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Original Research Article

Comparison of Szmyd incision over envelope incision during the surgical removal of impacted third molar for evaluating postoperative prognosis: a prospective randomized study

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ABSTRACT

Background: Manipulation of both hard and soft tissues during the surgical removal of mandibular third molars is usually associated with a number of postoperative complications. This study was aimed to compare the effects of two types of flap designs used during the impacted mandibular third molar removal and the consequences of choosing Szmyd incision over envelope incision in terms of primary wound healing and periodondal healing.
Methods: A prospective, randomized study was conducted in healthy 50 patients with partially or completely impacted mandibular third molars were selected. The patients were divided into two groups of 25 each. In one group envelope flap design was used and in the other group Szmyd flap design was used. The influence of these incisions on accessibility to third molar, primary wound healing and periodontal healing was evaluated and compared.
Results: The incidence of wound dehiscence at 7th day follow-up is more in envelop incision (p=0.123) and 20% more at 14th day follow-up (p=0.087) when compared to Szmyd design. Significant differences were noted with respect to the periodontal healing distal to adjacent second molar. Distal periodontal pocket depth was significantly lower for the Szmyd incision as compared to the Envelop incision. Effect size of Envelop flap is 1.84 times more than Szmyd flap.
Conclusions: The Szmyd flap design makes primary wound healing easier, less wound dehiscence and periodontal complication than envelop flap design.

Keywords: Envelope flap design, Flap design, Periodontal healing, Periodontal pocket depth, Primary wound healing, Szmyd flap design, Third molar, Wound dehiscence

INTRODUCTION

Third molars are present in 90% of the population with 33% having at least one impacted third molar, because of this prevalence, extraction is a relatively common procedure.[1] Surgical removing of impacted third molar is a common dental procedure that requires a sound understanding of surgical principles. Many times, it can be most difficult because of factors of access, bone density, position of the tooth in relation to the second molar and unfavorable root curvature.[2] It must be performed systematically to allow the expeditious and a traumatic removal of teeth embedded in a relatively inaccessible part of the oral cavity. Standardized

procedures like careful diagnosis, pre-surgical planning, good surgical execution and adequate post-operative care are benchmarks for acceptable treatment.[3]

Various post-operative complications such as wound dehiscence, intra-bony defects distal to the second molar leading to root exposure and sensitivity and nerve damage.[4] The line of incision should incorporate the important principles of flap designs such as wide base of flap with adequate blood supply, the mucoperiosteal flap should be large enough to provide good accessibility thereby preventing damages to soft tissue edges and finally when the flap is repositioned it should sutured without tension and rest on sound bone.[5]

The envelop flap causes wound dehiscence at the distofacial edge of adjacent second molar are very frequent in first phase of wound healing, which will extend the time of post-surgical healing.[6]

The modified triangular flap design, termed as Szmyd flap preserves a strip of mucoperiosteum on the buccal surface of second molar, thus minimizing bone resorption leading to pocket formation distal to second molar.[1] Thus this modification in flap design precludes the need for detachment of the buccal gingival fibers around the first and second molars, the amount of periosteum to be reflected is there by reduced markedly and also achieves adequate accessibility.[7]

This study was aimed to compare the influence of envelop design and Szmyd design on the primary wound healing and periodontal reattachment adjacent to second molar, evaluating the periodontal health by probing pocket depth distal to it, with a follow up of three months.

METHODS

A randomized prospective study (period between 2012-15) included 50 patients of either sex with the age group between 18-35 years who visited the Oral and Maxillofacial Surgery department for extraction of lower third molars either due to orthodontic or for symptomatic purpose.

Inclusion criteria

The inclusion criteria were

- Patients of age group between 18-35 years
- Patients with any type of impacted mandibular third molar (partially/completely impacted)
- Patients who were willing for extraction of impacted mandibular third molars and who came for regular follow-up were included in the study.

Exclusion criteria

Medically compromised patients, patients with any periapical/oral pathological conditions or patients above the age group of 35 years were excluded.

