ORIGINAL RESEARCH

Lingual Triangular Flap vs Buccal Triangular Flap: A pilot study

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ABSTRACT

Aim: The study was aimed at comparison of a lingual triangular flap with the routinely used triangular flap in the surgical removal of impacted mandibular third molars. **Material and method:** 10 patients with impacted bilateral mandibular third molars that were symmetrically positioned, mesially angulated, and retained in bone were included.The impacted third molars were removed in two sittings (removal of impacted tooth in the subsequent session was done three months after the first session to remove post antibiotic effect of first surgery), using two different flap designs: the new lingual based triangular flap and the traditional triangular flap. Postoperative complications (pain, swelling, trismus, alveolar osteitis, and wound dehiscence) were recorded on days 2, 7, 14, and 21. The data obtained were analyzed using the Chi square test, the Mann–Whitney U-test, and Pearson's correlation test.SPSS IBM Software version 20 was applied to analyze the data. **Result:** The pain level in this study was measured by VAS scale, it came out to be less in the lingually based triangular flap as compared to buccally based flap and was statistically significant at 6 hours, 12 hours, 1st day,4th day,5th day and 6th day($P< 0.05$). There was a better recovery in mouth opening in the lingually based flap, but it was not statistically significant. Also, the reduction in facial swelling in lingually based flap was slightly better than the other and was statistically significant at 2nd day ($P< 0.05$). Wound dehiscence was less in both the group but was slightly more in the buccally based flap which was statistically significant at 14th and 21st day ($P< 0.05$). **Conclusion:** In conclusion, these results show that this new flap design is preferable to the routinely used buccal triangular flap for impacted third molar surgery.

KEYWORDS: Lingual Triangular Flap, Buccal Triangular Flap, Impaction, Mandibular Molar

INTRODUCTION

An impacted tooth has been defined by Mead as a tooth that is prevented from erupting into final position because of malposition, lack of space for an eruption and other impediments.[1] Later Peterson characterized impacted teeth as those teeth that fail to erupt into the dental arch within the expected time.[2] Farman in 2004 stated that the impacted teeth are those teeth that are averted from eruption due to a physical barrier within the path of eruption.[3] Generally, third molars have been found to erupt between the ages of 17 and 21 years.[4,5] Also, the time of eruption of third molars has been reported to vary within different races.[6-7]

The presence of third molars is reported in 90% of the population with 33% of the population having impacted third molar. Hence the removal of impacted molars is a commonly performed procedure in a clinical setup.[8] Impacted lower third molar extraction produces a series of unavoidable effects, which include pain, inflammation, and trismus.[9]

Flap design affects the severity of the above-said complications.[10] Flap design allows for optimal visibility and accessibility to the impacted third molar and also influences the healing of the created defect. In order to achieve all these objectives, the design of a flap gets compromised between peri and post–operative considerations.[11]

In oral surgical procedures, it is desirable to place the mucoperiosteal incision on sound bone. Many flap designs used in impacted third molar surgery do not follow this rule, as they involve incisions that are placed in the extraction socket, resulting in a high incidence of mucosal dehiscence, followed by secondary wound healing. In secondary healing, the buccal flap is often tucked into the socket region and organization of the coagulum in the socket region may be disrupted and sometimes leading to delayed wound healing and the risk of developing alveolar osteitis due to which the discomfort period after extraction is elevated.

Various incision and flap techniques, each with variations, have been performed for third molar surgery. The envelope flap and triangular flap are the most commonly used and preferred flap designs in impacted third molar surgery.[12, 13]

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This study aimed at comparison of a new lingual triangular flap design with the routinely used buccal triangular flap design in the surgical removal of impacted mandibular third molars.

MATERIALS AND METHODS

This randomized, prospective, split-mouth study was performed at the Department of Oral and Maxillofacial Surgery, ITS Centre for Dental Studies and Research, Chaudhary Charan Singh University, Meerut, Uttar Pradesh India. It involved 10 patients with impacted bilateral mandibular third molars that were symmetrically positioned, mesially angulated, and retained in bone.

Patients who met the exclusion criteria had a history of systemic disease, use of medications, poor oral hygiene and compromised dental and periodontal status, smoking habit, allergy or contraindications to the drugs or anesthetics used in the study, pregnancy or lactation, and a noticeable local inflammation or pathology in the oral cavity that would influence the surgical procedure or postoperative wound healing.

