

A Comparative Study of the Effect of Sutureless and Multiple Suture Techniques on Inflammatory Complications Following Third Molar Surgery

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Abstract

Introduction: Teeth impaction is defined as a tooth which is prevented from erupting into its normal position properly within the expected/estimated time due to some kinds of physical barrier within the path of eruption. Third molar/wisdom teeth impactions are commonly associated with several acute or chronic pathological symptoms such as pain, infection, caries, periodontal disease, root resorption, bone loss, cyst formation, and benign tumors. All of these changes justify its removal. Pain, swelling, reduced mouth opening, and temporary inability to work are the commonly recognized and inevitable post-operative consequences following surgical extraction. Damage to the capillaries and the release of inflammatory cytokines as a result of surgery lead to increased permeability of vessels and accumulation of serosanguineous fluid and exudate. Suturing the flap back to its position has an advantage of promoting healing by primary intention, convenient maintenance of effective oral hygiene, and hemorrhage control. However, suturing creates a one-way valve that allows food debris to enter the socket but does not allow them to escape. Large amount of data exists regarding the advantages of sutureless technique after third molar surgery such as less pain, swelling, and trismus with comparatively few undesirable effects. Thus, we are interested to compare the effects of multiple sutures and sutureless technique in patients referred for third molar surgical extraction with the objective to evaluate the effectiveness of both techniques in reducing post-operative complications. This would help us to predict the outcomes on oral health-related quality of life and treatment cost for our patients/population. **Materials and Methods:** This was a prospective, randomized controlled trial performed on humans. Fifty-two healthy patients were included in the study who were having complete or partially impacted third molar. These patients were then divided into two groups, namely, multiple sutures ($n = 26$) and sutureless ($n = 26$) with the help of computer automated randomized table. Exclusion criteria include those patients with systemic diseases, pregnant and lactating women, any known contraindication to the drugs or anesthesia in the surgical procedure, and patients with pericoronitis who were currently under antibiotics regimen within 3 days. After seeking ethical approval from the Institutional Ethical Board, patients were explained about the surgical procedure and a written informed consent was obtained regarding research. **Results:** There were no significant differences in demographic, anatomic, operative, and baseline patient characteristics except for the number of local anesthetic blocks which were more in the sutureless group ($P = 0.02$). The results of the present study depicted that swelling was significantly more in the multiple sutures group when measured from the gonion to lateral canthus on all post-operative days ($P = 0.002-0.004$). Although mean duration of surgery, swelling as measured from tragus to commissure, trismus, number of analgesics consumed, and complications were more in the multiple sutures group, the difference was not statistically significant. The mean number of analgesics consumption was higher in Group 1 except for the 5th and 6th post-operative day. An equal number of analgesics was consumed in the 5th post-operative day by both the groups. Since the number of analgesics taken was greater in the 2nd post-operative day among both the groups, the frequency decreased till the 7th day. On the whole, there was no statistically significant difference in analgesic consumption between two groups. Complications such as angular cheilitis, rashes, diarrhea, fever, erythema, and fainting were seen in a greater number of patients in Group 1. There was no statistically significant relation between occurrence of complications between the two groups ($P = 0.33$). Limitations of daily activities to work were reported only in the multiple sutures group. **Conclusion:** This study has shown that the sutureless technique can be used as an alternative to conventional third molar surgery, including

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those performed through standard incisions. Hence, the sutureless technique is a simple and viable option for minimizing the post-operative morbidity associated with inflammatory sequelae after the third molar surgery.

Keywords: Complications, Multiple sutures, Sutureless, Third molar surgery.

