

COMPARATION OF SCAR FORMATION AND PAPILLA HEALING FOLLOWING THREE TYPES OF FLAPS IN PERIAPICAL SURGERY

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ABSTRACT:

Aim of study: To compare the soft tissues scarring and papilla healing when using different types of flap designs in endodontic surgery.

Material and methods: Thirty patients were included in the study, they were divided randomly into three groups, each comprised of (10) patients. In the first group, apicectomy was done using sulcular (Trapezoidal) Flap. Whereas, in the second group, a sub marginal (Luebke–Ochsenbein) scalloped . While in the third group, a new experimental (Papilla Base Flap). The extent of scarring was evaluated clinically ,and the Assessment was done after a week, a month and three months.

Result: Comparison among the three study groups was performed significant differences in the results of papilla base flap over the other two types in scar formation. And the sulcular full thickness flap procedure resulted in a significant decrease in papilla height compared to the other types of flaps in this study

Conclusion: Papilla based incision is an excellent method of elevating the mucoperiosteal flap in endodontic surgery with excellent esthetics results.

Keywords: apical surgery ,flap design, papilla base incision, scarring ,papilla healing.



INTRODUCTION

The ultimate goal in periapical surgical is the eradication of periapical pathosis using properly designed flaps for the purpose of preserving the periodontal condition of the surrounding area following surgery.^[1] Acceptable treatment outcomes are no longer possible without consideration of esthetic consequences for all involved dent alveolar structures. Many types of incisions can be selected, including horizontal, sulcular, sub marginal and vertical releasing incisions.^[2] The variety of flaps reflects the number of variables to be considered before choosing an appropriate flap design. While many flap designs have been suggested over the

years, some have become absolute and new techniques have emerged.^[1] Oral surgeons and endodontists always desire to improve methodology of this procedure by means of instrumentation, materials and different approaches to have a better success rate^[2–3]

But, little attention has been given to the treatment of gingival tissue that must be incised and reflected to surgically gain access to the lesion. The design of the surgical flap greatly influences the healing process. Surgical flaps on the basis of horizontal incision can be classified into two major types^[4]:

1. Full mucoperiosteal flaps:
 - a. Triangular (one vertical releasing incision).
 - b. Rectangular (two vertical releasing incision)
 - c. Trapezoidal (broad based rectangular).
 - d. Horizontal (no vertical releasing incision)
2. Limited mucoperiosteal flaps:
 - a. Sub marginal curved (Semilunar)
 - b. Sub marginal scalloped (OchsenbeinLuebke)

Recently the goal of periapical surgery has shifted from the mere reduction or elimination of existing pathosis to the achievement of successful outcomes regarding function and aesthetics as well as to periodontal tissue preservation. [5]

The two most commonly used flaps are the intrasulcular triangular (2-sided) flap .Figure(1). And Luebke–Ochsenbein flap .Figure(2). Due to their advantages.[6] The rectangular flap (or trapezoid) is made of a sulcular incision and two releasing incision which goes in apical direction from ends of sulcular incision (Fig. 3). Sulcular and releasing incision proceed as already described. In the “rectangular” design releasing incisions go vertically, parallel to the teeth long axis in order to avoid root eminences (Fig. 5) ,following the same direction of buccal vessels. In the “classic trapezoid” flap releasing incisions diverge in order to obtain a wider flap base [7],

while Luebke–Ochsenbein flap is a variant of the rectangular one, replacing the sulcular incision with a scalloped submarginal one. [8] It is made of a horizontal incision along the attached gingiva and two releasing incisions that starting from the end of the horizontal incision, run apical. Horizontal incision runs along attached gingiva following the gingival scallops. In order to avoid dehiscences and gum recessions incision should not involve neither the gingival sulcus nor the junctional epithelium but should run between the bone margin and the mucogingival line. [7] Although these two flaps have several advantages, yet each one carries some complications making it not amenable to all surgical cases. With the intrasulcular flap, wound healing is rapid, surgical access is good, there is minimal disruption of blood supply and healing is done by primary intention but there is loss of crestal bone height and loss of soft attachment level with subsequent recession [6]

The purpose of the present study was to evaluate the scar formation and the papilla height after two different flap designs: Full intrasulcular triangular flap and Luebke–Ochsenbein (limited sub marginal flap), and comparing them with a new experimental flap which is anticipated to be more beneficial in terms of healing.

MATERIALS AND METHODS

Thirty out patients aged between 20 and 50 years, and of both genders who were attending Oral and Maxillofacial Surgery

Department, in the Dentistry College NTishreen University, Lattakia, Syria; for apicectomy of upper anterior teeth, only teeth with periapical granuloma less than 10mm or abscess were eligible for inclusion in this study. Patients without signs of periodontal disease were included in the study. Periodontal health was defined as absence of bleeding on probing and probing depths not exceeding 3 mm on any of the teeth in the area of the surgery. Interdentally papillae were occupying the interproximal space below the contact area.

