

A prospective randomized study to compare the efficacy of triangular flap and envelop flap in surgical removal of mandibular third molar

¹Dr. Sardar Yadav, Senior Lecturer, Department of Oral and Maxillofacial surgery, Rama Dental College Hospital and Research Centre, Rama University, Kanpur, Uttar Pradesh, India.

²Dr. Gokkulakrishnan, Head of Department, Department of Oral and Maxillofacial surgery, Rama Dental College Hospital and Research Centre, Rama University, Kanpur, Uttar Pradesh, India.

³Dr. Abhishek Karan, Reader, Department of Oral and Maxillofacial surgery, Rama Dental College Hospital and Research Centre, Rama University, Kanpur, Uttar Pradesh, India.

⁴Dr. Sakshi Pandey, Post Graduate Student, Department of Oral and Maxillofacial surgery, Rama Dental College Hospital and Research Centre, Rama University, Kanpur Uttar Pradesh, India.

⁵Dr. Devang Dwivedi, Post Graduate Student, Department of Oral and Maxillofacial surgery, Rama Dental College Hospital and Research Centre, Rama University, Kanpur, Uttar Pradesh, India.

Corresponding Author: Dr. Sakshi Pandey, Post Graduate Student, Department of Oral and Maxillofacial surgery, Rama Dental College Hospital and Research Centre, Rama University, Kanpur Uttar Pradesh, India.

Citation this Article: Dr. Sardar Yadav, Dr. Gokkulakrishnan, Dr. Abhishek Karan, Dr. Sakshi Pandey, Dr. Devang Dwivedi, “A prospective randomized study to compare the efficacy of triangular flap and envelop flap in surgical removal of mandibular third molar”, IJMSIR- March - 2022, Vol – 7, Issue - 2, P. No. 47 – 54.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

The retention of impacted third molars, once they have exposed to the oral environment and dental plaque, may lead to a more rapid periodontal attachment loss than is usually associated with adult periodontitis. This prospective study was carried out on the 100 patients with impacted mandibular third molar requiring surgery for its removal. In both groups Group A (100 patients) with triangular flap and Group b (100 patients) with Envelope flap. Envelop Flaps yield reduced pain on visual analog scale (VAS), trismus, and swelling, which was found to statistically significant. The duration of surgery was less in envelope flap design. Triangular flap design had the disadvantage of higher pain score, trismus

and swelling but had the advantage of less prevalence of wound dehiscence, alveolar osteitis, sensitivity, and good exposure of surgical site. Triangular flap allowed for a faster return to the preoperative probing depth.

Keywords: Flap, periodontitis, wound dehiscence, alveolar ostetis

Introduction

Different designs for raising of a mucoperiosteal flap to expose an impacted lower third molar have been advocated, the most common designs being the modified triangle flap and the envelope flap. The presence of various important anatomical structures in the adjacent area around the surgical site has made surgeons to design an incision, which would allow proper access and

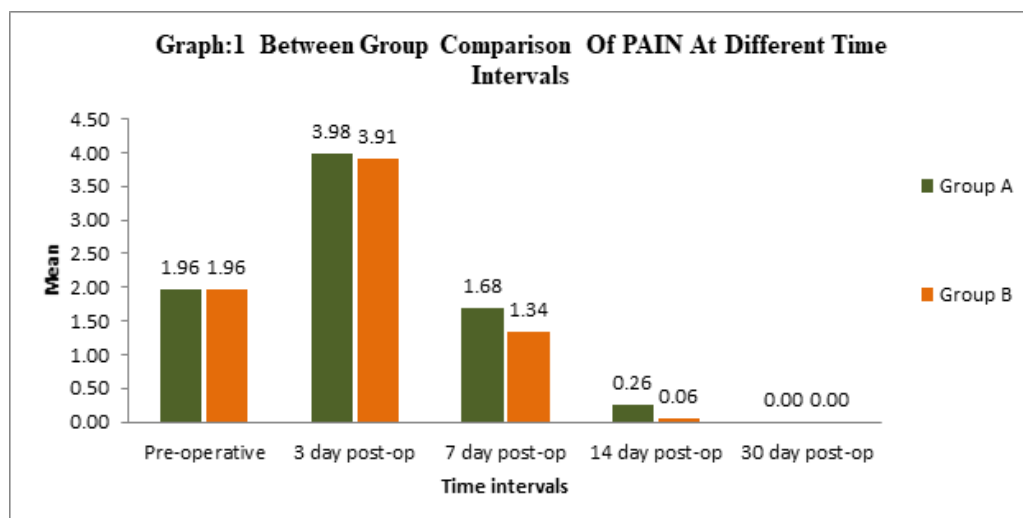
visibility. This prospective study was designed to compare triangular and envelope flap in mandibular third molar extractions and evaluates the affect of periodontal healing, operative time and the occurrence of postoperative complications such as trismus, swelling, pain and wound infection.

