

Comparison of the Influence of Two Different Flap Designs on Pain and Swelling after Surgical Extraction of Impacted Mandibular Third Molars

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Abstract: Swelling and pain are common complications of surgical extraction of impacted teeth. The aim of this study was to evaluate the influence of two different flap designs on the pain and swelling after surgical extraction of impacted mandibular third molars. Twenty-six patients aged 18 D 35 years, who had bilateral mandibular third molars, participated in this study. Each patient was operated with envelope flap on one side and SZMYD type 2 flap on the other side of his/her mouth. The severity of pain and swelling was evaluated on the operation day and thereafter by a surgeon who was blind to the study procedures. Data was analyzed by ANOV A and t-test. There were severe swelling and pain after surgery, with no significant differences between the two groups. The flap design had no significant influence on pain and swelling after surgical extraction of impacted mandibular third molars.

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Keywords: Impacted third molars, Envelop flap, SZMYD, Pain, Swelling.

1. Introduction

Third molars generally erupt between the ages of 18 and 24 years, although there is wide variation in eruption dates. One or more third molars are absent in approximately 25% of adults but they may still be present in the elderly, otherwise edentulous, patient.(Borgonovo, Giussani, Grossi, Maiorana 2014; Charan Babu, Reddy, Pattathan, Desai, Shubha 2013) The prevalence of unerupted third molars varies widely and is influenced by age, gender and ethnicity. The failure of eruption of third molars is a very common condition, and the extraction of impacted third molar teeth is one of the most frequent surgical procedures carried out in the NHS.(Engelke, Fuentes, Beltran 2013; Kumar, T S, M V, Raman 2013) It has been reported that a significant proportion of those on oral and maxillofacial surgery waiting lists are awaiting third molar removal. Some studies have investigated the complications of surgical extraction of third molars, most of which concluding that the most common complications are bleeding, a delay in wound healing, dry socket, swelling and pain.(Christensen, Matzen, Vaeth, Wenzel, Schou 2013; Engelke, Beltran, Cantin, Choi, Navarro, Fuentes 2014) Many research studies have focused on the relationship between the complexity of surgery and complications of surgical extractions of third molars. These studies have shown a correlation between different surgical techniques and postoperative complications.(Pippi, Alvaro 2013; Tolstunov 2012) Surgical techniques, especially type of the flaps used, are important factors in surgical

extraction of third molars. Several types of flaps have been used for extraction of third molars, but the SZMYD flap has better effects on the periodontium.(Rafetto, Synan 2012; Umar, Obisesan, Bryant, Rood 2013) Kirtiloglu et al. reported that initial healing of wound in SZMYD flap is better than others.(Kirtiloglu, Bulut, Sumer, Cengiz 2007) In addition, Faria et al. demonstrated that SZMYD flap resulted in good healing process in comparison with the triangular flap.(Faria, Gallas-Torreira, Lopez-Raton 2012) These results state that fewer complications might arise after surgical extraction of third molars by SZMYD flap. (Koyuncu, Cetingul 2013; Piecuch 2012) Only a few studies have compared pain and swelling after surgical extraction of third molars by different flap types.(Dolanmaz, Esen, Isik, Candirli 2013; Pai, Khosla 2012) Since pain and swelling after extraction of impacted third molars cause discomfort for patients, the aim of the present study was to investigate the influence of SZMYD and envelope flap designs on the incidence of pain and swelling after surgical extraction of impacted third molars.

2. Material and Methods

Twenty-six patients aged 18 to 35 years voluntarily participated in this study from May 2012 to May 2014. This study was approved by ethic committee of Tabriz university of medical sciences. Written consent was obtained from all the patients. All the patients had bilateral impacted mandibular third molars with the same surgical difficulty

according to Peterson's criteria, confirmed by radiography. The patients needed similar bilateral surgeries for impacted (split-mouth) lower third molars, and the results of surgery with two SZMYD and envelope flaps were evaluated. In each patient, first, one of the impacted molars was extracted by surgery using an envelope flap. To this end, inferior alveolar and long buccal nerve blocks were administered, and a sharp incision was made from the mesial line angle papilla of the first molar following the *eEl* line of the first and second molars continuing posterior until it reached the anterior portion of the ramus (Figure 1).

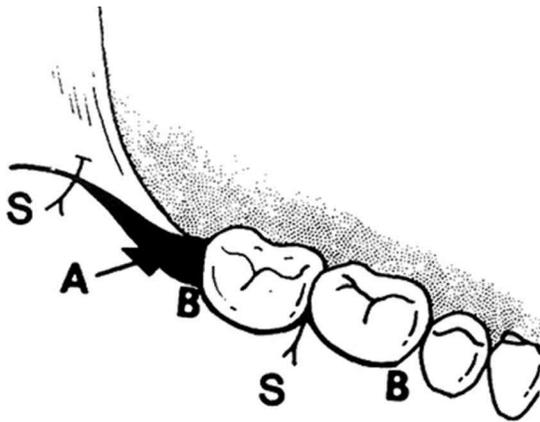


Fig 1. Envelope flap. A, distal wedge of tissue to be removed; B DB, extent of sulcular incision; S, sutures.

