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Efficacy of Securing Three Sided Mucoperiosteal Flaps Devoid of Palatal Papillae Involvement (Original Clinical Study)

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Abstract

Objectives: This study directed to achieve an advanced suturing technique to ensure minimum stitches securing three sided mucoperiosteal flap with good approximation and seal of margins. Improvement of the complications which can face the patients as postoperative pain and swelling adding to that low infection rate. Also proven the efficacy by subjective clinical parameters affect patients satisfaction. Furthermore to estimate wound healing with both protocols. As well as to quantify scales for the purposes of determining response to treatment and for evaluating outcomes.

Patients and Methods: Study conducted on 200 patients from (2004-2009). All underwent operations in upper jaw under local anaesthesia involving three sided muco-periosteal flap. Patients divided in to 2 groups (A and B) evaluated 1st, 7th and 20th postoperative days.

Results: Statistical analysis done by SPSS show significant *p* value concerning pain, swelling, ooze and wound healing. Noticed postoperative ooze with effective clinical healing of the wound by inspection.

Discussion and Conclusions: This technique avoids palatal injection, flap repositioning with minimal trauma to the gingival tissue, obtain an eventual healing process and Easy suture removal.

Keywords

Corner suture; Palatal anaesthesia; Three sided flap

Introduction

The primary objective of dental suturing is to position and secure surgical flaps to promote optimal healing [1]. Accurate apposition of surgical flaps is significant to patient comfort, homeostasis, reduction of the wound size to be repaired, and prevention of unnecessary bone destruction.

The interrupted suture encompasses two suturing techniques: the simple loop and the Figure 1. The simple loop is the most commonly used technique in dentistry and is routinely used to coat tension free, mobile surgical flaps. Mattress technique is used in areas where tension-free flap closure cannot be accomplished [2]. Traditionally, mattress sutures are left in place for 14 to 21 days before dissolution or removal [3]. The interrupted suspensor suture independently repositioned the flap to its original position, the sling suture technique is useful when performing coronally repositioned sliding flaps (1). To understand the basis of suturing, it is important to know how wound heals. This occurs in four phases: Hemostasis, Inflammation [4], Proliferation and Remodeling [5,6].

Valid, reliable outcome measures that can assess important clinical differences are essential tools for clinical trials. Investigators have been interested in measuring important but subjective outcomes. Outcome measures have been developed to evaluate subjective outcomes such as quality of life, and pain [7].

Clinical Parameters for patient's assessment. The scales were translated into Arabic and explained to the patients preoperatively. A special data scales for each clinical manifestation described as below.

Pain Visual Analogue Scale (VAS)

Usually, pain is the major complaint of patients and thus, the evaluation of pain is one of the foundation pillars in the outcome assessment. Pain intensity assessment seems to be most reliable when asking for an average pain level during a short past period of time from 1 week to 6 months. In well-informed patients, VAS is valuable instrument to assess pain intensity and changes due to therapy.

Visual Analogue Scale (VAS) consists of a straight horizontal line 100 mm in length with the endpoints defining extreme limits such as 'no pain at all' and 'pain as bad as it could be'. Patients asked to make a mark on the line that best represents the intensity of their pain [8,9].

The distance between 'no pain at all' and the mark then defines the subject's pain [10].

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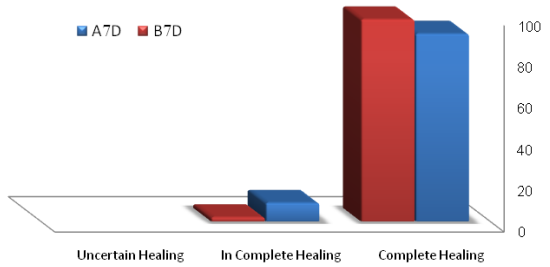


Figure 1: Wound healing scale of cases sample

Swelling Visual Rating Scale (VRS)

The visual analog scale being the most commonly followed scale has been used for evaluation of pain and swelling. The VRS is a six-point scale that consists of a list of phrases (no swelling, mild swelling, moderate swelling, severe swelling, very severe swelling, and worst swelling imaginable), with an explanation of each phrase. Patients selected the single phrase that best characterized their swelling. Each phrase corresponded to a numerical score (0,2,4,6,8,or10) [11,12].