Full medical histories were obtained from all patients, those with systemic diseases or penicillin allergy and pregnant or lactating women were excluded from the study. In addition, smoker patients or any patient who had taken any medications for dental or medical purposes at least 3 days before operation, were excluded. Patients were subjected to detailed history, clinical examination, and investigations as needed and randomly enrolled into three groups, each containing 10 patients as follows:

Group 1: Intrasulcular (full triangular) flap, which was composed of a single horizontal intrasulcular incision + two vertical releasing incisions, Figure (1).

Group 2: Submarginal (Luebke–Ochsenbein) flap, this flap was composed of single scalloped horizontal submarginal incision + two vertical releasing incision, Figure (2).

Group 3: The “Papilla Base” flap is made of two vertical releasing incisions connected by an horizontal incision at the papilla base alternated with a sulcular incision .Figure(3) . Releasing incision starts from between middle third and apical third of the papilla with an initial direction in that point perpendicular to the gum margin, then bends vertically. The horizontal incision is made of a “Papilla Base” incision in the interdental zone, alternated with a sulcular incision in the cervical teeth zone. The “Papilla Base” incision is made of two different incisions of the interdental papilla. Figure(4). The first incision, shallow, starts perpendicularly to the gingival margin from the inferior third one of the papilla. Then it makes a light apical convex arch to the gingival margin of the adjacent tooth. This first incision is obtained with the scalpel perpendicular to tooth long axis and carves epithelium and connective until a depth of 1.5 mm. The second incision starts from the previous one, now apically moving the scalpel parallel to tooth long axis till the bone margin, creating a papillary split thickness incision. From that point on starts the full thickness part of the flap.^[16]

A standard surgical protocol for periapical surgery was adopted. All operations were carried out under local anesthesia which was achieved by infiltration of (2.2–4.4 ml) of 2% lidocaine hydrochloride with 1:80000 adrenaline.^[2] Flaps were raised with periosteal elevator, the removal of bone and root apex was carried out with a

round bur on low speed straight hand piece under sufficient cooling with normal saline, then apical lesion currated with surgical curate, the root canal then irrigated, dried and obturated with gutta purcha. The flap was repositioned and sutured using 4/0 black silk, four simple interrupted stitches were used, one for each vertical incision and the remaining two for the horizontal incision.

Patients were instructed to apply a cold compress to the face for 10 min every 30 min for the rest of the day and were prescribed Amoxicillin 500 mg four times per day for one week and NSAID (Ibuprofen 400 mg three times per day for 48 h). Following this, patients only took the analgesics when required. Patients were instructed to refrain from mechanical oral hygiene in the operated area and rinse twice daily with 0.2% chlorhexidine during the first week after the surgery. The sutures were removed 5-7 days post operatively. [6]

Extent of scarring; they were assessed on the basis of Kramper et al.,^[9]criteria and as follows : 0 = None; 1= Mild; 2 = Moderate; 3 = Severe.

An acrylic stent was prepared over the incisal edges of papilla which included in the flap for standardization of measurements. The distance between the tip of papilla (P) and a fixed point on the stent (S) PS_1 was measured before the surgery with Williams graduated probe from a fixed point on the acrylic stent.[10] Figure(5)

Comparison was done afte7, 30 and 90 postoperative days and statistical analysis was performed by chi-squared test to compare if there is any significant differences among the three study groups regarding the specific criteria for scarring and papilla high.

The significant difference was recorded at 0.05 levels

RESULTS:

We used Chi-square test in order to test for the presence of scar essential difference between the three methods , when the level of significance (0.05) .(Table 1)

In the classic sulcular flap mild scar formation was obvious in only one patient after 3 months. While in the Ocshenbein-Lubke the scar was mild in seven patients and moderate in the other three. Papilla base flap showed full absence for the scar after three months. Figures(6-7-8)

Search results showed the presence of a substantial and statistically significant differences in terms of the ($p = 0.000$) at the confidence level (99%) where it is smaller than 0.01 between scar formation , according to the three flap designs.(Table 2)

Papilla height:

We used Chi-square test in order to test for the presence of papilla height changes essential difference between the three methods , when the level of significance (0.05) . (Table 3)

In the sulcular flap technique 50% of the patients did not suffer from any papilla recession, while the other 50% had recession between 1-2 mm.

Papilla base incision and Ocshenbeein-Lubke incision didn't show any change in papilla height after 3 months . Figures (6-7-8)

Search results showed a presence of a substantial and statistically significant differences in terms of the (P=0.017) at the confidence level (95%) where it is smaller than 0.05 between papilla height, according to the three flap designs . (Table 4)

DISCUSSION :

Scar formation:

Scarring has been defined as a microscopic disturbance of the normal structure and function of the mucosa architecture, resulting from the end product of a healed wound. The healing process includes homeostasis, inflammation, proliferation and remodeling. Scar formation occurs when deregulation of the normal physiological processes occurs, resulting in altered growth factor, cytokine, proteolytic and cellular profiles [11]. Scarring may manifest itself as an elevated or depressed site, with an alteration of mucosa texture, color, reflectance and biomechanical properties. These macroscopic changes undoubtedly result from histological alterations in the involved epithelial and sub mucosal elements. [12]

Scar formation could be attributed in sub marginal flaps to the fact that the horizontal incision in labial or buccal oral mucosa severs the vertically oriented supraperiosteal vessels and disrupts normal collagen tension. This causes loss of tissue fluid and combined with collagen retraction, provides a high potential for shrinkage and results in healing by secondary intention with scar formation [6]. This opinion was greatly accepted by Schoeffel [13], who stated that compromising blood flow during and after surgery tends to leave scars that will subside spontaneously.