INTRODUCTION

Teeth impaction is defined as a tooth which is prevented from erupting into its normal position properly^[1] within the expected/estimated time^[2] due to some kinds of physical barrier within the path of eruption.^[3] Third molar/wisdom teeth impactions are commonly associated with several acute or chronic pathological symptoms such as pain, infection, caries, periodontal disease, root resorption, bone loss, cyst formation, and benign tumors. All of these changes justify its removal. Pain, swelling, reduced mouth opening, and temporary inability to work are the commonly recognized and inevitable post-operative consequences following surgical extraction. These are commonly associated with significant deterioration in oral health in the immediate post-operative period^[4] and makes the third molar removal as expensive.^[5,6] The magnitude of these sequelae depends on the extent of inflammatory response resulting from the overall tissue damage produced,^[7] which, in turn, depends on certain demographics which include age, gender, oral health status, and anatomic and operative factors such as increased procedural difficulty, magnitude of osteotomy, and duration of surgery.^[7] There are different closure techniques with or without the incorporation of drains;^[8] use of drugs such as analgesics,^[9] corticosteroids,^[10] and antibiotics;^[11] and physical therapeutic methods such as cryotherapy,^[12] soft-tissue laser application,^[13] and sutureless techniques^[14-18] are among the various modalities published in the literature to minimize post-operative pain, swelling, and trismus. Damage to the capillaries and the release of inflammatory cytokines as a result of surgery lead to increased permeability of vessels and accumulation of serosanguineous fluid and exudate.^[16] Suturing the flap back to its position has an advantage of promoting healing by primary intention, convenient maintenance of effective oral hygiene, and hemorrhage control. However, suturing creates a one-way valve that allows food debris to enter the socket but does not allow them to escape.^[19] This leads to local infection, inflammation, edema, clot necrosis, alveolar osteitis, and pain. Large amount of data exists regarding the advantages of sutureless technique after third molar surgery such as less pain, swelling, and trismus with comparatively few undesirable effects^[5,7,15-18] related to healing by secondary intention. Moreover, there might be high risk for the formation of a periodontal pocket in relation to the adjacent second molar, the literature report is equivocal. As per our knowledge, no study has been reported for our population with completely different oral hygiene status. Furthermore, there are only few of the comparative studies done between the newer sutureless technique and the conventional method of closure after the third molar surgery. Thus, we are interested to compare the effects of multiple sutures and sutureless technique in

patients referred for the third molar surgical extraction with the objective to evaluate the effectiveness of both techniques in reducing post-operative complications. This would help us to predict the outcomes on oral health-related quality of life and treatment cost for our patients/population.

MATERIALS AND METHODS

This was a prospective, randomized controlled trial performed on humans. Fifty-two healthy patients were included in the study who were having complete or partially impacted third molar. These patients were then divided into two groups, namely, multiple sutures ($n = 26$) and sutureless ($n = 26$) with the help of computer automated randomized table.

Exclusion criteria include those patients with systemic diseases, pregnant and lactating women, any known contraindication to the drugs or anesthesia in the surgical procedure, and patients with pericoronitis who were currently under antibiotics regimen within 3 days.

After seeking ethical approval from the Institutional Ethical Board, patients were explained about the surgical procedure and a written informed consent was obtained regarding research.

Surgical procedure – The surgical procedures were performed by a single concealed consultant until the time of flap repositioning. The standard surgical procedure for extracting the impacted mandibular third molar using Ward's incision was practiced. Patients were not given any antimicrobial or other drugs (NSAIDs) that might influence healing and pain preoperatively. Group 1 (multiple sutures), the flap was repositioned and sutured (3–0 Silk suture, interrupted) whereas the sutureless group (Group 2), the flap was repositioned and allowed to passively fall into a natural position, often leaving the socket slightly open. Sterile gauze was placed to arrest the bleeding and to stabilize the flap. The patients were allowed to recover for 20–30 min and then rechecked for flap position and hemorrhage. No dressing was applied on the open socket. The mean duration of surgery, from incision to suturing/flap repositioning, was recorded in minutes. Patients were given capsule amoxicillin 500 mg PO 8 hourly for 5 days and tablet ibuprofen 400 mg + paracetamol 325 mg PO 8 hourly for 1 day then SOS, along with oral and written post-operative instructions. Sutures were removed after 7 days in Group 1.

Data collected were tabulated in Microsoft Excel sheet and analyzed using Statistical Package for the Social Sciences (SPSS) v11.5. For descriptive statistics, SD, mean, median, and percent proportion were calculated and variables were then analyzed using non-parametric tests like Mann–Whitney U-test

and independent sample *t*-test. Measurements of association of variables were done using Chi-squared test and odds ratio with 95% confidence limits.

