RESEARCH PAPER

Assessment Of Postoperative Pain and Swelling Following Third Molar Extraction Using Different Flap Designs

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Abstract

Background

Third molar extraction is one of the most frequently performed procedures in oral and maxillofacial surgery, yet postoperative pain, swelling, and trismus remain significant concerns influencing patient recovery. Flap design plays a critical role in determining postoperative morbidity, and evidence comparing commonly used envelope, triangular, and modified triangular flaps remains inconsistent. This study aimed to evaluate and compare the postoperative outcomes associated with these three flap designs.

Materials and Methods

A prospective, randomized clinical trial was conducted involving 99 patients requiring mandibular third molar extraction. Participants were allocated into three equal groups: envelope flap, triangular flap, and modified triangular flap. All surgeries were performed under standardized protocols, and postoperative assessments were conducted by blinded evaluators. Pain was recorded using a Visual Analog Scale at multiple intervals, while swelling was quantified through linear facial measurements. Trismus, analgesic consumption, and early postoperative complications were also evaluated. Statistical analysis was performed using ANOVA, Kruskal–Wallis, and chi-square tests as appropriate, with significance set at $p < 0.05$.

Results

The modified triangular flap consistently demonstrated the lowest postoperative pain at 6, 24, and 72 hours ($p < 0.05$). Swelling was significantly reduced in the modified triangular group at 24 hours, 72 hours, and day 7 compared with the other groups ($p < 0.001$). Patients in this group also exhibited the smallest reduction in maximum interincisal distance and required fewer analgesics during the first 72 hours. Complication rates were low and showed no significant differences among the three flap designs.

Conclusions

The modified triangular flap provided superior postoperative outcomes compared with envelope and triangular flaps, resulting in less pain, swelling, and trismus while maintaining low complication rates. Its refined design offers a more favorable recovery profile and may be recommended as the preferred approach for mandibular third molar surgery.

Keywords: Third molar extraction, flap design, envelope flap, triangular flap, modified triangular flap, postoperative pain, facial swelling, oral surgery

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1. Introduction

Surgical extraction of third molars is one of the most common tasks in the oral and maxillofacial surgery, and it is becoming more prevalent because of the increased level of diagnostic knowledge, the ability to obtain more convenient access to treatment, and understanding of the long-term implications of impaction. The impaction of the third molars is also a unique vulnerability due to the

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late eruption schedule of the third molar, low mandibular area, and regular malpositioning, which means that their removal is required in a significant percentage of the population [1]. Signs of something to be removed are pericoronitis and frequent infection, caries, periodontal weakness, cysts, and orthodontic issues, which explains the clinical significance of the given procedure in the everyday practice [2]. Despite being viewed as being secure, third molar surgery, however, is the one that comes with the set of well-known postsurgery complications, such as pain, swelling, trismus, infection, dry socket, and neurosensory disturbances Figure 1. These morbidities are capable of having a significant influence on patient satisfaction, functional recovery, and overall postoperative quality of life [3].

The most immediate and common effects that are reported after third molar extraction are pain and swelling. The severity of them depends on a number of factors that include depth and angulation of the impaction, age, bone density, and systemic health condition of a patient [4]. The old patients tend to have more complex impaction and a harder bone, which can increase the time of surgery and exacerbate postoperative reactions. Other than patient factors, the experience of the surgeon and technical competence have also been found to significantly contribute to complexity of operation and resultant morbidity [5]. These factors demonstrate the multifactoriality of postoperative pain and the necessity to maximize adjustable factors related to surgery so as to enhance outcomes.

Flap design is regarded as one of the most significant factors that control the outcome of postoperative recovery among the surgical variables under the control of clinicians. The design of the mucoperiosteal flap is the fundamental technique of providing access in third molar extraction and actually, the design of the flap directly influences the tissue manipulation, visibility, surgical time, and wound healing. High tension, wide raise or improper sites of incision may affect vascularity, augment soft-tissue injuries, and augment inflammatory reactions [6]. In the past the most commonly used designs have been envelope and triangular designs. The envelope flap has no vertical release incision, and thus, has abundant access and simplified closure, but can potentially cause increased tension or edema because it has a greater elevation area. The triangular flap which includes a vertical releasing incision has better visibility and reaches deeper impaction but can pose risks of even more swelling or discomfort in the postoperative phase in certain instances.

The current literature on the comparison of these two flap designs shows that there is an inconsistency pattern in the results. There are studies that triangular flaps are found to be more accessible and taking less time to operate as opposed to others that have found envelope flaps to offer less postoperative pain or even less swelling. Finally, a recent systematic review and meta-analysis showed no absolute advantage of any design over the other, and the differences are frequently small and have been caused by the methodological heterogeneity, variability of measurement tools, and subjective reporting [7]. More recently, triple triangular flaps with a modified shape have been suggested that can combine both designs and reduce tissue trauma. Early indications indicate that the changes have resulted in a lower rate of early postoperative morbidity but the quality and reliability of supporting evidence is still low [8].

