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## Free Gingival Graft in Single and Multiple Soft-tissue Defects.

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### ABSTRACT

The aim of this study is to compare the clinical results which are established after the use of a free gingival graft in patients with single and multiple soft-tissue defects. This study includes 18 teeth in 7 patients with single and multiple gingival recession, treated with a free gingival graft. For these interventions we used Carl Martin Periodontal Surgery Instruments and Vicryl absorbable sutures with a 5-0 size. The graft was obtained from the palate and placed it in the recipient region. Before the start of the procedure, the following parameters were measured: periodontal pocket depth, size of gingival recession, width of the keratinized gingiva and amount of clinical attachment loss. The patients were given instructions to wash their mouths with a 12% Chlorhexidine solution and the sutures were removed after two weeks. After three weeks, the patients were given instructions to continue to mechanically clean their teeth, whereas after a period of 6 months they were submitted to a clinical examination to analyze the achieved results. On the day of the surgical procedure, the average periodontal pocket depth was measured to be 2,25 mm, whereas after a 6 months follow-up it decreased to 0,22 mm. The average width of the keratinized gingiva was 2,17 mm on the day of the procedure, whereas after 6 months it increased to 3,69 mm. The average size of the gingival recession on the day of the procedure was 2,86 mm, but after 6 months it reduced to an amount of 1,83 mm. The average value of the clinical attachment on the day of the procedure was 5,03 mm, but after a 6 months follow-up it came down to 2,15 mm. By using a free gingival graft in patients with single and multiple soft-tissue defects and performing a 6 months follow-up, we received positive clinical results regarding every examined periodontal parameter.

**Keywords:** recession, free gingival graft, clinical attachment, keratinized gingiva, periodontal pocket.

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## INTRODUCTION

Gingival recession occurs with the apical migration of the gingival margin tissue and results in the exposure of the root surfaces of the teeth, which from an esthetic and functional point of view is considered to be a serious problem. Essentially, the periodontists define gingival recession as an apical dislocation of the gingival margin, [1] primarily determined by the morphology and structure of the gum tissue, the inadequate maintenance of oral hygiene and the eventual overload in the form of dental trauma.[2]

At first, the exposed root surfaces undermine the visual appearance of the patients teeth, thus leading to destruction of the periodontal tissues and eventual tooth loss.

In some cases a conservative approach to the treatment of these defects is considered to be sufficient. However, for a more successful and accurate outcome to the problem in hand, priorities are given to surgical corrective techniques from the field of periodontal mucogingival surgery.

In many studies, there is for a fact data that confirms the use of the Miller-Classification [3] for the present gingival recession. Treating gingival recession is quite a complex procedure, where the success of the implemented treatment is determined by many factors: the initial condition, the biological capacity of the tissue, the chosen surgical technique, adequate blood supply and the regenerative potential of the periodontal tissue.[4]

The free gingival graft is mostly used to cover exposed root surfaces.

Obtaining the graft from the maxillary tuber region is justified with the fact that the operative field is small, the healing of the donor place is much more simple and faster than when the graft is taken from the palate.[5,6,7] Also, grafts from the tuber region contain less adipose and glandular tissue, but more amount of collagen, According to some authors, the ideal thickness of the graft is measured to be 1-1,5 mm and this is also a key factor for managing a successful outcome to the surgical intervention.

The only problem in obtaining the palatal graft is the risk of damaging the palatal artery, due to variations in the anatomy of the palate.[8] To make sure this is avoided, a preoperative evaluation of the maximal dimension of the palatal tissue is required.

There are different methods that are used to examine the thickness of the palatal tissue, such as: a periodontal probe, a needle with the application of local anesthesia and also computer tomography [9] and ultrasound as a more contemporary approach.

Recent studies suggest the implementation of guided tissue regeneration (GTR) as a method of choice. The main benefit from using this method comes from the formation of a new periodontal attachment, that can be confirmed with a histological examination. This newly regenerated attachment contains ligament cells, which are responsible for the production of connective tissue.[10]

According to everything that was previously mentioned, we can state that the goal of this study is to compare the clinical results that are established after the use of a free gingival graft in patients with single and multiple soft-tissue defects.

## MATERIAL AND METHODS

For the realization of this study, the treatment process involved 18 teeth in 7 patients (5 female and 2 male) with single and multiple recession of the gingival tissue. All of these patients had no systemic disease and were non-smokers. The patients were treated with a free gingival graft, placed on the following teeth in the upper jaw: 2 central incisors, 3 lateral incisors, 1 canine; and in the lower jaw: 7 central incisors, 4 lateral incisors and 1 canine. Fig. 1a) and b) and Fig. 2.

