

Original Research

Evaluation of risk factors and infection probability in mandibular impacted third molar surgeries- A cross sectional study

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ABSTRACT:

Background: Removal of impacted mandibular third molars is one of the most common minor oral surgical procedures done in an outpatient setting. The disimpaction procedure is associated with some complications such as pain, swelling or infection. This study aimed to identify the risk factors causing infection and also the incidence of infection after mandibular third molar surgery in Kashmiri population. **Materials and methods:** This cross sectional study was conducted in the Department of Oral and Maxillofacial Surgery, GDC Srinagar from July 2019 to December 2021 on a total of 125 patients. A thorough case history records for the identification of the risk factors were made which included independent variables like age, gender, habits, oral hygiene status, size of the follicle surrounding the impacted third molar, difficulty index, status of the adjacent second molar, type of flap used, material used for suturing and the skill of the surgeon operating. Patients were followed for infection after 1 week, 2 weeks and 1 month after the third molar removal. **Results:** Among the 125 patients included in the study, 63.2% were females and 36.8% were male subjects. The mean age was 27 ± 5 years at the time of operation. Some patients 4.8% developed acute infection and mostly reported within the first two weeks after the surgery. In our study Pederson's difficulty index and skill of the operator were significantly associated with post op infection. **Conclusion:** Post-op infection in impacted mandibular third molar surgery must be prevented and dealt with efficiently and patients followed up regularly post surgery. Factors such as Pederson's difficulty index and skill of the operator were significantly associated with post op infection.

Keywords: Eruption; Impaction; Third molar; Orthopantograph.

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INTRODUCTION

One of the most common outpatient surgery performed in dental clinics is the extraction of an impacted third molar. [1, 2] Patients usually present with slight pain and swelling due to the surgical procedure with no major complications involved. [3, 4] Sometimes complications in the form of alveolitis, dry socket, hemorrhage, parasthesia of the inferior alveolar nerve and mandibular fractures might occur. [5, 6]. Infections after third molar surgeries are worrisome and delay the healing process. A number of factors could lead to the possible infection sequelae like the systemic condition of the patient, improper sterilization of the dental instruments, poor incision design and inadequate closure, inadequate irrigation of the debris from the surgical site, inadequate

curettage of the periapical lesions. [7, 8] The signs and symptoms of infection include pain, fever, swelling, trismus, pus discharge and collection in the form of abscess and cellulitis at the surgical site. The diagnosis can be made by foul smelling surgical site with purulent discharge, pain and induration [9] Infection, though not so common a complication, occurs more in the mandibular third molar surgeries than the maxilla. Some studies reported an infection rate of 1.5-5.8% after third molar removal. approx 50% infections are Due to inadequate irrigation and improper cleaning of the surgical site leading to debris accumulation under the mucoperiosteal flap .these usually present as subperiosteal abscesses that occur 2-4 weeks after surgery.[3] There are a number of factors governing the onset and severity of infection

,such as the systemic condition, age, gender, localised dental anatomy, difficulty index, severity of impaction, education level and skill of the surgeon ,surgical technique used , the type of incision given and size of the surrounding follicle (>3mm) [3, 9, 10] The third molar removal surgeries are carried out on a daily basis and thus the preventive measures to reduce the incidence of post operative infection takes paramount importance. Thus this study is designed to evaluate the incidence of infection and the risk factors involved with it in hard tissue third molar impactions. This study aimed to identify the risk factors causing infection and also the incidence of infection after mandibular third molar surgery in Kashmiri population.

MATERIALS AND METHODS

This cross sectional study was conducted in the department of oral and maxillofacial surgery GDC Srinagar from July 2019-December 2021 on a total of 125 patients. The study design was approved by the research ethical committee board of GDC Srinagar. A written informed consent was obtained from each patient included in the study. After detailed case history and clinical examination, all the patients who had hard tissue impacted third molar surgery were included in the study.

The inclusion criteria set for the study was 1) hard tissue impacted third molar 2) age above 18 years 3) no systemic diseases.

The exclusion criteria were: 1) acute or chronic inflammation in the area of surgery 2) soft tissue impactions.

The radiographic investigations included IOPAR and panoramic radiographs and cone beam computed tomography wherever required. The third molar removal surgery was performed by the oral and maxillofacial surgeons or residents or general dentists (house surgeons). All the necessary instruments were properly cleaned and sterilized before the surgery. The surgeries were performed using a low speed handpiece and abundant irrigation as per the principles of infection control.

After the surgery, proper antibiotics and analgesics were prescribed for a duration of 5-7 days.

The follow up visits were scheduled as within 1 week, second week and one month after surgery and the

surgical site and presence of infection evaluated. The risk factors predicting the incidence of infection were recorded which included age, gender, habits, oral hygiene status, difficulty index , type of flap used, material used for suturing (whether resorbable or non resorbable) and the skill of the surgeon operating. The signs and symptoms of infection were noted and the duration of occurrence whether within the first week or after 7 days was duly noted. A painful induration and purulent discharge defined the presence of infection.