RESULTS

There were no significant differences in demographic, anatomic, operative, and baseline patient characteristics except for the number of local anesthetic blocks which were more in the sutureless group ($P = 0.02$) (Table 1). The results of the present study depicted that swelling was significantly more in the multiple sutures group when measured from the gonion to lateral canthus on all post-operative days ($P = 0.002-0.004$). Although mean duration of surgery, swelling as measured from tragus to commissure, trismus, number of analgesics consumed, and complications were more in the multiple sutures group, the difference was not statistically significant.

Table 1: Demographic, anatomic, operative, and baseline patient characteristics

Characteristics	Multiple sutures	Sutureless	P-value
Age			0.92
Mean±SD	28.63±8.75	28.38±6.80	
Range	18–52	18–46	
Gender			0.24
Male	18	13	
Female	8	13	
Tooth			0.56
38	14	11	
48	12	13	
Impaction			1
Mesioangular	15	16	
Horizontal	5	3	
Vertical	2	2	
Distoangular	4	5	
Impaction			0.37
Class I	9	12	
Class II	15	14	
Class III	2	0	
Impaction			1
Position A	16	16	
Position B	10	9	
Position C	0	1	
Number of blocks used	1.29±0.46	1.04±0.20	0.02
Duration of the surgery (minutes)	28.50±19.31	24.21±11.0	0.60
Guttering			0.67
No	5	4	
Yes	21	22	
Sectioning			0.38
No	13	8	
Yes	13	18	
Number of sutures	1.92±0.50	0.00	-
Swelling			0.20
Gonion – Lateral canthus	10.92±0.52	10.72±0.55	
Tragus – Commissures of lip	11.75±0.61	11.36±0.83	0.09
Trismus			0.08
Before mouth opening	43.88±3.98	46.55±5.86	

The mean number of analgesics consumption was higher in Group 1 except for the 5th and 6th post-operative day. An equal number of analgesics was consumed in the 5th post-operative day by both the groups. Since the number of analgesics taken was greater in the 2nd post-operative day among both the groups, the frequency decreased till the 7th day. On the whole, there was no statistically significant difference in analgesic consumption between two groups. Complications such as angular cheilitis, rashes, diarrhea, fever, erythema, and fainting were seen in a greater number of patients in Group 1. There was no statistically significant relation between occurrence of complications between the two groups ($P = 0.33$). Limitations of daily activities to work were reported only in the multiple sutures group.

DISCUSSION

Third molar surgery is a routine clinical procedure which the clinician encounter in their day-to-day dental practice with a 3-fold increase in adverse effects on the quality of life in patients who experience pain, swelling, and trismus, compared to those who are asymptomatic.^[20] Sutureless procedure is growing rapidly as a simple and viable option for minimizing the post-operative morbidity, decreasing the overall time for the procedure, and also reducing the financial burden associated with material cost and follow-up visit required for suture removal after the third molar surgeries. This cost-effective impact of sutureless technique is also one of the influencing factors, especially for patients residing in the developing countries. The present study compares the effect of sutureless (secondary closure) and multiple suture (primary closure) techniques on reducing the post-operative pain, swelling, and trismus. The mean number of sutures in the multiple sutures group was 1.92 ± 0.50 with a range of 1–3. Since pain is a subjective measure which is influenced by many factors such as the patient's age, cultural background, educational level, previous experience of pain, pain threshold, and tolerance; the assessment of pain might be difficult. An 11-point pain assessment, numerical rating scale being more useful than verbal rating scale or the visual analog scale^[21-24] and total analgesics consumption after the prescribed dose, has been documented in this study. Pain was significantly higher in the 1st post-operative day in the multiple sutures group ($P = 0.01$). The difference was not statistically significant on other post-operative days, which is in concordance with the study by Rakprasitkul and Pairuchvej^[25] which differs from most other studies.^[5,15-18]