Every oral surgical procedure was performed with a previous application of a 3% anesthetic-Scandonest, in the form of local infiltration anesthesia with the help of a carpule syringe for the maxillary and mandibular nerves. For the treatment of the single and multiple gingival recessions we used Carl Martin

Periodontal Surgery Instruments. With a number 15 surgical scalpel, a incision was made 2-3 mm from the gingival margin on the mesial side of the upper first molar, going in depth right down to the periosteum, while maintaining a parallel course with the tooth position. In length, the incision spread all the way to the distal side of the canine, without including the palatal rugae as not to compromise the esthetic results. Because the path of the incision was parallel to the longitudinal axis of the tooth, a damage to the palatal artery was avoided and a separation of the connective tissue from the periosteum and epidermis was made in the desired length according to the size of the recession, where the graft will be later placed. In the end of the surgical procedure, sutures were placed on the palate and primary hemostasis was achieved with a 5 minute digital compression. By size, the obtained graft was compatible to the recipient location and fixated to it with Vicryl absorbable sutures with a 5-0 thickness. The remaining part of the gingiva was sutured with non-absorbable sutures. For the treatment of the upper incisors, the free gingival graft was relieved from the epithelium and placed under the coronally positioned flap as a submucosal gingival graft. Figure 3, 4, 5a), 5b).

**Figure 1: Gingival recession in mandibular front: a) left central incisor; b) both of the central incisors.**



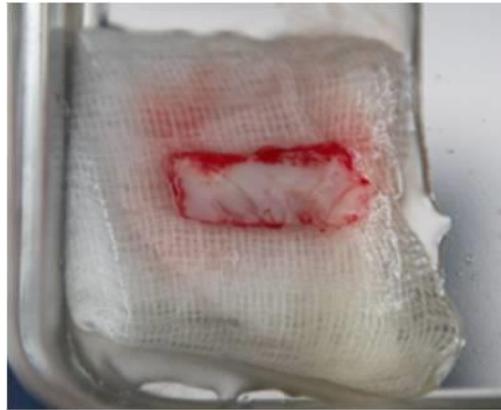
**Figure 2: Gingival recession in the maxillary front- multiple recession**



**Figure 3: Retrieving the graft from the palate**



**Figure 4: Free graft from the palate-donor region**



**Figure 5: Placement of the graft. a) Recipient region, b) Applied suture**



**Figure 6: Six months after the intervention. a) In mandibular front; b) In maxillary front**



Regarding the postoperative protocol, the patients were instructed to avoid any kind of mechanical irritation and tooth brushing in the area of the intervention for a period of 3 weeks. They were also advised to rinse their mouth with a 12% Chlorhexidine solution, twice a day for 1 minute. The sutures were removed two weeks after the procedure. After the third week, the patients were suggested to start brushing the teeth in the area of the intervention, whereas after six months they were submitted to a clinical examination to analyze the achieved results.

The following parameters were measured and evaluated on the day of the intervention and six months afterwards:

- Depth of the periodontal pocket, measured with the use of a periodontal probe from Jakobi Dental Instruments, Industriestrasse 2 69207 Sandhausen, Federal Republic of Germany, in accordance with the Ramfjord teeth index.
- Millers index of gingival recession, determined by measuring the distance between the enamel-cementum junction and gingival margin with a periodontal probe.
- Index of keratinized gingiva, determined with a positive iodine test by the Land & Loe method

- Clinical attachment level, measured from the enamel-cementum junction to the bottom of the periodontal pocket.

The obtained results were calculated and statistically processed in the IBM SPSS Statistics 20 software program. Also the parametric t-test was used for numerical marking.

**RESULTS**

The results that derived from the conducted examinations are displayed in the following Table 1 and 2 and Chart 1.