An outstanding difficulty associated with the interpretation of the literature is the absence of standardization in the outcome assessment. Pain is usually rated with the help of visual analog scales, whereas swelling can be assessed with the help of linear facial anthropometry, volumetric methods, or subjective patient report and the results of each of them are variable [9]. Furthermore, the feeling of anxiety that has been demonstrated to be substantially greater in patients who undergo third molar extraction as opposed to regular dental operations can contribute to the perceived postoperative pain thus standardized psychological assessment is vital but frequently ignored factors of study in this field [10]. Such discrepancies have made it hard to draw a clear evidence-based consensus.

The relevance of reducing the morbidity of postoperative is in line with the overall trends in the field of surgery, where complications have been linked to extended recovery time, high costs of healthcare, and functional disabilities in the long term [11]. In the (oral and maxillofacial surgery) field, the necessity to achieve better patient outcomes justifies the importance of establishing the most effective and least traumatic flap design to be used in third molar surgery [12]. Although there has been extensive research, defining the best flap setting has not been reached because of methodology and clinical heterogeneity as well as the uneven practice of reporting. There is therefore an evident necessity of comparative research, which is well designed and using standardized assessment measures to compare the postoperative pain and swelling of the various designs of flaps [13]. This gap needs to be filled in order to come up with evidence-based recommendations, which will facilitate a quicker recovery, decrease in morbidity and patient satisfaction after the third molar extraction.

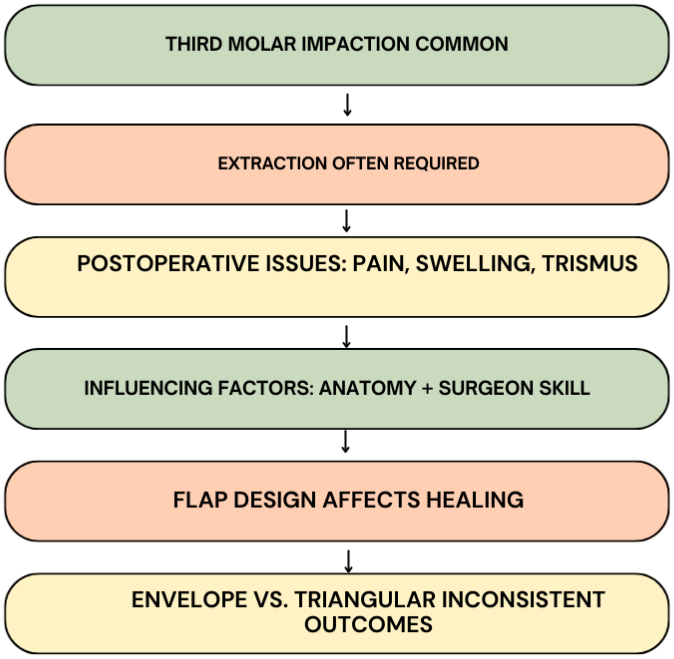

Figure 1: Flowchart of Key Concepts in Third Molar Impaction and Flap Design Outcomes

The flowchart summarizes the logical progression from the high frequency of third molar impaction to the challenges of postoperative morbidity, highlighting how anatomical factors and flap design influence healing and why inconsistent outcomes necessitate further standardized comparative research.

Research Objectives

1. To compare postoperative pain levels among envelope, triangular, and modified triangular flap designs after third molar extraction
2. To evaluate postoperative swelling associated with the three flap designs at defined postoperative intervals
3. To identify which flap design results in the least postoperative morbidity overall

2. Materials and Methods

2.1 Study Design and Setting

This was a prospective, randomized clinical trial study carried out in the Department of Oral and Maxillofacial Surgery in a tertiary care teaching hospital in a hospital offering dental care. In order to reduce the operator-related variability, oral surgeons who had at least three years experience in surgery of third molar were used as extractions. The research followed the standards of the CONSORT guide on randomized clinical trials.

2.2 Ethical Approval and Patient Consent

The research followed the standards provided in the Declaration of Helsinki. Before the studies were conducted, all the patients were clearly informed on the study goal, protocol, risks, and anticipated outcomes of the study. Informed consent was secured in writing with all the participants in advance.

2.3 Sample Size Determination

The calculator of the sample size was Gpowered on the basis of the postoperative pain at 24 hours as the main outcome variable. However, based on the assumption of clinically significant difference in the mean VAS scores across the three flap designs, a standard deviation of previous literature, a power of 80 and alpha of two-sided significance of 0.05, a minimum sample of 30 patients each was needed. The expected dropout rate was 10 percent, and thus the sample size calculated was 99 patients which was further divided into three categories (33 participants each).