Before the procedure, each participant was informed about the surgical and postoperative study protocol and written signed consent for the study was obtained. Approval for the study was taken from ethical committee. All surgical procedures were carried out by the same surgeon and same assistant in the oral and maxillofacial surgery department. For each patient, the impacted teeth were removed in two sessions using the two different flap designs. The time interval between the two sessions was at least 12 weeks to eliminate post antibiotics effect prescribed in the first session. The flap design and operated side of the mouth were assigned randomly for the patients using envelopes prepared in advance. The side of the first surgical extraction was decided by the patient. Before starting the procedure, the oral cavity was rinsed thoroughly with diluted povidone iodine solution for 30 s. Three milliliters (ml) of Lignocaine HCl 2% with 1:200,000 epinephrine was used as the local anesthetic agent for inferior alveolar and the lingual nerve block (2 ml), along with long buccal nerve block (1 ml).

Flaps were made using two techniques. In Group I, technique A was used in which (n = 10 teeth), the impacted teeth were removed using a buccally based triangular flap (Fig.1), as first described by Szymd.[14] An incision was made from the anterior border of the mandibular ramus to the distal surface of the distobuccal cusp of the mandibular second molar. It was extended along the sulcus to the distobuccal corner of the second molar crown. The incision was continuous, with a relieving vertical incision, oblique into the mandibular vestibular fornix, aligned with the mesiobuccal cusp of the second molar.

In Group II, technique B was used (n = 10 teeth), in which a lingually based triangular flap (Fig.2, 3, 4) was used to remove the impacted mandibular third molar on the contralateral side of the patient. An incision was made adjacent to the distal surface of the mandibular second molar and extended along the sulcus to the distobuccal corner of the mandibular second molar. An oblique vestibular incision was made and extended into the vestibular fornix of the mandible, aligned with the mesiobuccal cusp of the second molar. It was continued posterosuperior towards the anterior border of mandibular

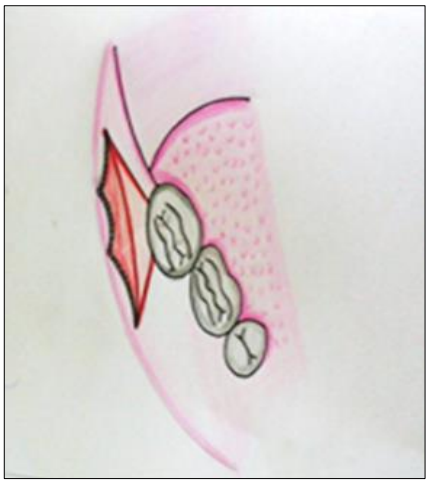

Fig. 1: Incision for the buccally based triangular flap.

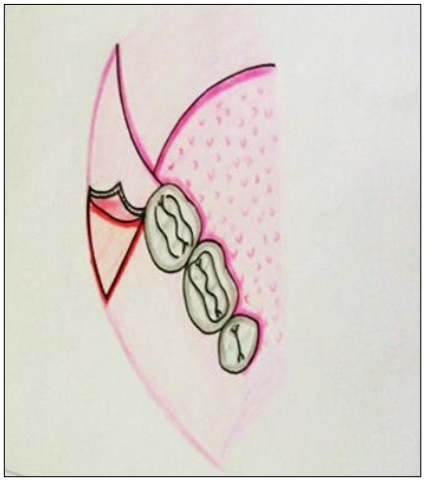

Fig. 2: Incision for the lingually based triangular flap

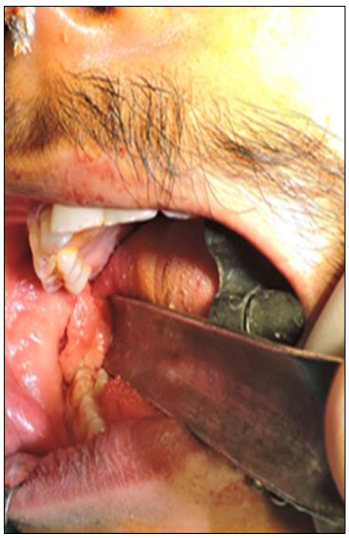

Fig. 3: Incision for the lingually based triangular flap

Fig. 4: Lingually based triangular flap

ramus. A mucoperiosteal flap was raised. Bone was removed with a round bur under copious irrigation with 0.9% sterile saline, following which the tooth was extracted. When necessary, the tooth was sectioned with a fissure bur. Primary wound closure was accomplished using 4–0 silk sutures (Fig.5). VAS scale with zero representing no pain and 10 representing excruciating pain was used to assess the pain. Patients were asked to mark the position of their pain along the VAS scale at 6 hrs and 12 hrs after the operation and in the morning for 7 days post-surgery.