STATISTICAL ANALYSIS

Data was statistically analysed using the SPSS software version 17(SPSS Inc. Chicago,IL,USA). The resultant values were presented as means, standard deviations, and frequencies/percentages. Pearson's chi-square test was used to evaluate the association between dependent and independent variables. The significance level was considered at $P < 0.05$

RESULTS

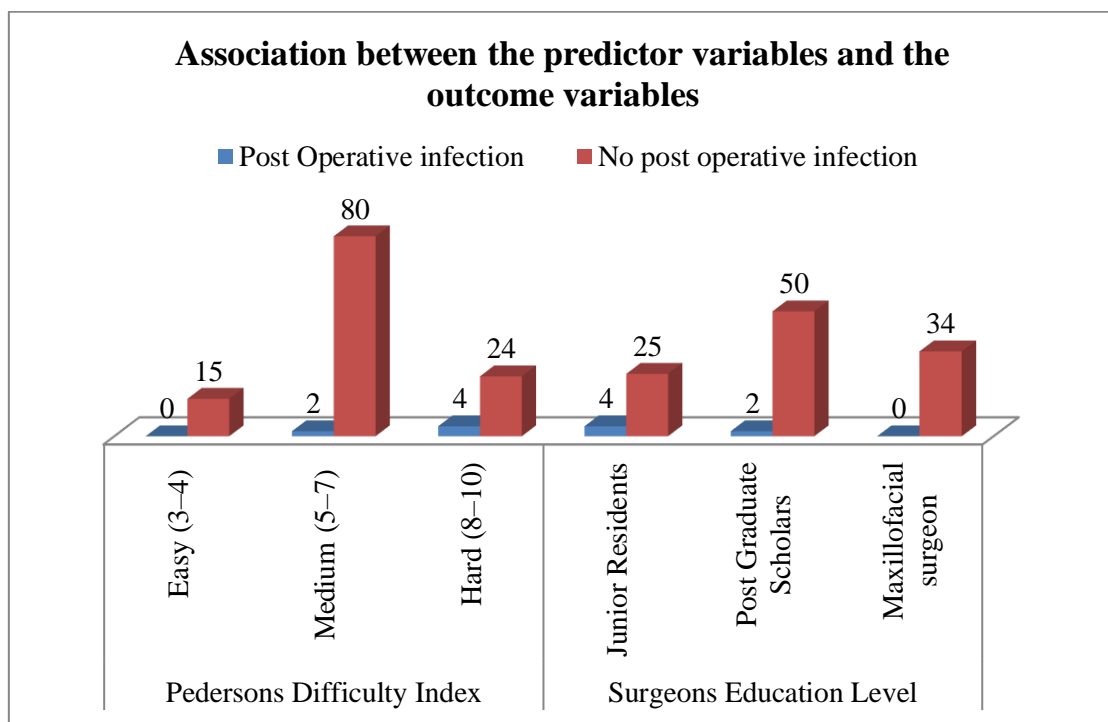
Among the 125 patients included in the study, 63.2% were females and 36.8% were male subjects. The mean age was 27 ± 5 years at the time of operation. Some patients 4.8% developed acute infection and mostly reported within the first two weeks after the surgery. There was no single patient among these to report an infectious episode 1 month after the surgery. All the participants remained till the end of the study.

Factors like age($P=0.120005$), gender ($P=0.85679$), Position Of Tooth ($P=0.464032$), Depth Of Impaction ($P=0.249771$), Angulation ($P=0.467082$), periapical radiolucent lesions ($P=0.12643$), type of flap ($P=0.160441$) and the suture material used($P=0.918314$) were not associated with the development of postoperative infection. However, Pederson's difficulty index ($P=0.0263842$) and education level of the operating surgeon ($p=0.0411297$) was associated with post op infection. The surgeries performed by junior residents resulted in more post operative complications in the form of infection as compared to the ones performed by Post Graduate Scholars and even lesser when performed by Maxillofacial Surgeons. These associations were further confirmed by logistic regression model.

Table 1: Association between the predictor variables and the outcome variables

Variables	Categories	Post Operative infection	No post operative infection	P value
Age	<25yrs	2	77	Chi-Square = 2.41726 df = 1 p = 0.120005
	>25 yrs	4	42	
Gender	Male	2	44	Chi-Square = 0.0325667 df = 1 p = 0.85679
	Female	4	75	
Position Of Tooth	Right	3	77	Chi-Square = 0.536152
	Left	3	42	

