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## Original Research Article

# Flap vs flapless technique for impacted third molar removal: A split mouth prospective randomized control study

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## ABSTRACT

**Objectives:** The aim of this study was to compare the post-operative sequelae of removal of impacted third molars in participants treated with conventional flap elevation technique or with a minimally invasive flapless technique.

**Materials and Methods:** Participants with bilaterally impacted mandibular third molars were included. They were divided into two sites constituting 2 groups. One group was operated by using conventional flap design and elevation and other with flapless technique. Objective clinical parameters were recorded and compared in the post-operative period like mouth opening, swelling, surgical time, and pocket depth. Subjective parameters including pain were also assessed and statistically analyzed.

**Results:** The sites operated in Group II (Flapless technique) had better results ( $p \leq 0.05$ ) in terms of pain, swelling, trismus, and pocket depth distal to second molar when compared to Group I (Flap).

**Conclusion:** The flapless technique gives better surgical results and improved healing process after third molar removal and so should be recommended in routine clinical practice.

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## 1. Introduction

Third molars are the most commonly impacted teeth with approximately 33% of population having at least one impacted third molar, due to genetic and environmental factors.<sup>1</sup> Impacted teeth have the potential to cause mild to serious problems if they remain unerupted. Vast information has been collected based on extensive clinical for indications for removal of impacted teeth but there is lack of evidence-based data from long-term prospective longitudinal studies.<sup>2</sup>

Surgical removal of impacted 3<sup>rd</sup> molars is one of the most frequently performed surgical procedure which allows expeditious and atraumatic removal of teeth embedded in

a relatively inaccessible part of the oral cavity. Though a minor surgery, its relation to adjacent soft tissues, vital teeth and neurovascular bundle makes it a complex. A wide variety of different surgical techniques have been suggested and generally this surgical removal requires creation of a flap and performance of ostectomy.<sup>3</sup> Transalveolar extraction of mandibular third molar is generally followed by complaints from the patient about pain, trismus, and swelling which have shown to be related to the duration of surgery, incision and the reflection of the mucoperiosteal flap.<sup>4</sup> Another important complication is periodontal pocket formation and cementum exposure distal to the mandibular 2<sup>nd</sup> molar following removal of partially erupted or impacted 3<sup>rd</sup> molars.<sup>5,6</sup>

This study was thus aimed to comparatively evaluate the effect of flap and flapless extraction of partially impacted

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bilateral mandibular third molars on postoperative pain, swelling, trismus and pocket depth distal to second molar for decision about better surgical planning and execution.

## 2. Materials and Methods

This randomized prospective study was conducted on patients reporting to the Out Patient department of Oral and Maxillofacial surgery. 50 Healthy patients with no significant medical history, of both sexes, aged 18-40 who required surgical removal of their impacted mandibular third molars under local anesthesia were included over a period of 2 years.

The impactions included were mesioangular, horizontal or partially covered by soft tissue, which radiographically had the distal surface of the crown completely anterior to the anterior border of the mandibular rami and the occlusal surface of the impacted molar at or nearly at the level of the occlusal plane of the second molar (Pedersons scale 3-5). Patients with swelling, inflammation or infection in the area of operation were excluded.

A detailed case history was obtained and routine records for the purpose of diagnosis and treatment planning along with intraoral periapical/panaromic radiographs were obtained. Written informed consent and willingness to participate in the study was recorded for each of them prior to treatment.

Each patient undergoing surgery were equally divided into 2 sites and allotted to 2 groups: Group I (Control, 50): Surgical removal of lower third molar by raising a buccal flap, Group II (Test, 50): Surgical removal of lower third molar without raising a buccal flap. Which side the patient was to undergo flap or flapless technique was randomized, determined by generating a table of random numbers for the same purpose and the contralateral side was operated upon usually 2-4 weeks later by the other technique.

