

Primary and Secondary Closure of the Surgical Wound After Removal of Impacted Mandibular Third Molars

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Abstract

Aim The present study attempted the evaluation of Primary and secondary closure techniques after removal of impacted third molars in terms of healing, post-operative pain and swelling.

Material and Methods 60 patients with impacted mandibular third molars were randomly divided into two groups of 30. Panoramic radiographs were taken to assess degree of eruption and to assess 3rd molar angulations to the long axis of 2nd molar. Teeth were extracted, and in Group I the socket was closed by hermetically suturing the flap. In group II a 5–6 mm wedge of mucosa distal to the second molar was removed & the flap was repositioned. Interrupted sutures were given, so as to form a triangular opening distal to second molar measuring about 5 × 5 mm. Swelling and pain were evaluated for 7 days after surgery with the VAS scale.

Results Study results showed that post operative Sequale were comparatively less in secondary closure group than the primary closure group. Pain showed statistically significant difference between two groups. Pain was less in secondary closure group from day 1 to day 7. Swelling & trismus was also significantly less in secondary closure group. Evaluation of the complications of these two techniques showed that delayed wound healing occurred in 66.6% of cases (20 cases out of 30) in secondary closure

group where as dehiscence of suture line occurred in 33.33% of cases (10 out of 30) in primary closure group.

Conclusions The results obtained in the present study enable us to conclude that, in cases of equal intra-operative difficulty, open healing of the surgical wound after removal of impacted third molars produces less post-operative swelling and pain than occurs with closed healing, by hermetically suturing the socket.

Keywords Primary closure · Secondary closure · Third molar · Swelling · Pain

Introduction

Removal of impacted mandibular third molars is one of the most common surgical procedures routinely undertaken in the Oral and Maxillofacial Surgery clinic that requires a sound understanding of surgical principles and patient management skills. Usually postoperative recovery of patient takes several days and patient is advised bed rest and absence from work. This postoperative course is dominated by pain, swelling, trismus and dysphagia which reflect inflammatory tissue reactions [1].

One of the factors most closely linked to the intensity of postoperative pain & swelling is the type of healing of the surgical wound [2]. In essence, use of minimal sutures [3] with smaller diameters is advocated. Tight suturing and primary closure in third molar surgery will give rise to more postoperative discomfort to the patient [4]. In primary healing, the socket is covered and sealed hermetically by the mucosal flap & in secondary healing, socket remains in communication with the oral cavity [2]. To allow the socket to heal by secondary healing a wedge of mucosa distal to second molar is removed and a self irrigating

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opening is maintained which results in less pain & swelling in the postoperative period [2, 5], as compared to the primary healing. Conflicting opinions have been expressed in literature concerning these two types of healing. Some authors are in favour of closed healing, whereas, other authors report that primary healing frequently causes more pain and swelling than the secondary healing and the postoperative progress does not differ in the two types of healing [2]. It has been seen that most of the primarily closed sites gets dehisced and heal by secondary intention.

It is now generally accepted that a mandibular third molar socket can be left partially open to facilitate the postoperative irrigation. This goal can be achieved by making a small window in the flap before closure or by inserting a foreign body like gauze dressing with medication partially submerged [6]. A secondary closure appears to minimize immediate postoperative edema, pain, thus contributing to enhance patient comfort. Further the postoperative care and hygiene of the secondary closure site is more easily managed by the patients as compared to the primary closure site that has dehisced [5].

The present study compares the primary and secondary healing after surgical removal of impacted mandibular third molars, evaluating the incidence of postoperative complications and monitoring the extent of swelling, severity of pain and trismus.

Material and Methods

Total 60 patients both males and females within the age of 25–30 years, who were referred for removal of impacted mandibular third molars, and fulfilled the following inclusion criteria were selected for this study with due permission of local ethical committee. Ortho-pantomograph was taken to assess third molar angulations to the long axis of second molar. Inclusion criteria:

1. Patients who are having mesio-angularly impacted mandibular third molar (Position B Class II, PELL & GREGORY classification 1933, with difficulty index-5).
2. No systemic diseases.
3. Non-smokers.
4. Not allergic to the drugs or anesthetic agent used in the surgical protocol.

Written informed consent for the study was taken from all the patients.

The patients selected for the study were randomly assigned into one of the surgical groups:

Group I (control group): Underwent primary closure (30 patients)—Fig. 1.



