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Effect of 0.2% Hyaluronic Acid Gel Topical Application on Healing Period of Oroantral Fistula Treated with Buccal Flap

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Abstract

BACKGROUND: Oroantral fistula (OAF) is a pathological communication between maxillary sinus and oral cavity, which treated by various surgical methods including buccal flap and associated with post-operative discomfort and relatively long healing period.

AIM: The objective of the study was to evaluate the effect of 0.2% hyaluronic acid (HA) gel on the healing period after surgical buccal flap treatment of OAF.

METHODS: The records of 20 patients of both genders included and reviewed retrospectively. Ten patients treated with topical 0.2% HA gel while the other 10 patients treated without it. Patients healing process followed up for suture removal appointment.

RESULTS: Statistically significant $p \leq 0.05$ decreases in healing period when we compare patients treated with topical HA gel and those without topical HA gel.

CONCLUSION: The use of topical HA gel may have advantages for soft-tissue healing and decrease healing period for patients has OAF treated with surgical buccal flap.

Introduction

Oroantral fistula (OAF) is a connection between maxillary sinus and oral cavity started as opening result from maxillary posterior teeth extraction, dental infections, osteomyelitis, radiation therapy, or trauma [1], [2]. Failure of immediate management of that opening leads to pathological duct with epithelial lining and granulation tissue filling termed fistula [3].

The presence of OAF might cause inflammation of the maxillary sinus and infection due to oral bacteria and food debris escape from oral cavity that requires more treatment that is complicated [4].

Management of OAF depend on the size, chronicity, and degree of maxillary sinus involvement, generally different techniques available such as buccal or palatal flap, bone graft, platelet-rich fibrin (PRF) clot, and PRF membrane and others [5], [6], [7].

OAF closure by tissue flaps has wide area in clinical practice, especially in mild and moderate size fistula. Buccal flap widely used because of easy, quick, and low failure rate, however, buccal flap associated with post-operative pain, swelling, and decrease of buccal sulcus, which trouble the use of prosthesis in the future [8], [9].

Hyaluronic acid (HA) is a polymer of glucuronic acid and N-acetylglucosamine disaccharide that found in many tissues such as eye, skin, joints, and other tissue. HA plays crucial role in connective tissue integrity and elasticity that favorite the use of it in various pharmaceutical preparations [10], [11].

The therapeutic advantages of HA proved in various surgical and non-surgical fields due its ability to promote healing, reduce infection in addition to induction of fibroblast proliferation and angiogenesis [12].

In dental practice, HA used topically for the treatment of periodontitis twice daily for a month reduce inflammatory process and improve the state according to a study made by Mesa *et al*. [13].

Another study done by Koray *et al*. [14] found that applying 0.2% HA spray 3 times a day, for 7 days after a surgery for impacted third molar to the extraction area, reduce swelling and trismus throughout the post-operative period.

The aim of the current study was to evaluate the effect of HA gel topical application on pain, swelling, and healing period of OAF treated surgically by buccal flap.

Methods

This is a retrospective study conducted to evaluate the effect of topical HA gel on the healing of OAF treated by buccal flap compared with patients treated without HA gel application during the period from March to December 2018. The records of patients treated by one maxillofacial surgeon in AL-Hilla Teaching Hospital maxillofacial clinic evaluated retrospectively.

Patients

Twenty patients of both sexes included in study all of them have chronic OAF treated by surgical buccal flap. Ten of them received HA gel applied directly after suturing and instructed to apply twice daily until suture removal, while the other 10 patients were without HA gel (Table 1).

Healing evaluated during suture removal appointment by clinical examination.

Outcomes are as follows:

- Decrease rate of dehiscence and suture failure
- Decrease gingival inflammation
- Adverse reactions and infection
- Healing period.

Inclusion criteria

Traumatic tooth extraction with immediate opening more than 4 mm and patients with acute fistula more than 4 mm included in the study.

Exclusion criteria

The following criteria were excluded from the study:

- Patients with osteomyelitis
- Patients with tumors
- Patients with syphilis
- Patients with osteoradionecrosis
- Patients with mucormycosis.

Treatments

Buccal flap technique

All patients treated with Rehrmann [15] buccal advancement flap in which two divergent incisions made in the buccal side of the alveolus the horizontal release made to release the periosteum to allow advancement and closure of OAF without tension.

Post-operative treatments and instructions

All patients prescribed with antibiotics, analgesia, and nasal decongestant. Patients were instructed to wear surgical stent for 7-10 days and a date of suture removal was set at day 14. Patients were clinically examined at days 7, 10, and 14.

Instructions

Patients with HA gel advised to apply the gel twice daily for 14 days.

Patients of both groups instructed to stop smoking, avoid nose blowing and open mouth widely while sneezing.

