

EVALUATING THE EFFICACY OF BUCCALLY BASED TRIANGULAR FLAP VERSUS LINGUAL BASED TRIANGULAR FLAP AFTER IMPACTED MANDIBULAR THIRD MOLAR REMOVAL SURGERY: A COMPARATIVE PROSPECTIVE STUDY

Oral & Maxillofacial Surgery

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ABSTRACT

Introduction: Flap design in mandibular third molar surgery influences postoperative morbidity. The selection of flap design governs surgical access, operative field visibility, soft-tissue management, and postoperative healing patterns. **Aims & Objectives:** To compare lingually based and buccally based triangular flaps regarding postoperative pain, swelling, trismus, wound healing and surgeon's convenience following impacted mandibular third molar removal surgery. **Methods:** Twenty-four patients (>21 years) with completely impacted mandibular third molars with difficulty index 3–5 were randomly allocated into two groups. Group A (n=12) received buccally based triangular flaps; Group B (n=12) received lingually based triangular flaps. Standardized surgical extraction was performed under local anaesthesia with postoperative evaluations of pain, swelling, trismus, wound healing were assessed using validated scales on days 1, 3, and 7 postoperatively to compare outcomes between groups. **Results:** Pain scores were similar between groups across all days with no significant differences. Trismus was significantly less in Group B on day 3 ($p=0.032$), with comparable mouth opening on other days. Wound healing distributions showed no significant differences ($p>0.05$) between groups on 1, 3, or 7 postoperative days. Swelling showed significant reduction in Group B on day 1 ($p=0.013$). The Surgeon's convenience on 5 point rating scale showed superior intraoperative outcomes among group B in third molar surgery. **Conclusion:** The lingual-based triangular flap showed superior outcomes in trismus and swelling at certain time periods while providing adequate access with minimal tissue disruption. This flap design is a viable alternative for mandibular third molar surgery, especially with extensive distal bone removal.

KEYWORDS

postoperative outcome, flap design, triangular flap, third molars, healing

INTRODUCTION

The field of oral and maxillofacial surgery has been upgraded over time but still the core component remains the dentoalveolar surgery in routine clinical practice. The incidence of impacted teeth has increased over the years owing to factors such as unfavourable dietary habits, genetic predisposition and insufficient jaw growth leading to inadequate space for tooth eruption[1,2]. Third molars are the most commonly impacted teeth to be found in humans and their surgical extraction is one of the most common dentoalveolar surgical procedures in the oral maxillofacial surgical field. Third molar impaction has higher prevalence of 90%[3]. As it is routinely performed, the postoperative complications in third molar surgeries include pain, swelling, trismus, delayed wound healing which deals with discomfort in patient's routine activities. Several factors contribute to these postoperative outcomes including the difficulty assessment of position and depth of the tooth, surgeon's operating skill, flap design, choice of instruments, amount of bone removal, patient specific factors like age, gender etc[4]. The preference of flap design is very critical as it affects the intraoperative access as well as the postoperative outcomes. The selection of flap influences the surgical accessibility, visibility, tissue handling and healing dynamics.

This study aims to assess the effective nature of lingual based triangular flap and buccal based triangular flap in mandibular third molar impaction surgery and evaluating postoperative outcomes and surgeon's convenience.

MATERIALS AND METHODS:

This prospective comparative clinical study was conducted in the Department of Oral and Maxillofacial surgery, CSI College of Dental Sciences and Research, Madurai, Tamil Nadu. Patients reported with indication of removal of impacted mandibular third molars were included in the study. Ethical approval was obtained from the Institutional Ethical Committee and Review Board (CSICDSR/ IEC/

0321/ 2024). A total of 24 patients aged above 21 years with completely impacted mandibular third molars with Pederson difficulty index from 3 to 5 were included in the study and patients with systemic illness, partially impacted mandibular third molars, pregnant and lactating females were excluded. The participants were allocated into two groups as group A (n=12) were subjected to Buccally based triangular flap and group B (n=12) were treated with lingual based triangular flap. All the study cases were operated by single experienced surgeon.