Fig. 1 Primary closure after 3rd molar removal



Fig. 2 Secondary closure after 3rd molar removal

Group II (experimental group): Underwent secondary closure (30 patients)—Fig. 2.

The surgical procedures were performed by a single surgeon.

Surgical Procedure

Patients were made to sit comfortably on the dental chair, face was prepared with Betadine and standard draping was done. All the patients were instructed to rinse with 5–10 ml of 0.12% of Chlorhexidine for 2 min preoperatively.

The effective anesthesia was achieved with 1:2,00,000 Lignocaine with Adrenaline solution by giving classical inferior alveolar nerve block, lingual nerve block and long buccal nerve block on the side to be operated.

A full-thickness incision was made to prepare a trapezoid flap. The flap was reflected and osteotomy was performed. The tooth crown was sectioned under abundant irrigation in all cases. All parts of the tooth were loosened with a lever and removed. After completing extraction, curettage of the socket was performed plus irrigation with 20 ml sterile saline solution.

After achieving proper Hemostasis the wound closure was started. In Group I (Primary closure in 30 patients) the flap was repositioned & sutured hermetically with 3-0 black braided silk. In group II (Secondary closure in 30 patients) a wedge of mucosa, width 5–6 mm, was removed distal to second molar & the flap was repositioned & sutured with 3-0 black braided silk, so as to form a triangular opening distal to second molar measuring about 5×5 mm. For all cases pressure dressing was given. Time required for surgery was noted from taking incision to last suture.

All patients received postoperative instructions, which included the following.

1. Ice pack application for 6 h after surgery, alternating 30 min of application with 30 min pause.
2. Soft diet for 2 days.
3. Normal oral hygiene maintenance with 0.12% Chlorhexidine twice daily.
4. All patients were given following prescription:

Cap. Amoxicillin 500 mg thrice a day for 5 days.

Tab. Voveran (Diclofenac Sodium) 50 mg b.d. for 3 days.

5. Patients were given a daily pain & swelling record sheet to be completed during the subsequent 7 days.
6. Patients were called for follow up on 2nd and 7th postoperative day.
7. Sutures were removed on 7th postoperative day.

All patients were also evaluated one month postoperatively.

Evaluation Criteria

Subjective Method for Evaluation of Pain and Swelling

Visual analogue scale was used for this purpose consisting of a pain & swelling scale 5 cm long subdivided into five equal parts, one end corresponds to no pain, no swelling and other to extremely severe pain, extremely severe swelling.

A card describing predetermined values of pain (Table 1) & swelling (Table 2) was given to all patients and they were asked to fill the record everyday for seven

Table 1 VAS scale to evaluate pain : reference values given to the patients

0 No pain	The patient feels well
1 Slight pain	If the patient is distracted he or she does not feel the pain
2 Mild pain	The patient feels pain even if concentrating on some activity
3 Severe pain	The patient is very disturbed but nevertheless can continue with normal activities
4 Very severe pain	The patient is forced to abandon normal activities
5 Extremely severe pain	The patient must abandon every type of activity and feels the need to lie down

Table 2 VAS scale to evaluate swelling: reference values given to the patients

0 No swelling	The patient does not detect the slightest swelling
1 Slight swelling	The patient detects a slight swelling but is not very noticeable
2 Mild swelling	The swelling is noticeable but does not interfere with normal mastication & swallowing
3 Severe swelling	The swelling is evident & hinders normal mastication
4 Very severe swelling	The swelling is marked. Mastication is hindered but there is no reduction in mouth opening (no trismus)
5 Extremely severe swelling	The swelling is very evident & mouth opening is reduced (trismus)

subsequent days starting 6 h postoperatively making reference to the predetermined values.

Objective Method of Evaluating Swelling and Trismus

Trismus

Maximum mouth opening was measured between the incisal edges of upper & lower central incisors. The readings were taken before surgery and on 2nd day & 7th day postoperatively.

Swelling

The horizontal distance from the corner of mouth to the lobe of the ear and vertical distance from outer canthus of eye to the angle of the mandible was measured with a silk suture following the contour of soft tissue, and not stretching the suture thread. The measurement was transferred on a scale & recorded in the record sheet. The measurements were taken preoperatively, on 2nd & 7th postoperative day on the site of surgery.

Evaluation of Wound Healing

The surgical sites were examined on 2nd and 7th postoperative day. In primary closure the site was checked for dehiscence and in secondary closure delayed wound healing was checked. In all patients, the surgical site was also evaluated 1 month after the surgery.