Patients were assessed under two groups. The selected cases were examined clinically to rule out any infection and medical assessment was made. In one group of patients, a conventional envelope flap design was used and Szmyd flap (modified triangular flap) was used in the other group. Pre-operative intraoral peripical radiographs were taken to assess the type of impaction, position and depth in relation to the second molar and to find out the presence or absence of the intrabony defect distal to the second molar.

A surgical procedure was planned for removal of impacted mandibular third molars which was performed by standard protocol (Figure 1). All the procedures were done under local anesthesia. All the procedures were done with a follow-up period of 3 months for periodontal healing by checking the pocket depth distal to adjacent second molar using William's periodontal probe.

Primary wound healing was evaluated for 1-2 weeks by visually assessing the presence or absence of wound dehiscence.

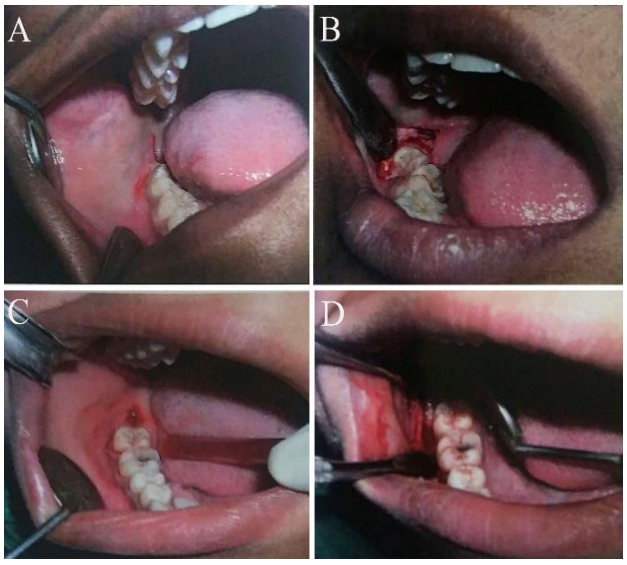

Figure 1: Flap designs of Szmyd and envelop pattern: A) Incision marking, B) Refection of Szmyd flap, C) Incision marking and D) Refection of envelop flap.

Statistical analysis

Chi-square and Fisher exact test was used to test the significance of proportion of accessibility, wound dehiscence etc. Student t test (two tailed, independent) was used to find the significance of Pocket depth between two groups. Student t test (two tailed dependent) has been used to find the significance of pocket depth within each

group (baseline and at 3 months). Effect size due to Cohen has been computed to find the effect.

RESULTS

Figure 2 shows the age of patients in each group was ranging between 18-35 years with mean age of 26.08 for Szmyd group and 25.44 for envelope group (p=0.578). There is no significant difference between the Envelop and Szmyd incision with respect to the accessibility to third molar during the surgery (Figure 3). Accessibility pattern is statistically similar between two groups (p>0.05) (Figure 4).

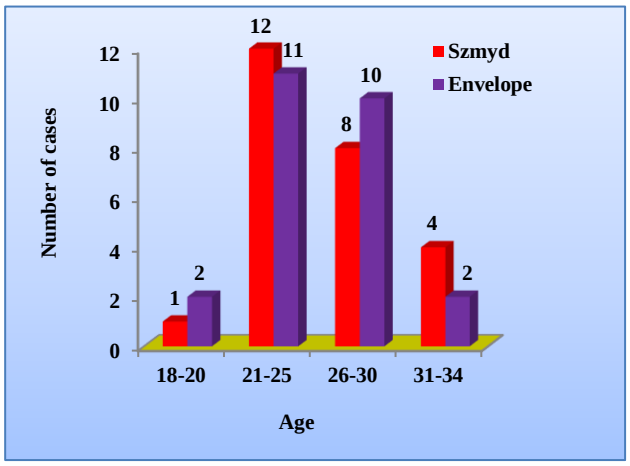

Figure 2: Distribution of age.