After routine blood and radiographic investigations, the patients were taken up for surgery. Under aseptic conditions, anesthesia was secured with 2% Lignocaine hydrochloride with 1:80000 adrenaline (Lignox, Warren pharmaceuticals) with inferior alveolar nerve block, lingual nerve block and long buccal nerve block in both groups, and surgical removal of the impacted third molar was done.

For Group I sites, ward's triangular incision was given and mucoperiosteal flap was reflected to expose the tooth and bone with Howarth elevator. Bone was removed with a round bur and a straight fissure bur at 35,000 RPM (Rotation per minute) under constant irrigation of normal saline to create a 'gutter' along the buccal side and distal surface of the tooth. Coupland or Cryer elevator was used to deliver the tooth. In cases where tooth sectioning was required it was done with a straight fissure bur, longitudinally along the long axis of tooth and tooth removed in two fragments using Coupland or Cryer's elevator.

In Group II, tooth was sectioned longitudinally using round bur and a straight fissure bur at 35,000RPM under constant saline irrigation. The tooth was not completely sectioned and a thin plate of enamel was left which was then fractured using Coupland elevator, to prevent accidental injury to lingual nerve. It was then removed in two pieces.

Debridement was performed for both groups. Tooth follicle attached to the socket and remnants of bone were removed. Sharp bony edges were smoothed by bone file and socket was irrigated with normal saline. For group I the flap was approximated and the wound sutured with 3 simple interrupted sutures using 3-0 non absorbable Mersilk and for group II approximation of the margins was achieved with digital pressure, without sutures. A pressure pack was given to attain hemostasis. Post-operative instructions and follow up was advised. All the patients were given oral Amoxicillin 500 mg and oral Metronidazole 400 mg 8 hourly for 5 days and analgesic Ibuprofen 400 mg 8 hourly for three days. Patients were recalled on 2<sup>nd</sup> day, 7<sup>th</sup> day, 1<sup>st</sup> and 2<sup>nd</sup> month postoperatively and all measurements recorded each time. Suture removal was done on the 7<sup>th</sup> post-operative day.

Facial swelling was determined by recording facial contour post-operatively and comparing it with pre-surgical baseline. It was measured preoperatively and postoperatively by marking on lowest attached part of ear lobules and corner of mouth in closed mouth position. Postoperative measurements were done on 2<sup>nd</sup> and 7<sup>th</sup> days. Using a measuring calibrated scale to follow the contour of the face, linear distances were noted.

Pain was measured by the patients using a visual analogue scale and was graded 1 to 10 experienced by the patient on second and seventh post-operative days.

Trismus was calculated by the maximum postoperative inter-incisal distance measured in millimeters with the help of a digital Vernier caliper between left maxillary and mandibular central incisors in open mouth position on second and seventh post-operative days. In the absence of any of these two teeth, adjacent teeth were considered.

Pocket Depth was measured using a calibrated periodontal probe UNC-15 placed on the distal surface of second molar and inserted into the alveolar mucosa till the tip of the probe reached the alveolar bone distal to second molar. Readings were noted at 1<sup>st</sup> month and 2<sup>nd</sup> month postoperatively.

Duration of surgery was measured using a Digital stopwatch for group I from incision to suturing while for group II from tooth sectioning to tooth elevation.

Data from both sites for each patient was compared with the contralateral site.

The data thus obtained was tabulated and subjected to statistical analysis using SPSS Software version 16 and using tests of statistical significance (Chi square test and paired t tests).

### 3. Results

A total of 50 subjects were included in study out of which 25 (50%) were of 18-24 years while 50% were older than 25 years. 28 were males and 22 were females.