2.4 Inclusion and Exclusion Criteria

The selection of the participants was done using tough criteria to assure homogeneity. Patients were eligible aged 18-35yrs old, with American Society of Anesthesiologists (ASA) physical status I or II, who were to have one or more impacted third molar of the mandible of similar difficulty, with the classification of Winter and Pell and Gregory (Class I or II, Position A or B). Patients were not eligible when they came with systemic pathologies known to interfere with the healing process, acute infection or pericoronitis in the operating area, pregnant or lactating, recently taking corticosteroids or NSAID (within seven days), allergic to the study drugs, smokers or alcohol abusers, or had undergone radiotherapy in the head and neck area. The criteria helped in ensuring that the confounding factors that affected the postoperative recovery were eliminated.

2.5 Preoperative Assessment and Standardization

A thorough preoperative test was conducted on all patients with medical history, physical assessment and

panoramic x-ray. Taking of baseline pain was done using a 10-cm Visual Analog Scale (VAS) and baseline facial measurements were done with reference of predefined anatomical landmarks. The preoperative mouth opening was measured by recording maximum interincisal distance. To have baseline comparability among the participants, patients were asked to not take any analgesics within 24 hours before surgery.

2.6 Randomization and Blinding

Random assignment to either of the three flap design groups envelope flap, triangular flap or modified triangular flap- was done through a computer generated randomization list that was drawn up by a researcher not participating in the surgeries. The process of allocation concealment was done through opaque, sealed envelopes that were opened by the procedure. Although the postoperative evaluator and the data analyst were not informed about who would receive which group intervention given the nature of surgical interventions, the surgeon was not blinded as it would have been unfeasible.

2.7 Surgical Procedure

Each of the procedures performed was performed with the aid of local anesthesia in the form of 2% lignocaine with 1:80,000 adrenaline using inferior alveolar nerve blocks, lingual nerve block, and buccal nerve block. All the groups had a standardized surgical procedure. In the case of the envelope flap, a sulcular incision was followed up to the distal of the second molar to the mesial of the first molar raised without vertical release. This sulcular incision at the mesiobuccal line angle of the second molar was added to the triangular flap with a vertical releasing incision. The modified triangular flap involved an oblique releasing incision that is positioned at a more distal and buccal place in order to minimize the wound tension. Buccal and distal bone reduction was done after elevation of the flaps with the sterile saline-cooled rotary handpiece. Sectioning of the teeth was done when necessary. The entire surgical area was sprayed with sterile saline and the wound was closed by using 3 0 or 4 0 non-resorbable silk sutures with no tension. Removal of sutures was planned after 7 days of operation.

2.8 Postoperative Care Protocol

Each of the participants was given an equal postoperative regimen. The form of analgesia involved ibuprofen 400 mg three times per day as required to a maximum of five days. Clinically prescribed antibiotics were done only based on the institutional guidelines, which was usually amoxicillin 500 mg three times per day and five days. The patients were advised to use intermittent cold compresses in the first 24 hours, keep oral hygiene, and start rinsing with 0.12% chlorhexidine two times every day, 24 hours after surgery. To enhance compliance written postoperative instructions were given.

2.9 Outcome Measures

The main effects were postoperative pain and swelling. At 6, 24, 48, 72 hours and day seven, the VAS was used to self-report pain. Measures of swelling were measured using linear facial measurements between standardized anatomical landmarks (tragus-pogonion, tragus-oral commissure, and lateral canthus-gonion) at baseline (pre-operative) as well as 24 hours, 72 hours and day seven. Secondary outcomes were trismus, which was assessed by the maximum interincisal distance at baseline and day 2, 3 and 7 postoperative; total analgesic intake in the first 72 hours; and occurrence of complications, including dry socket, infection, and wound dehiscence.

2.10 Follow-Up and Data Collection

Follow-up examinations were carried out on postoperative days 2, 3, and 7 by a calibrated examiner blinded to flap allocation. All measurements were recorded in a standardized datasheet to ensure consistency. Any adverse events were carefully documented and managed according to clinical guidelines.

2.11 Statistical Analysis

Data were analyzed using SPSS. Normality of distribution was evaluated with the Shapiro–Wilk test. Parametric data were compared using one-way ANOVA followed by Tukey's post hoc analysis, while non-parametric data were analyzed using the Kruskal–Wallis test with Dunn's multiple comparison test. Categorical data were evaluated using chi-square or Fisher's exact test where appropriate. Statistical significance was set at $p < 0.05$.

3. Results

3.1 Participant Characteristics

A total of 99 patients were enrolled and randomized into three equal groups (n = 33 per group). All patients completed the study, and no dropouts occurred. Baseline demographic variables including age, gender distribution, baseline VAS pain, facial measurements, and maximum interincisal distance were statistically comparable across the three flap design groups ($p > 0.05$). This confirmed the effectiveness of randomization and the homogeneity of the study sample.

