

Envelope Flap Vs Modified Flap In Mandibular 3rd Molar Disimpaction Surgery

Research Article

Prasanna Guru .E^{1*}, Abdul Wahab P.U², Kathiravan Selvarasu³, Melvin George .A⁴

¹ Post Graduate Student, Department of Oral and Maxillofacial Surgery, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai 600077, India.

² Professor and Head, Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai 600077, India.

³ Reader, Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai 600077, India.

⁴ Senior Lecturer, Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai 600077, India.

Abstract

Background: The main purpose of this experimental study is to investigate the effect of envelope flap and modified flap in relation to postoperative outcomes of mandibular second molar in surgical extraction of impacted mandibular third molar extraction.

Aim: To understand and investigate the effect of different flap designs accessibility, post operative pain, swelling and trismus, periodontal health status of mandibular second molar after the impacted third molar extraction.

Materials and Methods: Sixty patients, aged between 18 and 25 years that includes 15 males and 15 females, fulfilling criteria for inclusion in this study were divided into either group (Group A=Envelope Flap, Group B =Modified flap), the surgical extraction was carried out under local anesthesia. The primary outcome variables were pain measured using VAS (Visual analogue scale), swelling in mm; wound opening measured in mm, and surgical accessibility. Statistical significance was set at 5% ($p = 0.05$).

Results: No statistically significant differences were found in comparing of pain, swelling, trismus and periodontal status for the between both type of flap design used.

Conclusion: This study of envelope flap and modified ward's flaps showed good efficacy. Design of mucoperiosteal flap used in surgical removal of impacted mandibular third molar have no effect on the degree of pain, swelling, trismus and periodontal health of adjacent second molar.

Keywords: Envelope Flap; Modified Wards; Mandibular 3 Rd Molar; Disimpaction Surgery.

Introduction

Mandibular third molar extraction is the frequently performed practice in oral surgery and necessitates substantial preparation and ability in analysis and intraoperative as well as postoperative management [1]. Flaps are needed to attain good visibility to the surgical site that will facilitate the adequate osteotomy for odontectomy. Different flap designs have been suggested for the surgical removal of mandibular 3rd molar to minimize the patient discomfort and to prevent periodontal complications. Numerous literature on the flap designs that have been published have as-

essed the flap designs based on subjective outcomes of pain, swelling, and trismus [2-5]. Regardless of degree of difficulty, the success depends primarily on correct preoperative assessment and planning, and on careful execution that comes with extensive training and experience.

Flap design is one of the most important factors which influence the severity of the complications, allowing for optimal visibility and access to impacted tooth. Flaps used preferably for third molar surgery are envelope flap and triangular flap. Envelope flap is a flap that is elevated from a horizontal linear incision, parallel to the

***Corresponding Author:**

Prasanna Guru .E,

Post Graduate Student, Department of Oral and Maxillofacial Surgery, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai 600077, India.

E-mail: prasanna.guru1996@gmail.com**Received:** May 20, 2021**Accepted:** August 5, 2021**Published:** August 16, 2021

Citation: Prasanna Guru .E, Abdul Wahab P.U, Kathiravan Selvarasu, Melvin George .A. Envelope Flap Vs Modified Flap In Mandibular 3rd Molar Disimpaction Surgery. *Int J Dentistry Oral Sci.* 2021;8(8):3756-3760. doi: <http://dx.doi.org/10.19070/2377-8075-21000770>

Copyright: Prasanna Guru .E[©]2021. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

free gingival margin, with no vertical incision. It may be sulcular or submarginal. The ends of the gingival flaps are positioned and folded against the surface of the roots and then folded like an envelope. Modified Ward's flap is regarded as more conservative owing to adequate degree of tissue reflection, which has advantages like better accessibility and visibility especially in deep seated mandibular impactions.

The most common postoperative complaints including pain, trismus, swelling and wound dehiscence that influence the patient's quality of life in the week following surgery. Intraoral suture and flap techniques affect these postoperative complications. Considering that the normal tissue is being used as a leverage to access the pathology, it is essential that good healing with restoration of normal health of the flap and the adjacent structures is restored without disrupting the normal periodontal health of the adjacent teeth.

The purpose of the present study is to compare and investigate the effect of envelope flap, modified flap designs accessibility, postoperative pain, swelling and trismus, periodontal health status of mandibular second molar after the impacted third molar extraction.

Materials And Methods

The present study was a split mouth experimental study, conducted in Saveetha Dental College and Hospital, Chennai from October 2020 to January 2021. A total of 60 patients [males (30), Females (30)] referred to the Department of Oral and Maxillofacial Surgery were recruited for the study.

