



EFFICACY OF FREE GINGIVAL GRAFT IN TREATMENT OF LOCALIZED GINGIVAL RECESSION IN SMOKERS AND NON-SMOKERS: DONOR SITE HEALING, GRAFT SHRINKAGE AND SUCCESS

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ABSTRACT

Objective: The objective of this study was designed to evaluate the effect of light smoking (≤ 10 cigarettes per day) and number of years of cigarettes smoking on free gingival graft procedures. **Subjects and Methods:** A total of 22 patients with miller class I,II gingival recession consist of two group: group I was 12 non-smokers and group II 10 smokers (≤ 10 cigarettes per day & less than five years on smoking habit). All patients were treated with free gingival graft. Phase I therapy was performed for all patients to provide an oral environmental more favorable to wound healing. The following clinical indices measurements of plaque index, gingival index, probing depth clinical attachment level, recession height, recession width, width of keratinized gingiva, gingival thickness, graft shrinkage (length, width), immediate and delayed bleeding, complete epithelization and discomfort, sensibility disorder all were recorded at 1 month, 3 months and 6 months. **Results:** The non smokers group showed significant decrease of recession width and graft shrinkage area compared to smokers group. The clinical parameters showed improvement in non-smoker group more than smokers group but the difference was not statistically significant. Probing depth, clinical attachment level, recession height, keratinization tissue width, gingival thickness, the improvement occurs at all follow up periods was more in non smokers than smokers but the difference was not statistically significant. Regarding donor site healing bleeding was more in non smoker, pain was more in smokers group and complete epithelization was equal and the difference between both groups wasn't significant. **Conclusion:** Following free gingival graft procedures, free gingival graft undergoes graft shrinkage which decrease amount root coverage. Light and young smokers showed increased in recession width and graft shrinkage area.

KEYWORDS: gingival recession, graft, smoking

INTRODUCTION

Gingival recession is the apical migration of gingival tissue beyond cemento-enamel junction (CEJ), which may cause an adequate dimension of keratinized tissue with aesthetic problem. For this reason an increasing interest was directed to solve this problem⁽¹⁾. Gingival recession has been

successfully treated by several periodontal surgical procedures. The ultimate goal for those plastic periodontal procedure is the coverage of exposed root surface⁽²⁾, for aesthetic concern, reduce the root surface hypersensitivity reaction, prevent root caries and cervical abrasion to enhance the restorative outcomes and subsequently can aid in the facilitation of plaque control⁽³⁾.

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Several periodontal surgical procedures have been proposed like autogenous soft tissue graft and include the use of sub epithelial connective tissue graft and free gingival graft⁽⁴⁾. With regard to free gingival graft, it's considered the surgical procedure technique described approximately 50 years ago as one of the most frequently approaches for gingival augmentation⁽⁵⁾ aiming to increase the keratinized tissue dimension and so solve gingival recession through preventing the occurrence of shrinkage of free gingival graft in the healing period⁽⁶⁾, that affecting transplantation tissue in both horizontal and vertical dimension. Palatal mucosa was found to be more common used for its thickness to solve such mucogingival problems. One of these is the gingival recession⁽⁷⁾.

It has been reported that more than one factor can affect the periodontal disease condition and consequently the outcome of its treatment, one of these factor is smoking habit. Smoking is highly prevalent and considered an epidemic in both developing and developed nations⁽¹²⁾. Smoking is harmful to almost every organ in the body and it is associated with multiple diseases that reduce life expectancy and quality of life, such as lung cancer, heart disease, stroke, emphysema, bronchitis and cancer of oral cavity⁽⁹⁾.

