

Postoperative Complications of Third Molar Surgical Extraction in a Malaysian Sample

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Abstract: Background: The most common impacted teeth in adults are the mandibular third molars which frequently require surgical extraction. There are many factors contributing to the occurrence of postoperative complications, one of which is surgeon's experience. Hence, this study aimed to determine the prevalence of postoperative complications of third molar extractions by different level of surgical experience. **Methods:** A retrospective study was conducted in Kulliyah of Dentistry, International Islamic University Malaysia. A total of 112 cases were collected from the records of surgical extraction of lower third molars performed by dental students, dental officers and specialists, collected data was transferred into special case sheets and analyzed using IBM SPSS 23. **Results:** From 112 cases, 64(57.1%) had presented with postoperative complications. The highest prevalence of postoperative complications was in dental students' group 38 out of 62 patients (61.3%), followed by specialists' group 20 out of 39 patients (51.3%) and dental officers' group 6 out of 11 patients (51.6%). Meanwhile, the common complications observed were pain (33.9%), swelling (20.5%), trismus (12.5%), paresthesia (6.3%) and bleeding (3.0%). **Conclusions:** There is no statistically significant correlation between the postoperative complications and the level of surgeons' experience.

Keywords: Postoperative, Complications, Lower third molar, Surgical extraction.

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INTRODUCTION

Impacted tooth is defined as any tooth that is prevented from reaching its normal position in the mouth either by soft tissue, bone, or another tooth^[1]. The most common impacted teeth in adults are the mandibular third molars which frequently require surgical extraction^[2]. Unfortunately, postoperative complications usually will arise following this procedure. For that reason, there are certain indications and contraindications that we need to refer to before any procedure of surgical removal of third molar is carried out. According to the latest National Institute for Health and Care Excellence (NICE) guidelines, surgical removal of impacted third molars should be limited to patients with evidence of pathology only. Functional tooth, deeply impacted tooth with no signs and symptoms, and also exposure to high risk of surgical and medical complications are contraindicated to be removed^[3].

The most frequent complications that can occur in any surgical removal of mandibular third molars are pain,

swelling, trismus, bleeding and soft tissue infection. Other than that, injury to the inferior alveolar nerve, mandibular fracture and dry socket are less common to take place^[4]. Complications that occur are highly associated with many factors. According to Xu *et al.*,^[5] proximity of the impacted third molar to the mandibular canal, surgical techniques, sex and age of patient are the main contributors that lead to the occurrence of wisdom tooth extraction complications. This is also supported by Farshid, Mohiti, and Ghasemzadeh^[6] who believed that a few other factors such as duration of surgery, surgeon's experience, systemic disease, medications, smoking, oral hygiene as well as type of impaction may lead to complications after the removal of wisdom tooth. Hasegawa *et al.*^[7] found that surgeons' experience does not have any significant relation with the postoperative complications. This is corroborated by another study by Azenha, Kato, Bueno, Neto, and Ribeiro^[8] which claimed that the rate of accidents and complications in the procedures performed by students is comparable from when the procedures performed by

experienced professionals. They suggested that the proximity of the tooth to mandibular canal plays a bigger role in causing postoperative nerve injury. Considering all these factors our study aimed to determine the prevalence of postoperative complications of third molar extractions by undergraduate students and compare the prevalence between procedures done by undergraduates, dental officer and specialists. Apart from that, this study also done to determine the risk factors associated with postoperative complication following third molar extractions. Level of extraction difficulty which presumably depends on the demographic factors, clinical and radiographic findings were evaluated, compared and interpreted in this study to assess the relevance of degree of extraction difficulty with postoperative complications among undergraduates.

METHODS

The data was collected from the case records of surgical extraction of lower third molars performed by year 4 and year 5 undergraduate dental students in Polyclinic Kulliyah of Dentistry, International Islamic University Malaysia (IIUM) Kuantan Campus between January 2015 and December 2019. Apart from that, data of surgical extractions of third molars were also collected from dental officer records and oral and maxillofacial surgery specialist clinic within the same duration. The patients were selected according to inclusion criteria which include third molar surgical removal of patients above 18-year-old and the reports of the procedure and case follow-up should be available. Patients below 18 years old, and patients who have systemic diseases that can affect outcome such as bone pathology, immunopathologies, mental disorders and pregnant women, were excluded from the study. The collected data were then transferred to special case sheets that were prepared for this study purpose. The study was done under the approval of IREC (IIUM1504/14/11/2/IREC 2019-024).