**Table 1: A display of the clinical values of the periodontal parameters before and 6 months after the surgical procedure**

Tooth	Day of intervention				6 months after the intervention			
	PSD (mm)	WKG (mm)	GR (mm)	CAL (mm)	PSD (mm)	WKG (mm)	GR (mm)	CAL (mm)
11	3,5	3,5	3	6	0	1	1	1
21	3	3	3	5,5	0	1	1	1
22	2	3,5	3,5	5	0	0,5	1	0,5
43	2	1	3	5	0	5	2	1,5
42	1,5	2	2	3,5	0	3,5	2	1,5
41	2,5	1	3,5	6	0	4	2	2
31	3	1	3	6	0,5	2	1	3
32	2	0,5	2	4	0	2	1,5	2
12	0,5	1	2	3	0	5	2,5	2,5
22	0,5	1	2,5	3,5	0	4	2	2
23	0,5	1	2	3	0,5	3,5	2,5	2
41	0,5	4	3	3,5	1	7,5	2,5	3
31	3	2	3,5	7	0	7	2	2,5
41	3,5	3	3	6	0,5	6	2	2,5
31	4	2	3	6,5	0,5	2,50	2	3
32	0,5	3	2,5	3	1	2	2,5	3,5
41	5	3,5	3,5	7	0	5,5	2	3
42	3	3	3,5	7	0	4,5	1,5	2,5
Average value	2,25	2,17	2,86	5,03	0,22	3,69	1,83	2,17
Highest value	5	4	3,5	7	1	7,5	2,5	3,5
Lowest value	0,5	0,5	2	3	0	0,5	1	0,5

PSD- Periodontal socket depth; WKG- Width of the keratinized gingival; GR- Gingival recession; CAL- Clinical attachment level

**Table 2: Utilizing the t-test in the results that are obtained before and after the intervention.**

Clinical Parameters	Day of intervention		6 months after the intervention		t-test value	p value
	Average value	Standard deviation	Average value	Standard deviation		
Periodontal Socket Depth	2,25	1,37	0,22	0,35	5,663	<b>0,000</b>
Width of the keratinized gingiva	2,17	1,15	3,69	2,07	2,775	<b>0,013</b>
Gingival recession	2,86	0,56	1,83	0,54	4,765	<b>0,000</b>
Clinical attachment level	5,03	1,49	2,17	0,82	7,194	<b>0,000</b>

**Chart 1: Graphic display of the results of the observed clinical parameters on the day of the intervention and six months afterwards.**

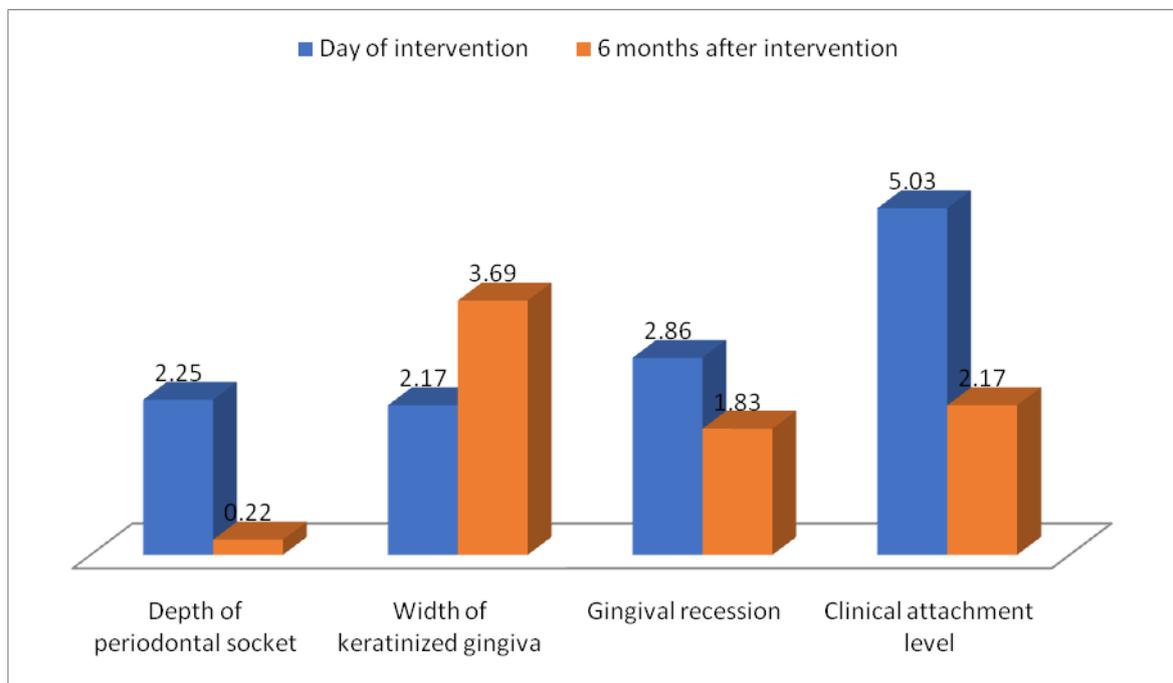


Table 1 displays the values of the periodontal socket depth, width of the keratinized gingiva, gingival recession and the level of the clinical attachment, all measured on the day of the surgical intervention and six months afterwards.