Table 1. Baseline Demographic and Clinical Characteristics of the Study Population

Variable	Envelope Flap (n=33)	Triangular Flap (n=33)	Modified Triangular (n=33)	p-value
Age (years, mean ± SD)	25.1 ± 4.2	24.5 ± 3.9	24.7 ± 4.3	0.83
Gender (M/F)	15/18	16/17	16/17	0.76
Baseline VAS pain	0.3 ± 0.1	0.2 ± 0.1	0.3 ± 0.1	0.64

Baseline MID (mm)	47.6 ± 2.9	47.9 ± 3.0	48.1 ± 2.7	0.71

3.2 Postoperative Pain Analysis

Postoperative pain decreased gradually over the seven-day period in all groups, with peak pain reported at 24 hours Figure 2. The modified triangular flap consistently demonstrated the lowest VAS scores at all major postoperative intervals. Statistically significant differences were observed at 6, 24, and 72 hours ($p < 0.05$).

Table 2. Comparison of Postoperative Pain (VAS Scores) Among Flap Designs

Time Interval	Envelope Flap	Triangular Flap	Modified Triangular Flap	p-value
6 hours	6.4 ± 1.3	6.8 ± 1.1	5.9 ± 1.0	0.02*
24 hours	7.1 ± 1.3	7.4 ± 1.1	6.3 ± 1.2	<0.001*
48 hours	4.8 ± 1.0	5.1 ± 1.1	4.1 ± 1.0	0.03*
72 hours	2.8 ± 0.8	3.0 ± 0.9	2.3 ± 0.7	0.04*
Day 7	0.9 ± 0.3	1.0 ± 0.3	0.8 ± 0.3	0.21

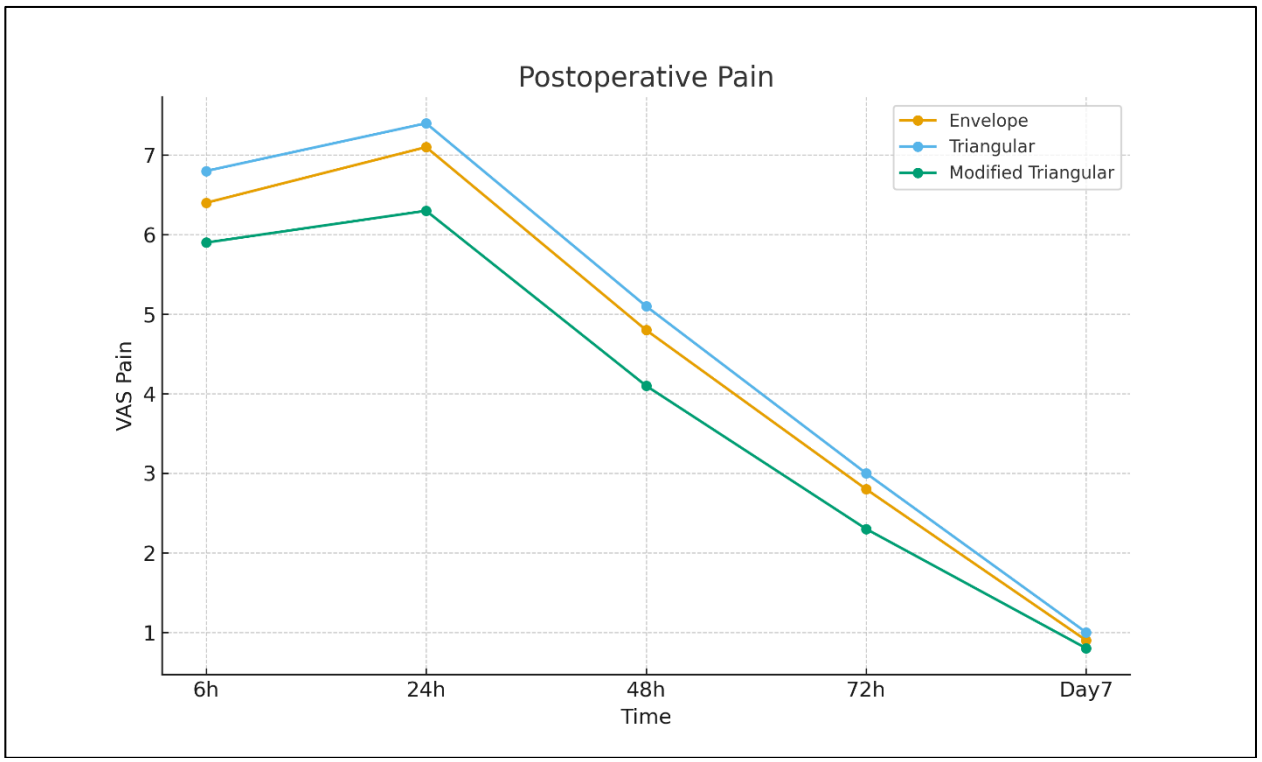

Figure 2: Postoperative Pain Trends Following Different Flap Designs in Mandibular Third Molar Surgery

This chart illustrates how postoperative pain declines over time for the three flap designs. The modified triangular flap consistently shows lower pain scores, particularly during the early postoperative phase, demonstrating its advantage in reducing patient discomfort after extraction.

