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Post-Operative Infections in Patients After Extraction of Impacted Third Molar by Different Flap Designs

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ABSTRACT

Introduction: One of the biggest worries for most surgeons doing impacted dental operations is post-surgery infection. This study's objective is to ascertain the prevalence of post-operative infections in patients having their impacted third molar removed using various flap designs and suturing techniques. The findings of this study will help surgeons choose flap designs and biomaterials more effectively, reducing the risk of infection and maybe speeding up the healing process for patients. **Study type:** Descriptive, cross sectional study. **Settings:** Department of Oral and Maxillofacial Surgery, Madinah Teaching Hospital, Faisalabad. **Study duration:** January 2025 to May 2025. **Materials & Methods:** Total 437 patients between the ages of 18 and 60 undergoing third molar extraction were included. Patients with severe medical conditions, women who were pregnant or nursing, smokers, and those using drugs that affect the healing of wounds after surgery were excluded. Oral and maxillofacial surgeons carried out the operations. An injection of local anesthesia was made. Blade number fifteen was used to raise the designated flap (envelope or triangular). Hemostasis was attained. After the tooth was fully extracted and thoroughly irrigated with 0.9% normal saline, the flap was sutured using the appropriate suture material (both absorbable and nonabsorbable). Postoperative instructions were provided, and a little gauze pack was applied to the area. On the seventh postoperative day, the suture was taken out, and a postoperative infection was observed (painful induration and purulent discharge at the surgical site). **Results:** Age range in this study was from 18 to 60 years with mean age of 36.95 ± 11.60 years. Majority of the patients 254 (58.12%) were between 18 to 40 years of age. Out of 437 patients, 79 (18.08%) were male and 358 (81.92%) were females with male to female ratio 1:4.5. Mean duration of surgery in our study was 27.88 ± 7.0 minutes. In our study, frequency of post-operative infections in patients undergoing removal of impacted third molar was found in 34 (7.78%) patients. **Conclusion:** This study found no statistically significant association between the presence of post-operative infection and any of the other risk factors, with the exception of flap design.

INTRODUCTION

One of the most prevalent irregularities of dental position is tooth impaction. The most frequently impacted teeth are third molars.[1] Third molar impaction has a prevalence rate of 24% that can reach up to around 68% globally, and its frequency varies greatly among populations, ranging from 18% to 70%, particularly in the mandible.[2] Systemic and local factors are among the causes of tooth impaction.[3] The most common surgical procedure carried out by oral and maxillofacial surgeons is the extraction of mandibular third molars. The surgical extraction of impacted mandibular wisdom teeth has been linked to a number of postoperative problems, such as discomfort, edema, and infection.[4] To improve the repair of periodontal abnormalities distal to the second molar and avoid post-operative problems, a variety of therapeutic approaches have been employed. varied flap designs and varied suturing techniques for the extraction of the third molar are among the reported treatment methods.[5]

Several writers have described a variety of soft tissue flap designs, including envelop, triangular (wards), L-shaped, bayonet-shaped, comma-shaped, and "S" incisions, to reveal the underlying third molars. The most popular designs are triangle and envelope flaps.[6] The benefits of suturing the flap back include bleeding management, convenient maintenance of good oral hygiene, and primary intention healing promotion. Suturing, however, produces a one-way valve that lets food particles enter the socket but prevents them from leaving. This results in discomfort, alveolar osteitis, clot necrosis, inflammation,

edema, and local infection.[7] Farhadi et al. looked at the prevalence of infections and useful variables in hard tissue-impacted mandibular third molar procedures performed on Iranian patients. Envelope and triangular flaps were utilized, and both absorbable and nonabsorbable sutures were used. The infection rate was 3.4%.[8]

One of the biggest worries for most surgeons doing impacted dental operations is post-surgery infection. This study's objective is to ascertain the prevalence of post-operative infections in patients having their impacted third molar removed using various flap designs and suturing techniques. The findings of this study will help surgeons choose flap designs and biomaterials more effectively, reducing the risk of infection and maybe speeding up the healing process for patients.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted at the Madinah Teaching Hospital's Department of Oral and Maxillofacial Surgery in Faisalabad between January and May of 2025. After being approved by the institutional ethical review committee, 437 patients who satisfied the inclusion criteria were selected via non-probability sequential sampling. The informed consent of each patient will be sought. A sample size of 437 cases has been established, with a 95% confidence level, a 1.7% margin of error, and a 3.4%[8] frequency of post-operative infections in patients having their impacted third molar removed. Patients with severe medical conditions, women who were pregnant or nursing, smokers, and those using drugs that affect the healing of wounds after surgery were excluded.

