

The Influence of the Suture-less Anterior Releasing Incision in a Triangular Flap Design on Postoperative Healing Following Surgical Removal of Impacted Mandibular Third Molars

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Received : 04-11-19.
Revised : 25-03-20.
Accepted : 31-03-20.
Published : 15-06-20.

ABSTRACT **Objectives:** The objective of this study was to determine the effect of suture-less anterior releasing incisions on postoperative wound healing following surgical removal of impacted mandibular third molars. **Materials and Methods:** A total of 112 patients were included in the study. Group 1 had 56 patients in which the anterior releasing incision was not sutured postoperatively, and group 2 had 56 patients, in whom the anterior releasing incision was sutured. The two groups were compared in terms of pain, swelling, and trismus at 1 day, 3 days, and 7 days postoperatively. The Univariate Type III Repeated-Measures ANOVA Assuming Sphericity was used to compare the two modes of treatments at different time points. The periodontal healing distal to the second molar was assessed on the first day and at 2 months following the surgical intervention. The independent *t* test was used to compare the periodontal healing between the two groups at two time points. **Results:** No significant difference was observed between the two groups for pain and trismus ($P > 0.05$). However, the swelling was significantly greater in group 2 as compared to group 1 ($P < 0.001$). Periodontal healing was better in group 2, which showed lower periodontal probing depth distal to the mandibular second molar, compared to group 1 ($P < 0.05$). **Conclusion:** Suture-less anterior releasing incision decreases the postoperative swelling and edema, but the periodontal healing was poor when compared to the sutured anterior releasing incision cases. The type of closure technique did not have any significant influence on pain and trismus.

KEYWORDS: Anterior releasing incision, impacted mandibular third molar, suture less

INTRODUCTION

Impacted mandibular third molar removal is a commonly performed minor surgical procedure in oral and maxillofacial surgery. Pain, swelling, and reduced mouth opening are common findings in third molar surgeries. Trauma during the surgical procedure causes damage to the capillary vessels along with the release of inflammatory cytokines, which results in increased permeability of vessels causing accumulation of serosanguinous fluid and exudate.^[1] This contributes

to the postoperative discomfort to the patient. Hence, surgeons must minimize postoperative distress to improve quality of life.

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How to cite this article: Nayak SS, Arora A, Shah A, Sanghavi A, Kamath AT, Nayak VS. The influence of the suture-less anterior releasing incision in a triangular flap design on postoperative healing following surgical removal of impacted mandibular third molars. *J Int Soc Prevent Communit Dent* 2020;10:262-8.

Access this article online	
Quick Response Code: 	Website: www.jispcd.org
	DOI: 10.4103/jispcd.JISPCD_444_19

Some authors have advocated the use of medicated drains to decrease discomfort in patients with primary wound healing and have found satisfactory results.^[2,3] The method used for wound closure also dictates the severity of postoperative discomfort to the patient.^[4] The authors have differed in their opinion regarding the closure of the extracted wound. Osunde *et al.*^[5] have reported that postoperative swelling and pain worsened following primary closure of the wound. Some other authors have opined that complete wound healing is achieved by primary closure.^[6]

The triangular flap is one of the commonly advocated flaps for the removal of impacted mandibular third molars. It is raised by an anterior releasing incision and a distal incision given along the external oblique ridge. Conventionally, after the surgical procedure, the flap closure is achieved by suturing along both the incision lines. This study is based on the principle that nonclosure of the anterior releasing incision facilitates drainage of the exudate.

This study aimed to analyze the effects of suturing versus non-suturing of the anterior releasing incision in a triangular flap design following surgical removal of impacted mandibular third molars.

MATERIALS AND METHODS

ETHICS CLEARANCE

This randomized clinical trial abides by the Helsinki Declaration, and with the ethical principles regarding human experimentation. This research study was reviewed and approved by the Institutional Ethics Committee, Kasturba Hospital, Manipal, Manipal Academy of Higher Education (No: 901/ 2018).