Bleeding and ooze scale

Post operative bleeding and / or ooze are a significant clinical parameter. It disturbs patient psychology and trust. As well it can be annoying to the surgeon himself (13,14).

Many different classifications for post surgical ooze has been described in literature specially post extraction ooze which can be a worrying sign of underline situation. T. Lillis et al, cited in his research a new classification proposal for bleeding in post extraction socket which we thought that it can be used here to give appropriate description for ooze and or bleeding post surgery [13].

In 2010 the Bleeding Academic Research Consortium (BARC) developed a consensus universal definition of bleeding to overcome, as much as possible, all the heterogeneity and limitations of the different arbitrary bleeding classifications.

The BARC (2010) it comprises an objective, hierarchically graded, consensus classification for bleeding and it discerns 6 types of bleeding (from Type 0: No bleeding to Type 5: Fatal bleeding).

Wound healing evaluation scale

Recently several scales have been developed to measure the cosmetic outcomes of healed incisions. Ease of use, ability to measure small difference added to its reproducible result; encourage us to use a visual analogue cosmoses scale as a clinical parameters to estimate wound healing (15).

Any innovative human study should follow the human ethics legal guides. It is imperative to proof the procedure clinically with the most common symptoms that usually patients complain. List of different supported questioner are combined with the scales to get real scientific clinical results that can be beneficial for other researcher.

Aims and Objectives

This study directed to achieve an advanced suturing technique to ensure minimum stitches securing three sided mucoperiosteal flap with good approximation and seal of margins. Improvement of the complications which can face the patients as postoperative pain and swelling adding to that low infection rate. Proven the efficacy by subjective clinical parameters affect patients satisfaction. Furthermore to estimate wound healing with both protocols. As well as to quantify scales for the purposes of determining response to treatment and for evaluating outcomes.

Patients and Methods

The study conducted on235 patient. Thirty five patients were excluded either because of poor follow up or the patients they don't know how to fill the questioner. So two hundred patients were participate from (2004-2009) in the Department of Maxillofacial surgery in Al-Salam hospital in Mosul, all patients underwent an oral surgical operations in upper jaw under local anesthesia involving three sided labial and/or buccal mucoperiosteal flap (with 4-5 papillae in each flap) with the vertical incision distal to the last papillae, all have an existing sound tooth uninvolved with the flap on each side of the surgical exposure.

Specially prepared patient information's case sheet, particular identification code, and VAS questioner for pain, swelling, oozing and wound healing are geared up for each patient.

Human Ethical Scientific Approval Application Form for Research is organized following the recommendation of the scientific committee of the Nenavah Health Directory/Ministry of Health/Iraq. Licenses number is 19/77 in 12/6/2019 with session number 185.

Each patient examined well clinically, radio graphically as a pre-operative preparation for periapical surgery (Apecictomy).

Summary of surgical procedure

- Local anesthetic agents are given for control of pain and anxiety Lidocaine with epinephrine
- Three sided mucoperiostael flap incision and reflection
- Bone removal with burs
- Apical Curettage of any lesions done
- Apecictomy and beveling at 45 degree or greater
- Control of bleeding and of spillage of filling materials
- Root filling done appropriately follow the slandered ways
- Cleaning the site, remove all debris, wash with normal saline and final checkup done
- Closure with 3/0 silk suture

The new suturing technique involves only one papilla on each side of the flap and the suture thread loop around the tooth distal to the flap and finally secured with the other end without any additional gingival tissue (labial or palatal papillae) involvement. The remaining papillae not involved with any stitch, this corner sutures placed 2-3 mm from the tip of the papilla and located below the imaginary line that forms the base of the triangle of the inter dental papilla, Figures 2 & 3. In case of bone exposure following corner suturing, the vertical incisions secured with only one simple interrupted suture. Patients instructed to maintain healthy oral hygiene in the postoperative period including the use of mouth wash.