The patient's clinical information and general demographics were gathered. Prior to surgery, all participants had panoramic radiographs taken. Oral and maxillofacial surgeons carried out the operations. An injection of local anesthesia was made. Blade number fifteen was used to raise the designated flap (envelope or triangular). Hemostasis was attained. After the tooth was fully extracted and thoroughly irrigated with 0.9% normal saline, the flap was sutured using the appropriate suture material (both absorbable and nonabsorbable). Postoperative instructions were provided, and a little gauze pack was applied to the area. Following surgery, a 400 mg tablet of ibuprofen will be taken three times a day for five days, and a 1 g tablet of Augmentin will be taken twice a day for five days. On the seventh postoperative day, the suture was taken out, and a postoperative infection was observed (painful induration and purulent discharge at the surgical site). The pre-made proforma (annexure I) contained all of the data.

SPSS V-25 was used to enter all of the data. For every quantitative measure, including age and length of surgery, the mean and standard deviation were determined. For every qualitative variable, including gender, tooth position, angulation, flap design, suture, and postoperative infection, frequency and percentage were computed. To assess postoperative infection between flap design and suture, the chi-square test was used. Stratification was used to adjust for effect modifiers such as age, gender, length of surgery, tooth position, and angulation. Using the post-stratification chi-square test, a P-value of less than 0.05 was considered significant.

RESULTS

Age range in this study was from 18 to 60 years with mean age of 36.95 ± 11.60 years. Majority of the patients 254 (58.12%) were between 18 to 40 years of age. Out of 437 patients, 79 (18.08%) were male and 358 (81.92%) were females with male to female ratio 1:4.5. Mean duration of surgery in our study was 27.88 ± 7.0 minutes. Distribution of patients with other confounding variables is shown in Table 1.

In our study, frequency of post-operative infections in patients undergoing removal of impacted third molar was found in 34 (7.78%) patients (Figure 1). Stratification of post-operative infections with respect to confounding variables is shown in Table 2.

Table 1

Distribution of Patients with Other Confounding Variables (n=437)

Confounding variables		Frequency	%age
Age (years)	18-40	254	58.12
	41-60	183	41.88
Gender	Male	79	18.08
	Female	358	81.92
Duration of surgery (minutes)	≤30	260	59.50
	>30	177	40.50
Position of tooth	Right	215	49.20
	Left	222	50.80
Angulation	Horizontal	104	23.80
	Vertical	197	45.08
	Distoangular	96	21.97
	Mesioangular	40	9.15
Flap design	Envelope	226	51.72
	Triangular	211	48.28
Type of suture	Non-absorbable	189	43.25
	Absorbable	248	56.75

Figure 1

Frequency of Post-Operative Infections in Patients undergoing Removal of Impacted Third Molar (n=437).

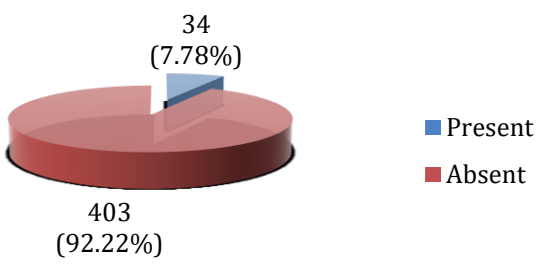

Table 2
Stratification of Post-Operative Infections with Respect to Confounding Variables.

Variables		Present (n=34)	Absent (n=403)	P-value
Age (years)	18-40	21	233	0.654
	41-60	13	170	
Gender	Male	09	70	0.185
	Female	25	333	
Duration of surgery (minutes)	≤30	13	247	0.009
	>30	21	156	
Position of tooth	Right	14	201	0.329
	Left	20	202	
Angulation	Horizontal	04	100	0.057
	Vertical	21	176	
	Distoangular	04	92	
	Mesioangular	05	35	
Flap design	Envelope	23	203	0.050
	Triangular	11	200	
Type of suture	Non-absorbable	18	171	0.235
	Absorbable	16	232	

DISCUSSION

The range of third molar extraction site infections reported in the literature varies greatly, ranging from 1% to 27%–30%.[9-12] Numerous factors, including the invasiveness of the surgery, the preoperative condition of the surgical site, and variations in the classification definition of POIs, might be blamed for this irregularity. Comparing infection rates and outcomes among studies evaluating the advantages of antibiotic prophylaxis is challenging due to the subjective nature of patient-reported symptoms and the varying definition of infection. In order to help clinicians distinguish between typical post-operative presentations including alveolar osteitis, delayed healing and protracted inflammatory state, and a true POI, it is necessary to develop more precise clinical diagnostic criteria for POI.