The average value of the periodontal pocket depth on the day of the intervention was up to 2,25 mm, and after six months later it decreased to 0,22 mm. The average value of the width of the keratinized gingiva on the day of the intervention was 2,17mm, and after six months it increased up to 3,69 mm. The gingival recession on the day of the intervention was measured to have a 2,86 mm average value, but after six months it decreased to 1,83 mm. The average value of the clinical attachment level on the day of the intervention was 5,03 mm and six months later it decreased to 2,15 mm.

Table 2 displays the calculated statistical difference of the parameters presented in Table 1 with there average value and standard deviation, while using the t-test.

The t-test value of 5,663 and  $p < 0,001$  suggests that the depth of the periodontal sockets is statistically more smaller in six months after, than on the day of the intervention. A significant statistical difference exists in the width of the keratinized gingival (it is much more wider six months after than on the day of the

intervention), (t-test 2,775 and  $p < 0,05$ ). Six months after the intervention the amount of gingival recession is much more smaller, than on the day of the 4,765 and  $p < 0,001$ ). The level of the clinical attachment is statistically much smaller in 6 months after, than on the day of the intervention (t-test 7194 and  $p < 0,0001$ ).

Chart 1 displays a graphical format of the acquired results from the analyzed parameters in table 1, stating that there is a drastic drop in the value of the periodontal pocket depth six months after the treatment. Also the chart clearly displays a decrease in the size of the gingival recession and the level of the clinical attachment, while an enlargement in the width of the keratinized gingival in six months after rather than on the day of the procedure.

## DISCUSSION

The treatment of gingival recession has become a relevant therapeutic problem, not just from an esthetic, but also a functional point of view. In essence, the improvement of the esthetics and function have become the primary goals to achieve in the periodontal surgical practice. Gingival recession cannot be approached as an isolated condition, because in a smaller or larger manner it has an impact on the adjacent teeth. In order to reduce the number of procedures and to optimize the esthetic results, most of the periodontists suggest that all the defects be handled in one surgical session to minimize the inconvenience for the patient.

The studies of Chambrone [11,12,13] and many others show results that are similar to those acquired during our studies of the same clinical parameters. However, the study of Carvalho [14] shows an improvement in every clinical parameter, except the periodontal pocket depth, which is incompatible with our clinical results. The small number of treated patients (10) in his study is considered the main disadvantage that affects the outcome of the results. In other studies, such as those of Dembowska,[15] the use of free gingival graft has shown rather positive results with a 94-98% coverage of the exposed root surfaces. A large amount of studies show that the submucose and free gingival graft is considered to be a golden standard in the treatment of soft-tissue defects and despite minor complications, the achieved clinical results remain stable for a long period of time. The free gingival graft leads to augmentation of the gingiva and coverage of the recession, though the only disadvantage is in the esthetics. This disadvantage exists because the graft is with a slightly white color due to its retrieval from the palate. In the cases where we have a gingival recession below 5 mm (class I and II according to Millers classification), the success rate is 100%. But in the cases where the gingival recession was larger than 5mm, we also achieved satisfying results. These outcome results are encouraging, both for the doctors and the patients. The free gingival graft provides reconstruction of the interdental papilla, even in cases where there is a Miller III class gingival recession, managing a 70% coverage of the exposed root surfaces. From all of the previous statements we can assume that the implementation of the guided tissue regeneration, the free and submucose gingival graft, invokes great enthusiasm in the field of periodontal surgery. This point of view is also represented by Chambrone,[16] who conducts systemic check-ups on the use of several methods in the periodontal surgical interventions. However, to achieve the best esthetic and functional outcome, the doctors must choose the method that is most adequate to the problem in hand. Despite of the size of the defect, the width of the keratinized gingiva, the number of affected teeth surfaces, the decision of what kind of surgical technique is the most appropriate also depends on the amount of manageable connective tissue from the donor location. Nonetheless, our study has shown solid results regarding the use of the free gingival graft in multiple gingival recessions.

Because there isn't a procedure that is unique in treating different cases of gingival recession, Ricci [17] suggests that a comparison be made between two or more modalities of treatment, as to determine which one of them will provide the most beneficial outcome.

Observing the results that are gained after the use of free gingival grafts in patients with single and multiple soft-tissue defects, we can clearly state that six months after the surgical procedure we achieved positive therapeutic results in every periodontal clinical parameter.

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