Figure 2: Corner suturing technique

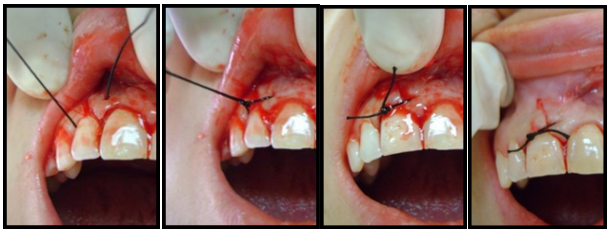


Figure 3: Steps of corner suturing technique

Study design

We divide the patients in to two groups according to technique used for wound closure of the mucoperiosteal flap .Each group contain 100 participant.

- **Group A** (Conventional Controlled): mucoperiosteal flap closed by simple interrupted suturing technique in both vertical and horizontal lines of the surgical incision which is popularly used by oral surgeons.
- **Group B** (Innovative Procedure): mucoperiosteal flap closed by innovative suturing technique which differs from group Aim both anesthesia and suturing technique. No palatal injection with local anesthesia is prearranged and no involvement of the palatal papillae by suture is undergone.

Inclusive criteria

- Patients with upper anterior teeth infection need periapical surgery for removal of lesions
- Patients with upper anterior teeth cyst need periapical surgery for removal of lesions
- Patients with upper anterior teeth granuloma need periapical surgery for removal of lesions

Exclusive criteria

- Sites other than anterior upper teeth
- Medically compromised patients
- Smokers
- Patients with periodontal disease
- Patients with poor follow up and/or don't understand how to fill the scales
- Patients with spaced or lost teeth involved in the flap site including diasthema

Clinical parameters for comparison

We select four most appropriate clinical symptoms that it's applicable to be described by patients, easily proved by surgeons and not need so much effort from both patients and surgeons. These parameters are:

- Pain
- Swelling
- Bleeding and Oozing
- Wound Healing

Pain

It is a subjective complex experience, and there are no tools to measure it. We follow the questioner answered by patients wards (Visual Analog Scale) [11].

Criteria for post – operative follow up (PAIN)

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

Swelling

Also considered as a subjective clinical parameter. In our study here we follow the VRS by instruct patients to look in the mirror to detect the degree of swelling and answering the questioner list appropriately [11].

Criteria for post – operative follow up (SWELLING)

0- No swelling - patient does not detect the slightest swelling

1- Slight - patient detects a slight swelling but it is not very noticeable

2- Mild swelling - swelling is noticeable but does not interfere with normal mastication

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 the mouth opening

5- Extremely severe swelling - the swelling is very evident and mouth opening is reduced

Postoperative bleeding or oozing

Presentation of ooze can be one of the important clinical parameters as we in our research leave the palatal papillae untouched with the suturing technique group B as described previously. By using a modified BARC classifications for post exodontia bleeding and oozing we prepare a special questioner for the patients [13].

Wound healing

Here we depend on the surgeon how performed the operation as he examine the wounds and answer specific clinical question prepared for this parameter also.VAS for cosmosis are used. Scale of 6 from 6. Worst scar, best scar. Average is between optimal and sub optimal scar [15].

Clinical examination made preoperatively with recording the base line data for each patient in his prepared case sheet for both group. Follow up start postoperatively from the 1st day by phone call. Patients over all perception done At the 7th day were patients attend to the department for suture removal. A face to face interview done with modified questioner answered, clinical examination done and suture removed. At 20th post operative day final interview with re-examine the patients again.

Clinical parameters comparison of group A and B

Pain scale: For comparison between group A and B we use post operative records D1 and D7. While base line and D20 records are used only as data base information.

Swelling scale: (16,17) VAS were used to document swelling as same as pain with special questioner answered by the patients 1st day, 7th day and 20th day. Same as pain scale we use post-operative D1 and D7 records for comparison.