Data analyses were done for the collected 112 cases using IBM SPSS 23. Normality test was done using Kolmogorov-Smirnov and the test revealed that data were not normally distributed. Pearson Chi Square analysis was used to analyze the data.

RESULTS

The study included 112 cases with the highest complications were in the age group of 18-26 years old (69.3%) followed by 27-36 years old (25.4%) and 37-46 years old (3.5%). More than half of these cases involved female with the number of 76 (67.9%) and the remaining involved 36 (32.1%) male patients. Besides that, our data only involved two out of three main races in Malaysia which is Malay (89.3%) and Chinese (9.8%). The patients came with history of pain (65.2%), pain with swelling (13.4%), food impaction (10.7%),

discomfort (5.4%) and the remaining were asymptomatic.

The cases were then classified into Winter's classifications, Pell and Gregory's Classification and type of impaction. According to Winter's classification (Table 1), 48 (42.9%) cases were classified as mesioangular, 31 (27.7%) as horizontal, 25 (22.3%) as vertical and 8 (7.1%) as distoangular. On the other hand, as for Pell and Gregory classifications, 60 (53.6%) cases were categorized in IIA group, 3 (7.7%) cases in IA group, 11 (9.8%) cases in IIB group, 4 (3.6%) in group IB, 2 (1.8%) cases in each IIIA and IIIB group followed by 1 (0.9%) in each IC and IIC group. No IIC case was observed in this study. For the type of impaction, the highest percentage was partial bony impaction (78.9%) followed by soft tissue impaction (15.1%) and full bony impaction (6.3%).

The most surgical third molar removal cases were operated by dental students (55.4%) meanwhile specialists managed 39 (34.8%) cases and another 11 (9.8%) cases handled by dental officers. Out of the 112 cases, 64 (57.1%) cases presented with postoperative complications after follow-up appointment (Figure 1). Table 2 showed that the highest prevalence of postoperative complications was contributed by pain (33.9%), followed by swelling (20.5%), trismus (12.5%), paresthesia (6.3%) and bleeding (3.0%).

The complication rate was higher in female group (58.3%) compared to male group (56.6%). However, Pearson chi square analysis revealed that there was no statistically significant association between gender and postoperative complications ($p=0.861$) as shown in table 3.

Table 4 shows the relationship of complication to the age of patients, it can be observed that the complications rate was the highest in the 18-26 years old group. But when relating the age with postoperative complications through Pearson chi square analysis, it shows that there is no association between postoperative complications with age ($p=0.488$).

The data that collected only included a few smokers (8%) and large number of non-smokers (92%). Among the smokers 6 (66.7%) have postoperative complications while in the non-smokers group, 58 (56.3%) have complications rate (Table 5). According to Fisher's test, there is no association between the smoking status and postoperative complications ($p=0.731$). However, the number of data collected was not enough to conclude that smoking is not the risk factor for postoperative complications.

It can be observed the prevalence of complications in dental students' group were 38 (59.4%), dental officers' group 6 (9.4%) and specialists' group contributing 20 (31.3%) as shown in figure 2. The highest percentage

was found in the dental students followed by specialists and dental officers. The Pearson chi square analysis demonstrated that there is no statistically significant

correlation between the postoperative complications and level of surgeons' experience (Table 6).

Table 1: Distribution of cases according to Winter's classification

Winter's classification	Frequency	Percentage (%)
Mesioangular	48	42.9
Horizontal	31	27.7
Vertical	25	22.3
Distoangular	8	7.1
Total	112	100

Table 2: Frequency of different types of postoperative complications

Types of complication	Frequency	Percentage (%)
Pain	38	33.9
Swelling	23	20.5
Trismus	14	12.5
Paresthesia	7	6.3
Bleeding	3	3.0
Infection	0	0.0
Dry Socket	0	0.0

Table 3: Prevalence of postoperative complications among different gender & Pearson Chi analysis relationship between gender and postoperative complications

Variable	Gender (%)		df	p-value
	Male,	Female		
Postoperative complications	36 (32.1%)	76 (67.9%)		
Yes	21(58.3%)	43 (56.6%)	-	0.861
No	15 (41.7%)	33 (43.4%)		

Table4: Prevalence of postoperative complications among different age group & Pearson chi analysis relationship between age and postoperative complications