Tobacco smoking contain multiple thousands of noxious chemicals comprises of gaseous phase and solid phase. Gaseous phase contains carbon monoxide, ammonia, formaldehyde and many other toxic irritants. Solid phase includes nicotine, tar and benzopyrene. Nicotine is an alkaloid found within tobacco leaf and evaporates when cigarette lighted, it is quickly absorbed in the lung and reaches the brain within 10-19 sec, it is highly addictive and leads to arise of blood pressure, increased heart and respiratory rate⁽¹⁰⁾. Severity of periodontal destruction in smokers more than non-smokers has been reported due to changes in composition of sub gingival plaque, increase number of pathogenic micro-organism and increase in collagenase enzymes⁽¹¹⁾.

Another study had investigated that patients on smoking habits don't respond as well to different periodontal therapy as nonsmokers do⁽¹³⁾. Therefore, the present study was designed to evaluate the efficacy of free gingival graft for treatment of localized gingival recession in smokers and non-smokers.

SUBJECTS AND METHODS

The present study was conducted to evaluate the efficacy of free gingival graft in treatment of recession in smoker in comparable with non-smoker patients. A total of 22 patients consist of 12 non-smokers and 10 smokers with gingival recession aging between (20-35). Smoker patients had less than five years of smoking habits and smoked (less than 10 cigarettes daily).

Inclusion Criteria: Both males and females with age more than 18 years and without any active periodontal disease. Selected teeth were free of cervical restoration. Patient exhibit class I, class II gingival recession according to miller classification.

Exclusion criteria: Periapical or palatal pathologies. Systemic disease such as chronic high-dose steroid, immune-suppressive therapy, pregnancy, lactation and allergy to any drugs, patient with prolonged bleeding, delayed healing and uncooperative patients. Phase I therapy was performed for all patients to provide an oral environmental more favorable to wound healing.

Surgical procedure:

Recipient site preparation: After the patient was properly anesthetized articaine 4% 1/100.000, (inibsa4%.spain,) Horizontal incision by scalpel 15 c (Swann-Morton-England) were performed mesial and distal to recession site labially at the level of cemento-enamel junction. Two vertical releasing incisions were made extending beyond the mucogingival junction. Raised tissue was discarded and de-epithelization of inter dental papilla on both sides was performed. Periosteal bed was prepared and moisted gauze was applied on recipient bed.

Donor site preparation: After administration of anesthesia, the area chosen to harvest graft from first premolar area to first molar area and 2ml from gingival margin of corresponding teeth. After harvesting the graft, the connective tissue was inspected for irregularities and any of adipose tissue after graft separation. Graft thickness was measured by periodontal probe and if graft thickness was prepared to be approximately from 1 to 1.5 ml, graft soaked in saline until sutured.

Graft placement: The graft was properly positioned and firmly adapted and stabilized by interrupted suture from periphery and suspensory periosteal suture “w” shape suture in the recipient area, in this manner no trauma to tissue this improve healing by 5-0 polypropylene suture (Polyprlene, mopylin 5-0, Germany). The donor area was cleaned and sutured by cross suture 3-0 silk (Suturing doctor, China) suture, Figure (1).

Post-operative protocol: Patient were instructed to abstain from brushing and flossing until suture was removed and to use anti-microbial rinse (Hexitol) mouthwash and patients instructed to consume only soft diet for first week and avoid any mechanical trauma to treated sites. Subjects were prescribed anti-inflammatory analgesic. No specific instruction given to smokers to avoid or reduce smoking after surgery. Sutures were removed after 10 days and follow up patient continued up to 6 months.

The following clinical indices measurements of plaque index⁽¹⁴⁾, gingival index⁽¹⁵⁾, probing depth, clinical attachment level, recession height, recession width, width of keratinized gingiva, gingival thickness, graft shrinkage (length, width), immediate and delayed bleeding, complete epithelization and discomfort, sensibility disorder all were recorded at 1 month, 3 months and 6 months.