SURGICAL PROCEDURE:

Informed consent was obtained from the patient and preoperative difficulty assessment was performed using Orthopantomogram or Intra Oral Periapical Radiograph (IOPA). All the procedures were done under Local anaesthesia. Incision and flap designs were performed based on the patients allocated in each group.

Buccally based triangular flap:

In group A patients, the incision commenced with a vertical release at the mesio-buccal gingiva of mandibular second molar, continues as crevicular incision and extended at 45° along the distobuccal line towards angle of mandible(Figure 1)



Figure 1: Buccally based triangular flap

Lingually based triangular flap:

In group B patients, vertical incision was placed distal to mandibular second molar extended into buccal vestibule and then incision carried posterosuperiorly to reach mandibular ramus. Once after the incision, full thickness mucoperiosteal flap was elevated buccally in group A patients and lingually in group B patients (Figure 2).



Figure 2: Lingually based triangular flap

Ensuring adequate exposure of the bone and impacted tooth, bone guttering was performed. Tooth luxated, elevated out of socket and surgical site closed primarily.

OUTCOME VARIABLES:

The postoperative assessments were performed on the 1st, 3rd and 7th days to evaluate parameters such as pain, swelling, wound healing and trismus.

Wound healing was assessed using modified wound healing index based on erythema, slough, granulation tissue, and complete wound closure. Evaluation of pain was measured using visual analogue scale (VAS). Facial swelling was determined by clinical edema grading scale.

Mouth opening was measured between incisal edges of maxillary and mandibular teeth. In addition to the postoperative clinical outcomes, this study also assessed the surgeon's perception in intraoperative convenience by 5 point rating scale questionnaires.

STATISTICAL ANALYSIS:

All the data were entered in Microsoft Excel and all the Statistical analysis was performed using IBM SPSS Statistics 21. Continuous variables were assessed for normality using the Shapiro-Wilk test and summarized as mean $\pm$ standard deviation (SD) for normally distributed data or median with interquartile range (IQR) for non-normally distributed data. Intergroup comparisons of postoperative pain (VAS scores) and mouth opening at each follow-up were performed using the independent samples t-test for normally distributed data and the Mann-Whitney U test for non-normally distributed data. Postoperative swelling grades and wound healing scores, being categorical variables, were compared between the groups using Fisher's exact test. A two-sided p-value < 0.05 was considered statistically significant.

RESULTS:

A total of 24 patients underwent surgical removal of mandibular third molars were included. 12 patients subjected to group A (Buccal based triangular flap) and 12 patients subjected to group B (lingual based triangular flap).

Comparative of postoperative pain:

The median postoperative pain gradually decreased in both the groups from day 1 to day 7.

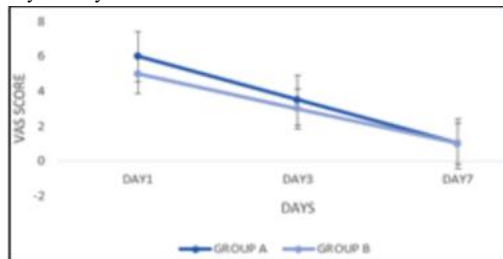


Figure 3: VAS Scores Between Group A and B

Group A showed a higher median VAS score than Group B on day 1 and day 3, but was not statistically significant ($p=0.327$ and $p=0.672$, respectively). On Day 7, both groups had similar postoperative pain pattern irrespective of flap designs (Figure 3).

Comparison of postoperative trismus:

Both groups showed marked reduction in mouth opening on Day 1, followed by better improvement on day 3 and day 7. A statistically significant difference observed on day 3 with better mouth opening in group B ($p=0.032$). (Figure 4)

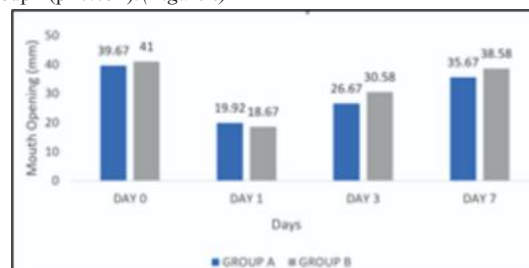


Figure 4: Mouth Opening in Group A and B

Comparison of postoperative wound healing:

On Day 1, erythema was the predominant healing finding in both groups, with no significant difference in wound healing distribution ($p=1.000$). On day 3, slough and granulation tissue was observed as predominant finding in group A and group B respectively ($p=0.742$). On Day 7, complete wound closure was observed more frequently in Group B (50.0%) than in Group A (33.3%) but was not statistically significant ($p=0.859$) (Figure 5, 6).