Papilla height:

When a full thickness flap was performed with the total mobilization of the papilla, progressive loss of papilla height resulted, in spite of microsurgical techniques used. [14] This might be due to the damage to the papilla during the elevation process, despite the use of less traumatic modern techniques. Ideally the buccal papilla should be dissected from the lingual papilla, but especially in narrow interproximal spaces the separation process is technically difficult. Tissue fragments, left behind after the flap elevation process, are often too small to survive and may necrotize leading to recession. Another reason for shrinkage of the coronal portion of the papilla can be due to insufficient adaptation of the papilla to the underlying tissue at flap closure. Vertical mattress sutures do not always allow predictable, close approximation of the papilla to the underlying tissue surface

and this might predispose to recession with this design. [15]

Velvart [16] proposed the papilla base incision technique for marginal mucoperiosteal flap to prevent loss of interdental papilla height. Although this technique is challenging to perform because two different incisions are necessary to avoid excessive scar formation or an indentation at the site of the incision, it is conducive to periodontal healing without noticeable loss of papilla height..

With the papilla base incision it is possible to prevent any noticeable recession of the papilla following endodontic periapical surgery. The interdental papilla, as well as the raised flap, should be handled with great care,

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kept moist, and retracted without pressure during suturing. The wound edges are perfectly reapproximated without tension to prevent compromising blood circulation on both the papilla and the split flap which can cause delayed healing. [17]

CONCLUSIONS:

Based on the results of this study we can conclude that, papilla base incision is an excellent method of elevating the mucoperiosteal flap with excellent esthetics and without any postoperative loss of papilla height or scar formation . Further studies with a larger sample size can analyze the long term healing after the papilla base incision and may replace it as a primary method of flap elevation in endodontic periapical surgeries.

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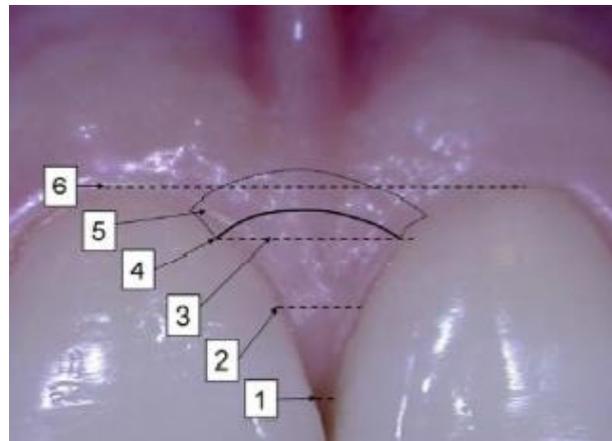
FIGURES



Figure(1) Intrasulcular (2-sided) flap



Figure(2) Luebke-Ochsenbein flap



Figure(3) Papilla base flap

1. Top of the papilla. 2. Apical third of papilla. 3. Middle third of papilla. 4. 90° incision beginning. 5. Vertical incision. 6. Papilla base



Figure(4)



Figure(5) Luebke–Ochsenbein flap after 3 months



Figure(6) Papilla base flap after 3 months

Figure(7)



Figure(8)



Intrasulcular flap after 3 months

TABLES:

		Papillabase	Ocshenbein	Classic	Total
0	Num.	10	0	9	19
	%	100.0%	0.0%	90.0%	63.3%
1	Num.	0	7	1	8
	%	0.0%	70.0%	10.0%	26.7%
2	Num.	0	3	0	3
	%	0.0%	30.0%	0.0%	10.0%
3	Num.	0	0	0	0
	%	0.0%	0.0%	0.0%	0.0%
Total	Num.	10	10	10	30
	%	100.0%	100.0%	100.0%	100.0%

TABLE 1

	Value	df	Asymp. Sig.
Pearson Chi-Square	26.329 ^a	4	.000
N of Valid Cases	30		

TABLE 2

		Papillabase	Oshenbein	Classic	Total
0	Num.	10	10	5	25
	%	100.0%	100.0%	50.0%	83.3%
1	Num.	0	0	4	4
	%	0.0%	0.0%	40.0%	13.3%
2	Num.	0	0	1	1
	%	0.0%	0.0%	10.0%	3.3%
Total	Num.	10	10	10	30
	%	100.0%	100.0%	100.0%	100.0%

TABLE 3

	Value	Df	Asymp. Sig.
Pearson Chi-Square	12.000 ^a	4	.017
N of Valid Cases	30		

TABLE 4