RESULTS

The results of this study showed a statistically significant increase in the mean Plaque index and Gingival index (more in smokers than non-smokers) at 1, 3 months then decreased at 6 months of follow up periods with no significant difference between the two groups as showed in Table (1-3). Regarding probing depth there were statistically increase in probing depth in all follow up periods in both groups with significant difference between the two groups in particular at 1,6month follow up. The clinical attachment level measuring showed improvement in non-smoker group more than smokers group but the difference was not statistically significant. In the other measurements in both keratinization tissue width and gingival thickness the improvement occurs at all follow up periods was more in smokers than non-smokers but the difference was not statistically significant.

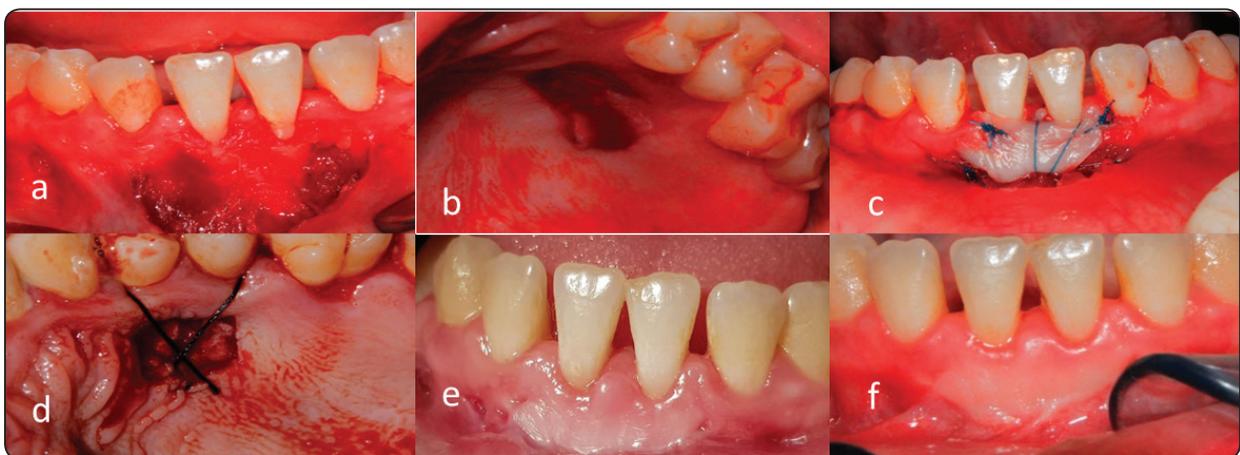


FIG (1) a; Recipient site preparation, b; donor site preparation, c; after suturing FGG in recipient bed, d; suturing donor site, e; Healing of FGG after 3month, f; healing after 6 months.

Recession height and recession width in the two groups showed a decreased during all follow up periods (less in non-smokers) but this decrease was not statistically significant in regard to recession height and significant in recession width in both groups. Regarding graft shrinkage there was a decrease in graft area in the two groups but the difference between them was statistically significant in (smoker more than non-smoker group). Regarding donor site healing, the current study showed that there was anon significant difference manifested between the two group smokers and non-smokers, in immediate and delayed bleeding as well as complete epithelization occurred, discomfort and sensibility disorder affecting patients at all follow up periods.

TABLE (1): Comparison between the two studied groups according to **Plaque index**, Gingival index, Probing depth and CAL.

Plaque index	Smoking (n = 5)		Non-Smoking (n = 5)		t	p
	Mean	±SD	Mean	±SD		
Plaque index						
Baseline	0.0	0.0	0.0	0.0	-	-
1 month	1.24	0.25	1.52	0.20	1.932	0.089
3 months	1.48	0.48	1.28	0.22	0.847	0.432
6 months	1.34	0.61	1.02	0.20	1.104	0.321
Gingival index						
Baseline	0.0	0.0	0.0	0.0	-	-
1 month	1.38	0.16	1.52	0.20	1.192	0.268
3 months	1.04	0.09	1.22	0.18	2.012	0.079
6 months	0.88	0.16	1.08	0.11	2.265	0.058
Probing depth						
Baseline	0.60	0.22	0.80	0.27	7.5	0.310
1 month	1.70	0.35	1.40	0.00	2.5*	0.032*
3 months	1.60	0.27	1.30	0.27	3.0	0.056
6 months	1.50	0.22	1.20	0.42	2.0*	0.032*
CAL						
Baseline	3.80	0.67	3.70	0.84	10.5	0.690
1 month	1.20	0.45	0.90	0.55	8.0	0.421
3 months	1.20	0.45	1.20	0.97	9.5	0.548
6 months	1.30	0.67	1.20	0.97	8.5	0.421

