



A comparative study of the effect of suture and suture-less techniques on post-operative complications following lower third molar surgery

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Abstract

Background: Lower third molar surgery remains one of the most common surgical procedure in oral and maxillofacial surgery. It has its own risks, and post-operative complications, that influence the recovery period, and affect a patient's quality of life. This study aims to determine which of the two secondary closure techniques assessed is superior in improving wound healing, and reducing post-operative complications, following lower third molar surgery.

Material & Methods: We carried out a prospective, randomised, double-blind, split-mouth controlled trial on 37 patients, who had bilateral impacted third molars of similar surgical difficulty, were recruited, with 34 successfully completing the study. We compared partial closure using one suture to the suture-less technique. Surgical sites were divided into two groups, Group A: one suture, and Group B: suture-less. Each patient received both treatments at the same time. During the first post-operative week, all patients were asked to daily assess pain, facial swelling, and bleeding, using subjective self-assessment scales.

Results: The results showed a statistically significant difference between the two techniques in the following outcomes: a) less post-operative pain in one suture technique at day five ($p = 0.046$), and six ($p = 0.034$), b) better socket healing at one week ($p = 0.002$), and one month ($p = 0.014$) in one suture technique, and c) better soft tissue healing at one week ($p = 0.016$) in one suture technique.

Conclusion: The one-suture technique for lower third molar surgery is superior to the suture-less technique in reduction of post-operative pain at day five and day six, and improving wound healing at one week and at one month post-operatively. There is no difference between the two techniques in reduction of post-operative swelling.

Keywords: Suture, Suture less, Impacted third molar, Pain, swelling, wound healing.

Introduction

Third molars generally erupt between the ages of seventeen and twenty-one years¹, they may erupt as early as fourteen years among Nigerians², and up to age of twenty-six years in Europe³.

The impaction of lower third molar occurs in up to 73% of young adults in Europe⁴. This impaction happens due to the inadequate space to accommodate the lower third molar teeth, which results from insufficient development of retro-molar space⁵, or insufficient mesial movement of

the modern human dentition, due to lack of interproximal attrition⁶. Additionally, the medial angulation of the third molar bud at the early calcification and root development stages could lead to an unfavourable path of eruption⁵.

Impacted lower third molar could lead to a variety of pathological consequences, that include a decayed tooth, distal caries in the second molar⁷, pericoronitis, and acute dental diseases⁸. A higher incidence of periodontal diseases related to the impacted lower third molar may have an impact on systemic health⁹.

Although there is no evidence to support, or refute removal of asymptomatic impacted third molar teeth¹⁰, the American Association of Oral and Maxillofacial Surgeons (AAOMS) fully supports the elective prophylactic removal of asymptomatic impacted third molar teeth that are unlikely to erupt into a disease-free position¹¹. The concept of prophylactic removal of asymptomatic third molar teeth is no longer accepted in the most recent National Institute for Health and Care Excellence (NICE) guidelines, which advise that the removal of impacted third molars, should be carried out for teeth with evidence of pathology (NICE, 2000)¹².

Lower third molar surgery remains one of the most common surgical procedure in oral and maxillofacial surgery. As any other surgical procedure, lower third molar surgery has its own risks, and post-operative complications, that influence the recovery period, and affect a patient's quality of life¹³. A lot of research has been directed toward investigating these postoperative complications, to predict the patient at risk, and to find the ideal, and most cost-effective way to prevent, or at least minimize these complications, in order to improve post-operative quality of life. We carried out this prospective, randomised, double-blind, split-mouth controlled study, in order to investigate the effect of wound closure technique, through using different number of sutures, on the post-operative complications, following lower third molar surgery.

Material & Methods

This clinical trial is a prospective, randomised, double-blind, control trial, which is designed to investigate the effect of two secondary wound closure techniques, using different number of sutures, on the post-operative complications, following lower third molar surgery.