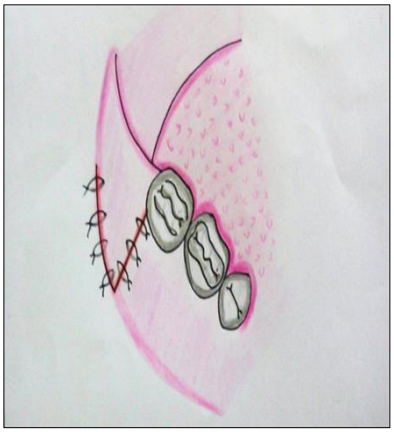

Fig. 5: Closure of the lingually based triangular flap

For the objective evaluation of swelling, five distances were measured: (a) the distance from the mandibular angle to the lateral corner of the mouth; (b) the distance from the mandibular angle to the nasal alar curvature, (c) the distance from the mandibular angle to the lateral canthus of the eye, (d) the distance from the tragus to the soft tissue pogonion, and (e) the distance from the tragus to the lateral corner of the mouth. Measurements were performed twice with a thread, transferred to a ruler, and recorded. The facial measurement was calculated as: (a + b + c + d + e)/5.

Trismus was assessed by measuring the maximum inter-incisal opening (in millimeters) – the distance between the incisal margin of the upper and lower central incisors – using a standard ruler.

The presence of alveolar osteitis (dry socket) was determined clinically using Blum's criteria.[15] On days 7, 14, and 21 postoperatively, wound healing was assessed and recorded as primary or healing by secondary intention. Every opening along the incision was recorded as a wound dehiscence. Sutures were removed on 7th postoperative day. Patients were recalled on days 2, 7, 14, and 21 postoperatively, and were evaluated for the parameters of pain, facial swelling, maximum mouth opening, wound dehiscence, and other variables. During each postoperative visit, data were collected and recorded by the same surgeon who was blinded to the surgical technique used. This measurement was repeated twice.

Statistical analysis: Data were analyzed using SPSS IBM Statistics version 20.Differences in individual parameters among the groups were tested using an independent sample t-test for normally distributed variables (trismus) and the Mann–Whitney U-test for non-normally distributed variables (swelling and pain). Additionally, Pearson's correlation test was used to assess if a statistically significant relationship existed between two categorical variables. Differences were considered significant if the P-value was less than 0.05.

RESULTS

A total of 10 patients (4 women and 6 men), aged between 19 and 28 years (mean ± standard deviation, 23.10 ± 2.51 years), participated in this study. The average time taken to perform the surgery was 21.30 ± 1.49 min for the buccally based triangular flap group and 22.50 ± 1.08.97 mins for the lingually based triangular flap group (P = 0.42). The pain level in this study was measured by VAS scale, it came out to be less in the lingually based triangular flap as compared to buccally based flap and was statistically significant at 6 hours, 12 hours, 1st day,4th day,5th day and 6th day(P< 0.05) (Table 1). There was a better recovery in mouth opening in the lingually based flap, but it was not statistically significant (Table 2). Also, the reduction in facial swelling in the lingually based flap was slightly better the other and was statistically significant at 2nd day (P< 0.05) (Table 3). Wound dehiscence was less in both the group but was slightly more in the buccally based flap which was statistically significant at 14th and 21st day (P< 0.05) (Table 4).

Time of assessment post-surgery	Buccally based triangular flap (mean ±SD)	Lingually based triangular flap (mean ± SD)	P-value[a]
6 Hours	7.50 ± 0.527	5.70 ± 0.67	0.00*
12 Hours	6.80 ± 0.63	5.70 ± 0.94	0.01*
1st Day	6.50 ± 0.70	5.80 ± 0.78	0.05*
2nd Day	6.00 ± 1.24	4.70 ± 1.63	0.06
3rd Day	5.50 ± 1.26	4.00 ± 2.00	0.09
4th Day	4.30 ± 1.56	2.70 ± 1.89	0.05*
5th Day	3.50 ± 1.95	0.60 ± 1.35	0.00*
6th Day	2.20 ± 1.81	0	0.00*
7th Day	0.60 ± 0.96	0	0.06

Table 1.Pain levels assessed by VAS (in centimetres).
VAS, visual analogue scale; SD, standard deviation. a P-value, Mann–Whitney U-test. * P < 0.05.