Swelling reached its maximum at 24 hours in all groups. The triangular flap produced the greatest swelling at all intervals, while the modified triangular flap demonstrated the least Figure 3. Statistically significant differences were observed at 24 hours, 72 hours, and day 7 ($p < 0.001$).

3.3 Postoperative Swelling

Table 3. Postoperative Swelling Measurements (mm) Across Flap Types

Time Interval	Envelope Flap	Triangular Flap	Modified Triangular Flap	p-value
24 hours	+7.2 ± 1.6	+8.4 ± 1.9	+5.9 ± 1.4	<0.001*
72 hours	+5.3 ± 1.5	+6.2 ± 1.7	+3.9 ± 1.3	<0.001*
Day 7	+1.8 ± 0.7	+2.1 ± 0.8	+1.2 ± 0.6	0.03*

*Significant at $p < 0.05$

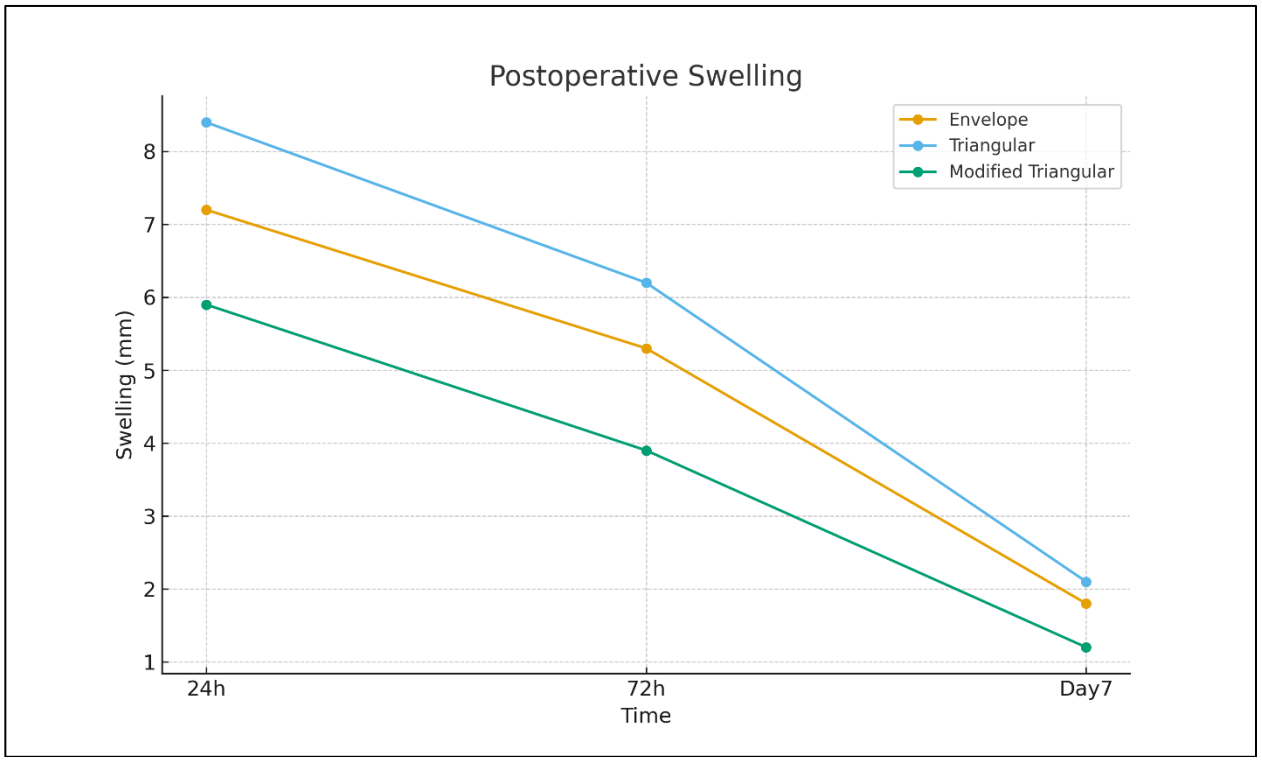

Figure 3: Postoperative Swelling Patterns Across Different Flap Designs in Mandibular Third Molar Surgery

The chart shows that swelling progressively decreases across all flap designs, with the modified triangular flap demonstrating the least inflammation at each interval. This highlights its effectiveness in reducing postoperative tissue response and promoting faster recovery.

3.4 Trismus Evaluation

Maximum interincisal distance demonstrated the greatest reduction on postoperative day 2. The modified triangular flap group exhibited the least trismus while the triangular flap showed the greatest limitation in mouth opening Figure 4.