An informed and written consent was taken before enrolment of study. The demographic and clinical parameters like age, gender, medical history, procedure of removal of tooth were identified and recorded in proforma. The history, clinical examination and radiographs (OPG and periapical) had done

Variables used to assess the primary outcome of the flap designs were pain, swelling, mouth-opening, wound-healing and accessibility.

Inclusion criteria

Patients who required removal of infected or prophylactic teeth having bilateral mirror image impacted mandible third molars replicating the same angulation, class and position according to Pell and Gregory classification were included in the study.

Exclusion criteria

Patients who had co-morbid diseases like diabetes, renal failure, epileptic, cancer, endocarditis, immune compromised, pregnant women, patients who had prophylactic radiotherapy and who were extremely uncooperative were excluded from the study.

Surgical protocol

After selection of patient into either groups, the standard preparation and draping was done and all surgeries were performed under local anesthesia by Conventional nerveblock anesthesia of inferior alveolar nerve, lingual nerve and buccal nerve with two 1.8mL cartridges of 2% lidocaine with epinephrine 1:100,000 was given.

For group A, envelope flap (Koener's incision) was raised by using sterile carbon steel surgical blade #15. The incision was given mesial to the impacted lower third molar.

And for group B, a standard full thickness mucoperiosteal flap (Modified ward's flap) was given by incision mesial to second molar. Using the straight elevator tooth was lifted; if tooth is retrieved, procedure was stop otherwise bone was removed with rosehead round burin slow speed turbine form mesio-buccal and disto-buccal side with constant irrigation of 0.9% normal saline then couplain straight elevator was used to lift the tooth after that any sharp bone was smoothen with curved bone filer then wound was closed with 3-0 Vicryl suture Sterile folded gauze (2 x 2) was applied over the surgical wound to achieve compression and hemostasis for 30 minutes. Standard antibiotics (Amoxi-clav 625mg BD) and painkillers (Ibuprofen 400mg TDS) were prescribed for 5 days.

At the end of the surgery, the flap design applied for the extraction of impacted lower third molar tooth and the duration of each operation (from the first extraction maneuver to the completion of the last suture), Pain, Swelling and Trismus were recorded.

Every patient was called for follow up on the 3rd day and 7th day.

Assessment protocol

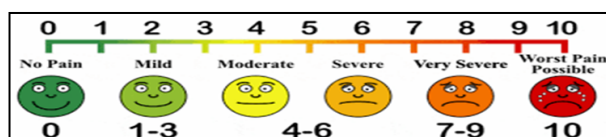
All the patients were reviewed on Day 3 and Day 7 post-operatively for complications in terms of post operative pain, post operative swelling and Trismus.

Pain

Intensity of pain is measured by using Visual Analogue Scale (VAS) (McCormack et al., 1988) whereby the intensity of pain is divided into 10 scales with 0 indicates no pain at all and 10 as the most severe pain that the patient has ever suffered. Patients were asked to fill according to their experience on the respective evaluation days.

Trismus

Trismus was evaluated by measuring the amount of mouth opening, measured as inter-incisal opening [using millimeter ruler (measuring the maximum distance between maxillary and mandibular central incisor)] associated with impacted mandibular third molar was performed.



Swelling

Postoperative swelling and the degree of swelling is measured using criteria published by Amin & Laskin.

Statistical Analysis

The sample size was calculated using the software GPower version 3.1.9.2. Paired T-Test was applied to compare mean values between timepoints and to analyse the mean values between the groups. We recorded the data of the patients and added to the database SPSS (IBM SPSS Statistics for Windows, Version 23.0, and Armonk, NY: IBM Corp. Released 2015). Significance level was set at 5% ($p = 0.05$).

Results

Out of 60, 23 patients were female and 37 were male patients with age from 18-25 year. Patients were randomly selected for each flap designs. Concerning group 1, there were 17 male and 13 female patients. The age range was 18-25 years with mean age 22 years. However in group 2 there were 17 male and 13 female patients. The age range from 18-25 years with mean age of 22 years.

On day 1, all patients had a pain, but the majority of patients were suffering from moderate pain. Only 11 patient's recorded mild pain and 14 patients showed severe pain. No statistically significant difference ($p \leq 0.005$) was observed among both groups. For the 3rd day 14 patients recorded no pain, 33 patients having mild pain and 13 patients suffering from the moderate pain. Over the 7th day, the pain levels were decreased. The majority of patients recorded no pain and only 6 patients stated mild pain. No statisti-

cally significant difference was observed as shown in Table 2.