Time of assessment post-surgery	Buccally based triangular flap (mean ±SD)	Lingually based triangular flap (mean ± SD)	P-value[a]
Pre-operative	4.02 ± 0.55	4.65 ± 0.85	0.27
2nd Day	3.30 ± 0.54	3.82 ± 0.46	0.42
7th Day	3.37 ± 0.50	3.99 ± 0.61	0.99
14th Day	3.65 ± 0.52	4.14 ± 0.71	0.54
21st Day	3.75 ± 0.52	4.44 ± 0.85	0.15

Table 2. Maximum inter-incisal opening (in centimetres).
SD, standard deviation. a P-value, independent sample t-test.

Time of assessment post-surgery	Buccally based triangular flap (mean ±SD)	Lingually based triangular flap (mean ± SD)	P-value[a]
Pre-operative	10.69 ± 0.55	10.89 ± 0.58	0.49
2nd Day	12.11 ± 0.79	11.35 ± 0.47	0.02*
7th Day	11.75 ± 0.80	11.27 ± 0.43	0.17
14th Day	11.56 ± 0.75	11.25 ± 0.53	0.38
21st Day	11.18 ± 0.71	11.00 ± 0.46	0.64

Table 3. Facial swelling
SD, standard deviation. a P-value, Mann–Whitney U-test. * P < 0.05.

Time of assessment post-surgery	Buccally based triangular flap n (%)	Lingually based triangular flap n (%)	P-value[a]
7th Day			0.65
Primary	4 (40)	7 (70)	
Secondary	6 (60)	3 (30)	
14th Day			0.02*
Primary	7 (70)	8 (80)	
Secondary	3 (30)	2 (20)	
21st Day			0.00*
Primary	8 (80)	9 (90)	
Secondary	2 (20)	1 (10)	

Table 4. Outcomes of wound healing according to the technique used
n= number, a P-value, Pearson x^2 test. * P < 0.05.

DISCUSSION

Multiple factors influence the severity of events associated with surgical procedures which are related to the procedure, patient, and/or operating surgeon.Risk factors and complications were seen after the third molar extraction should be explained to the patient clearly.

The incisions which are used to expose impacted third molars can be broadly classified into triangular and envelope types. Regardless of variations in the anterior extension of the incisions, all the incisions extend posteriorly from the distal aspect of the second molar on to the ascending ramus.Various modifications have been given by several surgeons to increase accessibility to the surgical site and reduce complications.

With the exception of a few flap designs, it appears that the incisions of many conventional flap designs are not placed on the sound bone. With the comma-shaped flap described by Nageshwar,[16] the tongue-shaped flap designed by Berwick, [17] and the lingually based triangular flap used in the present study, the incisions are not placed on the bony defect formed from the extraction of the impacted molar.

Nageshwar[16] compared the conventionally modified envelope flap with comma-shaped flap design and found that pain scores were significantly lower when the comma-shaped flap design technique was used. Also, it was found that the incidence of swelling and trismus was lower in the comma-shaped flap group, but this was not statistically significant. In the present study, the lingual based flap also had lower pain scores which were statistically significant and also had a better mouth opening with better reduction of facial swelling and less wound dehiscence.

Kumar et al[18] evaluated the effect of a comma-shaped flap design and standard flap design (Ward's incision) on pain, swelling, and trismus after impacted third molar surgery. They observed that the comma-shaped flap was associated with lesser facial swelling, lower pain scores, and a lower incidence of trismus. This present study with lingual flap also gives a faster reduction of facial swelling, lower pain scores and better recovery of mouth opening as compared to conventional buccal triangular flap.

Wound closure following third molar surgery may be primary or secondary in nature.[19] Various techniques of achieving closure have been described in the literature, which includes drain placement, mucosal excision, single suture placement, and the sutureless technique.[20] Primary or secondary wound closure techniques may affect postoperative morbidity.[19,20] With the secondary closure, the extraction socket remains vulnerable to the ambient environment and may become contaminated by oral pathogens and food residues; this condition may lead to the development of potential alveolar osteitis or infection.[15,20] Wound healing is delayed, and postoperative wound care is prolonged.[21] However, secondary wound closure facilitates the drainage of inflammatory exudates and fluids after surgery and aids in decreasing postoperative pain and swelling.[20,22] In our present study both primary and slight secondary healing occurred in both the group but at 14th and 21 days primary healing occurred which was statistically significant.

The aim of this study was to introduce a new flap design and to compare this with buccal triangular flap. Better healing, lower pain score, better mouth opening and slightly better reduction in facial swelling was observed with the lingually based triangular flap.

CONCLUSION

In conclusion, these results showed that this new flap design is preferable to the routinely used buccal triangular flap for impacted third molar surgery.

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