Original Article

OUTCOME OF ENVELOPE AND TRIANGULAR FLAP DESIGN IN SURGICAL MANAGEMENT OF IMPACTED MANDIBULAR THIRD MOLAR

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ABSTRACT

Objective: *The objective of the study was to compare the outcome of envelope and triangular flap design in surgical management of impacted mandibular third molar surgery in terms of pain, swelling and trismus.*

Material and Methods: *Surgery of Impacted third molar is a common dental procedure that requires a sound understanding of surgical principles and patient management skills. Generally envelope and triangular flaps are most commonly used flap designs in routine maxillofacial surgery practice. Surgical removal of impacted mandibular third molar is followed by sequel such as pain, swelling and trismus. The study was conducted in department of Oral and Maxillofacial surgery, Khyber College of Dentistry over a period of 10 months. Two hundred and eighty four patients of impacted mandibular 3rd molars were divided into two groups of 142 each. Impacted mandibular third molars having Pederson scale 3 were operated with envelope flap and 142 with triangular flap through randomization using lottery method.*

Results: *In Envelope flap group 22% experienced no pain, 36% mild pain,40% moderate pain and 1% severe pain.In triangular flap group 8% experienced no pain, 53% mild pain,37% moderate pain and 1% experienced severe pain. In envelope flap group 22% patients experienced Grade 1 swelling ,75% grade 2,3% grade 3 swelling. In triangular flap group 22% experienced Grade 1 swelling,67% grade 2 and 11% grade 3 swelling. In envelope flap group 68% experienced trismus and 32% experienced no trismus.In triangular flap group 59% experienced trismis and 41% no trismus.*

Conclusions: *Results of envelope and triangular flap design in terms of post operative pain, swelling and trismus were comparable with one another.*

Key words: *Impacted tooth, Mandibular third molar, Post operative complications, Flap design, Third molar surgery*

INTRODUCTION

An Impacted tooth is the one that fails to erupt within its expected time of eruption into the functional position in the dental arch. Impacted mandibular third molars are most commonly congenitally missing and impacted teeth. They account for 98% of all impacted teeth. The incidence of impaction of mandibular third molar varies from 9.5%-68% in different populations[1]. clinically and radiologically, there are two types of impactions namely complete and partial. Complete impaction means that the tooth is covered by bone and mucosa and is prevented from erupting into normal functional position; partial impaction means that the tooth is partially visible or in communication with oral cavity, but it has failed to erupt fully into a normal position. There are various pathological conditions associated with mandibular third molar such as caries, pericoronitis and periodontal problems. Impacted third molar surgery is a common dental procedure that requires a sound understanding of surgical principles and patient management skills[2].

The surgical removal of impacted mandibular third molar is done by raising a mucoperiosteal flap,- bone removal, tooth sectioning in some cases and closure. The surgical technique may be various in the

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flap design, bone removal techniques, tooth sectioning methods, placement of drain tubes and suturing techniques. Different types of flaps have been described for the extraction of mandibular third molar including triangular or modified triangular flap, envelope flap, paramarginal flap and tongue–shaped flap. Generally envelope and triangular flaps are most commonly used flap designs in routine maxillofacial surgery practice[3].

Surgical removal of impacted mandibular third molar is followed by squeal such as pain, swelling and trismus. Persistent pain and swelling are most commonly reported postoperative sequlae in mandibular impaction (42.5%), followed by infection(20%) and trismus (1.5%)[4]. The surgical flap is one of the modifiable factors which influence the severity of post op sequlae[5].

Pain is defined as a normal predictable physiological response to an adverse thermal, chemical and mechanical stimulus associated with surgery, trauma or any illness[4]. Post operative pain after impacted mandibular third molar surgery is due to localized inflammation with pain of varying intensities. Impacted mandibular third molar surgery causes destruction of tissues and cells which lead to release and production of several biochemical mediators which are involved in pain process, particularly prostaglandins, histamine and bredakinin[6]. Moderate to severe pain develop within first 12 hours and disappears within few days if wound heals normally[7].

Post operative swelling is direct and immediate post operative tissue reaction as a result of complaint after impacted third molar surgery which influences the patient's quality of life in days after surgery. Different studies describe different risk factors for swelling development such as age, gender, medications, previous infection, poor oral hygiene, difficulty of extraction, duration of surgery, surgical technique and surgeon experience. Post operative swelling reaches to its peak on 2nd post operative day and subsides by seventh day[8].

Trismus is the limitation of mouth opening. It is one of the most common immediate post operative complication .This is due to the complex array of factors most of which are related to the inflammatory process[9].

As impacted wisdom tooth removal is the most common surgical procedure performed by oral and maxillofacial surgeons, the rationale of the study was to compare the outcome of the two commonly used flap designs used for their surgical removal in terms of Pain Swelling and trismus. The study will help the surgeon to choose appropriate flap for odontectomy of impacted third molars as their post operative complications affect the quality of life of the patients.