The study population included patients who visited the Oral and Maxillofacial Surgical unit of Manipal College of Dental Sciences, Manipal, India in between January 2019 and July 2019 for the surgical removal of mandibular impacted third molars. In total, 112 patients were included by simple randomized sampling after obtaining their informed consent. The enrolled patients were consecutively randomized into groups 1 and 2 with 56 subjects in each treatment group. In group 1 patients, the anterior releasing incision was not sutured during wound closure. In group 2, both the anterior releasing and the posterior incision along the anterior border of the ascending ramus were sutured after removal of the impacted tooth. Patients aged between 18 and 40 years, having impacted mandibular third molars, free of acute pericoronitis, were included in the study. Patients with deep impacted mandibular third molars (Pell and Gregory classification Class 3, Position C), those with severe periapical pathology,

underlying systemic diseases, and pregnant women were not included in the study.

SURGICAL PROCEDURE

All the study subjects were evaluated preoperatively before the surgical procedure. Panoramic radiographs helped evaluate the relation of the impacted tooth to the surrounding bone and the adjacent tooth. All surgical procedures were operated by a single surgeon who had more than 7 years of experience in this field. All the procedures were carried out under local anesthesia using 2% lignocaine with 1:200,000 epinephrine. A full-thickness triangular mucoperiosteal flap was reflected to gain access to the impacted tooth. The incision used



Figure 1: Incision marking for the surgical removal of the impacted mandibular third molar

for the same consisted of an anterior releasing incision and a posterior incision along the anterior aspect of the ramus of the mandible [Figure 1]. The surrounding bone was guttered, and the teeth were sectioned with Tungsten carbide burs (HP 702) to deliver them out of the socket. Copious irrigation with normal saline was carried out during the surgical procedure, and closure of the wound was achieved with 3-0 silk sutures. The type of closure depended on the group allotted to the particular patient. Postoperatively, the patients were prescribed 625 mg of Augmentin (amoxicillin with clavulanic acid) and 400 mg of Brufen (ibuprofen, Abbot India Ltd., Mumbai) to be taken twice daily for 5 days.

CLINICAL ASSESSMENT

Evaluation of the patients was carried out by the same observer, blinded to the surgical technique on the first, third, and seventh day from the date of the surgical procedure. On each visit, data regarding pain, swelling, and trismus were recorded. The periodontal probing depth distal to the second molar was evaluated on the first day and after 2 months postoperatively.

The pain was evaluated using a visual analog scale (VAS). The patients were provided with a VAS data sheet which consisted of a 100-mm horizontal line with readings from 0 to 10, with words “no pain” at one end and “worst imaginable pain” at the other. The patients were advised to mark on the line at the point that they feel represents their perception of their current state of pain. The extraoral measurements to evaluate swelling were carried out using a flexible tape to determine two sets of measurements [Figure 2]. The distance between the angle of the mouth and the tragus of the ear was measured in millimeters. Similarly, the distance between the mandibular angle and the outer canthi of the eye was also measured. The arithmetic mean of the two measurements indicated the postoperative facial swelling for the particular day. The maximum inter-incisal opening between the upper and lower central incisors was measured in millimeters by a metallic scale to assess trismus. The periodontal probing depth distal to the mandibular second molar on the operating side was measured in millimeters using William's periodontal probe.

STATISTICAL METHODS

The R statistical software (University of Auckland, Auckland, New Zealand), version 3.6.1, was used for statistical analysis. The Univariate Type III Repeated-Measures ANOVA Assuming Sphericity was used to compare the two modes of treatments at different time points for pain, swelling, and trismus. The independent *t* test was used to compare the periodontal healing between the two groups at two time points at 95%



Figure 2: Assessment of facial swelling by two sets of measurements (angle of the mouth to the tragus of the ear and the mandibular angle to the outer canthi of the eye)

confidence interval. A value of $P < 0.05$ was considered statistically significant, and <0.001 was considered to be highly statistically significant.

RESULTS

Of the total 112 patients, 64 were males and 48 were females. There was not much of a significant difference ($P > 0.05$) in the severity of postoperative pain between the two groups [Table 1]. The difference in trismus between the two groups was not found to be statistically significant [$P > 0.05$; Table 2]. There was a highly significant difference in swelling between groups 1 and 2 ($P < 0.001$), and the swelling was more pronounced in group 2 subjects [Table 3]. The *F* values for the Univariate Type III Repeated-Measures ANOVA Assuming Sphericity are shown in [Tables 1–3] (where *n* is the numerator degree of freedom and *d* is the denominator degree of freedom). The periodontal probing depth, adjacent to the second molar, 2 months after the surgical procedure, was found to be more in group 1 patients and this was statistically significant ($P < 0.01$) [Table 4].

