. If necessary, bone was removed using a rose-head round bur in a slow-speed handpiece with copious saline irrigation. After extraction, sharp bony edges were smoothened with a bone file, and the wound was closed with 3-0 Vicryl sutures. Hemostasis was achieved using sterile 2×2 gauze applied to the site for 30 minutes.

Intraoperative complications, including root fracture—defined as fracture of the maxillary third molar root tip during extraction, confirmed on radiography—and tuberosity fracture were recorded and managed as per institutional protocols. Patients were followed at 24 hours postoperatively to assess for early complications including hemorrhage (excessive bleeding within 24 hours requiring intervention) and postoperative pain (Visual Analog Scale score ≥ 4). Patients were re-evaluated on the 10th postoperative day for signs of delayed wound healing, defined as exposed bone due to reduced epithelization.

The dataset was subjected to analysis employing SPSS version 26. The mean ± standard deviation was computed for both age and pain scores, whereas frequencies and percentages were delineated for categorical variables, including complications. The Chi-square test was utilized to evaluate the differences in complications, with a p-value of ≤ 0.05 deemed as statistically significant.

RESULTS

The investigation included a cohort of 231 patients, with an average age of 32.40 ± 11.01 years. A marginally predominant proportion, 53.2%, fell within the age range of 18 to 30 years, whereas 46.8% were aged over 30. Female participants represented 64.5% of the total sample, while male participants comprised 35.5%. In relation to smoking behavior, 25.5% identified as smokers, in contrast to 74.5% who were classified as non-smokers. Concerning comorbid conditions, 32.9% of the subjects were diagnosed with diabetes mellitus, and 47.6% had hypertension. The remaining proportions of 67.1% and 52.4% were classified as non-diabetic and non-hypertensive, respectively. Regarding the location of the affected dental structures, 55.4% were situated on the left side, while 44.6% were on the right. (TABLE I)

In the investigation comprising 231 individuals undergoing dental extractions, intraoperative complications were observed to be relatively rare. Incidences of root fractures manifested in 3.5% of the cases, whereas tuberosity fractures were noted in 1.7% of the participants. Postoperative complications, although infrequent, were significant enough to warrant attention. Hemorrhage was documented in 2.6% of the subjects, postoperative pain in 3.0%, and delayed wound healing in 6.9%. (TABLE II)

In the present investigation involving a cohort of 231 patients subjected to maxillary third molar extraction, complications were meticulously assessed in accordance with age stratifications. Intraoperative complications, including root fractures, were found to be markedly more prevalent in patients exceeding the age of 30, constituting 87.5% of such occurrences ($p = 0.021$). Furthermore, tuberosity fractures were exclusively documented within this advanced age demographic ($p = 0.046$). Postoperative complications similarly exhibited a heightened frequency in individuals aged over 30 years: hemorrhage was uniquely reported in this cohort ($p = 0.010$), postoperative pain was experienced by 85.7% of individuals in this age group ($p = 0.041$), and delayed

wound healing was predominantly observed within this age bracket, reflecting 93.8% of cases ($p < 0.001$). (TABLE III)

In the analysis encompassing 231 patients undergoing maxillary third molar extraction, gender was determined to exert a significant effect on the occurrence of specific complications. Intraoperative root fractures were noted to be more prevalent among male patients, accounting for 75% of such incidents ($p = 0.025$), while all occurrences of tuberosity fractures were exclusively recorded in male patients ($p = 0.015$). Furthermore, postoperative complications revealed notable gender differences: hemorrhage was documented in 83.3% of male patients ($p = 0.022$), and postoperative pain was reported by 85.7% of males ($p = 0.009$). In contrast, delayed wound healing was observed to be more frequent in female patients, constituting 87.5% of these cases ($p = 0.036$). (TABLE IV)

Table I: Clinical & Demographic Characteristics of Patients (n=231)	
Variable	**n** (%)
Age (Mean ± SD) = 32.40 ± 11.01	
18 - 30 years	123 (53.2)
>30 years	108 (46.8)
Gender	
Male	82 (35.5)
Female	149 (64.5)
Smoking Status	
Smoker	59 (25.5)
Non-Smoker	172 (74.5)
Diabetes Mellitus	
Diabetic	76 (32.9)
Non-Diabetic	155 (67.1)
Hypertension	
Hypertensive	110 (47.6)
Non-Hypertension	121 (52.4)
Site of Tooth	
Left	128 (55.4)
Right	103 (44.6)

Table II: Prevalence of Intraoperative and Postoperative Complications (n=231)	
Intraoperative Complications	
Root Fracture	8 (3.5)
Tuberosity Fracture	4 (1.7)
Postoperative Complications	
Hemorrhage	6 (2.6)
Postoperative Pain	7 (3.0)
Delayed Wound Healing	16 (6.9)

Table III: Comparison of Complications of Maxillary Third Molar Removal Surgery with Age Group (n=231)			
Variables	**Age** (years)		**P-Value**
	18 - 30 (n=123)	**>30** (n=108)	