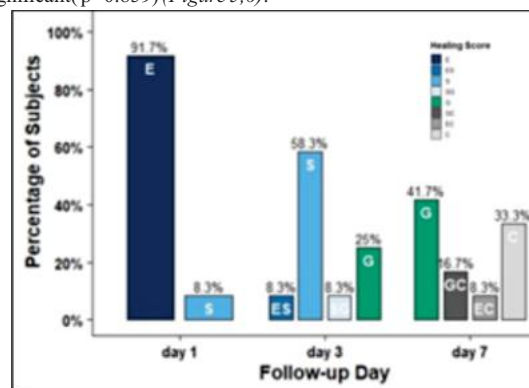


Figure 5: Wound healing distribution in Group A

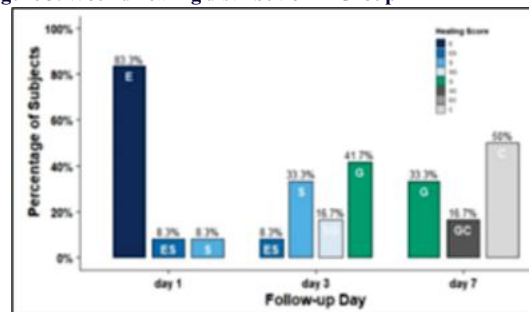


Figure 6: Wound healing distribution in Group B.

Comparison of postoperative swelling:

On Day 1, Group A predominantly exhibited Grade 3 swelling (83.3%), whereas Grade 2 swelling was more common in Group B (66.7%). This difference was statistically significant ($p=0.013$), indicating reduced postoperative swelling in group B. On Day 3 and day 7, there was reduction in swelling in both the groups but not statistically significant ($p=0.220$ and $p=0.371$) respectively (Figure 7, 8).

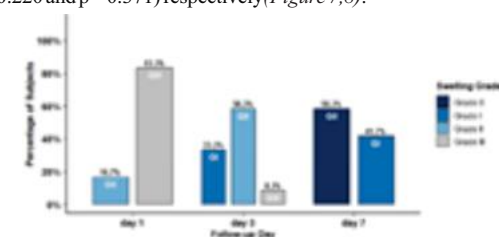


Figure 7: Swelling Grades in Group A

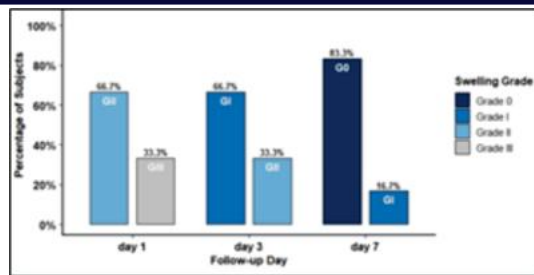


Figure 8: Swelling grades in group B

Comparison on surgeon's convenience:

Based on questionnaire assessed by a experienced surgeon, the lingual based triangular flap was accorded with higher ratings than buccal based triangular flap in intraoperative parameters. It showed optimal results in surgical field visibility, instrument accessibility, tooth sectioning and removal, operative duration and overall surgeon's convenience (Figure 9).

DISCUSSION:

This study measures the outcomes of two different triangular flap designs as buccal based and lingual based techniques on postoperative pain, wound healing, swelling, trismus and surgeon's convenience in mandibular third molar removal surgery. Shahi et al states that different surgical modalities like alternative flap designs, various wound closure techniques, pharmacological interventions, cryotherapy, use of corrugated drains and laser assisted procedures reduce postoperative complications[5].

The postoperative pain results from the tissue injury and inflammatory response subsequently. The intensity of postoperative pain depends on soft tissue manipulation and wound tension. Said N et al reported significant reduction in pain on the 3rd and 7th postoperative days in lingual based flap. He states that reduction in pain may be attributed to limited soft tissue trauma as incision placed over intact bone[6].