Both methods of treatment used in this trial were used in the same patient at the same time, so the participants act as their own controls. The use of such split-mouth design helps in reducing confounding variables that results from inter-patient variations, as the parameters we investigated in this study, such as pain, swelling, bleeding, and healing vary significantly between different patients undergoing the same surgery. In order to prevent the "carry-over" effect that happens in split-mouth design trials, when treatments are carried out at different times, we eliminated this effect by having the patient evaluating the effect of both treatments at the same time. On the other hand, we were unable to investigate the effect of both techniques on trismus; as mouth opening, unlike other variables, could be recoded only once for each patient at each time point.

Inclusion criteria

Consenting patients attending the Department of Oral and Maxillofacial Surgery at Mahatma Gandhi Dental college & Hospital, Jaipur, rajasthan who require the removal of both lower third molar teeth only, and fulfil the following requirements could be included in the study:

1. Suitable for treatment under local anaesthetic with intravenous conscious dental sedation
2. Full thickness mucoperiosteal flap required, with bone removal with or without tooth sectioning for removal of both lower third molars which have similar eruptive state and similar difficulty.
3. American Society of Anaesthesiologists (ASA) Grade I or II (Grade I = no medical conditions; Grade II = medical conditions that are well controlled)

4. No known congenital or acquired bleeding tendency
5. Aged between 18 and 45
6. Participants, who are willing to cooperate with the requirements of the study protocol.

Exclusion criteria

Participants are excluded in any of the following circumstances:

1. Participant does not want to take part in the study, or is unable to give informed consent for the procedure involved.
2. Participant does not require the removal of both lower third molars in line with NICE guidelines.
3. Participant is not suitable for treatment under local anaesthetic with intravenous conscious sedation.
4. Participant has a medical condition that could be complicated by the procedure (ASA>II).
5. Surgery doesn't require a full thickness mucoperiosteal flap or bone removal.

Thirty-seven patients, who had bilateral impacted third molars of similar surgical difficulty, were recruited, with thirty-four successfully completing the study. We compared partial closure using one suture to the suture-less technique. Surgical sites were divided into two groups, Group A: one suture, and Group B: suture-less. Each patient received both treatments at the same time. During the first post-operative week, all patients were asked to daily assess pain, facial swelling, and bleeding, using subjective self-assessment scales.

All patients attended follow-up appointment at one week, to objectively assess facial swelling and wound healing, and at one month, to assess wound healing.

Results

Our study showed that the sample consisted of twenty-five females, and ten males, with an age range of 18 to 37yrs, and a mean age of 26.6 yrs (table 1).

On day five, more patients (n= 13) experienced greater pain on the non suture side, than patients (n= 8) who experienced greater pain on the sutured side. On day six, again more patients (n=14) reported greater pain on the non-sutured side, than did patients (n= 7) reported greater pain on the sutured side, which was statistical significant (table 2). Swelling was no differences between the sutured and non-sutured sides at all evaluation days (all $p > 0.05$) (table 3).

The results indicated no relationship between differences in operative time and differences in degree of socket healing, $r(34) = 0.186, p = 0.284$, and no relationship between differences in difficulty of surgery and differences in degree of socket healing, $r(34) = - 0.084, p = 0.632$.

Table 1: Age Groups and Gender of Study Participants

| Age (yrs) | Male | Female |
|-----------|------|--------|
| 18-24 yrs | 5 | 8 |
| 25-30 yrs | 4 | 11 |
| 31-37 yrs | 1 | 6 |
| Total | 10 | 25 |

Table 2: Pain during first post-operative week

| Postoperative days | Suture group | Suture less group | P value |
|---------------------|--------------|-------------------|---------|
| 1 st day | 4.57±2.06 | 4.34±2.09 | 0.270 |
| 3 rd day | 4.28±2.44 | 4.45±2.48 | 0.818 |
| 5 th day | 3.25±2.64 | 4.34±2.65 | 0.046* |
| 7 th day | 2.65±2.32 | 3.74±2.58 | 0.034* |

