

## Removal of Partially Impacted Mandibular Third Molars with and without Flap: A Comparison of Two Surgical Techniques

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### ABSTRACT

**Objectives:** To compare with and without flap removal of partially impacted mandibular third molars in terms of mean pain and mean swelling on the second post-operative day.

**Study Design:** Quasi-experimental study.

**Place and duration of Study:** Department of Oral and Maxillofacial Surgery, Armed Forces Institute of Dentistry, Rawalpindi Pakistan, from May to Nov 2021.

**Methodology:** Sixty cases (30 in each Group) with partially impacted mandibular third molar with mesioangular impaction aged 18-45 years were included. Random allocation of patients was done to the removal with flap (Group-A) and without flap (Group-B). On the second post-operative day, the outcome of pain and swelling in patients was measured based on the Visual Analogue Scale (VAS between 0 to 10 cm points for pain and swelling on a scale of 0 to 3).

**Results:** The mean pain score was  $5.67 \pm 1.30$  in Group-A (with flap) versus  $2.97 \pm 1.25$  in Group-B (without flap) ( $p$ -value,  $<0.001$ ). The mean swelling score was  $5.40 \pm 1.16$  for Group-A (with flap) versus  $2.97 \pm 1.15$  for Group-B (without flap) ( $p$ -value,  $<0.001$ ).

**Conclusion:** The surgical extraction of the partially impacted mesioangular mandibular third molar without buccal flap reflection and bone ostectomy resulted in less post-operative pain and swelling than surgery with buccal flap reflection and bone ostectomy.

**Keywords:** Buccal flap, Partially impacted mesioangular mandibular third molar, Pain, Swelling, Third molar surgery.

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### INTRODUCTION

The mandibular third molar is one of the most common teeth impacted in the oral cavity, so its surgical removal is a commonly performed procedure in Oral and maxillofacial surgery.<sup>1</sup> In general, 33% of the total population can have at least one impacted third molar. The impacted molar is removed with a surgical procedure that requires reflecting an extensive sub mucoperiosteal flap and removal of sufficient bone around the tooth.<sup>2</sup>

A surgical extraction is one of the most common procedures conducted in maxillofacial surgery, and that of the impacted mandibular third molar is very frequent among them.<sup>1</sup> The indications for the removal of impacted mandibular third molars are swelling, pain, caries, paresthesia, periodontal pocket, abscess, pericoronitis, root resorption, interdental bone loss, osteomyelitis, and association of impacted teeth with any cyst, tumour, or other pathology.<sup>2</sup> Despite the availability of effective surgical procedures, the removal of the third molar is often followed by post-

procedure complications like pain, swelling, and trismus.<sup>3</sup> These sequelae occur due to the inflammatory tissue process, with cardinal signs of inflammation that include redness, pain, swelling, heat, and loss of routine function.<sup>4</sup>

Various strategies have been employed to prevent complications, including applying different flaps, bone-cutting techniques and different tooth-sectioning techniques.<sup>5</sup> Other strategies include the use of long-acting anaesthetic agents for reduction of post-operative pain,<sup>6</sup> and the use of corticosteroids to control inflammation at the surgical sites in various forms such as oral, intravenous, intramuscular, submucosal, and injection into pterygomandibular space.<sup>7</sup>

Surgical trauma produces arachidonic acid from phospholipids by the activity of phospholipase A2, ultimately synthesizing prostaglandins, thromboxane-related substances, or leukotrienes which mediate the inflammatory response. Symptoms appear gradually after the third molar extraction, with peak effects after two days.<sup>8</sup> One of the promising strategies is to remove the partially impacted mandibular third molar without raising buccal flap reflection and bone ostectomy rather than the surgical technique that involves the

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buccal flap reflection and bone ostectomy as it can avoid complications associated with elevation of the mucoperiosteal flap as well as the removal of bone.<sup>9</sup>

While evaluating the efficacy of various surgical techniques, Kim and colleagues reported mean pain of 6.2±2.3 in surgery with flap and 1.7±0.6 in the flapless procedure after two days of surgery. They also found a mean swelling score of 2.0±0.8 in surgery with flap compared to 0.3±0.1 in the flapless Group.<sup>10</sup> Not enough evidence is found on these two surgical techniques available in the country and our set-up. The current study aimed to compare the efficacy of a surgical technique without buccal flap reflection and bone ostectomy, which involves only tooth sectioning, compared to a surgical technique that involves buccal flap reflection and bone ostectomy in terms of controlling post-operative pain and swelling on the second post-operative day.

