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COMPARISON BETWEEN CORONALLY ADVANCED FLAP TECHNIQUE AND MODIFIED TUNNELING TECHNIQUE UTILIZING PERFORATED ACELLULAR DERMAL MATRIX IN TREATMENT OF MULTIPLE GINGIVAL RECESSIONS

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ABSTRACT

Objective: The aim of the present study was to evaluate the root coverage outcomes treated by modified tunneling technique (MTT) and compare it to coronally advanced flap (CAF) technique utilizing perforated acellular dermal matrix (PADM). **Subjects and Methods:** Twenty patients with 40 gingival recession (GR) sites of Miller class I and class II were selected to participate in this study. Sites treated by MTT were assigned as group I while sites treated by CAF were assigned as group II. PADM was incorporated in both groups. Patient satisfaction test, root coverage esthetic score (RES) system and periodontal chart including recession height (RH), recession width (RW), width of keratinized tissue (KW), Thickness of the keratinized tissue (TKT) were used in the clinical evaluation. **Results**: MTT showed superior results in relation to patient satisfaction test and RES. CAF showed higher root coverage percentage (94±0.0) than MTT (89.5 ±9.30) without statistically significant difference among them. **Conclusion**: MTT is considered a good treatment modality for GR, it meets patients demands and gives clinical acceptable results.

INTRODUCTION

Gingival recession GR is defined as the exposure of the root surface due to apical migration of the gingival margin (GM) away from the cementoenamel junction (CEJ). It may be localized or generalized and can be associated with one or more tooth surfaces [1].

Coronally advanced flap (CAF) has been considered treatment modality of Miller classes I and II recession defects, it is one of the Pedicle soft tissue graft procedure which can be performed if adequate sulcular depth exists [2,3]. It may be performed separately if adequate keratinized tissue present, or with conjunction of other techniques if not. According to Langer B. and Langer L. [4] two vertical incisions are made extending beyond the MGJ and a full thickness flap is raised. The flap is undermined by dissection to free the periosteum; then it is repositioned in a coronal position and is securely sutured [5].

Acellular dermal matrix (ADM) allograft has been introduced as an alternative for autografts soft tissue in mucogingival surgeries [6]. Due to its immunologic properties [7].

It has a wide range of dental uses such as: augmentation of soft tissue and keratinized gingiva, barrier membrane, and in root coverage procedures[8, 9].

A novel modified perforated membrane (MPM) was suggested while using ADM. That permits gingival connective tissue with its content of stem cells, periosteal osteoblasts and mediators to enhance periodontal regeneration [10].

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Minimal invasive techniques have been developed over the conventional one to promote healing process, decrease surgical steps and to meet patient acceptance. Allen [11] placed connective tissue graft in a tunnel preparation. Douglas H. Mahn in 2002 [12] has proposed a modified tunnel technique utilizing ADM. The modification is based on combination of tunneling and the use of ADM to reduce post surgical complications.

With the abovementioned background and the knowledge, the present study was conducted to compare between minimal invasive technique (MTT) and CAF utilizing PADM in treatment of multiple gingival recessions.

PATIENTS AND METHODS

Twenty patients with forty GR sites were selected to participate in this study at the clinic of the Department of Oral Medicine, Periodontology, Oral Diagnosis and Oral Radiology, Faculty of Dental Medicine, Boys, Cairo, Al Azhar University-their age ranged from 25 to 50 years old. Their recruitment started in 1/9/2015 and their chief complains were either an esthetic problem or a functional problem resulted from having GR; they were selected according to the following inclusion criteria aimed to control the study; Adults exhibiting Miller class I and II, recession height not more than 3 mm, Patients with good oral hygiene and free from systemic diseases that may influence the outcome of the therapy. While Exclusion Criteria were patients treated by immunosuppressive chemotherapy or radio therapy, smokers, allergy to any material or medication used in the study, pregnancy and lactating women.

This study was designed as interventional, controlled, comparative, randomized, and single blinded study. Participant patients were informed by the nature of the study and they signed an appropriate consent form including their participation agreement and their willingness to follow the instructions after surgical phase. Base line data were collected immediately pre-surgical and data were compared with the data recorded 6-month post-operative. Recession sights of each patient were randomly assigned using flip a coin method to receive one of the surgical techniques included in this comparative study as the following.

In Pre-surgical phase detailed medical and dental histories were taken from the selected patients; patients received proper oral hygiene instructions before entering the study to eliminate possible habits related to the etiology of the recession. Initial therapy was performed consisting of full-mouth supra and subgingival scaling, root planing and polishing. Patients were re-evaluated after 2-3 weeks following the initial therapy, to confirm their suitability for the designed study. Patients must show full mouth plaque score less than 10% and gingival index less than 15% to be included in the study.

Preoperative photographs, intra-oral periapical radiographs and full periodontal chart including Plaque index (PI), Gingival index (GI), PD, CAL, Recession height (RH), Recession width (RW), Width of keratinized tissue (KW) and Thickness of the keratinized tissue (TKT) were done for all patients, before any intervention as a base line for the comparative analysis. Measurements were obtained using a University of Michigan "O" probe with William's markings to the nearest 0.5 mm at baseline

The esthetic outcome achieved was evaluated by root coverage esthetic score (RES) system [13]. Patient satisfaction test was made under guidelines of Mahajan et al. 2007 [14] where patient was questioned about his/her satisfaction with regard to the following patient related criteria: Root coverage attained, Relief from dentinal hypersensitivity, Shape and contour of gingiva, Postoperative pain, discomfort and Overall-satisfaction.