Table 1: Statistical analysis of data for pain

	Day 1	Day 3	Day 7	F Value	d.f. (n, d)	P Value
Group 1				0.4707	1, 108	0.4941
N	56	56	56			
Mean	3.62	2.14	1.09			
SD	3.15	2.14	1.76			
Minimum	0	0	0			
Maximum	9	8	7			
Group 2						
N	56	56	56			
Mean	3.37	2.17	0.7			
SD	2.98	1.75	1.09			
Minimum	0	0	0			
Maximum	9	6	4			

N = sample size, SD = standard deviation

Table 2: Statistical analysis of data for inter-incisal distance to determine trismus

	Day 1	Day 3	Day 7	F Value	d.f. (n, d)	P Value
Group 1				1.5036	1, 108	0.2228
N	56	56	56			
Mean	40.16	30.79	36.62			
SD	7.17	8.57	9			
Minimum	28	20	20			
Maximum	55	50	65			
Group 2						
N	56	56	56			
Mean	40.7	32.04	39.87			
SD	7.69	8.73	8.26			
Minimum	22	15	22			
Maximum	54	47	60			

N = sample size, SD = standard deviation

Table 3: Statistical analysis of data for swelling

	Day 1	Day 3	Day 7	F Value	d.f. (n, d)	P Value
Group 1				26.179	1, 108	<0.001*
N	56	56	56			
Mean	103.89	108.62	106.88			
SD	6.74	9.75	9.54			
Minimum	90	92	91			
Maximum	117.5	137.5	132.5			
Group 2						
N	56	56	56			
Mean	106.58	120.56	117.02			
SD	6.18	12.81	11.45			
Minimum	90	95	93			
Maximum	117.5	150	142.5			

N = sample size, SD = standard deviation

* Highly statistically significant

DISCUSSION

Mandibular third molar removal is a fairly common practice in the field of Oral and Maxillofacial Surgery. The healing process during the postsurgical period following an impacted tooth removal causes considerable patient discomfort.^[7] The findings of this study are comparable to a study by Pasqualini

et al.^[4] who reported that the postoperative pain and discomfort experienced maybe due to the suturing technique used by the surgeon. Pain and swelling are some of the characteristic symptoms following impacted lower third molar removal, and this can be attributed to natural repair mechanisms and histological damage.^[8,9] Both the surgical and the suturing technique used might influence postoperative discomforts such as pain,

Table 4: Statistical analysis of data for periodontal probing depth

T statistic	df	P Value	Mean difference	Standard error difference	95% Confidence interval for difference in mean	
					Lower	Upper
-6.626	99.397	0.00*	-1.69643	0.25604	-2.20444	-1.18842

* $P < 0.05$ (statistically significant)

Independent samples test

swelling, and trismus. Danda *et al.*^[10] reported that postoperative swelling is influenced greatly by the type of wound healing. This study, too, showed a marked difference in the postoperative swelling status between two types of wound closure.

One of the main symptoms following impacted lower third molar removal is postoperative pain. Different individuals have a different perception of pain, and hence the pain measurement is always subjective. This study used a subjective VAS for assessment of pain in the study subjects. The pain perception in the subjects was found to be significantly different when the assessment was carried out between the postoperative days. This corresponds to a study by Maria *et al.*^[11] with near similar results. Some studies found that the postoperative pain in the primary closure group was significantly higher than those who underwent secondary closure.^[4,10] Martín-Ares *et al.*^[7] reported that VAS is a purely subjective assessment. Pasqualini *et al.*^[4] used the VAS to evaluate pain and found that there was a significant difference in the severity of pain between the two groups. Assessment of pain may be difficult as pain is a subjective experience influenced by various factors such as the patient's age, tolerance level, education, cultural background and previous experience.^[12] In this study, postoperative pain amongst subjects of the two groups was not statistically significant.