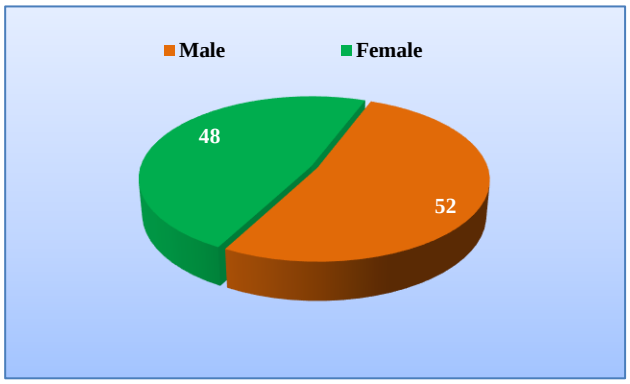

Figure 3: Distribution of gender.

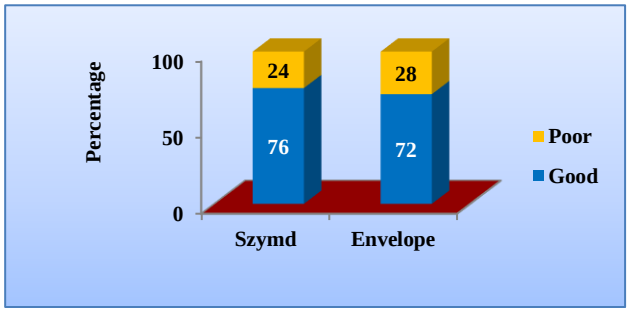

Figure 4: Accessibility to third molar during the surgery.

A statistically significant difference was found between the envelope and Szmyd incision with respect to periodontal healing which was assessed by periodontal pocket depth distal to adjacent second molar (Table 1). The values for both the incisions with respect to periodontal pocket depth differed on the third month of follow-up period with a mean difference of 1.4 mm on the 90th postoperative day (3 months). Distal periodontal pocket depth was significantly (p<0.001) lower for the Szmyd incision as compared to the envelope incision. Effect size of Envelope flap is 1.84 times more than Szmyd flap [>1.2 is considered as very large effect] which indicates a very large effect on pocket formation.

Table 1: Pocket depth in milli meter to adjacent second molar between two groups.

Study period	SZMYD (n=25)	Envelope (n=25)	p value
Baseline	2.78±0.66 (2.0-4.0)	2.76±0.72 (2.0-4.0)	0.999
At 3 months	3.88±1.09 (3.0-7.0)	5.28±1.46 (3.0-8.0)	<0.001 **
% changes	39.5%	91.30%	-
Effect size	1.25	2.31	-
P value	P <0.001**	P <0.001**	-
Inference	Effect size of Envelope flap is 1.84 times more than Szmyd flap [>1.2 is considered as very large effect]		

Values are Mean±SD

Table 2 shows that wound dehiscence was significantly higher with 40% and 32% of patients with envelope incision showing dehiscence on 7th and 14th postoperative day respectively as compared to Szmyd incision, where only 20% and 12% of the patients had dehiscence on 7th and 14th postoperative day, respectively. Incidence of wound dehiscence at 7th day follow-up is more in Envelope incision (p=0.123) and 20% more at 14th day follow-up (p=0.087) when compared to Szmyd design.

Table 2: Comparison of complications (Wound dehiscence) between two groups.

Wound dehiscence	SZMYD (n=25)	Envelope (n=25)	p value
At 7 days	5 (20.0%)	10 (40.0%)	0.217
At 14 days	3 (12.0%)	8 (32.0%)	0.171
Inference	Incidence of Wound dehiscence at 7th day follow-up is more in envelope with P=0.123 and 20% more at 14th day follow-up with P=0.087+ when compared to SZMYD		

DISCUSSION

In this study, a statistically significant difference between Envelope and Szmyd incision with respect to periodontal

healing was found. The values for the Envelope and Szmyd incision with respect to periodontal pocket depth differed on the third month of follow-up period with a mean difference of 1.4mm on the 90th postoperative day (3 months). Distal periodontal pocket depth was significantly lower for the Szmyd incision as compared to the envelope incision. Effect size of Envelope flap is 1.84 times more than Szmyd flap.