Materials and methods

This prospective study was carried out on the patients who reported to the dental outpatient Department of Oral and Maxillofacial Surgery Rama Dental College Hospital and Research Centre, Kanpur for surgical removal of impacted mandibular third molar. Informed written consent was obtained from each patient after explaining the nature and outcome of procedure and the possible consequences and complications. Patients were included in this study without cast, creed and socio-economic status. Detail case history of all cases was recorded. All patients were under went clinical examination, routine blood investigation and Intra Oral Periapical (IOPA) Radiograph, Orthopantomogram, IOPA tracings, and clinical photographs.

The sample size of patient were randomly divided in two

Graph 1:



Swelling was found to be increased at 3rd post-operative day after the procedure, in all the patients. No

groups i.e., Group' A' (100 teeth) Incision for Triangular flap and Group' B' (100 teeth) Incision for Envelop flap. The Inclusion criteria was patients with impacted mandibular third molar requiring surgery for its removal, free of any significant systemic diseases, between age of 18 - 40 years, surgical site free of active infection and Exclusion criteria included were periodontaly compromised 2nd molar, Impacted molars with pathology & periapical infection, Pregnant or lactating mother, unable to comply with oral hygiene instructions.

Results

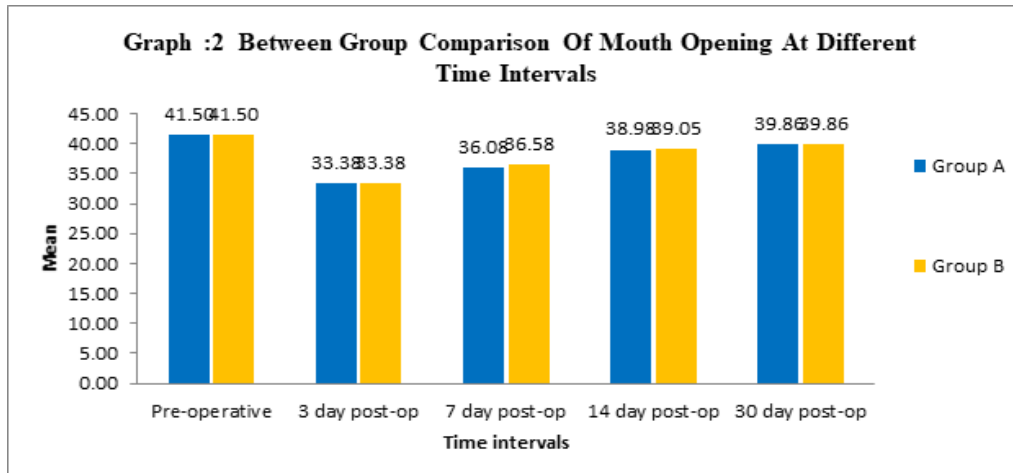
The distribution of study was 100 patients participated in each group with equal ratio of male and female population. The mean age of male population is 28.20±5.08 and the mean age of female population is 27.58±4.58.

On evaluating the pain score, the higher pain score was seen on 7th post-operative day in Group A (1.34±0.52) as compared to Group B (1.68±0.76) and this difference was found to be statistically significant (p=0.001) as illustrated in Graph 1. Statistical Analysis used was Mann-Whitney U test.

proportional difference in change in swelling in both the groups at 3 day post-operatively was found. At follow up