Postoperatively the impacted tooth removal is associated with swelling and edema. To quantify the swelling, various methods have been used in the past, which include photographic assessment, facebows, calibrators, and VAS among others.^[13] In this study, the tragus, the angle of the mouth, the outer canthi of the eye, and the gonion (angle of the mandible) were the four anatomic landmarks considered for assessment of postoperative swelling similar to the study by Pachipulusu and Manjula^[14] The distance from the angle of the mouth to the tragus and the outer canthi of the eye to the gonion were measured to determine the swelling in two planes and the mean reading of these two measurements was calculated. The determination of the postoperative swelling by considering the mean reading of two measurements on the face is similar to the method used by Osunde *et al.*^[15] in their study. A significant increase in the mean

measurements in group 2 subjects (closure of both incisions) was observed, and these correspond to other studies reported in the literature.^[16,17]

The inter-incisal measurement was taken to determine the presence of trismus. The difference in mouth opening postoperatively between group 1 and 2 patients in this study was not relevant statistically. This finding concerning postoperative trismus is comparable to a study by Suddhasthira *et al.*,^[18] who, too, found no significant differences in interincisal distance between primary and secondary closure methods.

The development of a periodontal defect distal to the second molar following the surgical removal of the impacted molar is a debatable issue. Although some authors have shown improvement in periodontal status adjacent to the lower second molar, others have found an increased incidence of periodontal depth postsurgery.^[19,20] Some studies have shown that variation of the flap design can influence postoperative pocket formation adjacent to the second molar.^[21-23] The results of this study are similar and shows that non-closure of the anterior releasing incision can lead to an increased periodontal probing depth distal to the second molar. Sisk *et al.*^[24] reported that surgical handling of the hard and soft tissues could influence the postoperative outcome. In this study, all surgical procedures were carried out by a single operator who had a good experience in this field for better surgical handling of tissues.

There have been differing opinions among authors regarding postoperative comfort when the two types of suturing methods for wound closure were compared. Suddhasthira *et al.*^[18] concluded that no significant difference was evident postoperatively among the two types of closure. Some authors found the difference in postoperative pain between the two groups to be of no statistical significance,^[2,25] whereas others showed a significant reduction in mouth opening, edema, and pain, during secondary healing.^[10,15] Almost all authors advocated the removal of a wedge of healthy mucosa half centimeter wide, to promote secondary healing.^[10,11,14] In this study, the authors differed in this respect, and no healthy mucosa was excised during the operative procedure.

CONCLUSION

A suture-less anterior releasing incision following removal of the impacted mandibular third molars decreases postoperative edema and swelling but is likely to increase a periodontal pocket formation adjacent to the second molar. The type of closure has no bearing on the postoperative pain and trismus.

CLINICAL TRIAL REGISTRATION

This trial is registered at the Clinical Trials Registry, India (www.ctri.nic.in), and the registration number of the trial is CTRI/2019/01/017296.

ACKNOWLEDGEMENTS

Nil

FINANCIAL SUPPORT AND SPONSORSHIP

Nil.

CONFLICTS OF INTEREST

There are no conflicts of interest.

AUTHORS CONTRIBUTIONS

Data collection, acquisition and analysis: *Sunil S. Nayak¹, Anushka Arora¹, Ashmeet Shah¹, Ameer Sanghavi¹*, Data interpretation, manuscript writing: *Sunil S. Nayak, Abhay T. Kamath, Vanishri S. Nayak.*

ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT

The authors confirm that the study has been conducted as per the ethical guidelines laid down by Declaration of Helsinki and approved by the Kasturba Medical College and Kasturba Hospital Institutional Ethics Committee, Manipal (IEC No: 901/ 2018).

PATIENT DECLARATION OF CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

DATA AVAILABILITY STATEMENT

The data supporting the study results are available from the corresponding author.