**METHODOLOGY**

This quasi-experimental study was conducted in the Oral and Maxillofacial Surgery department, Armed Force Institute of Dentistry, Rawalpindi Pakistan, for six months, from May to November 2021. Ethical clearance (Reference Number 905/Trg-ABP1K2) was taken and written informed consent was administered to all patients in the study.

The sample size was based on a 95% confidence level, 5% significance level, and mean pain of 6.2 in surgery with a flap and 1.7 in surgery without a flap.<sup>10</sup> Keeping a common sigma (SD) of 2.5, the calculated sample size was 30 cases in each study Group. A total of 60 patients were enrolled in the study.

**Inclusion Criteria:** Patients of either gender, between 18 to 45 years, ASA Class-I who had partially impacted mandibular third molar, (which was mesioangular impaction in which the distal surface was anterior to the anterior border of Ramus, the occlusal surface was at or near the occlusal plane, may or may not be covered partly by soft tissue) were included in the study.

**Exclusion Criteria:** Women who were pregnant, nursing mothers, smokers and patients with non-localized odontogenic infection were excluded. Patients taking medications that can alter wound healing, whose teeth are associated with pathologies, i.e. cysts, mandibular angle fractures, tumours, radiotherapy, chemotherapy, bisphosphonates, bone diseases, e.g. Paget's disease, were also excluded from the study.

Patients were randomly allocated into two Groups irrespective of gender and age in a manner

that odd registration number of patients to be assigned to the Control Group (Group-A). Furthermore, even registration number patients were assigned to the Experimental Group (Group-B). In Group-A, a surgical technique with a buccal flap was used for a tooth removal. First, a three or four-corner mucoperiosteal flap was raised, and minimal bone ostectomy was done, followed by tooth sectioning with a fissure bur mounted on a low-speed handpiece and extraction of the tooth. While in Group-B, a surgical technique without a buccal flap was used for a tooth removal. In this technique mucoperiosteal flap was not raised, no bone ostectomy was done, and only the tooth was sectioned with a fissure bur, followed by extraction of the tooth. At the end of the surgery, patients were instructed to grade post-operative pain and swelling on the second post-operative day on the Visual Analogue Scale (VAS between 0 to 10cm for pain and 0 to 3 for swelling. 0cm (no pain), 1-3cm (mild pain), 4-7cm (moderate pain) and 8-10cm (severe pain). Similarly, for the swelling scale, 0=(no swelling), 1=(mild swelling), 2=(moderate swelling) and 3=(severe swelling).

Statistical Package for Social Sciences (SPSS) version 23.0 was used for the data analysis. Quantitative variables like age, duration of the procedure, pain score on the second post-operative day, and swelling on the second post-operative day were measured as mean±Standard Deviation (SD). Qualitative variables like gender were measured as frequency and percentage. An independent sample t-test was applied to compare the mean pain and swelling scores between the two Groups at a significance level of ≤0.05.

**RESULTS**

Out of sixty patients, the overall mean age was 34.20±6.13 years in the study, and most patients 42 (70.0%), were 31 to 45 years of age. The mean duration of the procedure in Group-A was 29.7±2.3 minutes and in Group-B it was 29.5±2.3 minutes (Table-I).

**Table-I: Demographic Characteristics and Surgery Duration in both Groups (n=60)**

| Characteristics                  | Group-A (n=30) | Group-B (n=30) |
|----------------------------------|----------------|----------------|
|                                  | n (%)          | n (%)          |
| <b>Age (years)</b>               |                |                |
| 18-30                            | 8 (26.6)       | 10 (33.3)      |
| 31-45                            | 22 (73.3)      | 20 (66.6)      |
| Mean±SD (Years)                  | 34.0±6.3       | 34.2±6.1       |
| <b>Duration of surgery (min)</b> |                |                |
| ≤30                              | 19 (63.3)      | 20 (66.6)      |
| >30                              | 11 (36.6)      | 10 (33.3)      |
| Mean±SD (min)                    | 29.5±2.2       | 29.6±2.2       |

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Overall, 25(41.6%) study patients were males, and 35(58.3%) were females. There were 13(43.3%) males and 17(56.6%) females in Group-A whereas there were 12(40.0%) males and 18(60.0%) females in Group-B (Figure).