t: Student t-test

p: p value for comparing between the two studied groups

TABLE (2): Comparison between the two studied groups according to Recession height, Recession width, Keratinized tissue width, gingival thickness and graft shrinkage (surface area)

	Smoking		Non-Smoking		Test of sig.	p
	Mean	±SD	Mean	±SD		
Recession height						
Baseline	3.20	0.45	3.00	1.22	U=9.0	0.548
1 month	0.90	0.22	0.20	0.45	U=3.0	0.056
3 months	0.90	0.22	0.20	0.45	U=3.0	0.056
6 months	1.0	0.0	0.40	0.89	U=5.0	0.151
Recession width						
Baseline	2.20	0.45	2.00	0.00	10.0	0.690
1 month	1.00	0.00	0.20	0.45	2.5*	0.032*
3 months	1.00	0.00	0.20	0.45	2.5*	0.032*
6 months	1.00	0.00	0.20	0.45	2.5*	0.032*
Keratinized tissue width						
Baseline	0.90	0.22	0.30	0.45	t=2.683*	0.028*
1 month	3.70	0.45	3.50	0.61	t=0.590	0.572
3 months	3.60	0.22	3.30	0.76	t=0.849	0.421
6 months	3.20	0.45	3.10	0.55	t=0.316	0.760
Gingival thickness						
Baseline	0.80	0.27	0.60	0.22	7.5	0.310
1 month	1.60	0.22	1.50	0.35	10.5	0.690
3 months	1.50	0.00	1.30	0.29	9.5	0.634
6 months	1.50	0.00	1.30	0.27	7.5	0.310
Graft shrinkage (surface area)						
Baseline	54.80	9.96	81.60	16.44	1.5*	0.016*
1 month	34.90	8.10	56.55	16.82	2.0*	0.032*
3 months	28.20	6.13	55.11	22.23	1.0*	0.016*
6 months	27.70	5.22	54.90	18.99	1.0*	0.016*
% Ch. from baseline to						
1 month	36.75	3.17	31.73	7.27	7.0	0.310
3 months	48.79	1.71	32.81	22.76	0.0*	0.008*
6 months	49.50	1.12	33.17	19.25	1.0*	0.016*

t: Student t-test

p: p value for comparing between the two studied groups

TABLE (3): Comparison between the two studied groups according to bleeding, Complete epithelization, and Discomfort and sensibility disorders.

	Smoking		Non-Smoking		χ^2	FE _p
	No.	%	No.	%		
Bleeding						
Immediate	8	80.0	12	100.0	1.111	1.000
Delayed	2	20.0	2	16.6	0.0	1.000
Complete epithelization						
Baseline	0	0.0	0	0.0	-	-
1 month	10	100.0	12	100.0	-	-
3 months	10	100.0	12	100.0	-	-
6 months	10	100.0	12	100.0	-	-
Discomfort and sensibility disorders						
Baseline	0	0.0	0	0.0	-	-
1 month	2	20.0	0	0.0	1.111	1.000
3 months	0	0.0	0	0.0	-	-
6 months	0	0.0	0	0.0	-	-

DISCUSSION

The present study was designed to investigate the effect of smoking on free gingival graft (graft shrinkage, donor site healing, success) in treatment of class I, class II miller gingival recession. A total of 22 patient with gingival recession aging between (20-35) .Smoker patients less than five years on smoking habits and smoked (less than 10 cigarettes daily). Patients were divided into two groups 10 smokers and 12 non-smoker in each group and received free gingival graft for gingival recession. The following clinical indices measurements of plaque index, gingival index, probing depth , clinical attachment level, recession height ,recession width, width of keratinized gingiva , graft shrinkage (length, width) immediate, delayed bleeding, complete epithelization and discomfort, sensibility disorder were recorded at baseline 1 month, 3 months and 6 months.

