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A Comparison between primary and secondary wound closure after surgical removal of lower third molars according to pain and swelling

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Abstract

The aim of this study was to compare between Primary and secondary closure techniques after removal of impacted third molars. This comparison was carried out according to the pain and swelling parameter. One hundred patients with impacted third molars were randomly divided into two groups (50 patients in each group). Periapical radiographs were taken for each patient to determine the degree of eruption and angulations of third molars. After surgical extraction in Group I, the socket was closed by hermetical suturing of the flap while in Group II; a 5–6 mm wedge of mucosa adjacent to the second molar was removed to obtain secondary healing. Swelling and pain were evaluated for 7 days after surgery with the VAS scale. The statistical analysis (analysis of variance for repeated measures, $P < 0.05$) showed that pain was greater in GI, although it decreased over time similarly in the two groups ($P=0.003$, $F=2.6613$). Swelling was significantly worse in Group I ($P < 0.0001$, $F=38.395$). In Group I, dehiscence of the mucosa was present in 15% of patients at day 7, and 1% showed signs of re-infection with suppurative alveolitis at 30 days. Pain and swelling were less severe with secondary healing than with primary healing.

Key words: impacted tooth; primary wound closure; third molar surgery; tooth extraction.

Introduction

The post-operative period following surgical removal of third molars is frequently characterized by swelling and pain, sometimes quite severe, together with temporary restricted mouth opening and masticatory capability. More rarely, late or delayed haemorrhage or sepsis may occur [1]. One of the factors most closely linked to the intensity of post-operative pain and swelling is the type of healing of the surgical wound [2, 3]. In secondary healing, the socket remains in communication with the oral cavity while in primary healing; the socket is covered and sealed hermetically by a mucosal flap. Conflicting opinions have been expressed in the literature concerning these two types of healing. Some authors [4, 5, 6, 7, 8, and 9] are in favor of closed healing, whereas other authors [2, 3, 10, 11, and 12] report that primary healing frequently causes greater pain and swelling than secondary healing. Other authors [13, 14, and 15] are of the opinion that postoperative progress

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does not differ in the two types of healing.

The aim of this comparative study compares between primary and secondary healing after surgical removal of impacted third molars, evaluating the incidence of post-operative complications, and monitoring the extent of swelling and the severity of pain.

Materials and method

This study was conducted at oral surgery department, college of dentistry, Al-Mustansiria University in addition to two private clinics. The sample in this study consist of One hundred patients (61 women, 39 men) with age range (19–27 years)who had underwent third molar extraction. Periapical Radiographs were taken to each patient to determine third molar eruption and angulations and the adjacent second molar. Inclusion criteria for the study group were: totally or partially bone-impacted mandibular third molar, Class C with mesial inclination between

25 and 30 degrees , Groups 1 or 2 requiring ostectomy and odontotomy (Fig. 1); no systemic disease and good general health; age below 30 years; non-smoker; no inflammation of the oral cavity; cooperation with the study and with postoperative follow-up; no contraindication to the drugs or anesthetic agents in the surgical protocol. All patients enrolled in the study gave their informed consent to the procedure. The patients were randomly subdivided into two groups of 50 each. Group I underwent primary healing; Group II underwent secondary healing. The surgical procedures were performed by four different operators have degree master in oral surgery.

Surgical procedure

Immediately before surgery, the Patients rinsed with 0.12% chlorhexidine for 1 min; they were not given pre-operative antimicrobial or other medications that might influence healing. Loco-regional anaesthesia was applied by blocking the inferior alveolar nerve together with vestibular infiltration with 2% lidocaine hydrochloride with adrenaline, 1:100,000.A full-thickness incision was made to prepare a trapezoid flap. The flap was reflected and ostectomy was performed with a Lindemann-type bur (Germany) on straight hand-piece. The tooth crown was sectioned with a tungsten carbide burr under abundant irrigation. All parts of the tooth were loosened and removed with elevator. After completing extraction, all fragments and debris was removed, and this performed by curettage of the socket and irrigation with sterile saline solution. In Group I (primary healing) the flap was next repositioned and sutured hermetically (Ethicon, 3-0 silk) (Fig. 2a and b).

In Group II (secondary healing) a wedge of mucosa, width 5–6 mm, was next removed from the second molar and the flap was repositioned and sutured (Ethicon, 3-0 silk) (Fig. 3a and b); no dressing was applied to the open socket.