For Group I and II, the mean for Pre-operative swelling and mouth opening were not found to be statistically significant. For Group I, the mean duration of surgery was much more than Group II with Group II taking statistically significantly less time. (Table 1)

The mean presence of pain at different post-operative intervals was found to be statistically significant as Group II subjects reported less pain as compared to Group I. The difference in mean for post-operative swelling findings were found to be statistically significant and Group II subjects reported significantly lesser post-operative swelling than Group I. Also, group II had significantly more post-operative mouth opening. Group II subjects had significantly more post-operative mouth opening as compared to group I. (Table 1)

The mean periodontal probing depth at both 1 and 2 months in both groups reached the level of significance. The mean of difference from 1 to 2 months was found to be 1.80 (0.78) in group I and for group II was found to be 0.90 (0.56), which was statistically significant. (Table 1)

### 4. Discussion

Impacted third molar surgery is a common dental procedure that needs a sound understanding of surgical principles. Removal of these involves trauma to the soft and hard tissues because of preparation and retraction of mucoperiosteal flap and therefore the removal of bone, which is usually followed by edema of varying degree, pain, trismus and every now and then delayed healing.<sup>7</sup> As flap elevation is among the main factors influencing the severity of complications, this study was conducted to match the effect of flap and flapless extraction of partially impacted mandibular third molar in assessing postoperative complications.

Incision and flap design in any surgery are time-tested principles. The incisions expose impacted mandibular third molars are often broadly grouped under triangular (vertical) and envelope types. Incision lines mustn't, as far as possible, lie over prospective bony defects, should not cut muscle or tendon insertions and be least traumatic. However, the distal leg of the incisions comes near or perhaps cuts across the insertion of the temporalis tendon which commonly lies over the bone defect following removal of the tooth. This might be responsible, a minimum of partly, for the occurrence of complications like pain, swelling, trismus and compromised periodontal health status of preceding second molar.<sup>8</sup>

The closure technique is one among the factors that are linked to early postoperative complications after

third molar surgery. Flap repositioning technique was earlier advocated to secure healing by first intention after the extraction of lower third molars helps in complete wound sealing and contamination was avoided. However, in recent years, primary closure of the wound has been seen to forestall drainage of the latter - thereby worsening the postoperative sequelae<sup>9</sup> as that tight closure over an oversized bony socket or defect doesn't facilitate drainage and oral hygiene. Suturing may create a one-way valve allowing food debris to enter the socket and trapped resulting in local infection, inflammation, clot necrosis, alveolar osteitis and pain.

Partial closure, secondary closure, and secondary healing may end up in less pain, swelling, and trismus like by including excision of mucosa immediately distal to the second molar creating a window serving as an outlet for the inflammatory exudates. Other methods have included a mixture of mucosa excision and placement of gauze or rubber drains, and a sutureless technique.<sup>10</sup> Avoiding suture closure is useful because treatment for alveolar osteitis is irrigation, debridement, and alveolitis dressing. A tiny low flap left open may very well facilitate drainage, improve hygiene and reduce the chance of postoperative complication.<sup>10,11</sup> But, the sutureless closure can cause delayed healing of the surgical site.<sup>12</sup>

The post-operative phenomenon encountered (pain, swelling, and trismus) may reflect the formation of prostaglandins and other mediators of pain and swelling from membrane phospholipids released as a results of surgery. It thus seems reasonable that the severity of factors like pain, swelling, and trismus relate to the "aggressiveness" of surgery.<sup>13</sup>

Duration of surgery isn't much discussed in literatures although it is an important factor for postoperative complications.<sup>3</sup> Therefore the longer time taken for group I surgeries than group II could have affected postoperative complication in our patients.

Pain assessment is not one time affair. The most widely used scales are visual, verbal and numerical or some combination of all three forms. In the present study the pain experienced by the patient was recorded using visual analog scale (0-10). VAS scores were significantly higher for Group II, p value ( $\leq 0.05$ ) and in accordance with the results reported in literature.<sup>3,14</sup> Pain and swelling were greater when the surgical wound healed by first intention.<sup>9</sup> More pain and swelling was reported when primary closure was distributed.<sup>17</sup> However, after one month the surgical wound showed far better appearance than in those where closure and healing was by second intention.