In our study, the POI rate for surgical third molar extractions was 7.78%, which is regarded as a comparatively low prevalence. in contrast to the 1% to 30% that are typically reported globally.[9,10] This low prevalence is probably the result of many variables coming together. This covers the diagnostic criteria, the teaching environment at a university, and the use of pre-operative chlorhexidine mouthwash and sterile drapes for all surgical procedures.

The prevalence of post-operative infections was examined in relation to a number of risk variables. These include age, health, the surgical site's pre-operative condition, risk factors like smoking and drug use, the degree of impaction, the use of conjunctive corticosteroids and prophylactic antibiotics.[13,14] This study found no statistically significant association between the presence of post-operative infection and any of the other parameters except flap design. This corroborates Daly's claim[15] that, in contrast to other parts of the body, a true POI in the oral cavity is uncommon. The high vascularity of the orofacial tissues and/or the high lymph node predominance may be the cause of this. As a result, compared to general surgery, the criteria for surgical prophylaxis for oral surgery might need to be more carefully evaluated.

A variety of factors, including the patient's overall health, systemic diseases, age, gender, dental anatomy, difficulty index, degree of impaction, surgeon experience, surgical technique, flap design, and the presence of pre-existing pathosis, were taken into consideration when determining the degree of difficulty of surgical extractions using the Pell and Gregory classification system.[14] The mandible is more likely than the maxilla to become infected after a wisdom tooth extraction. Localized subperiosteal abscesses, which typically develop 2-4 weeks after surgery and are easily eliminated by surgical debridement and drainage, account for around 50% of infections. These abscesses are typically caused by debris that remains beneath the mucoperiosteal flap. It is estimated that between 0.5% and 1% of POIs develop within the first post-operative week.[16] Most of these infections are mild in nature and are stabilized by the host's reaction, typically with the help of curettage and antibiotic treatment. Poor surgical technique, insufficient irrigation of the surgical site, and inadequate instrument sterilization are further contributing factors.[17]

One well-known risk factor for post-operative infections is a weakened immune system. It has been shown that a patient's age, diet, diabetes, and other systemic health problems affect wound healing and infection rates.[18] Given that quitting smoking, having access to healthcare, complying with treatment, and being prepared to work with others can reduce the likelihood of problems, smoking and socioeconomic status may be confusing factors.[19] However, although while third molar surgery may cause considerable bacteremia, most individuals may not experience this sufficiently to overwhelm their host defenses, and as a result, most third molar extraction surgeries do not result in a POI.[20]

Because socioeconomic status may introduce possible confounders such inadequate health literacy, decreased post-operative compliance, and limited accessibility to follow-up care, it is considered a risk factor for infection and post-operative complications.[20] After third molar extractions, all of these may raise the risk of post-operative infection. It is hypothesized that socioeconomic status affects health ideas, behavior, and access to health care. Each patient's financing category was used to gauge their socioeconomic position and demographics. Disparities in patient education and understanding of dental health and home care could be one reason for this.[21] Clinician experience is known to affect the complication rates in oral surgery. This may impact the understanding and adherence to post-operative care instructions, general nutritional awareness with rest and recovery periods following surgery, and the differences in ease of access to follow-up care with the variable accessibility of support persons at home. The resident-treated group saw a greater rate of post-operative complications, according to a study comparing the complication rates of oral surgeons and oral and maxillofacial surgery residents.[22] In a similar study, a 2020 GUDC study that reviewed post-operative complications found that postgraduate oral surgery students had the greatest rate of post-operative complications (3.6%) across the four categories that

compared clinician experience levels and risk.[16]
Additionally, the length of the surgical process should be given more consideration. The risk of post-operative infections can rise with longer procedure times, which can happen with less skilled operators. Prolonged tissue manipulation and greater exposure to possible toxins are the causes of this. To improve surgical results, it would be beneficial to look into the relationship between operator skill, procedure duration, and infection rates.
This study's potential underreporting of postoperative infections that might arise after the one-week follow-up visit is one of its limitations, especially when patients choose to see their local physician rather than seek additional evaluation at the hospital clinic because they are rural or regional patients.

CONCLUSION

For surgical third molar extractions, a 7.78% post-operative infection rate has been found. This study found no statistically significant association between the presence of post-operative infection and any of the other risk factors, with the exception of flap design. It is not recommended to routinely take prophylactic antibiotics to prevent post-operative infections following third molar surgery due to the low prevalence rate. The inconsistent definition of post-operative infections in international literature is one of the study's main conclusions. To enable comparative study findings with future prospective studies and to develop universal measures to enhance infection-related outcomes, it is advised that diagnostic criteria be agreed upon.

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