Variable	Age			df	p-value
	17-26 yrs old,	27-36 yrs old,	37-46 yrs old,		
Postoperative complications	79 (70.5%)	29 (25.9%)	4 (3.6%)		
Yes	48 (60.8%)	14 (48.3%)	2 (50%)	2	0.488
No	31 (39.2%)	15 (51.7%)	2 (50%)	2	(p>0.05)

Table 5: Prevalence of postoperative complications among smokers and non-smokers & Fisher's Exact test relationship between smoking status and postoperative complications

Variable	Smoking status (%)		df	p-value
	Smoker,	Non smoker,		
Postoperative complications	9 (8%)	103 (92%)		
Yes	6(66.7%)	58 (56.3%)	-	0.730
No	3(33.3%)	45(43.7%)		(p>0.05)

Table 6: Pearson chi square analysis between postoperative complications and surgeons' experience

Variable	Level of Experience (%)			df	p-value
	Dental student,	Dental officer,	Specialist,		
Postoperative complications	62(55.4%)	11(9.8%)	39 (34.8%)		
Yes	38(61.3%)	6(55.6%)	20(51.3%)	2	0.603
No	24(38.7%)	5(45.6%)	19(48.7%)	2	(p>0.05)

DISCUSSION

The present study has provided information on postoperative complications of lower third molar extraction in Kulliyah of Dentistry, IIUM.

Before any surgical procedure of third molar removal is carried out, certain preoperative evaluation which is the assessment of the extraction difficulty needs to be done to predict the possible outcome of the surgery. If proper preoperative evaluation is not done thoroughly, the operator might anticipate challenging extraction procedure and there might be possible risks of postoperative complications to occur. Following this, classification of the impacted tooth according to the Pell & Gregory's and Winter's classifications can be done^[9].

It is important for us to identify the risk factors that contribute to the prevalence of postoperative complications following third molar surgery so that they can be assessed carefully preoperatively, and the frequency of its occurrence can be decreased in the future.

Most patients preferred to remove their impacted third molar at a younger age which is between the ages of 17-26 because commonly patients experienced the signs and symptoms at this age range. This is because the third molars complete their eruption at age 20, however in some patients, it may delay up until 25 years old. In previous study conducted by Deliverska and Petkova,^[10] it was claimed that the older the patients get, the higher the tendency for them to experience postoperative complications following the surgery and the more difficult the extraction will be. This is due to older patients have increased bone density and decreased healing capacity. Nonetheless, it was found that there was no association of postoperative complications with age in this study. Most of our patients were young and healthy.

In current study, female group showed higher frequency of postoperative complications following surgery compared to male group. However, we discovered that there is no association between gender and postoperative complications. The higher complications among female group may be because more female patients (67.9%) underwent minor oral surgery to remove impacted third molars in KOD IIUM as compared to males (32.1%). This study is consistent with another study^[8] which also discovered that higher complications rate in female group but the values were not able to conclude that genders are one of the risk factors for postoperative complications.

In previous study conducted by Sanari, *et al*,^[11] it was proven that postoperative complications experienced by smoking patients following dental extractions are bleeding, pain and swelling in order of frequency. However, in this study, it was shown that there was no

significant correlation between cigarette smoking and postoperative complications, this may be due to the fact that there are not enough number of smoker patients were collected. Gautam *et al*. refers to the ideas of Feldman, Bravacos and Rose^[12] that the clinical signs of inflammation and gingival bleeding in smokers is less if compared to non-smokers. This is ascribable to the fact that nicotine has effects that play a part in local vasoconstriction, reduced blood flow as well as oedema.

Different level of experience of the operators in current study showed no significant correlation with the postoperative complications rate. This is mainly because of two factors which are, all third molar surgical cases done by the students are closely supervised by the specialists, all cases of impaction were first evaluated in the consultation clinic and difficult cases were referred to the specialists. Students need to do preoperative evaluation of the case by reviewing the patient's radiographs. Then, the students need to present the case to their respective supervisors and the supervisors will carefully determine if the case is suitable to be done by the students or not.