Postoperative bleeding or oozing scale: For bleeding we just consider post-operative D1 and D7.

Clinical wound healing evaluation scale: Wound evaluation specifically done at D 7 postoperatively and D 20 was ultimate wound healing observed.

Statistical analysis

All scales mentioned here are statistically records by use SPSS version 25 program. Chi square test is used to clarify *p* value significance for comparison.

Result

Any clinical research should be provided with data authorized to proof the work validity and accuracy. In our research we use two different ways to secure the three sided mucoperiosteal flap in apical surgery patients. For comparison of accuracy of innovative technique we use the most common clinical manifestations that clarify patients satisfactions at first. These are pain, swelling and bleeding. Base line descriptive data are recorded. Follow up start from the first post operative day where pain, swelling as well as bleeding documented too. Either by phone call or visiting the department as patient's

conditions permits. Suture removal at day 7 more over also used for comparison between group A and B by direct examinations for the patients. Plus pain, swelling, ooze, we recorded at day 7 post operative wound healing state of the surgical flaps. Day 20 used as a follow up criteria to ensure final documented healing process.

Pain VAS: (Table 1, Figure 4) D1 follow up: pain scale as clear from the data no pain in group B were 83 patients while in group A were 37 patients. Minor tolerable pain shown in eight patients only in group B while in group A thirty patients were traced. Six patients in group A proof a severe pain (very intense distressing) while nothing like this shown in group B. Statistical analysis *p* value are significant for day one.

For 7th postoperative day no significance differences in *p* value are evident.

Swelling VRS: (Table 2, Figure 5) D1 follow up: swelling scale as viewed from the data no swelling in group B were 53 patients while in group A were 13 patients. Slight swelling shown in 38 patients only in group B while in group A 24 patients were traced. Fifty three patients in group A proof a minor to moderate swelling while nine patients only presented in group B. Statistical analysis p value were significant difference for day one.

D 7 follow up: significance differences in *p* value at 7th postoperative day are evidences between groups.

Oozing scale: (Table 3, Figure 6) D1 follow up: the main postoperative evaluation reveals obvious blood ooze in the sutured site for group B. From the patient's history, anxious postoperative blood ooze was obvious within immediate 12 postoperative hours. Group B illustrate minor bleeding in 82 patients, where as 77 patients in group A express no bleeding. Significant p. value is shown between groups. On contrary at day 7 no significance difference in *p* value.

Wound healing evaluation scale: Process are depict in (Table 4, Figure 7) at day seven only with significant difference in *p* value. At the 7th postoperative day, no marked wound complications, the mucosal color return to normal, with accepted gingival health. Stitches were loose at 7th postoperative day with ease suture removal process with effective clinical healing of the wound by inspection.

Discussion and Conclusion

The present study aim to create a new suturing technique to secure three sided mucoperiosteal flap in cases under went apical surgery (Apicectomy) and proven the efficacy by subjective clinical parameters which can affect patients satisfaction. Furthermore to estimate wound healing with both protocols. As well as to quantify scales for the purposes of determining response to treatment and for evaluating outcomes.

In corner suturing technique (group B), the sutures pull the flap edges to the distal sides of the surgical site in approximately 45 degree, securing the remaining papillae in place without the necessity for an additional stitches on horizontal or vertical edges, while the simple interrupted suturing technique (group A) of the three sided mucoperiosteal flap secure the flap in place by two forces, vertical (via inter dental suture of the free gingival margin) and horizontal (via vertical arms suture) direction, so the novel

Pain Scale	Level	Descriptions	D1 A	B	*p* value	D7 A	B	*p* value
No pain	0	No pain	37	83	0.000* Sig.	95	98	0.248 Non Sig.
Minor pain	1	Very mild	11			5		
	2	Discomfort					2	
	3	Tolerable	19	8				
Moderate	4	Distressing	13					
	5	V Distressing						
	6	Intense Distressing	14	9				
Severe	7	V. Intense Distressing	6					
	8	Horrible						
	9	Excruciating						
	10	Un imaginable						
Total			100	100		100	100	

