CORRUGATED RUBBER DRAIN PLACEMENT AS AN ADJUNCT TO IMPACTED MANDIBULAR THIRD MOLAR SURGERY: EFFECT ON POSTOPERATIVE PAIN, SWELLING, TRISMUS, AND QUALITY OF LIFE

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Abstract

BACK GROUND

Surgically removing impacted mandibular third molars is most commonly associated with postoperative pain, edema, and reduced mouth opening, which may negatively affect the patient comfort and quality of life. Surgical drains have been proposed to reduce the postoperative inflammatory sequelae by facilitating the drainage of the exudates.

AIM

To evaluate the effect of corrugated rubber, drain placement on postoperative pain, swelling, and mouth opening following mandibular third molar surgery.

MATERIAL AND METHOD

A prospective randomized comparative study was conducted on 30 patients undergoing impacted mandibular third molar extraction. Patients were divided into two groups: Group A (n=15) received a corrugated rubber drain after extraction, while Group B (n=15) underwent conventional primary closure without drain placement. Pain, swelling, and trismus were assessed on postoperative days 1, 3, and 7 using VAS, facial measurements, and maximum interincisal opening, respectively. Quality of life was also evaluated.

RESULTS

The drain group demonstrated significantly lower postoperative pain and swelling compared with the control group at all postoperative intervals ($p<0.05$). The greatest reduction in pain was observed on postoperative day 3. No statistically significant difference in mouth opening was observed between the groups ($p>0.05$). Patients in the drain group also reported less voice alteration and speaking difficulty.

CONCLUSION

Placement of the corrugated rubber drain effectively decreases the postoperative pain and swelling after mandibular third molar surgery, improving early postoperative comfort. However, it does not significantly affect the trismus recovery. However, this technique may be considered a simple and cost-effective adjunct for improving the postoperative outcomes.

Keywords: Mandibular third molar; Corrugated rubber drain; Postoperative pain; Swelling; Trismus; Quality of life; Surgical drainage

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INTRODUCTON

Impaction refers to the failure of a tooth to erupt completely into the oral cavity within its expected developmental period due to obstruction by bone, soft tissue, or adjacent teeth.[1,2] Mandibular third molars are the most commonly impacted teeth, accounting for the majority of impacted teeth encountered in oral and maxillofacial surgery.[3] Their prevalence varies among different populations and is influenced by genetic, racial, dietary, and environmental factors.[3,4]

Surgical extraction of impacted mandibular third molars is one of the most frequently performed procedures in oral and maxillofacial surgery. Although routinely performed, it is commonly associated with postoperative sequelae such as pain, swelling, and trismus, which significantly affects patient comfort, oral function, and quality of life during the early postoperative period. [5-7] The severity of these complications depends on several factors including the degree of impaction, surgical difficulty, flap design, operative time, and tissue manipulation.[8]

Postoperative inflammatory sequelae mainly occur as a result of surgical trauma and the subsequent inflammatory response. Tissue injury during flap elevation, bone guttering, and tooth sectioning leads to vascular changes and migration of inflammatory cells, resulting in accumulation of inflammatory exudate within the surgical site.[1,9] Postoperative pain is usually most severe during the first few hours after surgery, while swelling typically reaches its peak within 48–72 hours and gradually subsides over the following days.[10] Blood and inflammatory exudates accumulate within the anatomical spaces of the oral cavity, increasing the tissue tension, and thus leading to pain, swelling and trismus.[1,9]

Various methods have been proposed to minimize the postoperative morbidity following third molar surgery, which include modifications in flap design and suturing techniques, use of corticosteroids and analgesics, cryotherapy, low-level laser therapy, and placement of surgical drains. [11-14] Despite these approaches, postoperative discomfort remains a major concern for both the patients and the clinicians.

Surgical drains are used to evacuate accumulated blood and inflammatory exudate from the surgical site, thereby reducing dead space and tissue tension.[15] In OMFS, passive open drains like corrugated rubber drains are preferred because of their simplicity, low cost, and ease of placement.[16] By limiting the fluid buildup behind the surgical flap, corrugated rubber drains enable continuous drainage through capillary action and gravity, thereby reducing postoperative edema and pain.[16,17]

Several studies have demonstrated that placing drain after mandibular third molar surgery can reduce postoperative swelling and also improve patient comfort during the early healing period. [16-18] However, the effect of drains on postoperative trismus and overall quality of life still remains controversial. Therefore, the present study was undertaken to evaluate the effectiveness of corrugated rubber drain placement in reducing postoperative pain, swelling, and trismus following surgical removal of impacted mandibular third molars and the quality of life of the patient was also assessed.