Students have the highest percentage of postoperative complications followed by dental officers and specialists. There were few cases done by the dental officers in KOD IIUM thus contributing to the low complication rate in this group. Dental officers and specialists have comparable number of cases with complications and without complications, however for student cases with complications are way more than the number of cases without complications. The complications were pain (33.9%) has the highest percentage to likely occur, followed by swelling (20.5%), trismus (12.5%), paraesthesia (6.3%) and bleeding (3.0%). Regarding the complications for specialist group, it is mainly related to the difficulty index of the operated teeth since the difficult cases usually referred to specialist for removal.

Latest guideline by NICE^[3] claimed that only indicated teeth should be surgically removed. For this reason, there are a decreased percentage of third molar extractions presently. The side effects and complications of the surgical procedure may also be reduced. Deeply impacted teeth are not indicated for removal due to the absence of signs and symptoms, only limited cases with signs and symptoms are referred to be done by the specialists. Although according to new references, few of them mentioned that Pell & Gregory's classification is not reliable to measure the difficulty index, but until now, most specialists still follow the Pell & Gregory's and Winter's classifications as baseline to assess the difficulty index.^[13,14] Other factors such as the relation to second molar, root form, ankylosis should also be considered in order to identify the difficulty of the extraction.

Further studies should be performed to investigate other risk factors as well as for classification validation and reliability evaluation.

CONCLUSION

1. Level of experience of the operator does not have an impact in determining the prevalence of postoperative complications following lower third molar removal.
2. The indices used to evaluate the degree of extraction difficulty is not reliable in assessing the prevalence of postoperative complications following lower third molar removal as mentioned by previous studies.

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Conflicts of Interest: There are no conflicts of interest.

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Appendix A: Case Sheet

RANK NUMBER : _____ I/C : _____

AGE : _____ RACE : _____

GENDER : M / F

CHIEF COMPLAINT

DENTAL HISTORY

PAST MEDICAL HISTORY

FAMILY HISTORY NO YES If yes, specify: _____

SOCIAL HISTORY

Non-smoker

Smoker

INVESTIGATION

Pell & Gregory's Classification: _____

Winter's Classification: Mesioangular Distoangular Vertical
Horizontal


Type of Impaction: Full Bony Partial Bony Soft Tissue

POSTOPERATIVE INSTRUCTIONS GIVEN? YES NO

FOLLOW UP (Any postoperative complications?)

COMPLICATIONS		COMPLICATIONS	
1.Pain		5.Infection	
2.Bleeding		6.Paresthesia	
3.Swelling		7.Dry socket	
4.Trismus		8. Others (Please specify)	

Appendix B: Ethical approval obtained from IIUM Research Ethics Committee (IREC) (IIUM1504/14/11/2/IREC 2019-024).



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RESEARCH MANAGEMENT CENTRE

Our Ref. : IIUM/504/14/11/2/ IREC 2019-024
Date : 14 February 2019

Assoc. Prof. Dr. Muhannad Ali Kashmoola (Principal Investigator)
Kulliyah of Dentistry
International Islamic University Malaysia
Indera Mahkota, Kuantan Campus
25200 Kuantan, Pahang

Dear Assoc. Prof. Dr.,

The IIUM Research Ethics Committee (IREC) has reviewed your study protocol as mentioned below:-

ID NO.	: IREC 2019-024
TITLE	: Retrospective Study on Postoperative Complications of Third Molar Extraction in Kulliyah of Dentistry International Islamic University Malaysia
REGISTRATION DATE	: 24 Jan 2019
CO-INVESTIGATOR	: Associate Professor Naziyah Shaban Mustafa
STUDENT	: Fadhlin Amalia bt Kamaluddin Latifi, Mawaddah Munirah bt Mohamad Fadzli (Undergraduate Student)
NAME OF SITE	: Kulliyah of Dentistry, International Islamic University Malaysia
SAMPLE SIZE	: 100
EXPIRY DATE	: 14 February 2020

The IIUM Research Ethics Committee (IREC) operates in accordance to the Declaration of Helsinki, International Conference of Harmonization Good Clinical Practice Guidelines (ICH-GCP), Malaysia Good Clinical Practice Guidelines and Council for International Organizations of Medical Sciences (CIOMS) International Ethical Guidelines.


The following documents have been received and reviewed to the above study:-

1. Study Proposal/Protocol: Version 1, dated 14 Feb 2019
2. Approval Letter from Kulliyah of Dentistry, IIUM
3. Principal Investigator's CV

Decision by IIUM Research Ethics Committee (IREC):

Approved
 Disapproved

Date of Approval: 14 February 2019



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Appendix C: Turnitin report.