Results

The results of the study were evaluated statistically using SPSS 17.1 Software. The data of the VAS for pain was collected in the experimental and the control group from record sheet given to the patients for day 1 to day 7. The mean of the data from day 1 to day 7 was calculated for

both these groups as illustrated in Table 3. This data was then subjected to statistical analysis using *t* test which shows that there was a significant difference between the means of experimental and control group for all the days i.e. from day 1 to day 7.

Similarly, the data of VAS for swelling was collected from all the patients in the experimental and the control group. The mean of the data from day 1 to day 7 was calculated for both these groups as illustrated in Table 4. This data was then subjected to statistical analysis which shows that there was a significant difference between the means of experimental and control group for all the days i.e. from day 1 to day 7.

Tables 5 and 6 shows the mean values of percentage of facial swelling & trismus in the experimental and the

Table 3 Mean values of VAS for pain in experimental & control group (*n* = 30)

Pain	Experimental group (mean \pm SD)	Control group (mean \pm SD)	<i>t</i> Value	<i>P</i> value	Result
Day 1	2.2 \pm 3.04	3.39 \pm 1.12	4.26	<i>P</i> < 0.05	Significant
Day 2	1.54 \pm 0.76	2.94 \pm 1.21	5.38	<i>P</i> < 0.05	Significant
Day 3	1.14 \pm 0.99	2.20 \pm 1.22	3.71	<i>P</i> < 0.05	Significant
Day 4	0.77 \pm 0.88	1.79 \pm 1.06	5.31	<i>P</i> < 0.05	Significant
Day 5	0.27 \pm 0.57	1.34 \pm 0.81	5.95	<i>P</i> < 0.05	Significant
Day 6	0.27 \pm 0.57	0.87 \pm 0.96	6.0	<i>P</i> < 0.05	Significant
Day 7	0.24 \pm 0.66	0.47 \pm 0.67	1.98	<i>P</i> < 0.05	Significant

Table 4 Mean values of VAS for swelling in experimental & control group (*n* = 30)

Pain	Experimental group (mean \pm SD)	Control group (mean \pm SD)	<i>t</i> Value	<i>P</i> value	Result
Day 1	1.64 \pm 1.30	2.52 \pm 1.11	4.19	<i>P</i> < 0.05	Significant
Day 2	1.77 \pm 0.67	2.74 \pm 0.89	5.99	<i>P</i> < 0.05	Significant
Day 3	1.57 \pm 0.80	2.74 \pm 0.85	8.01	<i>P</i> < 0.05	Significant
Day 4	1.24 \pm 0.96	2.27 \pm 1.12	5.89	<i>P</i> < 0.05	Significant
Day 5	0.67 \pm 0.87	1.90 \pm 1.13	7.74	<i>P</i> < 0.05	Significant
Day 6	0.47 \pm 0.99	0.92 \pm 0.73	2.41	<i>P</i> < 0.05	Significant
Day 7	0.20 \pm 0.65	0.37 \pm 0.48	1.99	<i>P</i> < 0.05	Significant

Table 5 Percentage of facial swelling (FS) in experimental & control group (*n* = 30)

Day	Experimentally (mean \pm SD)	Control group (mean \pm SD)	<i>t</i>	<i>P</i>	Result
Day 2	1.059 \pm 1.05	3.88 \pm 1.81	7.27	<i>P</i> < 0.01	Highly Significant
Day 7	0.06 \pm 0.15	0.697 \pm 0.62	5.49	<i>P</i> < 0.01	Highly Significant

Table 6 Percentage of trismus in experimental & control group (*n* = 30)

Day	Experimentally (mean \pm SD)	Control group (mean \pm SD)	<i>t</i>	<i>P</i>	Result
Day 2	3.48 \pm 5.85	18.95 \pm 14.91	5.297	<i>P</i> < 0.01	Highly significant
Day 7	0.119 \pm 0.64	4.87 \pm 6.38	4.06	<i>P</i> < 0.01	Highly significant

Table 7 Dehiscence in primary closure

Dehiscence	(%)
Present	10 (33.33%)
Absent	20 (66.67%)
Total	30

Table 8 Delayed wound healing in secondary closure

Delayed wound healing	Experimental no. (%)
Present	20 (66.67%)
Absent	10 (33.33%)
Total	20

control groups on 2nd and 7th postoperative days. From the table it can be seen that the percentage of facial swelling in control group was higher than the experimental group for both the day, as is shown by the statistical analysis. Trismus was also showing the same results, with higher values for the control group in comparison to experimental group. Highly significant difference was seen between the experimental and the control group on both the days.