*Significant value

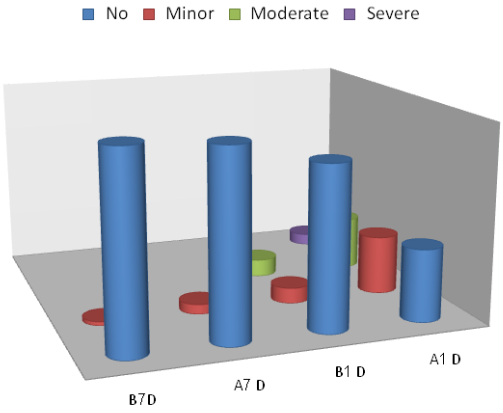
Table 1: Pain scale for cases sample

Figure 4: New corner suture pull the flap edges in 45 degree, without the necessity for an additional stitches on horizontal or vertical edges

Swelling Scale Levels	Levels	D1 A	B	*p* value	D7 A	B	*p* value
No Swelling	0	13	53	0.000* Sig.	78	98	0.000* Sig.
Slight	1	24	38		22	2	
Mild-Moderate	2	53	9				
Severe	3	10					
Very Severe	4						
Extremely Severe	5						
Total		100	100		100	100	

*Significant value

Table 2: Swelling scale for cases sample



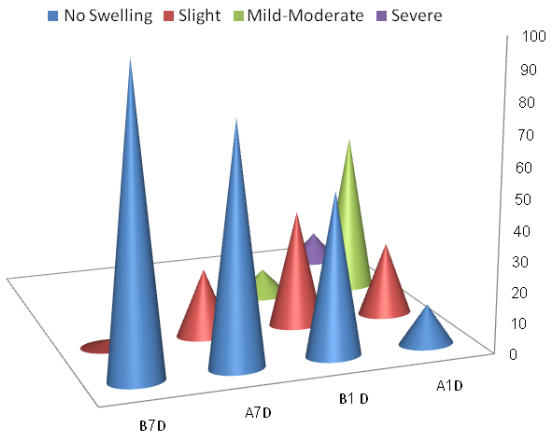
D1A=1st Postoperative day in Group A
D1B=1st Postoperative day in Group B
D7A=7th Postoperative day in Group A
D7B=7th Postoperative day in Group B

Figure 5: Operatively in Cases Sample

Bleeding	Score	D1 A	B	*p*_ value	D7 A	B	*p*_ value
No Bleeding	0	77	18		100	98	
Minor Bleeding	1	23	82			2	
Clinically Significant Bleeding	2			0.000* Sig.			0.155 Non Sig.
Life Threatening Bleeding	3						
Fatal Bleeding	5						
Total		100	100		100	100	

*Significant value

Table 3: Post operative Bleeding Scale for Cases Sample



D1A=1st Postoperative day in Group A
D1B=1st Postoperative day in Group B
D7A=7th Postoperative day in Group A
D7B=7th Postoperative day in Group B

Figure 6: Swelling scale post operatively in cases sample

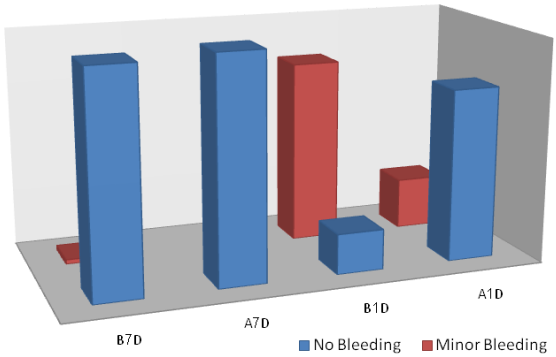


Figure 7: Bleeding and oozing scale in cases sample

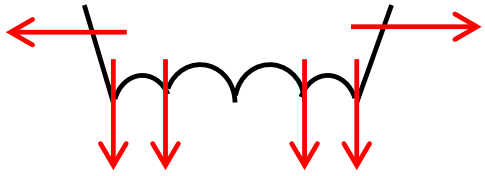


Figure 8: The traditional suture secure the flap by two forces, vertical and horizontal direction