Table 3: Swelling during first post-operative week

| Postoperative days | Suture group | Suture less group | P value |
|---------------------|--------------|-------------------|---------|
| 1 st day | 2.62±1.330 | 2.40±1.264 | 0.190 |
| 3 rd day | 2.28±1.250 | 2.11±1.182 | 0.404 |
| 5 th day | 1.05±0.937 | 1.11±0.963 | 0.946 |
| 7 th day | 0.828±0.857 | 0.742±0.852 | 0.397 |

Discussion

Wound healing after lower third molar surgery has a significant clinical importance for the clinician, as delayed healing and wound dehiscence make hygiene more difficult and may require intense follow-up treatment, which potentially extends the time of postsurgical treatment. From the patient's point of view, delayed healing could result in a longer period of discomfort and continuous pain which is caused by hypersensitivity in the exposed distal root surface of the adjacent second molar¹⁴.

In this clinical trial, we used an 11-point Numeric Rating Scale (NRS), to assess pain severity, at seven different time points- hour twelve, day one, two, three, four, five and six. The validity of this pain scale has been demonstrated and proven to correlate significantly with other pain scales such as the Visual Analogue Scale (VAS)¹⁵. In addition to its easy administration to the patient, it is more useful than other scales for audit, and research¹⁶.

Across seven evaluation time points in this clinical trial, the pain intensity was reported to be a maximum at twelve hours post-operatively, this is in agreement with findings from several studies in the literature which suggest that pain following lower third molar surgery reaches its maximum intensity in the first twelve hours¹⁷. The difference in pain scores between the two techniques from day one to day four was not significant ($p > 0.05$) in this clinical trial. This is in agreement with the findings by De Brabander and Cattaneo in 1988¹⁸, who compared two secondary closure techniques ; wedge mucosa excision to wedge mucosa excision with tube drain, and found no statistical significant difference in pain intensity at day two and day seven between the two techniques. This could be explained by the fact that acute inflammatory response peaks within seventy-two hours after the surgery and then diminishes gradually, and in both techniques, there is an outlet for these inflammatory mediators to be washed out.

The results of this clinical trial demonstrated a significant difference in the median pain scores, between the two closure techniques, at day five

and day six post-operatively ($p \leq 0.05$). Greater pain scores were reported in the suture-less sides at day five ($p = 0.046$) and day six ($p = 0.034$). This could be related to the delayed wound healing being observed in the suture-less sites at one week following the surgery.

In the literature, the suture-less technique has been found to have a decreased pain intensity during the early few days following lower third molar surgery when compared to primary closure^{19,20}. These findings have been also reported when the one-suture technique is compared to the primary closure technique, one suture technique has demonstrated significant reduction in pain intensity during the first seventy-two hours after the surgery²¹. However, there are no previously published studies comparing the suture-less technique to the one suture, or other secondary closure techniques.

The result of this clinical trial revealed no significant difference between the two techniques in facial swelling as measured by the patient from day one to day six ($p > 0.05$). Several studies have reported significantly less post-operative facial swelling in sutureless technique when compared to primary wound closure following lower third molar surgery^{19,20}. This significant reduction in facial swelling has been also reported in the one-suture technique when compared to the primary closure technique, where the former has shown significant reduction in facial swelling during the first seventy-two hours after lower third molar surgery²¹.

The results of this trial demonstrated a statistically significant better socket healing on sites received one suture, at one week ($p = 0.002$) and one month ($p = 0.014$) following lower third molar surgery. Incision line dehiscence and flap displacement were reported at one week post-operatively in five suture-less flap (14.3%) and one sutured flap (2.9%). Some investigators reported better wound healing associated with primary closure, when compared to various secondary closure techniques²², Rakprasitkul and Pairuchvej in 1997²³ reported no difference in

wound healing, when compared primary closure alone to primary closure with tube drain placement.

Conclusion

The results of this clinical trial suggest that the placement of one suture, distal to the lower second molar, after raising a small buccal envelope flap (Stassen modification) for lower third molar surgery, is superior to the suture-less technique, in decreasing postoperative pain and enhancing wound healing. Although this difference has been shown to be statistically significant, it may have no significant clinical importance.

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