Rate of complications in the control group is shown in Table 7. The dehiscence of suture line occurred in 33.33% of the cases in primary closure. Similarly, the rate of complications in the experimental group is shown in Table 8. The delayed wound healing occurred in 66.66% of the cases in secondary closure, whereas in 33.33% of cases the wound healing was uneventful.

Mean duration of surgery for experimental group was 29.13 min while for control group the mean value of time taken was 29.67 min with *t* value 0.32 & *P* value less than 0.005 which was statistically as well as clinically not significant (application of *t* test) Table 9.

Discussion

The extent of swelling and the severity of pain are the chief indicators of patient comfort during the post-operative period after third molar removal. Conflicting opinions have been expressed in the literature concerning the technique of wound closure after removal of impacted mandibular third molar. In secondary healing, the socket remains in communication with the oral cavity whereas in primary healing

the socket is covered & sealed hermetically by a mucosal flap. Primary wound closure may cause postoperative edema, pain, facial swelling & trismus.

According to Holland and Hindle [7] a primary closure is preferred by Howe, Archer, Kruger, Thoma & Killey key whereas many other authors preferred the wound to heal by secondary intention. In a similar attempt to decrease postoperative problems many authors have also tried tube drain in the buccal fold after surgical removal of third molars [8–10].

Holland and Hindle [7] showed that postoperative pain & swelling were marked in complete closure than in the open healing. They also found that the closed socket had broken down within a week & healed by secondary intention. Our study also ended in the same conclusion.

Pasqualini et al. [11] and David et al. [12] from their study revealed that secondary closure of the socket cause less in-convenience for the patient as it appears to minimize post extraction swelling & pain.

Berge [13, 14] had done a thorough investigation of visual scale & other objectives of assessment of pain & swelling and came to conclusion that pain, being an exclusive subjective experience, can be successfully assessed with the VAS. The VAS has also been established as a reliable & sensitive method for recording pain. The VAS has also been used for patient self assessment of postoperative swelling & provides a more complete assessment of postoperative swelling than does measurement of extra oral swelling alone.

According to David et al. [12] the swelling & pain was significantly greater in primary closure for 5 days following surgery than in secondary closure. Following the fifth postoperative day, no difference was observed in patient discomfort between the two groups.

In the present study, when pain was assessed with VAS it was found that there was a significant difference in the severity of pain between two groups, all times recorded i.e. from day 1 to day 7. Intensity of pain was greater in control group (primary closer group) on all 6 days after surgery. It was seen that the pain experienced by the patients in the experimental group (secondary closure) was much less than the control group. However the intensity of pain was maximum on the day of surgery which was decreased subsequently in both the groups. Similarly, when swelling was assessed with VAS it was found that there was a statically significant difference in the severity of swelling between the two groups, at all times recorded. It was seen

Table 9 Mean duration of surgery

Experimental (mean \pm SD) (min)	Control (mean \pm SD) (min)	<i>t</i> Value	<i>P</i> value	Result
29.13 \pm 7.31	29.67 \pm 5.39	0.32	<i>P</i> > 0.005	Not significant

that the swelling experienced by the patients in the experimental group was much less than control group.

In the present study, we found that in 33.33% of primary closure, there was dehiscence postoperatively and this finding is very close to the study of Pasquilini et al. [11] who found this complication in 30% of his cases. But rest of the cases healed by primary healing. Many other authors also came across this problem as found by Dubois [12] in 50%, Holland and Hindle in 66% [7] and Sutas and Verasak [10] in 73% of cases in primary closure.

The results obtained in the present study enable us to conclude that, in cases of equal intra-operative difficulty, open healing of the surgical wound after removal of impacted third molars produces less post-operative swelling and pain than occurs with closed healing, by hermetically suturing the socket. In secondary closure technique the post-operative Sequelae were comparatively less than the primary closure. The time required for both the techniques were almost same. The VAS for pain & swelling showed significant difference between two groups.

Evaluation of complications of these two techniques showed higher percentage of delayed wound healing (66.66%) in secondary closure group while dehiscence of suture line was the main complication present in primary closure group.

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