



## A Comparative evaluation between Traditional Ward's incision Versus Modification of Ward's incision in Mandibular Third molar removal surgery

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### Abstract

*Objective: To compare standard wards incision with modification of the wards incision in impacted third molar surgeries.*

*Methodology: This study involved 60 patients with mesioangular impacted mandibular third molars. The patients were categorized into two groups a standard ward's incision was made on the control group, while modification of ward's incision was performed on the study group to elevate the mucoperiosteal flap, thereafter disimpaction of tooth was done. The postoperative parameters were documented preoperatively, on postoperative day 1, and on postoperative day 7.*

*Results: Regarding postoperative Mouth opening in ward's incision, as well as in modification of ward's incision group, no significant difference was observed. Whereas a significant difference ( $p < 0.05$ ) 0.008 appears between the two groups in edema control group (11.853) and study group (11.627) respectively on postoperative 7th day.*

*Conclusion: The selection of flap design is contingent upon the specific requirements of the case and preference of operating surgeon. The surgeon must conduct thorough clinical and radiographic evaluations to reduce significant exposure of bone and avoid neurological complications during the procedure.*

*Keywords: mesioangular impacted third molar, wards incision, trismus, swelling.*

## Introduction

The extraction of the impacted third molar, the most prevalent dental minor surgical procedure, necessitates a comprehensive understanding of surgical principles and proficient patient management skills [1].

Third molar surgery can be performed using closed extraction techniques in certain cases, numerous instances necessitate open surgical approaches, which encompass flap elevation and alveolar bone removal [2].

The position, depth, angulation, and bone density may all influence the complexity of the extraction procedure. Irrespective of the level of complexity, meticulous preoperative planning and assessment, coupled with judicious execution that comes from extensive training and experience, constitute the successful outcomes [3, 4].

Several grading methods have been developed to assess the level of surgical difficulty involved in extracting the lower third molar. Three factors constitute the difficulty index: orientation (relative to the longitudinal axis of the second molar

(mesioangular, distoangular, horizontal), level (in reference to the occlusal plane (position a, b, c), and location (with respect to the vertical ascending ramus class i, ii & iii) [5,6].

A greater degree of impaction is associated with the majority of complications. Teeth categorized as ic, iic, and iiic impactions are associated with a higher frequency of complications compared to those classified as b or a impactions [7].

During third-molar extraction, complications may occur with a frequency ranging from 2.6% to 30.9%. Patients may experience complications such as blood loss, persistent pain, facial edema, infection, alveolar osteitis, crown and root fractures, damage to the inferior alveolar and lingual nerves, as well as temporomandibular joint trauma and mandibular fractures, are potential complications. These adverse outcomes are affected by several variables, including the patient's age and sex, medical status, smoking habits, degree of tooth impaction, surgeon's experience, use of contraceptive medication, oral health status, and the surgical technique employed [8].

Surgical planning necessitates careful consideration of incision placement due to the proximity of significant anatomical structures adjacent to the operative site. The objective is to optimize visibility and access while preserving critical anatomical structures. Multiple anatomical structures are susceptible to trauma during conventional distal extension incisions employed in third molar impaction procedures, potentially leading to complications [9, 10].

This study focuses on comparing the standard ward's incision with a modification of ward's incision in impacted mandibular third molar surgery, with respect to post-operative complications.

## Methodology

This prospective interventional study included 60 participants who were receiving treatment at the Department of Oral and Maxillofacial Surgery. The study commenced following ethical approval granted by the institutional ethical committee.