Majority of patients recorded grade 2 swelling, on 1st day. Only two patients from group 2 had no swelling (grade 0) and 12 patients had grade 3 swelling and remaining 21 patients had grade 1 swelling. At the third day, 29 patients showed grade 1 swelling and 22 patients had no swelling (grade 0). 9 patients showed grade 2 and 9 patients showed grade 3 swelling. On 7th day 59 patients showed no swelling and only 1 patient had grade 1 swelling and that was from group 2. No significant statistical differences among treatment groups concerning swelling.

The mouth opening was measured preoperatively and postoperatively on 1st day, 3rd day, and 7th day in both groups. The mean preoperative mouth opening in envelope flap group was 39.103 mm and in modified ward's flap group was 37.833 mm. On the 1st day, it was 23.33 ± 7.107 mm mouth opening in envelope group whereas 25.37 ± 7.218 mm in modified ward's group. On 3rd day, mouth opening was measured, in envelope group 28.43 ± 5.50 mm and in modified ward's group 30.90 ± 4.70 mm. After 7th day, mouth opening in group 1 was 34.37 ± 4.846 and in group 2 was 35.27 ± 3.443 mm. No significant difference was observed as shown in Table 4.

Discussion

Impaction is defined as cessation of the eruption of a tooth caused by a clinically or radiographically detectable physical barrier in the eruption path or by ectopic position of the tooth at least one impacted third molar will be present in 33% of the population which requires surgical removal of impacted third molar hence, disimpaction is the one of the most frequently performed procedure [8].

Table 1. Sex distribution and mean age of patients in relation to treatment group.

Group	Type of Flap	Sex		Total	Age range (Years)	Mean age (Years)
		M	F			
1	Envelope flap	17	13	30	18-25	22.2
2	Modified Ward's flap	18	12	30	18-25	22.2

Table 2. Expression of pain.

Severity of pain	1st day			3rd day			7th day		
	G1	G2	T	G1	G2	T	G1	G2	T
No pain(0)	0	0	0	7	7	14	27	27	54
Mild Pain(1)	3	8	11	14	19	33	3	3	6
Moderate pain(2)	19	16	35	9	4	13	0	0	0
Severe Pain (3)	8	6	14	0	0	0	0	0	0
p-value	0.245			0.262			1		

Table 3. Severity of swelling.

Severity of swelling	1 st day			3 rd day			7 th day		
	G1	G2	T	G1	G2	T	G1	G2	T
No swelling(0)	0	2	2	7	15	22	30	29	59
Mild swelling(1)	7	14	21	19	10	29	0	1	1
Moderate swelling(2)	16	9	25	4	5	9	0	0	0
Severe swelling(3)	7	5	12	4	5	9	0	0	0
p-value	0.085			0.055			0.313		

Table 4. Mouth opening in mm.

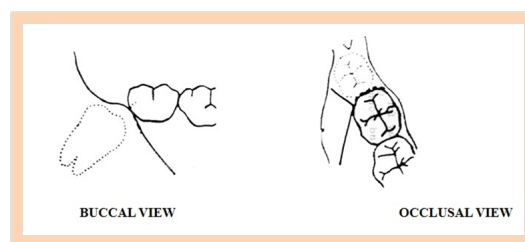
	Group	N	Mean	Std. Deviation	95% Confidence Interval of the Difference		p-value
					Lower	Upper	
1 st day	1	30	23.33	7.107	-5.735	1.669	0.276
	2	30	25.37	7.218	-5.735	1.669	0.276
3 rd day	1	30	28.43	5.500	-5.111	0.177	0.067
	2	30	30.90	4.700	-5.112	0.179	0.067
7 th day	1	30	34.37	4.846	-3.073	1.273	0.410
	2	30	35.27	3.443	-3.078	1.278	0.411

Figure 1. Modified wards flap and Envelope flap.



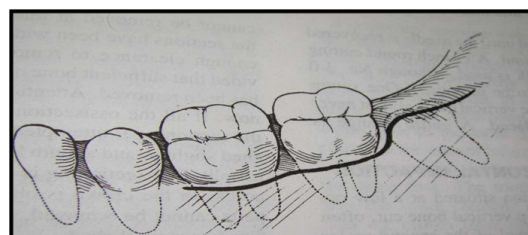
Surgical accessibility of Modified wards flap and Envelope flap

Figure 2. Modified wards flap.



Modified Ward's incision in Buccal and occlusal view

Figure 3. Envelope flap.