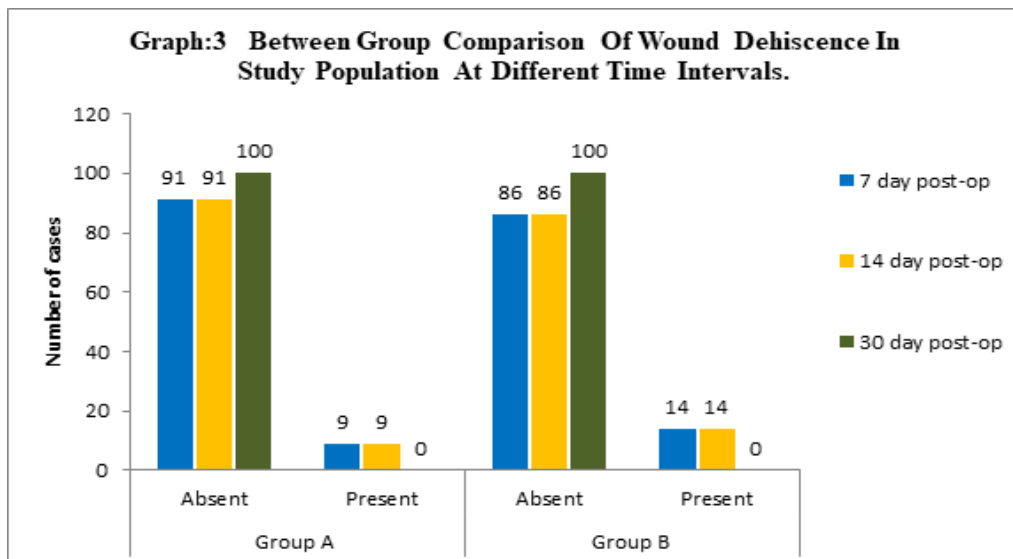
at 7 days, swelling level was increased at preoperative time found in higher proportion of Group A as compared to Group B statistically significant difference in swelling levels of both the groups at follow up at 7 days was observed (p=0.21). Independent sample t test Statistical Analysis used.

Mouth Opening at follow up 3rd, 14th, 30th days of Graph 2:



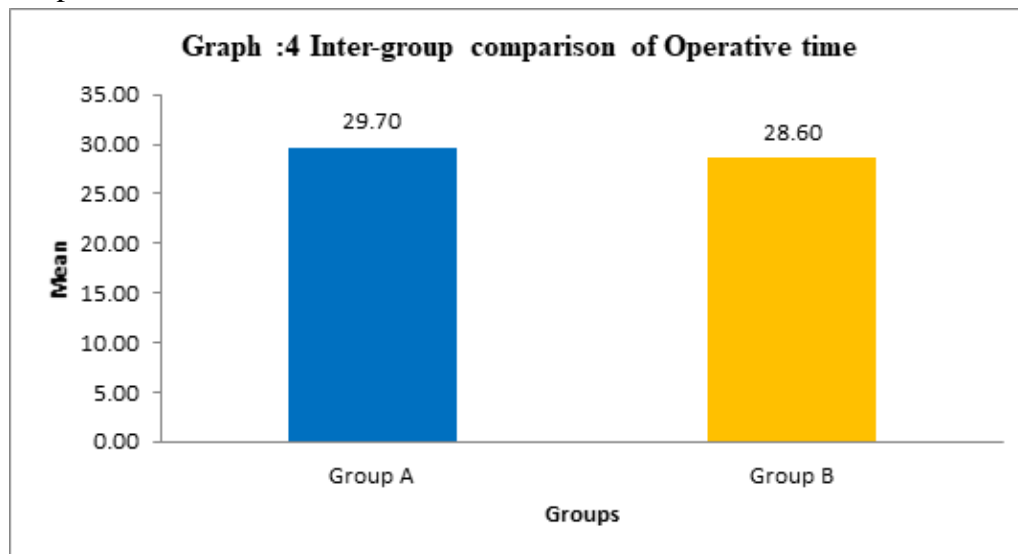
Wound Dehiscence at follow up at 7 days was found in 9 patients of Group A and 14 patients of Group B. Though prevalence of wound dehiscence was higher in Group B this difference was not found to be statistically significant (p=0.235). At follow up at 14 days wound dehiscence was found to be similar as at 7 days. Wound dehiscence was not observed in any of the new patient at follow up at 30th day. Illustrated in Graph 3. Statistical Analysis employed was Chi-square test.