### Selection criteria

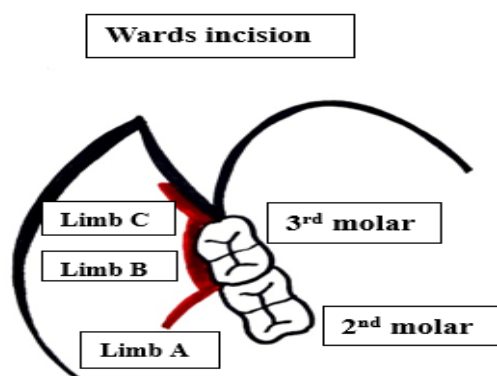
- Patients between the ages of 18 to 45, irrespective of gender, who had no medical history of any disease or long-term medication were eligible for this study.
- Impacted third molars indicated for surgical removal and classified as Mesioangular Class I, Position A were included in this study.
- Patients with good oral and periodontal health, exhibiting no signs of local pathology or inflammation associated with the impacted teeth, were incorporated into this research.
- Female patients who were lactating or pregnant were excluded.

Using computer-generated randomization, the 60 patients were split into two groups: group 1– control group (standard ward's incision) and group 2 – study group (modification of ward's incision). Prior to surgery, intraoral panoramic or periapical radiographs were obtained.

### Incision design

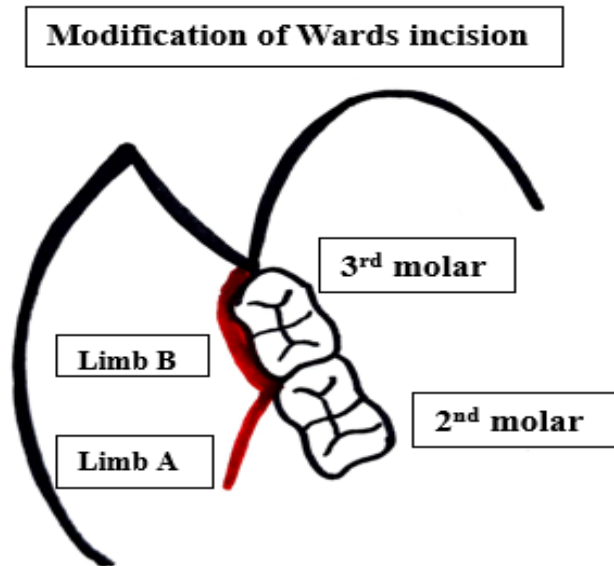
In the control group, the standard ward's incision was employed in 30 patients. Limb A commences at the intersection of the anterior two-thirds and distal one-third of the mandibular second molar, approximately 6 mm inferiorly in the buccal sulcus and proceeds vertically upward to the neck of the second molar, Limb B then extends cervically along the distal surface towards the tooth's midpoint after circumscribing the gingival margin of the posterior third of the tooth. Limb C follows the path of the external oblique ridge buccally and posteriorly (Figure 1).

**Figure 1 Diagrammatic representation of Standard Wards incision**



In the study group, the Modification of Ward's incision was employed in 30 patients. Limb A originates at the distobuccal corner of the mandibular second molar, involving the interdental papilla of the mandibular second and third molars. It then curves anteriorly, inferiorly, and along the attached gingiva toward the vestibule, terminating with a small curvature that corresponds to the mesiobuccal line angle of the tooth in the vestibule. Limb B originates at the distobuccal corner of the second molar without extending distally and continues to the cervix of the third molar (Figure 2).

**Figure 2 Diagrammatic representation of Modification of Wards incision**



### Surgical procedure

Standard draping and preparation were performed after the patient was assigned to one of the groups. The same surgeon conducted the entire surgical procedure, while another investigator carried out the preoperative and postoperative evaluations. Traditional nerve blocks of the lingual, buccal, and inferior alveolar nerves were administered using local anesthesia (2% lignocaine and adrenaline 1:80,000). After the local anesthetic took effect, all aseptic measures were followed during surgery.

Using a bard parker no. 3 handle and no. 15 blade, an incision was made. Group 1 received standard ward's incision, while group 2 received a modification of ward's incision. A periosteal elevator was utilized to reflect a full-thickness mucoperiosteal flap. Using a round no. 8 and a straight fissure carbide bur (no. 703), bone was removed around the impacted mesioangular third molar and the tooth was extracted.