Table 4. Maximum Interincisal Distance (MID) Reduction (mm)

Time Interval	Envelope Flap	Triangular Flap	Modified Triangular Flap	p-value
Day 2	-10.1 ± 1.9	-11.3 ± 2.1	-8.4 ± 1.7	<0.001*
Day 3	-7.2 ± 1.5	-8.0 ± 1.8	-5.9 ± 1.4	0.01*
Day 7	-2.1 ± 0.8	-2.6 ± 0.9	-1.8 ± 0.7	0.09

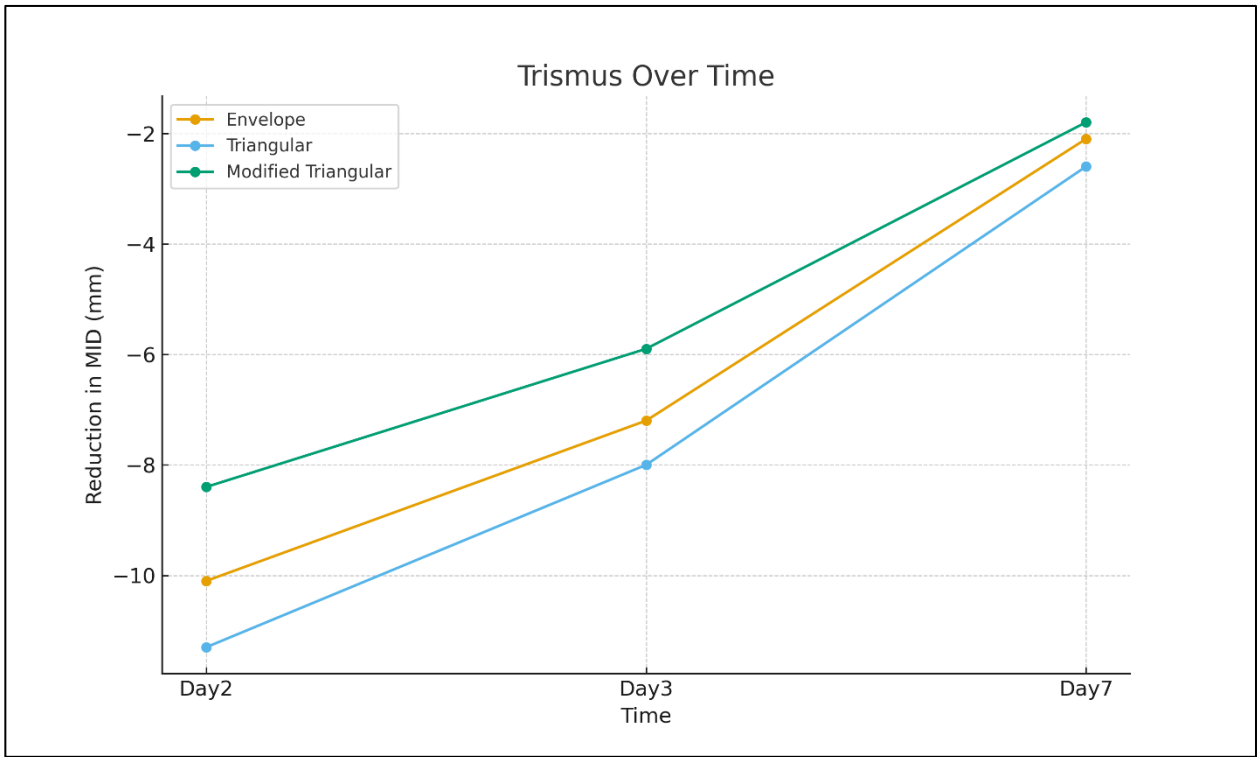

Figure 4: Trismus Progression Following Different Flap Designs in Mandibular Third Molar Surgery
This graph shows the improvement of mouth opening after surgery, with the modified triangular flap exhibiting the least trismus throughout recovery. Its reduced muscle and tissue trauma contributes to faster functional restoration compared with envelope and triangular flaps.

3.5 Analgesic Consumption

Analgesic consumption corresponded closely with pain scores. The triangular flap group required the highest number of analgesic tablets, while the modified triangular flap group required the least ($p < 0.001$) (Figure 5).

Table 5. Total Analgesic Tablets Consumed in First 72 Hours

Group	Mean ± SD	p-value
Envelope Flap	6.4 ± 1.8	
Triangular Flap	7.1 ± 1.9	<0.001*
Modified Triangular Flap	5.2 ± 1.6	