Various procedures for the incisions used to expose impacted mandibular third molars that have been described previously and most of the studies can be broadly grouped under triangular (vertical) and envelope types.[8,9] Regardless of variations in the anterior end of the incisions, all extend posteriorly from the distal aspect of the preceding second molar towards the ascending ramus. The length and angulations of this extension depend on the position of the third molar and the proximity and lateral flare of ramus.[9]

Several modifications were done to the existing incisions to provide adequate access and ease for the surgery as well as to conserve the periodontal tissue thus helps in primary wound healing and minimize post-surgical complications.[8,10] Recent study reported that Szmyd and paramarginal flap designs were most effective in reducing the probing depth in impacted third molar extraction, and the envelope flap may be the least effective.[11] Kirtiloğlu et al demonstrated that Szmyd flap can leaves an intact gingiva around the second molar which will provide a better primary periodontal healing.[12] However, the extent of periodontal effects was sometimes severe enough to prompt the development of special techniques to manage the resultant defects. Motamedi had described a lingual gingival finger flap for closing the defects.[13]

An envelope flap with a sulcular incision from the first to the second molar and a distal relieving incision to the mandibular ramus is a widely used technique for lower third molar surgery. It gives wide exposure to the surgical field and the osseous defects can be safely covered after the removal of the molar.[6] The disadvantage being the growing activity of osteoclasts in the area of the alveolar process, inducing loss of alveolar bone due to stripping of mucoperiosteum over a wide area.[6]

Every sulcular incision is an intervention to the periodondal ligament and may lead to periodontal damage. Alternatively, paragingival and vestibular tongue shaped flap designs, which aim at sparing the periodontal ligament of the adjacent molar, have been described.[5] Especially in cases of thin keratinized gingival in the area of the second molar: the conventional flap may lead to a total loss of the attached gingiva in this area after the operation. This can cause pocket formation and loss of attachment in the area of the second molar.[14]

The frequent occurrence of dehiscence distofacial to second molar seems to be another disadvantage of envelope flap design. Every gaping along the entire incision line was defined as a dehiscence.[6] These gapings are usually seen at the distobuccal gingival rim of the adjacent second molar where the distal incision leads in to sulcular incision. After suturing there will be soft tissue tensions resulting from hematoma and masticatory movements which will induse rupture of wound margins. Thus, the wound heals by secondary intention leading to wedge shaped defect of the gingival distal to second molar. A dehiscence thus makes hygiene more difficult and requires intence follow up treatment. There by leading to long lasting discomfort caused by hypersensitivity in the area of distally exposed root surface of second molar.

The present study has clearly shown that the flap design considerably influences primary wound healing and periodontal healing in the lower third molar surgery. When the conventional envelope flap design is used 40% and 32% of patients developed wound dehiscence occurred was only 20% and 12% on the 7th and 14th postoperative day respectively.

This suggest that in Szmyd group it was because of a tension decrease in the area of distal wound closure in comparison with the situation of 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.

The results of present study showed difference with respect to primary wound healing for each of the flap design which was assessed by pocket depth distal to second molar and by visual assessment of wound dehiscence. Periodontal pocket depth and wound dehiscence were significantly higher in Envelope incision as compared to Szmyd flap design. Since this study is done with smaller sample size a further multicentric randomized controlled trials are required on this new incision with bigger sample size and longer duration of follow-up.

CONCLUSION

The results of this study suggest that Szmyd incision which in turn a modification of existing triangular flap design, will allow the surgeon to execute a standard flap design with better accessibility and visibility during the surgical removal of impacted mandibular third molar.

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