After elevating the periosteum, the occlusal and buccal portions of the bone covering the impacted tooth were removed by a headpiece under normal saline cooling. Then the impacted tooth was sectioned by using a fissure bur and extracted with an elevator and/or special forceps. After rinsing the surgical area with normal saline, the flap was returned to its original position and the wound around the residual teeth was sutured with figure 8 technique; simple suture technique was applied for other areas. Silk thread was used for all the sutures. The patients were prescribed 500 mg of amoxicillin three times a day (os) and 400 mg of ibuprofen four times a day (os). After healing of the surgical site, the patients underwent another surgery for the extraction of the other mandibular impacted third molar. All the surgical steps were just like the first surgical steps except that the type of the flap was SZMYD type 2.

With the SZMYD type 2 technique, the first flap was an envelope flap with the incision beginning just medial to the external oblique ridge, extending to the middle of the distal line angle of the second molar. From there, it continued by a vertical

incision from the distofacial line angle of the second molar apically to the mucogingival line for approximately 2 to 3 mm (Figure 2). All the surgical operations were carried out at the Oral and Maxillofacial Surgery Department, Dental Faculty, Tabriz University of Medical Sciences, by one surgeon who was blind to the results of the study. To determine the pain severity after surgery, VAS (Visual Analogue Scale) was used. The patients were asked to explain their pain by 0 as no pain, 1-3 as mild pain, 4-6 as moderate pain, 7-8 as severe pain and 9-10 as very severe pain and write it down on a piece of paper provided. Swelling was evaluated as follows: Four points on the patient's face were marked. The points were the middle points of the tragus, gonion of the soft tissue, angle of mouth and external cantus of the eyes. Three lines (tragus-gonion, outer cantus-gonion, tragus-angle of mouth) were measured before and after each surgical operation. The differences between these dimensions showed the average amount of swelling.

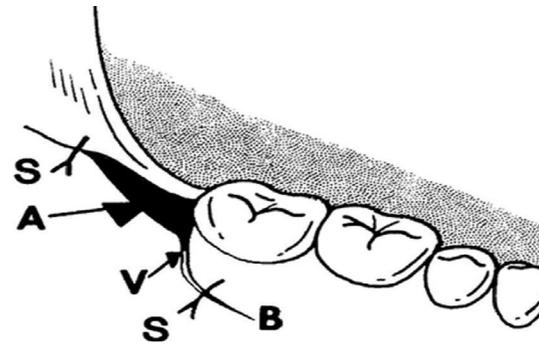


Fig. 2. SZMYD flap (modification of the envelope flap). A, distal wedge of tissue to be removed; V, vertical releasing incision to mucogingival line; B, anterior extent of horizontal releasing incision along mucogingival line; S, sutures.

Data analysis

Data was analyzed with ANOVA and t-test using SPSS 14. $P < 0.05$ was regarded as significant.

3. Results

Tables 1 and 2 present all the data collected. Within the limitations of this study, although pain in the two groups decreased in comparison with its level on the operation day, the differences between the two groups were not significant. There were no significant differences in swelling between the two groups on the day before and after surgery.

Table1. Swelling in the study population

Whole measured dimensions	Flap type	Total	Average
Before surgery	EN	26	26.89
	SZMYD	26	27.14
	Total	52	27.02
After surgery	EN	26	27.54
	S2	26	27.87
	Total	52	27.70

EN=Envelope flap type; S2=SZMYD type 2 flap

Table 2. Pain in the study population

Pain	Flap type	Total	Average
Operation day	EN	26	7.3846
	S.2	26	7.6538
	Total	52	7.5192
Day after operation	EN	26	2.7115
	S2	26	2.4615
	Total	52	2.5865

EN=Envelope flap type; S2=SZMYD type 2 flap

4. Discussions

Impacted wisdom teeth is the failure of the wisdom teeth to erupt fully into the mouth because of blockage from another tooth and affects up to 72% of the population. Wisdom teeth likely become impacted because of a mismatch between the size of the teeth and the size of the jaw.(Iwai, Chikumaru, Shibasaki, Tohnai 2013; Vecsey, Joob-Fancsaly 2012) Impacted wisdom teeth are classified by their direction of the impaction, depth compared to the biting surface of adjacent teeth and the amount of the tooth's crown that extends through bone or mucosa. If the wisdom teeth establish a communication to the mouth, pain can develop with the onset of inflammation or infection or damage to the adjacent teeth.(Baqain, Al-Shafii, Hamdan, Sawair 2012; Hassan, Marei, Alaghl 2012) Impacted wisdom teeth can also be classified by the presence or absence of symptoms and disease. A treatment controversy exists about the necessity and timing of the removal of asymptomatic, disease-free impacted wisdom teeth. Proponents of early extraction cite the cumulative risk for extraction over time and costs of monitoring to retained wisdom teeth. Advocates for retaining wisdom teeth cite the risk and costs of unnecessary operations.(Goldsmith, De Silva, Tong,