Impacted mandibular third molar teeth usually don't cause any problems, however, as the age of the person progresses, they can stimulate varied problems such as pain in affected side of jaw (unilateral or bilateral), swelling, pericoronitis, difficulty in mouth opening etc [10-12]. Several complications commonly associated with third molar impactions comprise of pain, swelling, trismus, nerve injury, and dry socket. Various flap designs were modified to minimize the aforesaid complications and long-term studies were conducted to assess and evaluate the efficacy of flap designs. Regardless of variations in flap design, the fundamental principle of flap vascularity aiding wound healing should be abided. According to Pederson et al. (1985) the interrelationship between trismus and pain has been reported in many studies. Pain was the main reason for reduced mouth opening after third molar surgery.

Flap design is important to allow good visibility, reach to the

impacted tooth, and for healing of the surgically created defect. Many different incisions have been used to raise the flap, like Ward's incision, modified Ward's incision, envelope, 'S'-shaped incision (Bould Henry) etc [13]. Flap design is important, not only for allowing optimal visibility and access to the impacted tooth, but also for subsequent healing of the surgically created defect. With so many objectives, the actual design of a flap sometimes becomes a compromise between peri and post-operative considerations [14].

Envelope flap: The incision starts on the ascending ramus, following the centre of the third molar shelf to the distobuccal surface of the second molar, and then extends as a sulcular incision to the mesiobuccal corner of the second molar. This flap is adequate for most mesial inclined and superficial impactions. This incision can be extended to the mesiobuccal surface of the first molar for better visibility and access.

Modified Ward's flap: Anterior vertical releasing incision curves forward from the distobuccal corner of the crown of the lower first molar and ends alongside the mesiobuccal cusp of that tooth. Crevicular incision should be made through the buccal gingival crevice of the second molar. Incision is then extended distally level with the buccal side of the tooth to the external oblique ridge. If the anterior part of the flap is elevated from the bone, one blade of a pair of scissors may be inserted onto the surfaces of the bone and the incision completed by closing the blades. Posterior part of the incision must slope outward as well as backwards, for the ascending ramus lies to the lateral side of the body of the mandible.

Modified ward's incision are regularly used and it is observed that these incision offer tremendous visual access and can be sealed by means of a suture introduced between the buccal and lingual soft tissues alone. Study by Ashook et al, had compared Ward flap and modified ward's flaps and we found good efficacy and less operative time in the modified ward's group as compare to ward's group. On the contrast to our study, Desai et al, reported that Koener's envelope flap was found to be better in terms of post-operative healing in Ward's incision.

Studies conducted by Nageshwar et al. (2002) [15], Silva et al. (2011) [16], Briguglio et al. (2011) [17], Boscho et al. (1977) [18] and Desai et al. (2014) [19] had provided statistical significance among one or more parametric variances to prove the superiority of one flap design over the other.

Post-operative pain after third molar surgery is a result of biochemical mediators involved in the pain process, mainly histamine, bradykinin, prostaglandins, and is directly related to resultant cellular and tissue destruction. Hence, flap injury incurred during impaction surgery plays a vital role in pain score (VAS) rather than flap design. Similarly, infection and iatrogenic trauma to hard/soft tissue contribute significantly to postoperative swelling which is prominent after 19–24 h and subsides in about 7 days. The majority of studies on flap designs performed by various authors over the years concluded that no statistical significance was noted in the parametric variance evaluated.

Chin Quee et al. (1984), Postoperative swelling is the consequence of trauma and infection. In this study no significant difference was found between both groups on 3rd postoperative day; according to tragus to corner mouth, lateral canthus to angle of mandible, tragus to menton and Mouth opening. In a previous study of Forsgren H et al, stated that swelling is most marked after 19 to 24 hours, and then lessens later about 7 days. No significant difference was noted in both groups on 7th postoperative day; according to Tragus to corner mouth, Lateral canthus to angle of mandible, Tragus to menton and mouth opening. As well as Kumar S et al, reported that massive swelling was not encountered in both groups on 7th day, only 13.33% of the patients suffered had mild distension in modified ward's group.

Conclusion

Disimpaction surgery of an impacted mandibular third molar may generally be associated with short-term pain, swelling, trismus and long-term periodontal problem. After the surgical re-

moval of mandibular third molar, we found pain and swelling were less in modified ward's flap group on the first day and third day post-operatively. But at the end of seventh day pain and swelling scale was similar in envelope flap group and modified ward's flap group. There were no statistically significant difference found on first, third and seventh post-operative day for the trismus and periodontal probing depth in surgical removal of mandibular third molar in envelope flap design and modified ward's flap design group.