The mean duration of surgery, from incision to suturing, was between 20 and 30 min. All patients received post-operative instructions (ice packs for 6 h after surgery, alternating 30 min of application with 30 min pause, soft warm diet for the first 24 h, normal oral hygiene from the day after surgery, mouth wash with 0.12% chlorhexidine twice daily .Patients were given antibiotics (amoxicillin, 1.5 g per day for 5 days) and analgesic drugs (brufen 400 mg per day for 3days). They were also given a daily pain and swelling record to be completed during the subsequent 7

days. Then sutures were removed after this period.

Evaluation criteria

Patients entered the degree of pain and swelling on the record, day by day, making reference to predefined values(VAS: visual analogue scale). Table 1 shows the reference values given to patients for pain, and the corresponding clinical situations. Patients also indicated their subjective perception of swelling, on the VAS scale, in a similar fashion. Table 2 shows the reference values given to patients for swelling, and the corresponding clinical situations. The patients were examined at 7 and 30days post-surgery. Any other complications were recorded.

Statistical methods

The VAS scale values at each visit in the two groups are showed as means, standard error, minimum and maximum mean differences between the two groups are presented with a 95% confidence interval. A suitable analysis of variance model for repeated measures was used to compare the variation of VAS scale values reported on each of the 7 days in the two groups. The Value of ANOVA for repeated measures are showed in the Results section as $F_{n,d.}$ (where n: numerator degree of freedom and d: denominator degree of freedom).Differences with $P < 0.05$ were considered statistically significant. To avoid an excessive b error, no correction for multiple comparisons was applied to the significance levels presented. The analyses were performed using the statistical software SPSS version 15.0 for Windows.

Results

There was a significant difference in the severity of pain between the two groups, at all times recorded. The decrease in pain over time was not significantly different in the two groups ($P = 0.003$; $F=2.6613$) (analysis of variance for repeated measures, lower bound estimate).Intensity of pain was greater in-Group I patients (primary healing) on all six days after surgery (Table 3; Fig. 4).There was a statistically significant difference in swelling between the two groups at all times recorded. Variation in swelling over time differed in the two groups ($P < 0.0001$; $F=38.395$).Especially on days 2 and 4, swelling was more severe in Group I, the peak of swelling being on day 3. In Group II, the severity of swelling had a much smaller peak, again on day 3 (Table 4; Fig. 5).At the check-up on day 7 after surgery, 15% of Group I patients had dehiscence distal to the second molar, but without signs of alveolitis. There was one case in this group (1%) of suppurative alveolitis with re-infection of the socket at about day 30 after extraction. There were no cases of hemorrhage, although in-Group II no dressing was applied to the socket

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. This study determined secondary healing to be more comfortable for the patient with regard to these two parameters. Swelling and pain were evaluated with the VAS scale, which is considered to be an efficacious tool to evaluate clinical parameters that influence the subjective experience of an individual, such as pain [16, 17].The most frequently

used methods to measure swelling involve subjective evaluation [18, 19]. Photographic techniques and computerized tomography scanning have also been proposed to measure anatomical changes in the profile of patients subjected to third molar surgery [20]. Stereo photographic techniques proposed by BJORN et al. [21] and developed by PEDERSEN& MEARSK-MOLLER [22] are probably the most sophisticated method described to date, but are too complex for clinical use. HENRIKSON et al. [23] proposed the use of the VAS scale to measure swelling, and compared the effects of two drugs on the post-operative course following third molar surgery. At the time of their study no objective measurement technique was available for comparison. BERGE [24, 25] compared VAS scale values to three-dimensional mechanical measurement of swelling using an extra-oral cephalostat, and concluded that the VAS scale was a reliable and repeatable method. The ability of the surgeon might influence the outcome of the surgery [26]. The operators involved in this study were judged to have the same level of competency, but no objective method [27] was used to assess this variable. The results obtained in the present study indicate that secondary closure of the socket causes less inconvenience for the patient as it appears to minimize post-extraction swelling and pain. In some cases, primary closure was complicated by supportive alveolitis that originated from the periodontal pocket distal to the second molar, 3 or 4 weeks after surgery (1% case in this study).These results are in agreement with many of those reported in the literature. The surgical procedure used in this study may be slightly differ from that used by other researchers as an example In a split-mouth study on 56 patients, DUBOIS et al. [2] extracted both mandibular third molars simultaneously. Closure was primary on the left; while on the right, mucosa distal to the second molar was incised so as to create a window of leave the socket open for secondary healing. Secondary closure was found to minimize swelling and pain in the immediate post-operative period, helping to reduce patient discomfort. HOLLAND & HINDLE [3] showed that post-operative pain and swelling were more marked in ‘‘closed’’ than in' open’’ healing, and that the technique of election should be ‘‘open’’ healing. This despite their finding that at one month from surgery the wound appeared to have healed better in ‘‘closed’’ healing. BRABANDER & CATTANEO [10] evaluated two different types of wound closure after removing mandibular third molars impacted in the mucosa. In the test group a portion of mucosa distal to the second molar was removed and a drain, in the form of Vaseline gauze, was inserted into the socket to ensure secondary closure of the surgical wound. In the control group they utilized the same surgical procedure but without drainage. Secondary closure was found to be preferable as it reduces pain and swelling post-surgery, but insertion of a Vaseline gauze drain did not influence these parameters. Result of the present study came in agreement with the above mentioned findings. Other surgical procedures with insertion of drain tube was also tried as KPRASITKUL PAIRUCHVEJ [11] compared primary healing associated to the insertion of a small drainage tube, removed on day 3, with primary healing alone. They found no significant difference with regard to severity of pain in the two groups, but swelling was significantly less in patients with drainage. In the drainage group, reduction of mouth opening was