Drugs

- HA gel 0.2%, GEGIGEL (Ricerfarma Gengigel Gingival Gel 20 ml, EU).
- Paracetamol 500 mg tablet, Panadol (GlaxoSmithKline, UK).
- Amoxicillin + clavulanic acid oral tablet 1000 mg (CoAmox Acino, Acino Pharma, Switzerland).
- Xylometazoline nasal decongestant.

Statistical analysis

The data evaluated at the level of significant of ≤0.05 by independent sample t-test and one-way ANOVA using IBM SPSS Statistics software 23.

Results

Evaluation of 20 patients had oroantral fistula treated with buccal flap show significant $p \leq 0.05$ decrease in healing period when we compare patients

Table 1: Distribution of patients included in the study according to gender and area of OAF

Groups	Numbers	Male no.	Female no.	Area of oroantral fistula			
				1st molar no.	2nd molar no.	1st pre molar no.	2nd premolar no.
Patients treated with HA	10	4	6	2	2	2	4
Patients treated with HA	10	4	6	2	2	2	4

OAF: Oroantral fistula, HA: Hyaluronic acid.

treated with topical HA gel (HA) and those without topical HA gel (Table 2).

Table 2: Differences in healing time between patients treated with HA and those treated without HA

Criteria	Groups	n	Mean	Std. deviation	Std. error mean	p-value
Healing time	With HA	10	10.0000	1.49071	0.47140	0.000 ≤ 0.05*
	Without HA	10	19.4000	1.50555	0.47610	

*p ≤ 0.05. HA: Hyaluronic acid.

Patients of both group show no dehiscence or suture failure at surgical site when inspected at day 14 (suture removal appointment) and neither of them show sign of infection too.

On the other hand, gingival enlargement decreased and about to be resolved completely in patients treated with topical HA gel than those without topical HA gel during clinical examination appointments at days 7 and 10 with complete healing observed at suture removal appointment (day 14).

No significant differences in healing period observed between male and female patients of both treatment groups p ≥ 0.05, Table 3.

Table 3: Differences in healing period between male and female of both treatment groups

Criteria	Gender	n	Mean	Std. deviation	Std. error mean	p-value
Healing time	Female	12	14.7500	4.86406	1.40413	0.958 ≥ 0.05
	Male	8	14.6250	5.62996	1.99049	

No adverse drug reactions recorded to drugs prescribed for both groups.

Discussion

Oroantral communications and fistulas are complications often faced by oral and maxillofacial surgeons commonly after maxillary molars and premolars extraction due to their roots proximity with maxillary sinus [16].

In the following study, patients were suffer from OAF and treated with buccal flap according to the decision of their maxillofacial surgeon. To decrease post-operative discomfort and healing period, HA gel applied and prescribed to the patients due to its known ability to facilitate wound healing and wound protection without reported contraindications or serious interactions [17].

The result of the current study shows significant decrease in healing period for patients treated with HA gel when compared with patients treated without it. The following result may due to the proved ability of HA in stimulation of fibroblast proliferation and collagen fiber deposition that decrease healing time and promote rapid wound closure, especially in late stage of wound healing [18].

This finding agrees with Lee *et al*. [19]. study that found reduction in healing period and ulcers number when they apply 0.2% HA gel twice daily for 2 weeks to patients have recurrent aphthous ulcerations and oral ulceration due to Behcet's disease. Furthermore, Romeo *et al*. [20] showed that applying 1.33% HA and amino acids gel, topically 3 times a day for 1 week, can promote faster healing in patients who underwent an excisional biopsy of the oral soft tissues using laser than the control group. The previous study outcome similar to our study finding except that the gel applied in this study contains 0.2% HA and used twice a day.

In contrast with the previous studies finding and the current one, Galli *et al*. [21] conducted a study using a single application of 0.8% HA and found no improvement in healing when applied to different surgical site in the oral cavity. However, this may due to differences of incisional site size, as none of them is flap wound in addition to the frequency of gel application and concentration. Henceforth, well-documented clinical trials required to assess the efficiency of HA on reduction of healing period after surgical buccal flap closure of OAF.

No statistically significant differences between male and female observed in healing period for both treatment groups (Table 3). This finding comes with Rodanant *et al*. [22] who found no significant variation among male and female in healing outcome after 7 days of surgical wound closure. This finding accepted in regard of no anatomical or physiological differences between male and female in healing process postoperatively.

The limitation of this study was small sample size due to decision to review the records of patients treated by the same operator rather than multicenter study. We recommend doing multicenter evaluation for different type of oral surgical operation to assume the effect of 0.2% HA gel on healing.

Conclusion

According to the present study finding, we conclude that topical application of 0.2% HA gel to a surgical closure of OAF treated surgically by buccal flap reduce healing period without recorded adverse effect.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional board and with the 1964 Helsinki Declaration and its later improvements.

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