Graph 3:



Sensitivity at 7 days of follow up, none of the patients of Group A reported while 9 patients of Group B reported sensitivity, but this difference was found to be statistically significant ($p=0.002$). At 14 day of follow up, none of the patients of Group A reported sensitivity while 3 patients of Group B reported sensitivity, but this difference was not found to be statistically significant ($p=0.316$). At 7 day of follow up, none of the patients of Group A or Group B reported sensitivity. Statistical Analysis employed was Chi-square test. Infection was found at day 3, in only 3 patient of Group B but difference in prevalence of infection in both the groups was not found to be statistically significant ($p=0.314$). At day 7th infection was found 1 patient and none of the patient reported infection in further follow-up in 30th day. Statistical Analysis employed was Chi-square test. Dry socket at 3rd day was found in 5 patients of Group B Though dry socket was found in higher proportion of Group B as compared to Group A, but this difference was found to be statistically significant ($p= 0.024$). At day 7, dry socket was not

found in any of the patients. Statistical Analysis employed was Chi-square test. Pocket depth of Group A (2.72 ± 0.46 mm) was found to be higher than that of Group B (2.68 ± 0.67 mm) but this difference was not found to be statistically significant ($p=0.632$). At 7 day after the procedure, pocket depth of Group A (5.54 ± 0.48 mm) was found to be lower than that of Group B (5.32 ± 0.71 mm) but this difference was not found to be statistically significant ($p=0.012$). At 30th day after the procedure, Pocket depth of Group B (4.50 ± 0.63 mm) was found to be lower than that of Group A (4.67 ± 0.79 mm) and this difference was found to be statistically significant ($p=0.092$). Independent sample t test Statistical Analysis used. Though operative time in Group A (29.70 ± 4.17 minutes) was found to be lower than that of Group B (28.60 ± 3.37 minutes) but this difference was not found to be statistically significant ($p=0.041$). Independent sample t test Statistical Analysis used. Illustrated in Graph 4.



Discussion

The surgical removal of an impacted mandibular third molar is a common procedure associated with various techniques and anecdotal opinion. In our study it was found that severity of pain following third molar surgery

declined between days 3rd and 7th. Similar result found by Erdogan et al in 2011. [1] In our study we have found that duration of surgery was evaluated as a variable for the degree of postoperative pain and a significant correlation between the two was found for both groups

on day 3. These results are similar to those reported by Kim et al who stated that increased duration of surgery was associated with significantly higher pain scores on days 1 and 7. [2]

Postoperative swelling after removal of the third molar has been attributed to the reflection of the mucoperiosteum. [3,1] In our study at 2 days after the procedure, swelling was found to be increased in both groups but difference in change in swelling of both the groups at 3 day post-operatively, was found to be statistically insignificant. But it was also noted that greater degree of swelling occurred with use of triangular flap (Group 'A') when compared with an envelope flap (Group 'B') at 3 day post-operatively. In both groups at 7 days post-operative, majority of patients had no swelling. In our study the degree of postoperative swelling was influenced by angulation of mandibular third molar and duration of surgery and found significant relationship between the two variables only on third postoperative day. These results are similar to those reported by Kirk et al. [4]

Cerqueira et al. found that trismus was greatest at 48 hr and was present till 15 days postoperatively following mandibular third molar surgery. [5] In our study it was observed that trismus was present in both groups following mandibular third molar surgery on the third post operative day. On day 7 after the procedure, trismus was observed in only 13.06% of Group A patients of and 11.86% patients of Group B. Difference in prevalence of trismus in both the groups at day 7 was not found to be statistically significant. On day 14, only 6 % patient of Group A and 5.90% patients of Group B reported trismus. These results are similar to those reported Kirk et al. [4]

Dhanraj ani pj, Jonaidal o suggested that triangular mucoperiosteal flaps induce inflammation in the muscles present in vicinity of 3rd molar, and it is possible that muscle irritation induced by haematoma formation when the periosteum is incised for the anterior releasing component, triangular flap design. [6] Other authors found no significant difference in mouth opening between the two flap designs.[7] In our study we found on 7th post-operative day, mouth opening of Group B was found to be higher than that of Group A but this difference was found to be statistically significant. In both groups it was also found that mouth opening decreased significantly at 3 days after the procedure and at follow up after 15 days of procedure mouth opening could achieve its preoperative position.