Group one: root coverage procedure was assigned to be made using MTT. It was done according Douglas H Mahn [12] guide lines. The PADM** is prepared and the exposed roots were planed then CEJ were smoothed. 24% EDTA£ were added as root conditioning material for it and kept for 3 min. The PADM were placed into the surgical site through the vertical openings (figure1). Then it is sutured with the two vertical openings with simple interrupted sutures using Polypropylene 6-0 β, the elevated tissues were coronally moved to cover the recession and fixed on teeth using sling suturing technique using Polypropylene 6-0 β.

Group two: root coverage procedure was assigned to be made using CAF technique. This group was done according to guide lines of Langer and Langer [4] technique (figure2). A trapezoidal full thickness flap was raised beyond the MGJ to allow a passive coronal displacement of the flap. Surgical field and PADM** was adjusted in the same previous manner. PADM** is fixed on placed using 4-0polyglycolic acid@ (X) suturing technique, the elevated tissues are coronally moved to cover the recession and it's fixed on teeth using sling suturing technique using Polypropylene 6-0 β. The two verticals were closed with simple interrupted sutures and no periodontal dressing was applied after surgery.

RESULTS

Sample size calculation

Using root coverage percentage as the primary outcome variable and assuming that the standard deviation (SD) of the differences in the paired measurements would not exceed 30% and $\alpha = 0.05$., the sample size for paired continuous data was calculated to be eighteen subjects per treatment group. This would provide 80% power to detect a true difference of 20% between test and control. To allow for possible dropouts, twenty patients were finally recruited

The comparison between MTT and CAF revealed no significance difference in relation to PD, RH, CAL, HK and KD. MTT showed superior patient acceptance according to patient satisfaction test and superior esthetic outcome evaluated by root coverage esthetic score (RES) system.

TABLE1: Comparison between MTT and CAF according to change in different parameters

	MTT (n=40)	CAF (n=40)	Test of sig.	P
PD	↓0.08 ± 0.09	↓0.35 ± 0.59	t= 1.308	0.230
RH	↓1.33 ± 1.05	↓1.05 ± 0.48	U= 32.0	1.000
CAL	↓0.65 ± 0.49	↓2.20 ± 1.28	t= 3.195*	0.011*
HK	↑0.73 ± 0.30	↑1.50 ± 0.53	t= 3.586*	0.004*
KD	↑0.60 ± 0.24	↑1.05 ± 0.37	t= 2.867*	0.014*
Root coverage %	89.5 ± 9.30	94.0 ± 0.0	MW=2.485*	0.013*
Overall satisfaction	2.4 ± 0.6	1.9 ± 0.6	-	0.007*
Esthetic score	8 ± 2.8	6.6 ± 3	-	0.027*

U, p: U and p values for Mann Whitney test for comparing between the two groups

t, p: t and p values for Student t-test for comparing between the two groups

**: Statistically significant at p ≤ 0.05*

Fig. (1) PADM in place

Fig. (2) Flap design.

MTT

Fig. (3) No sign for any surgical intervention after

six-month follow-up

CAF

Fig. (4) Mature scar after 6 month related to the vertical incesions

DISCUSSION

Since all surgeries were performed by the same operator, defect-related characteristics at baseline such as RH, KW, TKT and PD were mainly the same and patients influence on post-surgical wound healing (mainly oral hygiene habits) were equal for both surgical procedures, PADM was added to the study as a control. It significantly increased gingival thickness and improved the outcome for both surgical techniques [15].

Patient selection during GR treatment was taken under consideration because it affects the predictability of the surgical outcome directly [16]. Gingival biotype is an important factor to take care about while selecting patients for such a procedure; initial thick gingiva affects prognosis and predictability of GR treatment tremendously, the thicker the gingiva the more blood supply that will revascularize the graft leading to healing and graft incorporation [17].

The CAF had the advantage of better visualization, better graft fixation and stabilization. On the other hand, with MTT the graft is only fixed in place via engaging it to the two modified openings, while the MTT had the advantage of the absence of vertical incisions which aid in better marginal flap stability and superior blood flow.

After data collection and its analysis; there was no significant difference between the two studied techniques concerning the clinical parameters. This finding coped with the finding done by Zucchelli et al. [18] when he compared between CAF with and without vertical releasing incisions which nearly have the same concept of the conducted study. Both of satisfaction test and RES showed superiority of MTT over CAF.

MTT considers a minimum invasive approach to treat GR. In General, the idea of that there is no flap elevation and therefore there are small amount of bleeding during the surgery; removes a lot of stress from the patient shoulder. On the other hand, coronally advance flap considers an invasive treatment which necessitate a wide full thickness flap elevation all the way till the MGJ, the wide flap opening and the two vertical incision presented in this surgical design are always accompanied by huge amount of bleeding which has a negative impact on patients.

In mucogingival surgeries; preservation of blood clot is the corner stone for proper wound healing, that is because it considers the mesh which will be invaded by inflammatory cells, fibroblasts and endothelial cell to form a granulation tissue; which will mature later on during the healing process [19]. MTT preserved flap integrity due to absence of vertical incisions and preserve the blood clot formed post surgically much better than CAF [18, 20].

The final esthetic outcomes were different when comparing MTT sites with the CAF sites. The MTT showed superior tissue contour and absence of scaring. Moreover, after sufficient healing period the treated area was indistinguishable from the adjacent tissues. On the other hand, the CAF showed the opposite regarding to tissue contour and the treated areas showed scar formation in relation to areas of the vertical incisions [9, 18]. Scar tissue also affects wound breaking strength of the gingival tissues [19].

The present study postulates that MTT is considered a good treatment modality for GR, as it meets patients' demands including patient satisfaction test and RES , while, it is not superior to CAF regarding improvement of the clinical parameters.

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