Following the extraction, the socket was examined for loose bone pieces, root fragments, and any connected dental follicle sacs that required curettage. Betadine and normal saline were used for wound debridement. Three simple interrupted sutures were used for closure. Postoperatively, all patients were prescribed Amoxicillin capsules 500 mg tds, Tab Aceclofenac bid, and Tab Pantaprazole 40 mg once daily for 5 days.

Assessment was conducted preoperatively and postoperatively on the day 1 and 7th day following the procedure. The sutures were removed after a week, and an assessment was conducted to evaluate the overall recovery progress. Swelling was measured employing the tape technique in both horizontal and vertical planes. Mouth opening was assessed by measuring the interincisal distance using a divider and ruler.

### Results

This prospective interventional study involved 60 healthy individuals with Mesioangular impacted mandibular third molars. The age range was 18 to 50 years. Data were collected from 60 participants proceeded with statistical analysis using relevant statistical tools.

Chi Square Test has been performed to determine if there is any significant difference between the observed and expected frequencies in one or more categories. Statistical significance is indicated by a P value of less than 0.05. Regarding Postoperative mouth opening in ward's incision, as well as the modification of ward's incision, no significant difference was observed between the two groups (Table 1).

**Table 1 Post-operative Mouth opening outcomes in both the groups**

Duration	Control group	Study group	P- value
Preoperative	4.22	4.39	0.159
1st day post-operative	3.460	3.523	0.327
7 <sup>th</sup> day post-operative	3.973	3.967	0.538

A significant difference ( $p < 0.05$ ) appears between the two groups with respect to Swelling (Horizontal distance) postoperatively on the 7th day in the two groups (Table 2&3).

**Table 2 Swelling (horizontal distance) outcomes in both groups**

Duration	Control group	Study group	P- value
Preoperative	11.61	11.22	0.000
1st day post-operative	12.323	12.020	0.122
7 <sup>th</sup> day post-operative	11.853	11.627	0.008

**Table 3 Swelling (vertical distance) outcomes in both groups**

Duration	Control group	Study group	P- value
Preoperative	12.19	11.75	0.009
1st day post-operative	13.053	12.877	0.822
7th day post-operative	12.457	12.167	0.101

## Discussion

The surgical extraction of third molars is a commonly done minor surgical surgery pertaining to oral and maxillofacial surgery. That aims to address or prevent various conditions resulting from impacted teeth [11, 12].

Approximately 90% of individuals possess third molars, and diverse research sources indicate that there is at least one fully impacted third molar in 33% to 57% of the population [13].

Oral surgeons classify impacted mandibular third molar to assess the complexity of extracting the impacted teeth to determine the optimal treatment approach, and mitigate potential complications. Various classification systems have been developed to formulate effective treatment plans by evaluating the surgical procedure's complexity and minimizing complications during mandibular third molar extraction. The most frequently utilized classification systems for third molar inclinations and positions are winter's and pell and gregory's, which employ the relationship between the occlusal plane, ascending mandibular ramus, and longitudinal axis of the tooth as their foundation. This classification interprets the relationship between the wisdom tooth and the following anatomical structures: the mandibular canal, second molar, alveolar crest, mandibular ramus, and the tooth's spatial orientation [19-21].

Pain, swelling, trismus, compromised periodontal status of the second molar teeth adjacent to the surgical site, and lingual nerve damage are complications that occur frequently during impaction surgery [14].

Following third molar extraction, postoperative pain typically manifests as a localized inflammatory response that may exhibit varying degrees of intensity. Histamine, bradykinin, and prostaglandins are three biochemical mediators involved in the pain process that are released and produced as a consequence of the extraction of the impacted third molar and subsequent tissue destruction and cellular necrosis [15].