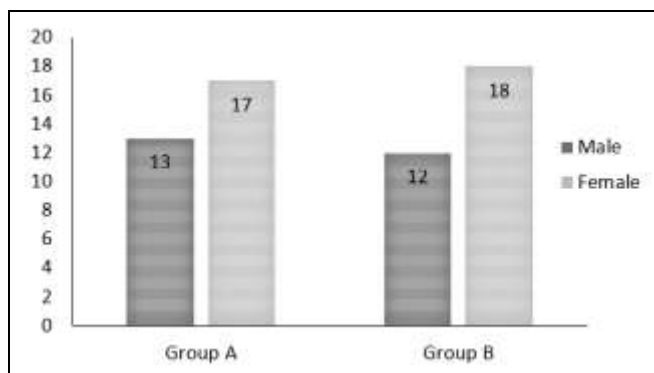


Figure: Distribution of Gender in the Study Groups (n=60)

In this study, the mean pain score was  $5.7 \pm 1.3$  for Group-A (with flap) versus  $2.9 \pm 1.2$  for Group-B (without flap) ( $p$ -value,  $<0.001$ ). Similarly, the mean swelling score was  $2.2 \pm 1.4$  for Group-A (with flap) versus  $1.4 \pm 0.9$  for Group-B (without flap) ( $p$ -value,  $<0.001$ ), as shown in Table-II.

Table-II: Comparison of the Mean Pain and Swelling in the Study Groups (n=60)

| Outcomes             | Group-A (n=30) | Group-B (n=30) | $p$ -value |
|----------------------|----------------|----------------|------------|
|                      | Mean $\pm$ SD  | Mean $\pm$ SD  |            |
| Pain (VAS score)     | $5.7 \pm 1.3$  | $2.9 \pm 1.2$  | $<0.001$   |
| Swelling (VAS score) | $2.2 \pm 1.4$  | $1.4 \pm 0.9$  | $<0.001$   |

Moreover, the difference was still statistically significant when pain and swelling were stratified according to age and gender in the study Groups.

### DISCUSSION

This study compared mean pain and mean swelling after removing partially impacted mandibular third molars with and without a buccal flap and found significantly low mean pain and swelling in patients managed without the buccal flap. Many other investigators have also witnessed a similar trend. A study by Kim *et al.* evaluated the efficacy of surgical technique with a buccal flap and technique without raising the buccal flap for impacted mandibular third molar surgery and witnessed significantly less pain and less swelling in the flapless Group after two days of surgery.<sup>10</sup>

In the studies by Gool *et al.* and Suarez-Cunquero *et al.* the pain was significantly greater in the buccal

flap technique compared to the flapless technique. They concluded that pain after the third molar surgery is due to the incision and reflection of the periosteum rather than the flap design.<sup>11,12</sup>

One more study by Liu *et al.* witnessed that when a little entry point with a negligible impression of the mucoperiosteum was made, the post-operative pain and swelling were fundamentally not as much as when a bigger cut with a standard fold was utilized. Additionally, a flapless technique worked with quicker extraction and consequently a more limited use time than those with a flap procedure.<sup>13</sup>

While using the flapless strategy, the patients had a low rate of post-operative difficulties and experienced insignificant disturbances in their satisfaction after the third molar medical procedure. A partial thickness fold is eliminated in the novel methodology, and the injury mends through subsequent open consideration; stitches are missing. Furthermore, a new researches featured that careful waste positively affects post-operative responses after the expulsion of third mandibular surgery and they inferred that a painful injury mending strategy after the careful evacuation of third mandibular medical procedure is advocated.<sup>14,15</sup> Lastly, the conceivable clinical attainability of utilizing the flapless method is additionally approved by an impressive decrease in medical procedure time, which improves patient satisfaction.

On the other hand, no significant difference has been witnessed according to the variety of flaps used. Bracco *et al.* found no difference in pain and swelling between the four flap Groups.<sup>16</sup> They stated that pain was not produced due to the incision itself but due to the release of endogenous mediators such as bradykinin, serotonin, and certain prostaglandins. According to other studies more pain was associated with the envelope flap Group than the triangular flap Group.<sup>17,18</sup>

The current study has many advantages; firstly, a quasi-experimental study design was applied, which is a strong and rigorous research method. Secondly, a significant difference in the effect of the flapless technique of third molar removal was witnessed, showing a clear benefit of the technique for these patients.

### LIMITATIONS OF THE STUDY

The study sample was not reasonable as only 30 cases were randomized in the study arms. This was mainly due to the shortage of time to conduct the study. Therefore, patients were randomized in a convenient manner and not a true systematic randomization scheme

**CONCLUSION**

Surgical extraction of partially impacted mesioangular mandibular third molars with a flapless technique will result in better post-operative pain and swelling compared to the flap technique involving buccal flap reflection and bone ostectomy. Therefore, it may be recommended that surgical extraction of partially impacted mesioangular mandibular third molars with a flapless technique should be done to reduce post-operative pain and swelling.

**Conflict of Interest:** None.

**Author’s Contribution**

Following authors have made substantial contributions to the manuscript as under:

NA: Study design, data analysis, critical review, drafting the manuscript, critical review, approval of the final version to be published.

MNK & SM: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

MRA & AY: Drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

SAS: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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