AIM OF THE STUDY

To assess the pain, edema and mouth opening following the surgical removal of the impacted lower third molar with and without use of a corrugated rubber drain. Along with the quality of life of the patient.

OBJECTIVES OF THE STUDY

1. To assess the effect of corrugated drain and primary closure.
2. To assess the complications following the placement of the intraoral drain in terms of pain, swelling and trismus.
3. To evaluate:
    - Pain
    - Trismus (Mouth Opening)
    - Swelling
    - Patient Discomfort

INCLUSION AND EXCLUSION CRITERIA

Inclusion Criteria:

1) All healthy patients were selected.
2) All the patients that came to TMDCRC requiring 3rd molar disimpaction.
3) All patients that belonged to age group 18-50.
4) All the patients who were co-operative, motivated and hygiene conscious were included.
5) None of the patients on medications that would interfere with the healing process after surgery were selected.

Exclusion Criteria:

1) Patients with uncontrolled systemic disease and immune compromised patients.
2) Patients with uncontrolled bleeding and clotting disorders.
3) Pregnancy and lactating mothers.
4) Patient who was unable to keep follow up and poorly motivated.

MATERIALS AND METHODS

Thirty patients were randomly divided into two groups. In group A (experimental group), 15 patients received a corrugated rubber drain placed on the buccal aspect of the surgical site and secured with silk sutures following mandibular third molar surgery. In Group B (control group), 15 patients underwent conventional primary closure without drain placement. Neither the surgeon nor the patient was blinded to the intervention. A detailed clinical and radiographic examination was performed, and informed consent was obtained from all patients before surgery.

All procedures were carried out in the Department of Oral and Maxillofacial Surgery, Teerthanker Mahaveer Dental College and Research Centre, Moradabad, under local anesthesia with or without midazolam sedation. Standard aseptic protocol was followed, and the surgical site was prepared using 1% povidone-iodine solution.

A standardized Ward's or modified Ward's incision was used in all cases. Inferior alveolar and long buccal nerve blocks were administered using 2% lignocaine hydrochloride with adrenaline (1:80,000). Buccal bone guttering was performed using a round bur in a straight handpiece under copious saline irrigation. Tooth sectioning was carried out when required. Following extraction, the socket was curetted and irrigated with sterile saline.

In Group A, a corrugated rubber drain was placed and stabilized with 3-0 silk sutures, whereas Group B received conventional primary closure with 3-0 black silk sutures. The drain was removed on postoperative day 3 and sutures on day 7.

Postoperative medications included amoxicillin-clavulanic acid, metronidazole, acetaminophen, and pantoprazole for 5 days. Patients were advised cold and soft diet for 24 hours, warm saline rinses, and betadine mouthwash.

Fig: IMPACTION ARMAMENTARIUM

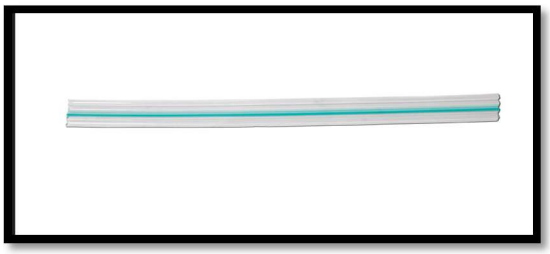


Fig: CORRUGATED DRAIN TUBE

EVALUATION PARAMETERS

Patients were evaluated preoperatively and on postoperative days 1, 3, and 7 for pain, facial swelling, and mouth opening. Quality of life was assessed on postoperative day 7.