Extravasation of fluid results in edema, while a temporary vasoconstriction of arterioles due to surgical trauma causes blood stasis, which subsequently increases the permeability of post-capillary venules and leads to fluid extravasation. This process is initiated by mediators released into the bloodstream. The distal aspect of traditional incisions utilized to access impacted mandibular teeth approaches or potentially traverses the temporalis tendon's insertion, which may result in restricted mouth opening following surgical removal [14].

Reducing postoperative swelling and pain is dependent upon minimizing soft-tissue injuries. However, not all patients will necessarily present these postoperative complications to the same extent. Therefore, for the appropriate management of the patient, a comprehensive understanding of the surgical concepts for the extraction of impacted third molars is essential [16, 17].

The complex interrelationship between impacted teeth and the surrounding osseous structures, soft tissues, and neurovascular bundle renders it a challenging procedure, notwithstanding its classification as minor surgery. One of the factors influencing the severity of surgical complications is flap design [18].

Incisions are performed to provide adequate access to the operating site, sufficient visualization of the operative field, and the ability to execute a precise surgical intervention [22].

Various researchers have proposed distinct methods for elevating a mucoperiosteal flap to obtain access to an impacted third molar. The two most commonly employed flap designs are the modified triangle flap and the envelope flap [23].

The envelope flap provides optimal exposure of the operative site. The blood supply is adequate due to the broad base, and the design facilitates straightforward closure and reapproximation. The literature has addressed potential issues associated with the envelope flap, which includes enhanced osteoclastic activity during mucoperiosteal flap elevation may lead to localized bone loss and periodontal ligament damage. Additionally, performing a sulcular incision around a tooth increases the risk of wound dehiscence post-surgery compared to a triangular flap. The triangular flap is viewed as a traditional approach because it minimizes tissue reflection. This technique facilitates a relatively tension-free closure [24, 25].

The comma-shaped incision appears to be a more effective and less invasive approach for reducing post-surgical morbidity. In comparison to the region where the conventional ward's incision was performed, the area with the comma incision exhibited reduced swelling. This technique offers advantages, including enhanced accessibility and visibility, due to its appropriate degree of tissue reflection. The modified ward's flap demonstrates greater conservation, particularly in cases of deep-seated mandibular impactions [14, 22, 26].

Kukreja et al in their study concluded that the termination point of a typical ward's incision, commonly employed for the third molars extraction, often approaches or intersects the temporalis ligament, frequently resulting in postoperative trismus. The anatomical fold typically conceals the osseous defect that occurs following the removal of the impacted tooth, potentially leading to prolonged healing, discomfort, and infectious complications [27].

Our modification of ward's incision is highly conservative, minimizing tissue reflection while maintaining sufficient surgical visibility. The incision line is positioned exclusively on solid bone, facilitating suture placement and enabling closure with minimal tension [28].

In our study mouth opening was assessed by estimating the maximum interincisal distance using a divider and a ruler. The mean preoperative interincisal mouth opening distance was 4.22cm in control group and 4.39cm in study group. The mean postoperative interincisal mouth opening distances at day 1 was 3.46cm and at day 7 was 3.97cm in control group. The mean postoperative interincisal mouth opening distances at day 1 was 3.52cm, day 7 was 3.96cm respectively in study group.

Throughout seven days of follow-up, significant statistical differences emerged between the groups as on the seventh day, the study group showed less horizontal postoperative swelling than the control group. The edema observed in the modification of ward's incision group was less than that in the traditional ward's incision group. The limitations of the study included lesser sample size and inclusion of limited parameters for comparison between the incisions. In future studies including additional parameters, such as wound healing, nerve injury, measurement of periodontal pocket depth and including difficult impactions would improve the clinical applicability of the incision.

## Conclusion

This study demonstrated that the modification of the ward's incision exhibited significant effectiveness in reduction of postoperative swelling in Mesioangular impactions exclusively. Its role in Difficult impactions are limited. The selection of flap design is contingent upon the specific requirements of the case and preference of operating surgeon. The surgeon must conduct thorough clinical and radiographic evaluations to reduce postoperative complications as much as possible.

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