Intraoperative Complications			
Root Fracture, *n* (%)	1 (12.5)	7 (87.5)	0.021
Tuberosity Fracture, *n* (%)	0 (0.0)	4 (100.0)	0.046
Postoperative Complications			
Hemorrhage, *n* (%)	0 (0.0)	6 (100.0)	0.010
Postoperative Pain, *n* (%)	1 (14.3)	6 (85.7)	0.041
Delayed Wound Healing, *n* (%)	1 (6.3)	15 (93.8)	0.000

Table IV: Comparison of Complications of Maxillary Third Molar Removal Surgery with Gender (n=231)

Variables	Gender		P-Value
	Male (n=82)	Female (n=149)	
Intraoperative Complications			
Root Fracture, *n* (%)	6 (75.0)	2 (25.0)	0.025
Tuberosity Fracture, *n* (%)	4 (100.0)	0 (0.0)	0.015
Postoperative Complications			
Hemorrhage, *n* (%)	5 (83.3)	1 (16.7)	0.022
Postoperative Pain, *n* (%)	6 (85.7)	1 (14.3)	0.009
Delayed Wound Healing, *n* (%)	2 (12.5)	14 (87.5)	0.036

DISCUSSION

Complications associated with the extraction of third molars are prevalent occurrences in the domains of dental and maxillofacial surgical interventions. The complications observed in maxillary third molar surgery range from minor inflammatory responses—such as pain and swelling—to more serious outcomes like nerve injury, mandibular fractures, and life-threatening infections.

This study aimed to evaluate the frequency of intraoperative and postoperative complications following the surgical extraction of maxillary third molars. Our findings indicated that root fractures occurred in 3.5% of cases, while tuberosity fractures were seen in 1.7%. Postoperative complications included hemorrhage (2.6%), pain (3.0%), and delayed wound healing (6.9%). These results align broadly with existing literature, although variations in incidence may be due to differences in patient demographics, surgeon experience, and study methodology.

Root fracture emerged as the most common intraoperative complication in our cohort. This aligns with findings by Rivis et al., who reported a 7% incidence and identified root fracture as the most frequent complication during maxillary third molar extractions [10]. Similarly, Sayed et al. reported a 12% root fracture rate and overall intraoperative and postoperative complication rates of 3.7% and 8.3%, respectively [8]. Our lower rates may reflect differences in case selection or surgical proficiency. De Abreu et al. also noted that complication rates are often influenced by the surgeon's experience, particularly in teaching hospitals where procedures are performed by residents under supervision [15].

Although less frequent, tuberosity fracture remains a serious concern due to its potential to expose the maxillary sinus and destabilize adjacent bone structures. Our study reported a 1.7% incidence, which is lower than the 6% reported by Sayed et al. and significantly below the 31.66% found by Salik et al. [8,9]. These discrepancies may stem from differences in surgical techniques, patient age, bone quality, or institutional practices. Aravena et al. stressed the importance of reliable and standardized

tools for measuring complications when comparing outcomes across studies [16].

Hemostasis was accomplished in most of the patients with the exception of 2.6% of patients who developed postoperative hemorrhage. Conversely, Sayed et al. indicating an incidence of 8%, hence the requirement of meticulous surgical approach and careful postoperative surveillance to avoid bleeding [8]. No patients experienced pain according to the Visual Analog Scale (VAS) in our study, which was much lower than the 16.66% reported by Salik et al. [9]. Such differences may be attributable to differences in analgesic regimens, differences in timing of pain assessment, or fundamental individual differences in pain tolerance.

Delayed wound healing, the most common postoperative complication found, occurred in 6.9% of patients. This condition may hinder recovery, but is much lower than the 18.33% reported by Salik et al. [9]. All factors like poor oral hygiene, systemic diseases like DM and less retention to suture lead to delayed healing. Di Nardo et al. highlighted that early intervention and systematic postoperative care are very important to reduce complications such as tissue dehiscence and socket exposure [16].

Our results confirm previously published literature while emphasizing the importance of clinical judgement, thorough preoperative workups, and adherence to standardized surgical protocols. Prerana et al. analogously highlighted that detailed case planning and surgical precision are essential in order to minimize complications and improve clinical results [17]. Additionally, appropriate patient counseling, continuous postoperative follow-up, and the use of approved tools for complication evaluation can improve the postoperative safety and quality of care [15,18].

Although this study provides an useful insight, various limitations must be addressed. Therapies studied are usually beneficial to patients; however, our findings may not be fully generalizable to other hospitals with different surgical expertise due to our single center, tertiary care teaching hospital design. Additionally, residents and specialists supervised some procedures, adding surgical skill level variability that could affect complication rates.

The follow-up period was short (up to 10 days), and late-onset complications, such as alveolar osteitis or infections that develop after this time, may not have been captured. The non-probability consecutive sampling could be interpreted as a limitation whereby the sample may not be representative due to possible selection bias. The VAS evaluated the pain alone at 24 h postoperatively but may not properly evaluate the entire postoperative experience of patients.