1) **Pain:** Pain intensity was assessed using a **10-cm Visual Analogue Scale (VAS)**, where 0 indicated no pain and 10 indicated the worst imaginable pain.
2) **Mouth Opening (Trismus):** Maximum interincisal opening was measured in millimeters using a **Vernier caliper**. Postoperative values were compared with baseline measurements to assess the degree of trismus.
3) **Facial Swelling:** Facial edema was evaluated using the **Laskin facial measurement method**. Three linear facial measurements were recorded using a flexible measuring tape:

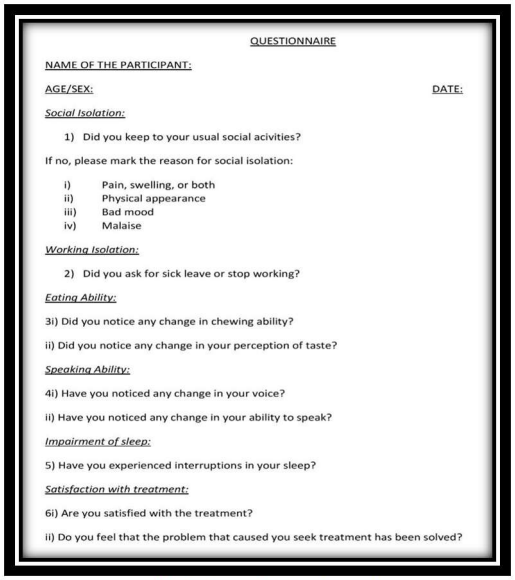
1. Tragus to corner of the mouth (Tr–Com)
2. Tragus to soft tissue pogonion (Tr–Pog)
3. Gonion to lateral canthus of the eye (Go–Lc)

The mean facial measurement was calculated as:

Facial Swelling = (Tr–Com)+(Tr–Pog)+(Go–Lc) / 3

Changes from the preoperative measurements were used to determine the extent of postoperative edema.

4) **Quality of Life (Patient Discomfort) [19]:** Postoperative quality of life was evaluated on **postoperative day 7** using a structured questionnaire assessing speech, chewing, social activities, sleep, taste alteration, voice changes, treatment satisfaction, and overall patient comfort.



QUESTIONNAIRE

NAME OF THE PARTICIPANT:

AGE/SEX: DATE:

Social Isolation:

1) Did you keep to your usual social acivities?

If no, please mark the reason for social isolation:

i) Pain, swelling, or both
ii) Physical appearance
iii) Bad mood
iv) Malaise

Working Isolation:

2) Did you ask for sick leave or stop working?

Eating Ability:

3i) Did you notice any change in chewing ability?

ii) Did you notice any change in your perception of taste?

Speaking Ability:

4i) Have you noticed any change in your voice?

ii) Have you noticed any change in your ability to speak?

Impairment of sleep:

5) Have you experienced interruptions in your sleep?

Satisfaction with treatment:

6i) Are you satisfied with the treatment?

ii) Do you feel that the problem that caused you seek treatment has been solved?

All patients were recalled for clinical evaluation on postoperative days **1, 3, and 7**.

RESULTS

A total of 30 patients undergoing surgical removal of impacted mandibular third molars were included in the study, with 15 patients allocated to the study group (corrugated rubber drain placement) and 15 to the control group (without drain placement). Baseline measurements of facial swelling, pain, and mouth opening were comparable between the two groups, with no statistically significant differences observed preoperatively ($p > 0.05$).

Facial Swelling

Both groups exhibited an increase in facial swelling during the early postoperative period, reaching peak values on Day 1. However, the study group demonstrated significantly lower swelling compared with the control group throughout the postoperative follow-up. On Day 1, mean swelling was 124.9 ± 12.5 mm in the study group compared with 127.7 ± 12.9 mm in the control group ($p = 0.001$). Similar significant differences were observed on Day 3 (120.4 ± 10.7 mm vs. 125.7 ± 10.2 mm; $p = 0.001$) and Day 7 (118.4 ± 11.1 mm vs. 122.8 ± 12.1 mm; $p = 0.001$). Intragroup analysis revealed significant temporal changes in swelling in both groups; however, the study group showed a faster return toward baseline values, indicating more rapid resolution of postoperative edema.