also less marked and there approximately 6 mm circumference and was less bleeding. In a similar split mouth study, SAGLAM [12] compared test side (surgical extraction, primary closure and drainage for 72 h) with control side (surgical extraction and primary closure alone).

The present study enable us to conclude that, incases 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.

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

0	No swelling	The patient does not detect the slightest swelling
1	Slight swelling	The patient detects a slight swelling but it is not very noticeable
2	Mild swelling	The swelling is noticeable but does not interfere with normal mastication and swallowing
3	Severe swelling	swelling is evident and 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 it is very evident and mouth opening is reduced (trismus)

Table (3) Pain: statistical analysis of data

		VAS 6 h	VAS 1 day	VAS 2 days	VAS 3 days	VAS 4 days	VAS 5 days	VAS 6 days	*F**	d.f *(n, d)*	*P value*
Primary closure	N	50	50	50	50	50	50	50	2.6613	6, 98	0.003
	Mean	3.6	3.5	3.2	2.98	2.5	1.98	1.5			
	SE	0.07	0.07	0.07	0.07	0.07	0.07	0.06			
	Min	2	2	1	1	0	0	0			
	Max	5	5	4	4	4	4	4			
Secondary closure	N	50	50	50	50	50	50	50			
	Mean	3.1	3.12	2.9	2.5	2.1	1.5	1.1			
	SE	0.07	0.08	0.10	0.10	0.09	0.08	0.07			
	Min	2	1	1	0	0	0	0			
	Max	5	5	4	3	3	2	2			
Difference between means		0.5	0.38	0.3	0.48	0.4	0.48	0.4			
C.I 95%	Upper	3.52	3.54	3.33	2.92	2.66	2.05	1.66			
	Lower	2.68	2.70	2.47	2.08	1.54	0.95	0.54			

*: analysis of variance for repeated measure (lower bound estimate)