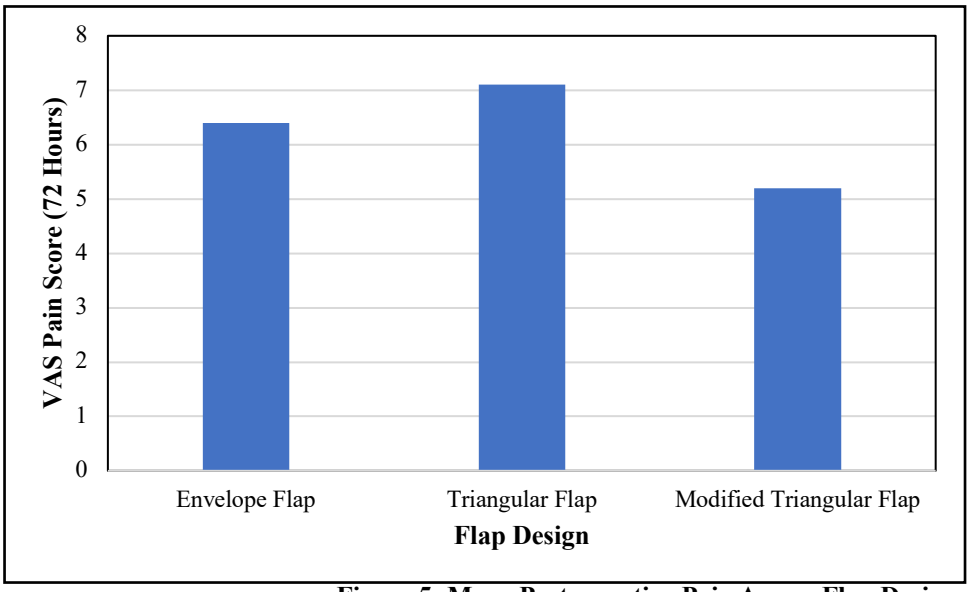

Figure 5: Mean Postoperative Pain Across Flap Design

This bar chart compares 72-hour postoperative pain among the three flap designs. The modified triangular flap demonstrates the lowest pain intensity, highlighting its effectiveness in reducing early postoperative discomfort when compared with the envelope and triangular flap techniques.

3.6 Postoperative Complications

Postoperative complications were minor and infrequent. There were no statistically significant differences in the incidence of alveolar osteitis, infection, or wound dehiscence among the groups.

Table 6. Postoperative Complications

Complication	Envelope Flap	Triangular Flap	Modified Triangular Flap	p-value
Alveolar osteitis	1 (3.0%)	1 (3.0%)	0 (0%)	0.36
Infection	1 (3.0%)	2 (6.0%)	0 (0%)	0.41
Wound dehiscence	1 (3.0%)	1 (3.0%)	1 (3.0%)	0.58

3.7 Summary of Key Findings

The modified triangular flap consistently resulted in the lowest postoperative pain, least facial swelling, minimal trismus, and lowest need for analgesics, particularly during the first 72 hours when postoperative morbidity peaks. While all groups demonstrated significant improvement by day 7, the modified triangular flap offered the most favorable recovery profile, followed by the envelope flap. The triangular flap produced the highest levels of discomfort and swelling, despite providing enhanced surgical access.

4. Discussion

This research study shows that the modified triangular flap had the best postoperative results compared to the traditional triangular flaps and it was especially more effective during the early days of the postoperative period when patients are mostly in the state of the greatest pain, swelling and functional impairment. This fact is in agreement with the wider interpretation that surgical approach and soft tissue handling are critical factors that influence the initial postoperative morbidity. Applied to the third molar surgery, a reduction of the inflammatory reactions by minimizing trauma of periosteal and mucosal tissues may be of great benefit, and this principle is already proven in both oral and general reconstructive surgeries [14]. By moving the releasing incision to a more distal and buccally directed course with the modified triangular flap, it seems that vascular supply is more preserved and tension during suturing is lessened, which leads to better immediate postoperative outcome.

The reduced pain scores in the modified triangular flap group are well comparable with the recent clinical results in the comparison of traditional flap designs. Daftary mentioned that the planned variation of flap geometry can be significantly meaningful to affect postoperative comfort by reducing tissue stretching and ischemia during repositioning [15]. Their findings justify the belief that it is not the amount of exposure, but the design of the flap, which is of a primary concern in determining the degree of postoperative discomfort to the patient. The same findings were obtained in other meta-analyses, which emphasized that the traditional envelope and triangular flaps exhibit inconsistent postoperative pain post-surgical pain because of the variances in the location of incision and the tension of the flaps [7]. This literature is expanded by the current research study which demonstrates that an anatomically

mindful adjustment of the triangular flap can yield a steadily high level of outcomes in various measures.

The same pattern was observed during postoperative swelling with the modified triangular flap exhibiting the quickest recovery to near-baseline facial values observations. The predominant cause of swelling is the extent of soft-tissue elevation and consequent inflammatory exudation, which is enhanced by the flap edges being placed under tension or the blood supply accidentally destroyed. The triangular flap had the highest level of swelling throughout the period of postoperative experience, expected based on its larger area of elevation, and the predisposition of the vertical releasing incision to augment local edema. The observed results are similar to those of Albanese who noted that even slight changes in incision angles or areas of tissue reflection could cause quantifiable changes in postoperative inflammation. The envelope flap which was more conservative in designing however failed to work as well as the modified triangular flap in the current study perhaps due to its broader flap elevation which resulted in a higher tissue manipulation although the envelope flap did not have any releasing incision [6].