METHODS AND MATERIALS

Approval of this randomized clinical trial was taken from hospital's ethical review committee. Subjects referred from outpatient Department, fulfilling the inclusion criteria were included in the study. Flap design was selected in random manner by using lottery method. Choice was given to the patient to select one piece of paper on which type of flap was mentioned. (Fig 1 and 2) It was a single blind study so patient was unaware that what type of flap we were using for his/her procedure. The purpose, procedure, risks and benefits were explained to the patient and informed consent was taken regarding their willingness and participation in the study. They were assured of maintaining confidentiality of their personal and other data collected from them. A comprehensive history was taken from the patients coming to the out patient department of Oral and Maxillofacial Surgery at Khyber College of Dentistry Peshawar. A thorough clinical examination was carried out to exclude any pre existing pathology and assess the accessibility. Radiographs in the form of peri apical and orthopantomograms were advised to confirm the position and difficulty index of impacted mandibular third molars. The surgical procedure was done by a single operator, and the surgical area anesthetized by giving lignocaine 2 percent with adrenaline 1: 1000, 00 as anesthetic agent. Same post operative precautions and medications were given to maintain standardization and follow up was done on third post operative day. The data so collected was checked by a senior consultant who is a fellow of College of physicians and surgeons Pakistan (CPSP). All the information was recorded on a pre-designed proforma. The exclusion criteria were strictly followed to control confounders and bias in the study results.

The data was analyzed by SPSS version 20 by descriptive statistics. Chi square test was used to compare the results. Descriptive statistics were done to compute the mean age ±standard deviation (SD) of the subjects. For gender male to female ratio was calculated, while

Frequencies and percentages were computed for variables like pain, trismus and swelling. Stratification with respect to age, severity of pain, swelling and gender was done to avoid effect modification. Post –stratification chi square test was applied. P value ≤ 0.05 was taken as significant. The data was presented in the form of tables, graphs and charts.

RESULTS

Mandibular third molar impaction was predominant in male gender with male to female ratio of 3:1. (Fig-3) The mean age was 22±3.28 SD. Most of the patients were in the third decade of life (91.3%) followed by fourth decade (8.7%). (Table 1) Out of 284 patients 142 who presented with impacted mandibular third molar having Pederson scale 3 were operated with envelope flap and 142 with triangular flap. Relation of flap design was determined with post operative pain, swelling and trismus. Both no pain and mild pain were considered as no pain and moderate and severe pain were categorized as pain. In Envelope flap group 22% experienced no pain,36% mild pain,40% moderate pain and 1% severe pain. In triangular flap group 8% experienced no pain,53% mild pain,37% moderate pain and 1% experienced severe pain.(Table 2)

In envelope flap group 22% patients experienced Grade 1 swelling ,75% grade 2,3% grade 3 swelling.In triangular flap group 22% experienced Grade 1 swelling,67% grade 2 and 11% grade 3 swelling. (Table 3)

In envelope flap group 68% experienced trismus and 32% experienced no trismus. In triangular flap group 59% experienced trismus and 41% no trismus. (Table 4)

DISCUSSION

Removal of impacted mandibular third molar surgical procedure is one of most common surgical procedure. It is mostly associated with post operative

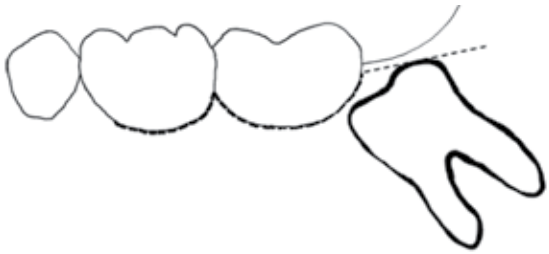

Figure-1: Incision for the envelope flap

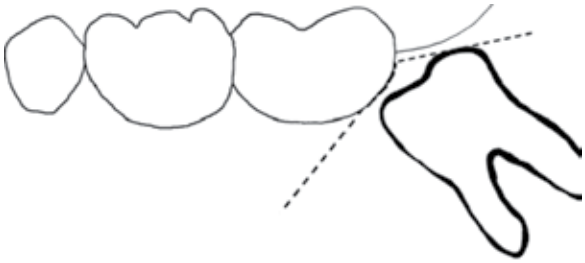

Figure-2: Incision for triangular flap

Table-1: Age distribution of impacted mandibular third molar

Total No of Patients	Age in Years	Frequency	%	Std Deviation	Minimum	Maximum	Mean
284	18-27 28-37	259 25	91.2 8.8	3.28	18	35	22

Table-2: Comparison of pain between envelope and triangular flap

Groups	Pain		Total	P-value
	Yes	No		
Envelope flap	59	82	142	0.003
Triangular flap	54	88	142	
Total	**113**	**171**	**284**	

Table-3: Comparison of swelling between envelope and triangular flap

Type of flap	Swelling		Total	P-value
	Yes	No		
Envelope flap	110	32	142	0.013
Triangular flap	**110**	**32**	142	
Total	**220**	**64**	**284**	