Our study reported a decline in the mean number of analgesics consumed with each post-operative day in both groups, and the difference was not statistically significant. Swelling was measured using a flexible plastic measuring tape as described by Gabka and Matsumura^[26] by measuring the distance from the corner of the mouth to the attachment of the earlobe, that is, tragus following the bulge of the cheek and the distance from the outer canthus of the eye to the angle of the mandible.^[17] Perhaps, more accurate and reliable methods such

as ultrasonography,^[27] computerized tomography scanning, or magnetic resonance imaging exist for making precise measurements of facial soft-tissue volume; so, the usage of flexible plastic measuring tape is a simple, cost-effective, and time-saving method which provides numerical data for the determination of changes in soft-tissue contour.^[17] In our study, the mean percentage swelling of the patients when measured from the gonion to lateral canthus was maximum on the 1st post-operative day which regressed on the 2nd and 7th post-operative days in both the groups but was significantly higher in the multiple sutures group. On the other side, the mean percentage swelling when measured from the tragus to commissure of lips was higher on the 2nd post-operative day as compared to the 1st and 7th post-operative days. The swelling was higher in the multiple sutures group, but the difference was not significant between the two groups. Unfortunately, there were no articles comparing the linear measurements separately, most literature^[8,14-18] studies agree to the fact that there will be more post-operative swelling in the multiple sutures group.

With regard to trismus, interincisional distance remained the most consistent and dependent variable over the years.^[10] The mean percentage for trismus was found to be reported more in the multiple sutures group on all post-operative days with maximum trismus present on the 2nd post-operative period followed by the 1st and 7th post-operative days in correlation to many studies;^[8,14-18] however, the difference was not significant statistically. In our study, complications were seen in eight patients in the multiple sutures group and five patients in the sutureless group. There were reported angular cheilitis in 10 patients and the most common complication with one patient each with erythematous swelling on the right neck up to the clavicle with hyperthermia on the 2nd post-operative day; fainting on the operative day or at the time of surgical procedure; diarrhea and rashes on the 3rd day; and fever on the 2nd day. The incidence of angular cheilitis can be explained by the need for retraction of cheek during the procedure. Rashes and diarrhea could be the possible adverse effects of the antibiotics but the patient did not report to the department immediately. Hence, there was no modification in post-operative antibiotic use. However, fever and erythema could be attributed to the inflammatory reactions and there were no literature reporting these complications. All the complications, except angular cheilitis were reported in the multiple sutures group.

The limitations from daily routine activities were said to be present if patients were unable to work after third molar surgery.^[4] This was recorded in all post-operative visits. We saw limitations of daily activities only in the multiple sutures group with a mean duration of 0.29 ± 0.75 days (maximum = 3 days). This is a limiting factor for the conventional technique of closure after the third molar surgery which greatly influences the financial burden. Some studies have reported that there may be high risk for the formation of a periodontal pocket in relation to the adjacent second molar with sutureless closure.^[17] However, studies by Magnus *et al.*^[28] and Woolf

et al.^[29] concluded that there were no significant differences on the outcomes between complete and partial wound closure. Inherently, design of the flap and suture technique even with an exposed area distal to the second molar did not result in a periodontal defect if properly carried out.^[18] The limitations of this study are short-term follow-up, experienced surgeon, and possibility of local anesthetic blocks acting as a confounding factor. Comparison of the delayed presentation complications among the two groups was not possible due to short follow-up duration of the study. Hence, a multicentric trials would be recommended globally to generalize the results obtained from the present study. Therefore, we recommend to reassess our practice in third molar surgery and adopting sutureless technique as a cost-effective alternative to reduce post-operative morbidity of the third molar surgery, especially in the developing countries like India. We would also suggest that to perform a multicentric long-term study involving general dentists and patients to find out long-term complications and reproducibility of the result in routine dental practices.

CONCLUSION

This study has shown that the sutureless technique can be used as an alternative to conventional third molar surgery, including those performed through standard incisions. Hence, the sutureless technique is a simple and viable option for minimizing the post-operative morbidity associated with inflammatory sequelae after the third molar surgery.

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