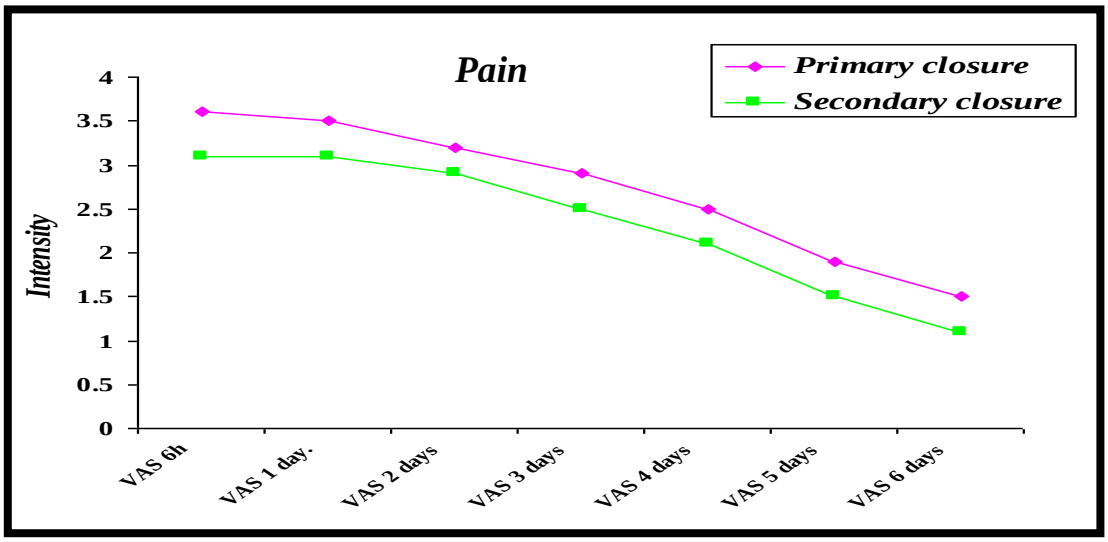

Fig (4): Pain: graphic representation of table

Table (4): Swelling: statistical analysis of data

		VAS 6 h	VAS 1 day	VAS 2 days	VAS 3 days	VAS 4 days	VAS 5 days	VAS 6 days	*F*	d.f *(n, d)*	*P value*
Primary closure	N Mean SE Min Max	50 0.66 0.06 0 1.5	50 0.99 0.05 0.5 2	50 1.3 0.06 0.5 3	50 1.6 0.07 0.5 3.5	50 1.1 0.05 0 2.5	50 0.44 0.05 0 3	50 0.2 0.04 0 1	38.395	6, 98	< 0.0001
Secondary closure	N Mean SE Min Max	50 0.55 0.04 0 1	50 0.66 0.03 0 1.5	50 0.77 0.04 0 2	50 0.88 0.05 0 2	50 0.55 0.03 0 1	50 0.25 0.03 0 1	50 0.07 0.02 0 0.5			
Difference between means		0.11	0.33	0.53	0.72	0.55	0.19	0.13			
C.I 95%	Upper Lower	0.28 0.06	0.54 0.12	0.85 0.21	1.07 0.37	0.79 0.31	0.49 0.11	0.24 0.02			

*: analysis of variance for repeated measure (lower bound estimate)