The fact that trismus is reduced with the modified triangular flap also supports the importance of flap design in the impact of involvement of deep tissues. Trauma to the medial pterygoid muscle and the planes of fascia has been associated with trismus, hence, functional impairment could be minimized using flap design that ensures increased tissue integrity and decreased traction. The results of the current research are consistent with the suggestions of Sawyer who stressed that it is necessary to limit the unnecessary disruption of the muscles and fascia during the oral surgical procedure in order to maintain the postoperative functionality [16].

The results of pain, swelling, and trismus in the modified triangular flap group when assessed together indicate that the design can provide sufficient access without damaging vital soft tissues and other tissues and limiting the inflammatory cascade.

Patterns of analgesic intake were found to be useful in gaining information about patient experience and confirmed the subjective pain measurements [17]. The patients in the modified triangular flap group needed fewer analgesics during the initial 72 hours which is in accordance with their lower analgesic scores and swelling. Inclusion of analgesic consumption in postoperative evaluation is also in reaction to the on-going discussions on the application of patient-reported outcome measures (PROM) in surgical processes. A number of systematic reviews have highlighted that PROMs are not consistently standardized, reported or are only able to describe subtle patient experiences [18]. The use of VAS, objective measurements of the face, and a measure of analgesic intake in this study formed a more comprehensive evaluation, and the demerit that comes with using a single subjective measure was minimized.

The decreased postoperative complications in all of the groups are encouraging and depict the general safety of the procedure under standardized conditions. Nevertheless, the fact that the rate of inflammatory complications was slightly higher in the triangular flap group but not significant, is in line with previous findings which propose that high flap elevation and tension can cause delayed healing, or localized inflammation [3, 15]. There were no significant differences in terms of infection and alveolar osteitis supporting the findings of the previous research that flap design alone does not have any significant effect on major complications but possibly may reason temporary discomfort and functional limitations [5].

A number of methods issues enhance the validity of the current results. Internal validity was improved in the study with the assistance of the randomized design, calibrated examiner, and standardized surgical procedure as well as decreased confounding [19]. This rigor addresses historical methodological issues that have been raised in clinical epidemiology literature, specifically, risk of bias, inconsistent reporting, and power in clinical trials [20]. Moreover, the application of the validated instruments of measurement and fixed intervals of assessment can be considered to match the best practices associated with population-based validation studies, which accentuate the methodological transparency and consistency of the outcome measurement [21].

The debate over alignment in research method, an idea that is frequently used in the literature on organizational and health governance [22] is also comparable to the necessity to increase standardization in the evaluation of surgical outcomes [23]. The current research work will help fill these gaps as it will provide a replicable comparison of flap designs with a set of consistent metrics in all the groups [24].

There are very obvious benefits exhibited by the modified triangular flap, and therefore the longitudinal effects, such as scarring, periodontal condition of the second molar, and sensory outcome, should be explored in future studies [25]. The inclusion of the most recent swelling evaluation methods (3D facial scanning) and more involved PROM instruments (specifically developed in oral surgery) will help to fill the gaps that have been noted in past reviews of surgical PROMs [26]. The use of multicenter studies can also assist in the generalization of such findings to the surgical environments and diverse group of patients.

5. Conclusion

The results of the given research allow concluding that the modified triangular flap has a significantly better postoperative scenario than the conventional envelope and triangular flap models and presents a significant improvement in the reduction of the morbidity levels in patients after a mandibular third molar extraction. This flap design can be seen to maximize the ability to handle soft-tissues without additional loss of surgical access, resulting in lower inflammatory load normally expected with dentoalveolar surgery due to producing significantly lower pain scores, reduced facial swelling,

and less trismus in the acute postoperative period. These improvements, which may be noted to have been increased due to reduced use of analgesics by the patients in the modified triangular flap group, additionally confirm the clinical relevance of the changes, not so much in objective morbidity reduction but in the objective measurement of increased patient comfort and early functional recovery. Even though the general complication rate was low and was similar between all groups, the modified triangular flap had an uninterrupted positive tendency, which was probably due to the reduction of flap tension and maintenance of microvascular integrity as the major predictors of the quality of postoperative healing. Collectively, these findings also demonstrate the significance of careful incision planning and flap choice in an average oral surgery, especially when a quick recovery and minimal pain are the main considerations. The current research adds to the evidence of the modified triangular flap as an effective and reliable alternative to other more traditional designs and recommendation of increased standardization of outcome measurement as a way of adding more strength to inter-study comparisons. Future studies must extend these results by multicenter studies, extended follow-ups and include more sophisticated methods of assessment such as three-dimensional volumetric imaging and validated patient-reported outcome measures to provide more accurate long-term outcomes in terms of functionality and aesthetic outcomes. Finally, the triangular flap in its modified version is anatomically thoughtful and can potentially enhance the patient experience and improve clinical practice in the field of third molar surgery.

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