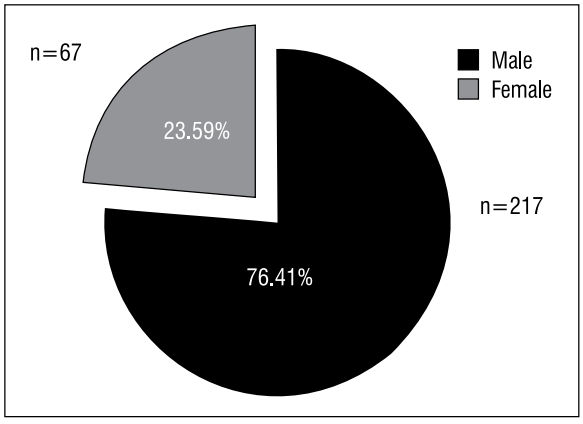

Figure-3: Ratio of gender distribution of impacted mandibular third molar

Table-4: Comparison of trismus between envelope and triangular flap

Groups	Trismus		Total	P value
	Yes	No		
Envelope flap	97 (68.31%)	45 (31.69%)	142	0.109
Triangular flap	84 (59.15%)	58 (40.85%)	142	
Total	**182**	**104**	**284**	

complications such as pain,swelling and trismus[10]. Different factors such as operation time,type and class of impaction,pre op administration of steroids,experience of surgeon are considered to affect post operative complications[11].

Different flaps are used for impacted mandibular third molar surgery which include envelope flap,triangular flap,trapezoidal flap and tongue-shaped flap. Envelope and triangular flap are most commonly used flap designs for this procedure.Each of these flaps have their own advantages and disadvantages[3].

Both envelope and triangular flap provides sufficient exposure and safety of vital structures. In the present study we compared the severity of complications such as pain, swelling and trismus associated with these two flap designs[12]. In our study impacted mandibular third molar were more common in males. Most patient presented were in their third decade of life.

In our study post op pain was less for envelope flap group which is similar with study done by Tareen MA et al in 2014. According to their study mean visual analogue scale was higher in triangular flap group on 2nd and 5th post op days but no difference on 7th post op day[13]. According to the results of the study done by Sulieman MS no statically significant difference of pain between four flaps groups[14] same findings found by Bracco et al who stated that pain was not produced due to incison itself but due the release of endogenous mediators such as bradakinine, serotinine and certain prostaglandins[15]. According to the study done by Sandhu A et al more pain were associated with envelope flap group as compare to the triangular flap group[16]. Study performed by Koyuncu BO et al shows statically significant increase pain associated with envelope flap group[17].

The difference in results of our study from other studies may be due to the difference in determining the pain method assessment and day of follow up as we determine the severity of pain on 3rd post op day but these studies determined pain severity on 2nd and 7th post op day.

In our study there was no significant difference in terms of swelling between envelope and triangular flap group. Our study results were same like the study of Suliman MS, which also reported no significant difference in terms of swelling between two flap groups. This is due to the fact that the post operative swelling is the result of local edema which is caused by accumulation of fluid exudates in the interstitial tissue spaces[14]. Dolanmaz D et al study results also shows no significant difference in terms of swelling in both flap groups[5]. According to the study of Sandhu et al no significant difference on any post op day between two flap groups and swelling is consider due the reflection of mucoperistium and is not due to the type of incison[16]. According to the study done by Baqain et al[18] there was significant difference in facial swelling in both flap groups on day 2nd and 7th. The triangular flap design resulted in greater post operative facial swelling. According to the study of Tareen KM et al less facial swelling resulted in envelop flap group when patients were followed on 2nd ,5th and 7th post op days[13]. Difference in results of our study from some of other studies is due to difference in methods of assessment of facial swelling and difference in follow up days.

Relationship of trismus with flap group were determined. According to our study there was no statistically significant difference in both flap groups in terms of trismus. Our study results are same like study done by Kirk et al which shows no statically significant difference in both flap groups on 2nd and 7th post op day[12]. Study done by Sandhu et al also show no statically significant difference in both flap groups post operatively[16]. Study done by Erdogan et al some limitation of maximal inter incisal opening occur in both flap groups on 3rd and 7th post op day but no statically significant difference occur in both flap groups[2]. Sulieman MS study show no statically significant difference in terms of trismus between envelope and triangular flap group[14].

According to study done by Baqain ZH et al[18] there was statically significant difference in terms of trismis on post op day 7th and 14th in both flap groups. According to them in triangular flap when

anteriorly realising incison is given it may cause irritation of muscles caused due to heamatoma. lead to inflammation of musclesof masticactions and causes trismus. According to the study of Tareen MK there was significant difference in mouth opening in both flap groups on 2nd and 7th post olp day. Triangular flap was associated with more limitation of mouth opening on 2nd day but on 7th day there was no difference[13]. Difference in results are due to difference in methodology used and difference in follow up days.

CONCLUSION

It is concluded that the results of post operative pain,swelling and trismus after impacted mandibular third molar surgery with envelope and triangular flap design were comparable and further studies on larger sample size are need to be performed to justify the results of the study.

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