Healing Scale	D7 A	B	*p*_ value
Complete Healing	91	98	
In Complete Healing	9	2	0.030* Sig.
Uncertain Healing			
Total	100	100	

*Significant value

Table 4: Wound Healing Scale for Cases Sample** $p \leq 0.05$

corner suturing technique not need more additional stitches for flap repositioning (Figures 3 & 8).

Correct interpretation of wound's clinical appearance need perfect knowledge of the clinical evolution of the healing process in each kind of surgery.

Tan WC cited in his paper that soft tissue painless swelling usually occurs at the surgical site from the second day and it tends to progressively and spontaneously decrease from the 3rd or 4th day on [18,19].

We reliance on telephone follow-up at the first postoperative day to monitor the initial phase of post-surgical healing. Briefly telephone phone call is fast, inexpensive and does not require high patient compliance. As well as, telephone follow-up improves the doctor-patient relationship since it gives the patient sense that the surgeon is showing real interest in his/her post-operative conditions. Once more that it is increases the patient's trust and confidence with the surgeon [19,20].

Telephone monitoring allows to inquire post-surgical signs and symptoms such as pain, discomfort, swelling, bleeding, exudation, interference with daily activities, in order to assess whether the post-surgical course is normal or not and to decide whether the patient should return for clinical monitoring of wound healing. Some of these features, such as pain, swelling, bleeding and bruising, may be inquired with self-assessment numerical or verbal scales [20,21].

Pain and swelling that occurs post-OMFS can be difficult to assess since patient self-reports are accepted as the gold standard for pain assessment [22], pain assessment, Pain measurement in oral and maxillofacial surgery tools should be simple and straight-forward to use. These tools should ideally measure baseline discomfort and the response to remedy.

Pain VAS swelling VRS show significant difference with the innovative suturing technique this can be consequence to many

reasons as less tension, less swelling existed, less surgery time and no hematoma also [22].

It is also very important that patients in group B should be informed about mild oozing that may be experienced during the first post-operative hours and that this is an anticipated phenomenon for which they have nothing to worry about.

Congestion of the flap kept to minimum in group B, mainly due to less inflammatory reaction with only two securing stitches in addition to less hematoma under the flap due to simple approximation of the mucosal margin rather than tight closure of the surgical flap with multiple stitches in group A.

Within first 24 hours postoperatively, from the patient's history in group B, increased blood ooze from the surgical site is noticed by the patient, which is significant in comparison with actual surgical flap bleeding in group A.

Roberto Pippi, 2017 [23] cited that wound healing monitoring after surgery is an important concern in dentistry. Suture monitoring and removal after proper evaluation of soft tissue healing progression is also an integral part of wound healing monitoring.

Wound healing goes smoothly in both groups at day seven suture removal with significant difference for the novel technique that might be linked to less surgery time, less force, less swelling and less hematoma.

In an original study done by Lorenzo Tavelli, 2018 [24] titled with Influence of suturing technique on marginal flap stability following coronally advanced flap: a cadaver study (2018). The completion of suturing the flaps with the vertical incision sutures was able to provide a better Marginal Flap Suture compared to suturing the surgical papillae alone. The author concludes that Suturing technique highly affects the MFS following Coronally Advanced Flap on cadavers.

Finally, the study shows the many advantages including absence of palatal anesthetic injection, as there is no involvement of palatal mucosa in the flap, so minimize discomfort to the patient; reposition the flap with minimal gingival tissue trauma and less possible post-operative wound complications; obtain an un eventual healing process as other dependent suturing techniques; minimal number of suture stitches; less chair side time consuming and easy suture removal procedure for both operator and patient. most papillae in this technique are free of knot pressure optimize the resultant healing process, less inflammatory process at gingival penetration site due to less number of involvement.

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