Pain Assessment

Pain scores progressively decreased in both groups over the postoperative period. At baseline, no significant difference was observed between groups ($p = 0.168$). However, postoperative pain was significantly lower in the study group on Day 1 (4.67 ± 1.18 vs. 5.80 ± 0.94; $p = 0.006$), Day 3 (2.93 ± 1.06 vs. 4.27 ± 0.88; $p = 0.001$), and Day 7 (1.60 ± 0.63 vs. 2.27 ± 0.80; $p = 0.012$). The greatest difference in pain scores was observed on Day 3, suggesting superior pain control in patients receiving drain placement. Intragroup comparisons demonstrated a significant reduction in pain scores over time in both groups ($p < 0.001$).

Mouth Opening

A marked reduction in mouth opening was observed in both groups during the early postoperative period, reflecting the development of postoperative trismus. Mean mouth opening decreased substantially on Days 1 and 3 and improved by Day 7. Although significant intragroup changes were observed over time in both groups ($p < 0.001$), no statistically significant intergroup differences were found at any postoperative interval (Day 1, $p = 0.877$; Day 3, $p = 0.612$; Day 7, $p = 0.684$). These findings indicate that drain placement did not significantly influence postoperative trismus.

Quality of Life Assessment

Evaluation of postoperative quality-of-life parameters demonstrated no statistically significant differences between groups with respect to social activities, requirement for sick leave, chewing ability, taste alteration, sleep interruption, treatment satisfaction, or perceived resolution of the presenting complaint ($p > 0.05$). However, significant differences were observed in speech-related parameters. Voice alteration was reported by 53.3% of patients in the control group, whereas none of the patients in the study group experienced this complication ($p = 0.001$). Similarly, speaking difficulty was significantly more common in the control group (66.7%) than in the study group (13.3%) ($p = 0.002$).

Overall, patients who received corrugated rubber drain placement demonstrated significantly lower postoperative swelling and pain scores, together with reduced incidence of voice alteration and speaking difficulty, when compared with the control group. No significant benefit was observed with respect to postoperative mouth opening.

DISCUSSION

Surgical extraction of impacted mandibular third molars is commonly associated with postoperative pain, swelling, and trismus due to surgical trauma and the subsequent inflammatory response. [5-7] Various methods have been proposed to reduce postoperative morbidity, including corticosteroids, cryotherapy, low-level laser therapy, and surgical drains. [11-13, 16]

In the present study, the drain group demonstrated significantly reduced postoperative swelling and pain compared with the control group. Reduced edema may be attributed to effective evacuation of inflammatory exudate and decreased tissue tension. Similar findings

were reported by Sağlam,[18] Cerqueira et al.,[16] Osunde et al, [7] and Liu et al.,[20] who concluded that surgical drainage significantly reduces postoperative swelling following third molar surgery.

Pain scores were also significantly lower in the drain group at all postoperative intervals. Reduced inflammatory accumulation and tissue pressure likely contributed to decreased nociceptor stimulation and improved patient comfort [16]. Similar observations have been reported by Liu et al.,[20] Osunde et al.,[7] and Majid and Mahmood.[21]

Although both groups showed reduced mouth opening during the early postoperative period, no statistically significant difference in trismus was observed between the groups. These findings are consistent with Bello et al. [22] and Trybek et al.,[23] who suggested that trismus is more closely related to surgical trauma and muscle irritation than to exudate accumulation alone.

Quality-of-life assessment revealed significantly lower voice alteration and speaking difficulty in the drain group, likely due to reduced facial edema. McGrath et al. [24] similarly reported that postoperative swelling adversely affects speech and social interaction during the early healing period.

Overall, the present study suggests that corrugated rubber drain placement is a simple and cost-effective adjunct for reducing postoperative pain and swelling following mandibular third molar surgery and improving early postoperative recovery.

CONCLUSION

Corrugated rubber drain placement following impacted mandibular third molar surgery significantly reduces early postoperative pain and facial swelling and improves patient comfort. However, it does not significantly influence postoperative trismus. The technique is simple, economical, and may be considered an effective adjunct for improving early postoperative recovery. Further studies with larger sample sizes are recommended to validate these findings.