Quantitative assessment of swelling represents a serious difficulty. Post-surgical facial edema is difficult to quantify accurately, since it requires a three-dimensional measurement with an irregular, convex surface and might happen internally moreover as externally.<sup>15</sup> Over

**Table 1:** Comparison of groups with clinical parameters

Variable	Assessment	Group-1 Open flap	Group-2 Flapless	P value
<b>Surgery Duration</b> Mean(SD)	Intra-operative	22.2(3.22)	14.8(1.22)	0.00
<b>Pain</b> Mean(SD)	2-day	5.3(0.94)	1.5(1.08)	0.00
	7-day	1.4(0.84)	0.0(0.0)	0.00
<b>Facial swelling</b> Mean(SD)	Preoperative	9.96(0.83)	10.7(0.80)	0.09
	2-day	10.41(0.80)	10.08(0.81)	0.00
<b>Mouth opening</b> Mean(SD)	7-day	9.99(0.25)	9.66(0.27)	0.19
	Preoperative	44.5(6.11)	44.4(6.09)	0.34
<b>Periodontal probing depth</b> Mean(SD)	2-day	32.7(6.41)	41.0(5.31)	0.00
	7-day	40.3(5.7)	44.4(6.0)	0.01
<b>Periodontal probing depth</b> Mean(SD)	At 1 month	3.5(0.52)	5.2(1.03)	0.00
	After 2 months	2.60(0.51)	3.4(0.69)	0.00
	From 1 months to 2 months	0.90(0.56)	1.80(0.78)	0.02

Paired 't' Test, \* Significance of relationship at  $p \leq 0.05$

the years, numerous researchers have tried various techniques in an attempt to objectively measure edema, most of which are indirect assessment of the altered facial contours. Measurement tools include standardized stereo-radiographic or photographic measurements, computed tomography, linear measurement, vernier-calipers to live cheek-girth, modified face-bow devices, ultrasonography, facial plethysmographs or various other means of taking direct facial measurements.<sup>16</sup> No technique has been proven to be superior or more accurate in analyzing swelling; hence for the practicality of low-cost and equally reliable technique, we used linear measurement technique supported designated facial points for assessment.

The statistically significant difference in swelling between two groups was observed with Group II showing significantly less post-operative swelling at 2nd post operative day while at 7th post-operative day, findings weren't significant. The results confirm that swelling may be a results of flap reflection and duration of surgery.<sup>3</sup>

Trismus after mandibular third molar surgery is sometimes caused by inflammation of the masticatory muscles or by transecting through the fibers of striated muscle while giving a distal release incision, resulting in spasm secondary to the raising of a mucoperiosteal flap. Significant difference on 2nd and 7th postoperative day was observed which is also a results of reflection of mucoperiosteal flap, pain and duration of surgery.<sup>8,17</sup> The interrelation between trismus and pain that mouth opening is painful after removal of impacted mandibular third molars and consequently avoided by patients to full extent. The hypothesis has been confirmed by an electromyographic study that restricted mandibular movement after this operation reflects a voluntary act to avoid pain.<sup>18</sup>

Flap design was a factor in determining the periodontal status of the second molar. In particular they found that the flap design which left an intact gingival collar on the distal

surface of the second molar produced the greatest reduction in pocket depth.<sup>19</sup> The difference in pocket depth between group I and group II was statistically significant at 1<sup>st</sup> and 2<sup>th</sup> postoperative month. This can be contributed to raising a flap and performing osteotomy distal to second molar in group I.

Limitations of the present study was the inclusion of different angulations of impacted third molars which should have been separately evaluated and compared with the techniques to further explore these parameters. However, we recommend additional studies with demarcated assessment of the type or difficulty of impaction with post-operative parameters to draw more definitive conclusion.

## 5. Conclusion

Lesser pain, swelling, trismus, and pocket depth distal to second molar was encountered in flapless third molar removal as compared to one with a conventional flap design. The flapless procedure to remove partially impacted mesioangular or horizontal third molars can significantly decrease postoperative discomfort of patient.

## 6. Source of Funding

None.

## 7. Conflict of Interest

None.

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