REFERENCES

1. Eming SA, Krieg T, Davidson JM. Inflammation in wound repair: Molecular and cellular mechanisms. *J Invest Dermatol* 2007;127:514-25.
2. Chukwunke FN, Oji C, Saheeb DB. A comparative study of the effect of using a rubber drain on postoperative discomfort following lower third molar surgery. *Int J Oral Maxillofac Surg* 2008;37:341-4.
3. de Brabander EC, Cattaneo G. The effect of surgical drain together with a secondary closure technique on postoperative trismus, swelling and pain after mandibular third molar surgery. *Int J Oral Maxillofac Surg* 1988;17:119-21.
4. Pasqualini D, Cocero N, Castella A, Mela L, Bracco P. Primary and secondary closure of the surgical wound after removal of impacted mandibular third molars: A comparative study. *Int J Oral Maxillofac Surg* 2005;34:52-7.
5. Osunde OD, Saheeb BD, Adebola RA. Comparative study of effect of single and multiple suture techniques on inflammatory complications after third molar surgery. *J Oral Maxillofac Surg* 2011;69:971-6.
6. Sanchis Bielsa JM, Hernández-Bazán S, Peñarocha Diago M. Flap repositioning versus conventional suturing in third molar surgery. *Med Oral Patol Oral Cir Bucal* 2008;13:E138-42.
7. Martín-Ares M, Barona-Dorado C, Martínez-Rodríguez N, Cortés-Bretón-Brinkmann J, Sanz-Alonso J, Martínez-González JM. Does the postoperative administration of antibiotics reduce the symptoms of lower third molar removal? A randomized double blind clinical study. *J Clin Exp Dent* 2017;9:e1015-22.
8. Osunde OD, Saheeb BD. Effect of age, sex and level of surgical difficulty on inflammatory complications after third molar surgery. *J Maxillofac Oral Surg* 2015;14:7-12.
9. Pourmand PP, Sigron GR, Mache B, Stadlinger B, Locher MC. The most common complications after wisdom-tooth removal: part 2: A retrospective study of 1,562 cases in the maxilla. *Swiss Dent J* 2014;124:1047-51, 1057-61.
10. Danda AK, Krishna Tatiparthi M, Narayanan V, Siddareddi A. Influence of primary and secondary closure of surgical wound after impacted mandibular third molar removal on postoperative pain and swelling: A comparative and split mouth study. *J Oral Maxillofac Surg* 2010;68:309-12.
11. Maria A, Malik M, Virang P. Comparison of primary and secondary closure of the surgical wound after removal of impacted mandibular third molars. *J Maxillofac. Oral Surg* 2012;11:276-83.
12. Gaya MVO, Capilla MV, Mateos RG. Relation of patient and surgical variables to postoperative pain and inflammation in the extraction of third molars. *Med Oral* 2002;7:360-90.
13. Bjorn H, Lundqvist C, Hjelmstrom P. A photogrammetric method of measuring the volume of facial swellings. *J Dent Res* 1954;33:295-308.
14. Pachipulusu PK, Manjula S. Comparative study of primary and secondary closure of the surgical wound after removal of impacted mandibular third molars. *Oral Maxillofac Surg* 2018;22:261-6.
15. Osunde OD, Adebola RA, Saheeb BD. A comparative study of the effect of suture-less and multiple suture techniques on inflammatory complications following third molar surgery. *Int J Oral Maxillofac Surg* 2012;41:1275-9.
16. de Santana-Santos T, de Souza-Santos AA, Martins-Filho PR, da Silva LC, de Oliveira E Silva ED, Gomes AC. Prediction of postoperative facial swelling, pain and trismus following third molar surgery based on preoperative variables. *Med Oral Patol Oral Cir Bucal* 2013;18:e65-70.
17. Singh T, More V, Fatima U, Karpe T, Aleem MA, Prameela J. Effect of proteolytic enzyme bromelain on pain and swelling after removal of third molars. *J Int Soc Prev Community Dent* 2016;6:197-204.
18. Suddhasthira P, Chinwat S, Sattapongsda P. The comparison study of primary and secondary closure technique after removal of impacted mandibular third molars. *Thai J Oral Maxillofac Surg* 1991;5:67-77.

19. Marmary Y, Brayer L, Tzukert A, Feller L. Alveolar bone repair following extraction of impacted mandibular third molars. *Oral Surg Oral Med Oral Pathol* 1986;61:324-6.
20. Tabrizi R, Arabion H, Gholami M. How will mandibular third molar surgery affect mandibular second molar periodontal parameters? *Dent Res J (Isfahan)* 2013;10:523-6.
21. Jakse N, Bankaoglu V, Wimmer G, Eskici A, Pertl C. Primary wound healing after lower third molar surgery: Evaluation of 2 different flap designs. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2002;93:7-12.
22. Kirk DG, Liston PN, Tong DC, Love RM. Influence of two different flap designs on incidence of pain, swelling, trismus, and alveolar osteitis in the week following third molar surgery. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007;104:e1-6.
23. 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;95:403-8.
24. 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;44:855-9.
25. Rakprasitkul S, Pairuchvej V. Mandibular third molar surgery with primary closure and tube drain. *Int J Oral Maxillofac Surg* 1997;26:187-90.