REFERENCES

1) Peterson LJ, Ellis E III, Hupp JR, Tucker MR. *Contemporary Oral and Maxillofacial Surgery*. 7th ed. Elsevier; 2019.
2) Archer WH. *Oral and Maxillofacial Surgery*. 5th ed. WB Saunders; 1975.
3) Hassan AH. Pattern of third molar impaction in a Saudi population. *Clin Cosmet Investig Dent.* 2010;2:109-113.
4) Quek SL, Tay CK, Tay KH, Toh SL, Lim KC. Pattern of third molar impaction in a Singapore Chinese population. *Int J Oral Maxillofac Surg.* 2003;32:548-552.
5) Blondeau F, Daniel NG. Extraction of impacted mandibular third molars: postoperative complications and their risk factors. *J Can Dent Assoc.* 2007;73:325.
6) Bui CH, Seldin EB, Dodson TB. Types, frequencies and risk factors for complications after third molar extraction. *J Oral Maxillofac Surg.* 2003;61:1379-1389.
7) Osunde OD, Saheeb BD, Bassey GO. *Ann Med Health Sci Res.* 2014;4:938-942.
8) Yuasa H, Sugiura M. Clinical postoperative findings after removal of impacted mandibular third molars: prediction of postoperative facial swelling and pain based on preoperative variables. British Journal of Oral and Maxillofacial Surgery. 2004 Jun 1;42(3):209-14.
9) Kruger GO. *Textbook of Oral and Maxillofacial Surgery.*
10) Rocha NS, Cavalcante JR, de Oliveira e Silva ED, Caubi AF, Laureano Filho JR, Gondim DG. Patient's perception of improvement after surgical assisted maxillary expansion (SAME): pilot study. Med Oral Patol Oral Cir Bucal. 2008 Dec 1;13(12):783-.
11) Markiewicz MR, DeSantis JL, Margarone III JE, Pogrel MA, Chuang SK. Morbidity associated with oral mucosa harvest for urological reconstruction: an overview. Journal of oral and maxillofacial surgery. 2008 Apr 1;66(4):739-44.
12) Bamgbose BO, Akinwande JA, Adeyemo WL, Ladeinde AL, Arotiba GT, Ogunlewe MO. Effects of co-administered dexamethasone and diclofenac potassium on pain, swelling and trismus following third molar surgery. Head & Face Medicine. 2005 Nov 7;1(1):11.
13) Brignardello-Petersen R et al. *J Oral Maxillofac Surg.* 2012
14) Santos TD, Silva ER, Faria AC, Mello Filho FV, Xavier SP. Multiple supernumerary teeth in a nonsyndromic 12-year-old female patient-a case report. Brazilian Dental Journal. 2014 Jan;25:79-82.
15) Fonseca RJ et al. *Oral and Maxillofacial Surgery.*
16) Cerqueira PR, do Egito Vasconcelos BC, Bessa-Nogueira RV. Comparative study of the effect of a tube drain in impacted lower third molar surgery. Journal of oral and maxillofacial surgery. 2004 Jan 1;62(1):57-61.
17) Rakprasitkul S, Pairuchvej V. Mandibular third molar surgery with primary closure and tube drain. International journal of oral and

maxillofacial surgery. 1997 Jun 1;26(3):187-90.

18) Saglam AA. Effects of tube drain with primary closure technique on postoperative trismus and swelling after removal of fully impacted mandibular third molars. Quintessence international. 2003 Feb 1;34(2).
19) Koyuncu BÖ, Zeytinoğlu M, Tetik A, Gomel MM. Effect of tube drainage compared with conventional suturing on postoperative discomfort after extraction of impacted mandibular third molars. British Journal of Oral and Maxillofacial Surgery. 2015 Jan 1;53(1):63-7.
20) Liu J et al. *J Oral Maxillofac Surg.* 2022 (systematic review/meta-analysis).
21) Majid OW, Mahmood WK. *J Oral Maxillofac Surg.* 2012.
22) Bello SA, Adeyemo WL, Bamgbose BO, Obi EV, Adeyinka AA. Effect of age, impaction types and operative time on inflammatory tissue reactions following lower third molar surgery. *Head Face Med.* 2011;7:8.
23) Trybek G, Preuss O, Kasperkiewicz A, et al. Effect of intraoral drainage after impacted mandibular third molar extraction on postoperative complications. *J Clin Med.* 2021;10(4):852.
24) McGrath C, Comfort MB, Lo ECM, Luo Y. Changes in life quality following third molar surgery—the immediate postoperative period. *Br Dent J.* 2003;194(5):265-268.