Nonetheless, the study had several strengths. These include a clearly defined methodology, consistent surgical protocols, and a rigorously calculated sample size. Incorporating both clinical and radiographic assessments also improved diagnostic precision.

Future studies should consider multicenter data collection, longer follow-up durations, and comparisons between maxillary and mandibular third molar extractions. Including stratification based on the surgeon's level of training and incorporating patient-reported outcomes would further enhance the clinical relevance of future findings.

CONCLUSION

The surgical removal of maxillary third molars is associated with a low frequency of complications, with root fracture and delayed wound healing being the most common. Age and gender were significant factors influencing complication rates. These findings highlight the importance of careful surgical planning and patient-specific risk assessment to minimize intraoperative and postoperative complications.

REFERENCES

Zhang Y, Chen X, Zhou Z, Hao Y, Li H, Cheng Y, et al. Effects of impacted lower third molar extraction on periodontal tissue of the adjacent second molar. Ther Clin Risk Manag. 2021: 235-47.

Rizqiawan A, Lesmaya YD, Rasyida AZ, Amir MS, Ono S, Kamadjaja DB. Postoperative complications of impacted mandibular third molar extraction related to patient's age and surgical difficulty level: a cross-sectional retrospective study. Int J Dent. 2022;2022(1): 7239339.

Shoshani-Dror D, Shilo D, Ginini JG, Emodi O, Rachmiel A. Controversy regarding the need for prophylactic removal of impacted third molars: an overview. Quintessence Int. 2018;49(8).

Chen YW, Chi LY, Lee OK-S. Revisit incidence of complications after impacted mandibular third molar extraction: a nationwide population-based cohort study. Plos One. 2021;16(2): e0246625.

Guillaumet-Claure MA, Juiz-Camps AM, Gay-Escoda C. Prevalence of intraoperative and postoperative iatrogenic mandibular fractures after lower third molar extraction: a systematic review. J Clin Exp Dent. 2022;14(1):e85.

Alfadil L, Almajed E. Prevalence of impacted third molars and the reason for extraction in Saudi Arabia. Saudi Dent J. 2020;32(5):262-8.

Yamada SI, Hasegawa T, Yoshimura N, Hakoyama Y, Nitta T, Hirahara N, et al. Prevalence of and risk factors for postoperative complications after lower third molar extraction: a multicenter prospective observational study in Japan. Medicine. 2022;101(32):e29989.

Sayed N, Bakathir A, Pasha M, Al-Sudairy S. Complications of third molar extraction: a retrospective study from a tertiary healthcare centre in Oman. Sultan Qaboos Univ Med J. 2019;19(3):e230.

Salik A, Amjad S, Rahman T, Ansari K. Study of complications of surgical removal of maxillary third molar. J Oral Med Oral Surg Oral Pathol Oral Radiol. 2019;5(1):1-3.

Riviş M, Roi A, Roi C. Evaluation of accidents and complications of maxillary third molar extraction. Roman J Oral Rehab. 2023;15(4).

Juodzbalys G. A classification for assessing surgical difficulty in the extraction of mandibular impacted third molars: Description and clinical validation. Quintessence Int. 2018;49(1):745-53.

Azab M, Ibrahim S, Li A, Khosravirad A, Carrasco-Labra A, Zeng L, et al. Efficacy of secondary vs primary closure techniques for the prevention of postoperative complications after impacted mandibular third molar extractions: a systematic review update and meta-analysis. J Am Dent Assoc. 2022;153(10):943-56.

Barone S, Antonelli A, Bocchino T, Cevidanes L, Michelotti A, Giudice A. Managing mandibular second molar impaction: a systematic review and meta-analysis. J Oral Maxillofac Surg. 2023; 81(11):1403-21.

Vranckx M, Fieuws S, Jacobs R, Politis C. Prophylactic vs. symptomatic third molar removal: effects on patient postoperative morbidity. J Evid Based Dent Pract. 2021;21(3):101582.

de Abreu JM, Cerqueira É, Quitério A, Nunes T, Figueiredo J, Corte-Real A. Assessment of complications in third molar surgery performed by resident surgeons: a comprehensive analysis. Surg Pract Sci. 2024;18:100256.

Di Nardo D, Mazzucchi G, Lollobrigida M, Passariello C, Guarnieri R, Galli M, et al. Immediate or delayed retrieval of the displaced third molar: a review. J Clin Exp Dent. 2019;11(1):e55.

Prerana G, Tantry D, Sougata K, Sivalanka SC. Incidence of complications after the surgical removal of impacted mandibular third molars: a single center retrospective study. J Acad Dent Educ. 2021;7(1):10-7.

Aravena PC, Astudillo P, Miranda H, Manterola C. Reliability and validity of measuring scale for postoperative complications in third molar surgery. BMC Oral Health. 2018;18:1-7.