References

- [1]. de Carvalho RW, de Araújo Filho RC, do Egito Vasconcelos BC. Assessment of factors associated with surgical difficulty during removal of impacted maxillary third molars. *J Oral Maxillofac Surg.* 2013 May;71(5):839-45. Pubmed PMID: 23598549.
- [2]. Moss CE, Wake MJ. Lingual access for third molar surgery: a 20-year retrospective audit. *Br J Oral Maxillofac Surg.* 1999 Aug;37(4):255-8. Pubmed PMID: 10475644.
- [3]. Malkawi Z, Al-Omiri MK, Khraisat A. Risk indicators of postoperative complications following surgical extraction of lower third molars. *Med Princ Pract.* 2011;20(4):321-5. Pubmed PMID: 21576990.
- [4]. Quee TA, Gosselin D, Millar EP, Stamm JW. Surgical removal of the fully impacted mandibular third molar. The influence of flap design and alveolar bone height on the periodontal status of the second molar. *J Periodontol.* 1985 Oct;56(10):625-30. Pubmed PMID: 3863913.
- [5]. Kugelberg CF, Ahlström U, Ericson S, Hugoson A. Periodontal healing after impacted lower third molar surgery. A retrospective study. *Int J Oral Surg.* 1985 Feb;14(1):29-40. Pubmed PMID: 3921477.
- [6]. Kumar B S, T S, M V, Raman U. To compare standard incision and comma shaped incision and its influence on post-operative complications in surgical removal of impacted third molars. *J Clin Diagn Res.* 2013 Jul;7(7):1514-8. Pubmed PMID: 23998110.
- [7]. Desai A, Patel R, Desai K, Vachhani NB, Shah KA, Sureja R. Comparison of two incision designs for surgical removal of impacted mandibular third molar: A randomized comparative clinical study. *Contemp Clin Dent.* 2014 Apr;5(2):170-4. Pubmed PMID: 24963241.
- [8]. Nageshwar. Comma incision for impacted mandibular third molars. *J Oral Maxillofac Surg.* 2002 Dec;60(12):1506-9. Pubmed PMID: 12465020.
- [9]. MacGregor AJ. The impacted lower wisdom tooth. Oxford University Press, USA; 1985.
- [10]. Sisk AL, Hammer WB, Shelton DW, Joy ED Jr. Complications following removal of impacted third molars: the role of the experience of the surgeon. *J Oral Maxillofac Surg.* 1986 Nov;44(11):855-9. Pubmed PMID: 3464711.
- [11]. Pasha Z, Naqvi ZA, Shaikh S, Khan N. A comparative evaluation of comma-shaped incision with standard incision in mandibular third molar surgery: A clinical study. *Journal of Orofacial Research.* 2015:12-7.
- [12]. Wikipedia. Wili/Tooth impaction.
- [13]. Suarez-Cunqueiro MM, Gutwald R, Reichman J, Otero-Cepeda XL, Schmelzeisen R. Marginal flap versus paramarginal flap in impacted third molar surgery: a prospective study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2003 Apr;95(4):403-8. Pubmed PMID: 12686924.
- [14]. García García A, Gude Sampedro F, Gallas Torrella M, Gándara Vila P, Madrián-Graña P, Gándara-Rey JM. Trismus and pain after removal of a lower third molar. Effects of raising a mucoperiosteal flap. *Med Oral.* 2001 Nov-Dec;6(5):391-6. Pubmed PMID: 11694874.
- [15]. Nageshwar. Comma incision for impacted mandibular third molars. *J Oral Maxillofac Surg.* 2002 Dec;60(12):1506-9. Pubmed PMID: 12465020.
- [16]. Silva JL, Jardim EC, dos Santos PL, Pereira FP, Garcia Junior IR, Poi WR. Comparative analysis of 2-flap designs for extraction of mandibular third molar. *J Craniofac Surg.* 2011 May;22(3):1003-7. Pubmed PMID: 21558905.
- [17]. Briguglio F, Zenobio EG, Isola G, Briguglio R, Briguglio E, Farronato D, et al. Complications in surgical removal of impacted mandibular third molars in relation to flap design: clinical and statistical evaluations. *Quintessence Int.* 2011 Jun;42(6):445-53. Pubmed PMID: 21519580.
- [18]. Ten Bosch JJ, van Gool AV. The interrelation of postoperative complaints after removal of the mandibular third molar. *Int J Oral Surg.* 1977 Feb;6(1):22-8. Pubmed PMID: 402319.
- [19]. Bataineh AB, Batarseh RA. The effect of modified surgical flap design for removal of lower third molars on lingual nerve injury. *Clin Oral Investig.* 2017 Jul;21(6):2091-2099. Pubmed PMID: 27837346.