				df = 1 p = 0.464032
Depth Of Impaction	A	1	35	Chi-Square = 2.77442 df = 2 p = 0.249771
	B	2	59	
	C	3	25	
Angulation	Horizontal	2	38	Chi-Square = 2.54574 df= 3 p = 0.467082
	Vertical	1	50	
	Distoangular	2	16	
	Mesioangular	1	15	
Pedersons Difficulty Index	Easy (3-4)	0	15	Chi-Square = 7.26998 df = 2 p = 0.0263842
	Medium (5-7)	2	80	
	Hard (8-10)	4	24	
Periapical Infections	Presence	3	27	Chi-Square = 2.3358 df = 1 p = 0.12643
	Absence	3	92	
Surgeons Education Level	Junior Residents	4	25	Chi-Square = 6.38205 df = 2 p = 0.0411297
	Post Graduate	2	50	
	Scholars	0	34	
	Maxillofacial surgeon			
Type Of Flap	Envelope	3	90	Chi-Square = 1.97007 df = 1 p = 0.160441
	Triangular	3	29	
Type Of Suture	Non-absorbable	5	101	Chi-Square = 0.0105181 df = 1 p = 0.918314
	Absorbable	1	18	



DISCUSSION

Impacted mandibular third molar removal being the everyday procedure performed by an oral and

maxillofacial surgeon demands great deal of attention as to how to reduce the chance of post operative infection. A number of studies have been conducted to

evaluate the incidence of infection and risk factors associated with it. This study also aimed to evaluate the incidence of infection and risk factors associated with mandibular impacted third molar removal in Kashmiri population.

Our study showed an association between the education level of the surgeon and incidence of infection. The null hypothesis was rejected. There was a decreased incidence of infection (%) with each higher educational qualification of the operating surgeon. The proper education regarding the procedure and skill development led to proper incision designs, more appropriate bone drilling and proper closure respecting the integrity of both hard and soft tissues and thus lesser chances of post op infection. However, one could question that a higher degree doesn't necessarily mean a higher experience. Since, the measurement of experience could be quite difficult and the education level is often referred in part as the standard of measuring experience, the findings of our study also suggested that incidence of infection did decrease with the higher education level and skill of surgeon. This was in accordance with the studies conducted by Farhadi F et al., Nguyen FE et al., Brunello G et al., Christiaens I and Reychler H. [1,11,12,13]

The incidence of infection in our study was reported to be around 6.0%. Many previous studies suggested the range of occurrence of infection to be around (0.4-6%) [1,10,12,14,15] the post operative infection rate was around 3.4% in a study conducted by Farhadi F et al. [1] and 1.94% in a study by Sukegawa et al [10] Both the studies had similar methodology. However, the greater incidence of infection in our study was due to the fact that the disimpactions performed by general dentists (house surgeons) were also included whereas only specialist oral and maxillofacial surgeons and 1st to 3rd year residents in research by Farhadi F et al [1] and only specialists had performed surgeries in the study by Sukegawa et al. [10] a study conducted by Brunello et al. [12] showed the incidence of delayed onset infection to be around 3.7% much similar to the study conducted by Farhadi F et al [1], wherein both had included specialists and residents as surgeons and not general dentists as in our study.

Some literature reports the difference in the incidence of post operative infection in males and females. Researches like Blondeau et al. [9] reported it to be higher in females compared to males and in a study conducted by Muhonen et al. [16], males were affected more. Our study is in accordance with the study conducted by Farhadi et al. [1], wherein there's no causal association of post op infection with gender. (P=)

Pederson's difficulty index was one of the predictive variables associated with a higher incidence of post op infection after impacted mandibular third molar surgery. In our study, higher the Pederson's difficulty index, The logical explanation behind this is that the

higher the difficulty index, the more chances of infection due to increase time required to complete the procedure, wider flap design, extensive bone removal and tooth sectioning. Though the sterilisation protocols for infection control in surgery are the same, the higher the difficulty index, the more difficult and lengthy the surgical procedure and thus higher chances of post op infection. This is in accordance with the study conducted by Farhadi et al. [1] and I Blum and T Renton et al [17] [18]

Sukegawa et al. [10] suggested that the depth of the impacted teeth within the jaw is a risk factor for infection after surgery. In our study, Pederson's difficulty index was used to estimate the difficulty index of the hard tissue impaction. Pederson's difficulty index is a combination of Winter's and Pell and Gregory classification and is widely used as a reliable indicator of the assessment of difficulty level. [1,19,20,21]

Although the indices like the depth of impaction, angulation or distal space availability were not separately associated with higher incidence of infection in our study, but Pederson's difficulty index combining all of these factors was used and it reported higher incidence of infection with a higher Pederson's difficulty index score. This was in accordance with the study conducted by Farhadi et al. [1] Although our study is concordant with the studies conducted in the past, there can be many other risk factors that can be studied with regards to post op infection like occlusion, individual healing process etc.

CONCLUSION

In our study, both Pederson's difficulty index and education level of the surgeon were appropriate risk factors associated with the incidence of post op infection in impacted mandibular third molar surgery. Post op infection in impacted mandibular third molar surgery, though, a rare complication must be prevented and dealt with efficiently and patients followed up regularly till at least a month after the tooth removal.

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