According to Jakse N et al every gaping along the entire incision line was defined as a dehiscence, and was frequent in the first phase of wound healing after surgery.[8] In our study wound dehiscence was found in 9 patients of Group A and 14 patients of Group B. Though prevalence of wound dehiscence was higher in Group B this difference was not found to be statistically significant. Jakse et al suggest that triangular flap has less incidence of wound dehiscence because of a tension decrease in the area of the distal wound closure compared with the situation of the envelope flap technique. The vestibular triangular flap can be easily moved to lingual, ensuring a wound closure that is almost tension-free. The mesial vestibular relieving incision, which is only adapted coronally by a single suture, allows depletion of the postoperative hematoma during masticatory movements. On the first postoperative day, a hematoma is easy to relieve by spreading and compression. Jakse et al also found a higher incidence of wound dehiscence with the envelope flap. They stated that because the

envelope flap is fixed anteriorly with inter-sulcular sutures, soft tissue tension resulting in postoperative hematoma and masticatory movements causes a higher incidence of wound dehiscence.[8] Thus, secondary wound healing can cause wedge-shaped defects of the gingiva distal to the second molar, or it can favor a loss of attachment distal to the second molar. Similar result found by Suarez-Cunqueiro et al. [9]

A dehiscence does make hygiene more difficult and requires intense follow-up treatment (ie, frequent irrigation and possible local medication). There is also a chance for longer-lasting discomfort caused by hypersensitivity in the area of the distally exposed root surface of the second molar. [8] At 7 day of follow up, none of the patients of Group 'A' reported sensitivity while 9 patients of Group 'B' reported sensitivity and at 14 day of follow up, none of the patients of Group 'A' reported sensitivity while 3 patients of Group 'B' reported sensitivity and this found to be statistically significant. Similar result found by Suarez-Cunqueiro et al and Chen. [9][10].

Hassan M et al [11] in the study of 28 patients reported alveolar osteitis (dry socket) with 11.76% in triangular flap and 41.17% in envelope flap. Wound dehiscence distal to the second molar is said to be another shortcoming of envelope flap design. These gaps are generally located adjacent to the second molar, serve as a trap for foods, and may be a good environment for bacteria, which may lead to alveolar osteitis and soft tissue abscesses. [8,12] Molars with complete bone coverage do not cause bone loss distal to the adjacent molar, nor do they exert a traumatic stimulus on the oral mucosa—in contrast with impacted teeth, which lie directly underneath the mucosa. In these cases, the covering mucosa often displays chronic inflammation,

with the impacted molar having already caused loss of attachment of the adjacent molar at the time of its removal. This seems to explain the higher rate of dehiscence in the group of not completely osseous impacted teeth. [13] In our study noted that there was a higher incidence of alveolar osteitis associated with the envelope flap design Group 'B' and this difference was found to be statistically significant. Similar results was found by Kirk et al and Hassan M et al in their observation after the study [4,11]

Quee et al investigated the effect of flap design and the surgical removal of the third molar on the periodontal status of the second molar. From the results of a 6-month follow-up period, 3 conclusions were made: that surgical removal of the third molar led to loss of periodontal attachment distal to the second molar, that flap design had no influence on the degree of loss of attachment, and that the initial height of alveolar bone on the distal aspect of the second molar had no influence on the loss of attachment.[14] Jakse et al found that flap design considerably influences primary wound healing, with the triangular flap being significantly less likely to develop a dehiscence. [8]

In our study we found that on at 30th day after the procedure, pocket depth of Group A was found to be lower than that of Group B and this difference was found to be statistically significant. Similar result was found by Kirtiloglu T et al B.C. and Lopes da Silva his study demonstrated an increase in distal probing depth in the early postoperative period with both flap designs significant greater with envelope flaps. [15,16] But in our study this difference was not found to be statistically significant with both groups.

Zu J et al in his study concluded that envelope flap requires less post-operative time than triangular flap. [17]

Similar results were reported by Koyuncu et al reported shorter duration in envelope flap whereas Monaco et al reported average operating time. [18, 19] In our study the length of surgery according to flap design was comparable, in group 'A' (28.10 minute) was found to be lower than that of group 'B' (28.60 minute) but this difference was not found to be statistically significant.

Conclusion

The two flap designs (Triangular flap and Envelope flap) used in the study, frequently have acceptance among oral surgeons. It appears that the envelope flap was more conservative flap than triangular flap and had less post operative complication. Further comparative studies are still needed for determining the better technique

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