The results of the current study showed that, in smoker group there was increase in mean

plaque index at 1, 3 months followed by decrease at 6 months. In non-smoker group showed a statistically significant increase in mean plaque index measurement at 1month followed by decrease at 3month and 6month.this mean the results of the present study showed non-significant difference between both groups, in plaque index scores.

Regarding probing depth measurement in both groups it showed an increase in mean probing depth (probing depth increased in smokers more than non-smokers). According to the results obtained the increase in probing depth was statistically significant at 1, 6 months between both group. While at 3 month the increase was not significant.

Regarding CAL, both groups showed gain in CAL (more in non-smoker). The result showed statistically non-significant difference in the mean CAL in both groups. The result obtained in this study was in agreement with other studies ^(16,17) and in contrast with others showed a significant difference between smokers and non smokers with regard to CAL gained ^(18,19)

The results of the current study also showed a decrease in recession height in both groups (was less in non-smoker). This decrease in recession height in both groups wasn't statistically significant and comparable with the results of other study done before ⁽²⁰⁾. On the other hand was not in agreement with other studies which showed a significant difference in recession height between smokers and non-smokers ^(21,22) .

With regard to the recession width the present study showed a decrease in recession width in both groups (less in non-smoker). The results demonstrated significant difference in recession width between smokers and non-smokers patients and was in contrast with other studies which showed a non-significant difference regarding recession width between smokers and non-smokers patients.

With relation to keratinized tissue width the present study showed a significant increase in

keratinization tissue width in both groups (more in non smoker) the increase of the width of keratinized gingiva as reported in both group not showed a significant difference and supported by other studies manifested a similar results ^(16,23).

With regard to gingival thickness the present study showed a increase in gingival thickness in both groups (more in smokers). The measurement showed a non significant difference in gingival thickness increase obtained in both smoker and non-smoker groups .This result of the present study was also similar to results obtained from other studies^(16,23).

With regard to graft shrinkage tissue at recipient site the result of shrinkage of grafted tissue showed decreased in both groups (more in smokers than non-smokers). According to the results obtained there was a significant difference between both groups in shrinkage affecting the graft..on the other handit was in contrast with results of other studies done ⁽²³⁻²⁶⁾ which showed non-significant difference between smoker and non-smokers in graft shrinkage. Therefore other researches ^(24.,27) suggested the use tissue adhesive material such as cyanoacrylate to work instead of suturing and found a significant decrease in graft shrinkage area obtained by using this alternative method, while other showed a non-significant difference between cyanoacrylate material group and mucoperiosteal suture in graft shrinkage area.

Donor site healing, after taken the palatal graft it covered with piece of gauze with adequate pressure for 2 minutes , the results showed that in smoker group bleeding was observed in 80% of patients and in non smokers group the bleeding observed was 100%.This means there was bleeding more in non-smokers. The result of current study also supported by other study which showed non significant difference between smokers and non-smokers in bleeding tendency ⁽²⁰⁾. This can be attributed to the known chronic long-term effect induced by smoking

on gingival blood vessels, which can be clinically observed as less gingival redness, and less prevalent to bleeding on probing.

With regard to complete epithelization at donor site the result of the present study showed complete epithelization in smoker and non-smoker groups with no changes observed at 1,3,6 month of follow up. The result also was similar to other study done before ⁽²⁰⁾.

The discomfort and sensibility disorder was observed in 20% only at 1month in smoker group, while non smoker group was not complain from these disorders during follow up periods.

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