The current study shows significant reduction in pain scores on all the assessed days. Group A showed the highest VAS score on day 1 and 3 when compared to group B but there was no statistically significant reduction between two groups.

The amount of postoperative trismus was attributed to inflammation involving the muscles along with edema and pain. Flap reflection beyond external oblique ridge and greater tissue retraction also a significant role in postoperative trismus after third molar surgery. Prajapati et al observed that the distal releasing incision in buccal based triangular flap placed in close proximity to temporalis tendon may contribute to restricted mouth opening postoperatively[7]. The amount of mouth opening was gradually improved on day 3 and day 7 in both the groups and group B showed a statistically significant difference on day 3 indicating better mouth opening when compared to group A.

Wound healing depends on adequate vascularity, flap retraction, tension free closure and soft tissue manipulation. Wound healing was assessed using Modified wound healing index customized from pressure ulcer scale for healing and Bates Jensen Wound Assessment based on five criterias like erythema, denuded bone, slough, granulation tissue and complete closure of socket. Yuan L et al published a review stating that lingual based flap showed significant decrease in wound dehiscence and better primary wound closure[8].

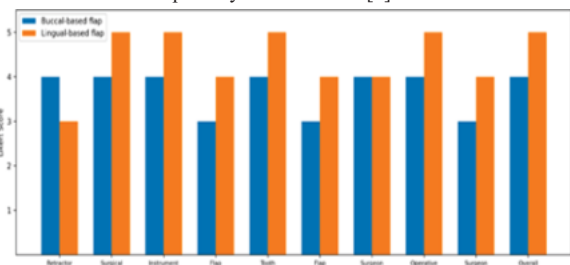


Figure 9: 5-point scale questionnaire

This study showed better wound closure in group B than group A but not statistically significant. Higher proportion of complete closure of

sockets showed in Group B (50%) than group A (33.3%). Wound dehiscence is minimized in group B as the flap is sutured over the bone whereas in group A, the flap is sutured over the extraction socket [9].

The postoperative swelling was assessed clinically in both intra-orally and extra-orally into grade 0 to grade 3. There was a statistical difference between the group on day 1 with p- value 0.013. Group B showed 83.3% of grade 0 and group A showed 58.3% of grade 0 which indicates no swelling on day 7 postoperatively. Though there was improvement in postoperative swelling the difference between the groups did not attain statistically significant difference.

The operating surgeon rated assessment demonstrated differences between the two flaps designs. Adequate visualization of impacted tooth and surrounding bone is essential for precise bone removal and controlled tooth sectioning. Based on the experienced operating surgeon's perception, lingual based triangular flap was perceived to provide superior surgical field visibility, easier instrument maneuverability and greater convenience during the distal bone removal when assessed against the buccal based triangular flap in impacted mandibular third molar surgery thereby increasing the operating efficiency.

Overall, the lingual based triangular flap is a convenient and efficient alternative in mandibular impacted tooth removal surgery in case of completely and partially soft tissue impactions with moderate difficulty and in cases with extensive distal bone removal whereas the buccal based triangular flap can be taken up for tooth with both hard and soft tissue impactions as per the surgeon's assessment.

LIMITATIONS:

- Only single surgeon's experience was assessed using a subjective questionnaire.
- This technique outcomes may also depend on surgeons skill and surgical expertise in manipulating lingual flap and tongue movements.

CONCLUSION

Within limitations of this study, the lingual based triangular flap demonstrated superior postoperative outcomes compared to buccal based triangular flap in completely impacted mandibular third molar surgery. Patients in lingual based group showed significantly better mouth opening and facial swelling at particular intervals indicating favourable recovery of the patients. In addition to clinical benefits, it also offered greater intraoperative operator convenience in surgical field visibility and accessibility thereby potentially reducing operating duration and surgical trauma to the adjacent tissues. Despite concerns regarding lingual tissue manipulation, this surgical technique considered a reliable and advantageous alternative to conventional flap designs for third molar surgery in cases with unfavourable impaction patterns requiring extensive distal bone removal.

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