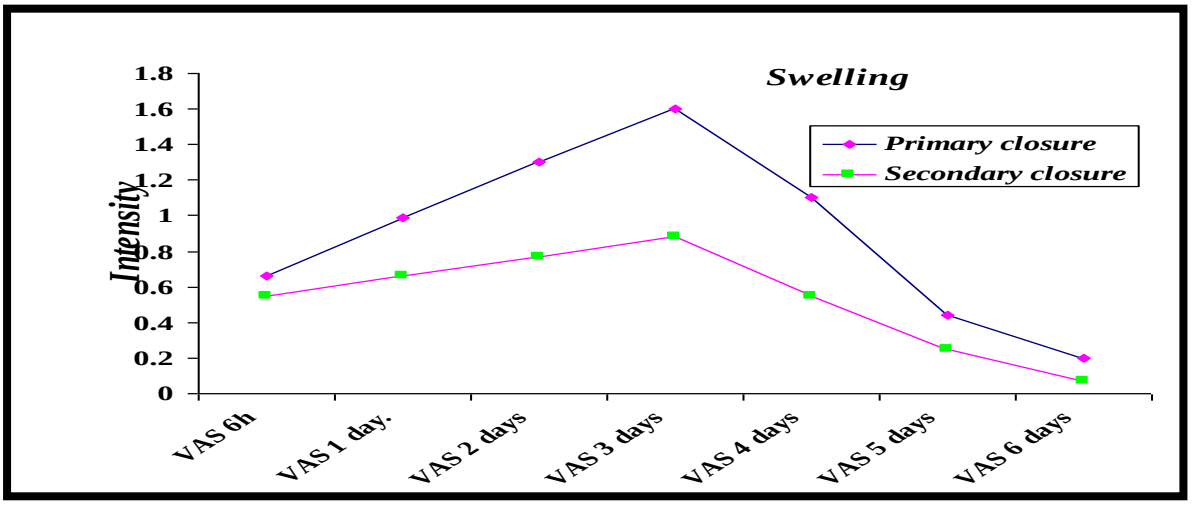

Fig (5): Swelling: graphic representation of tab

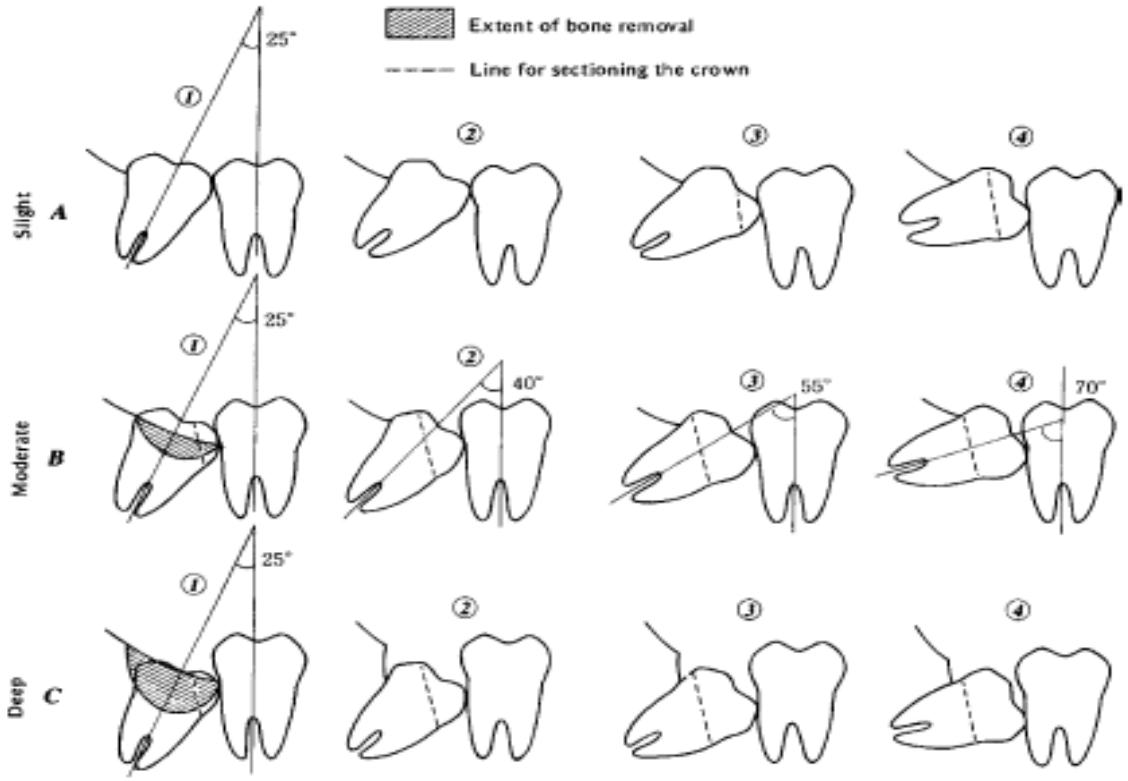

Fig. 1. Type of third molars considered in the study: Class C, Groups 1 and 2 (from Asanami S, Kasazaki Y. "Expert third molar extraction" Quintessence Publishing Company 1993, p. 23).

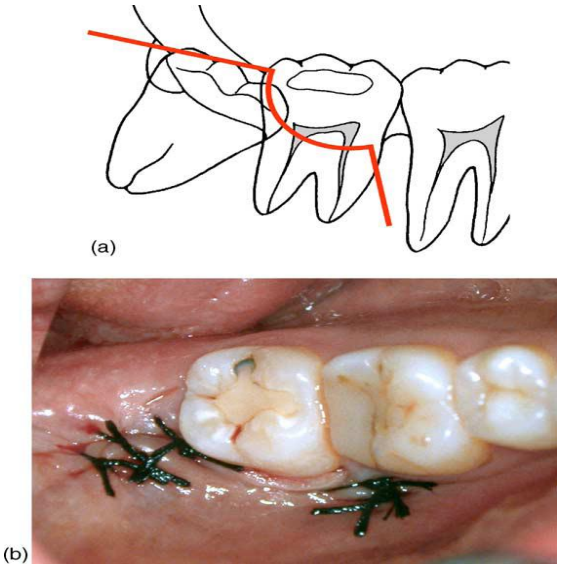

Fig 2 a&b

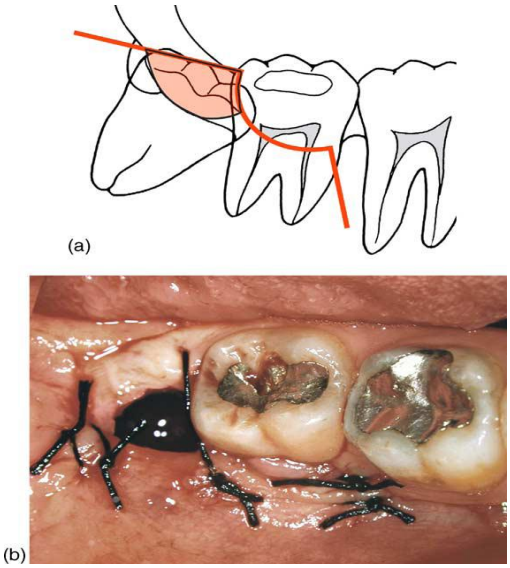

Fig 3 a&b