Love 2012; Sortino, Cicciu 2011) The flap designs used to expose impacted mandibular third molars has been the subject of textbooks and various articles in recent years. Several different flap techniques have been developed, compared, and discussed in order to minimize potential complications or improve surgical access.(Montero, Mazzaglia 2011; Refo'a, Ouatik, Golchin, Mahboobi 2011) An envelope flap exposing the buccal bone of the adjacent second molar is the most common approach for mandibular third molar surgery. This flap design has several advantages. The surgical site is adequately uncovered, providing adequate visibility during the surgery. The sulcular incision can be extended, if needed.(Celio-Mariano, de Melo, Carneiro-Avelino 2012; Hassan, Marei, Alaghl 2011) As a consequence of the extensively prepared mucoperiosteal flap, the osseous defect can be safely covered after surgery. Moreover, blood supply up to the wound margins is adequate. In the literature, however, possible disadvantages of this method have been reported. The distal extension of incisions conventionally made to gain access to impacted mandibular third molars comes too close to or even cuts across the insertion of the temporalis tendon. It also commonly lies over the bone defect formed after removal of the tooth, which might be

responsible, at least in part, for the trismus, pain, swelling and periodontal damage of the second molar after surgery.(Hashemi, Beshkar, Aghajani 2012; Malkawi, Al-Omiri, Khraisat 2011) Although there are no specific data available in the literature with the use of the envelope flap, wound dehiscence at the distofacial edge of the second molar is frequent in the first phase of wound healing after surgical removal of impacted mandibular third molars. Such dehiscence potentially prolongs postoperative healing, possibly leading to a longer period of discomfort, pain, development of alveolar osteitis, and compromised periodontal status of the adjacent second molar.(Silva, Jardim, dos Santos, Pereira, Garcia Junior, Poi 2011; Tolstunov, Javid, Keyes, Nattestad 2011) In 1969, Milobsky et al. recommended the second modification for the following advantages: (1) no need to detach the facial free gingival tissue around the second and first molars; (2) decreased amount of reflected periosteum; (3) broad-based blood supply to the flap; (4) adequate exposure and visibility; (5) good bony support for the soft tissue flap; and (6) closure with a single suture and the distal aspect of the third molar socket.(Milobsky 1969) This flap could be modified to provide a gingivectomy of the tissues overlying the impacted third molar by extension of a second incision from the external oblique line to the distal edge of tissue. In 2003, Suarez-Cunqueiro et al. compared two different flap designs in terms of wound healing, periodontal pocket depth of second molar, pain, maximum mouth opening, and swelling after third molar surgery. Twenty-seven healthy patients underwent surgical removal of 4 impacted third molars, including 54 lower and 54 upper. Access for removal of the impacted molar in one randomly chosen half of the jaw was accomplished by the use of a marginal flap, which is the traditional technique for third molar surgery, and access in the other half by use of a paramarginal flap, which is a variation of the latter. Statistical analysis of the results showed that the use of the marginal flap in impacted third molar surgery resulted in better primary wound healing at 5-day follow-up compared to the use of the paramarginal flap. However, there was no evidence that the choice of either flap design had an influence on postoperative pain, swelling, or mouth opening at 5- and 10-day and 3-month post-operative intervals. Although the paramarginal flap has less pocket depth in the initial stages, there was no difference after the early follow-ups in that both designs obtained the same positive outcome at 3-month postoperative interval. These authors concluded that there are no advantages of the use of a paramarginal flap instead of a traditional marginal flap for removing impacted third molars.(Suarez-Cunqueiro, Gutwald, Reichman,

Otero-Cepeda, Schmelzeisen 2003) Generally, surgical extraction of third molars often needs to pull over the covering soft tissues and bone. Every preparation of a mucoperiosteal flap is an intervention to the area of the alveolar process and might have some complications like periodontal pocket, trismus, pain and swelling. Some studies have surveyed pain and swelling after surgical extractions of impacted teeth.(Osunde, Saheeb, Adebola 2011; Roode, Butow 2010) In the present study, two different flap designs were compared. The results showed that there is no difference in pain and swelling of SZMYD type 2 and envelope flaps, consistent with the results of other studies which have examined the influence of different flap types on pain and swelling. More extensive postoperative discomfort was significantly related to longer surgical procedures. This observation has been made by others, too.

Conclusion

There are no significant differences in pain and swelling between SZMYD and envelope flaps on the operation day and thereafter.

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