

## Clinical Report

# Improving oral hygiene by increasing the width of keratinized tissue around dental implants using free gingival graft: A case report and literature review

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The need for keratinized tissue around endosseous implants is a controversial topic. The rationale for augmenting the keratinized tissue includes making plaque control more effective, dissipating muscular and frenal pull and possibly preventing further recession. In this case report, free gingival graft was used to overcome the patient's discomfort. The increase of keratinized tissue improved the condition of the peri-implant marginal tissue. This procedure appears to show benefits for oral hygiene, even though certain amount of shrinkage is seen both horizontally and vertically.

**Key words:** Free gingival, graft, oral hygiene, shrinkage

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## INTRODUCTION

The need for keratinized tissue around endosseous implants is a controversial topic. Longitudinal clinical studies have failed to reveal major differences in the progression of lesions around implants placed in sites with or without keratinized mucosa.<sup>[1]</sup> However, it was reported that the absence of adequate keratinized mucosa in endosseous dental implants, especially in posterior implants, was associated with higher plaque accumulation and gingival inflammation.<sup>[2]</sup> The rationale for augmenting the keratinized tissue includes making plaque control more effective, dissipating muscular and frenal pull and possibly preventing further recession.<sup>[3,4]</sup>

In this case report, free gingival graft (FGG) was used to overcome the patient's discomfort, and the changes of peri-implant marginal tissue were examined.

## MATERIALS AND METHODS

### Case

A 44-year-old female was referred to the Department of Periodontology at the Seoul National Dental Hospital, seeking treatment for the lower left molar area. The patient had noncontributory medical history or health and was not taking any medications that were associated with a compromised bone healing response. Clinical examinations revealed that two implants were placed in the lower left molar area

[Figures 1A and B]. There was no keratinized tissue on the buccal side of the implants. Plaque could be seen with the naked eye and isolated bleeding spots were visible when a North Carolina periodontal probe (Hu-Friedy, Chicago, IL) was passed along the mucosal margin. Peri-implant probing depth on the buccal side was 4 mm. Soft tissue graft from the palate was planned after consulting with the patient on the treatment period and the possible complications, and an informed consent form was signed.

Immediately before the procedure, the patient rinsed for two minutes with a 0.12% chlorhexidine digluconate solution (Hexamedine, Bukwang, Seoul, Korea). Following an injection of 2% lidocaine with 1 : 100,000 epinephrine local anesthetic, partial-thickness flap was reflected as close to the periosteum as possible, to create the bed preparation. The FGG (length of 15 mm x height of 5 mm) was obtained from the left palate in the molar area [Figure 2A]. The graft was trimmed to produce a uniform thickness of approximately 1.00 mm. The raised partial-thickness flap was positioned apically and secured to the periosteum, with absorbable sutures (Vicryl, Johnson and Johnson Medical Inc., Arlington, TX, USA). The graft was placed on the firm periosteal bed with the connective tissue side against the periosteum. The prepared graft was placed and stabilized with sutures [Figure 2B]. A periodontal dressing was applied and routine postoperative instructions were given. The patient was placed on amoxicillin 500 mg three times

per day, for five days; aceclofenac 100 mg, two times per day for five days; and, chlorhexidine digluconate 0.12%, three times per day for four weeks. The patient was asked not to chew or brush the surgical area for the first four weeks postoperatively. Twelve days after surgery, the periodontal dressing and any remaining sutures were removed and then the grafted area was carefully cleaned with a 0.12% chlorhexidine solution. The patient received oral hygiene instructions and was shown how to achieve a roll-stroke brushing technique. The patient was seen regularly to monitor the healing and plaque control. The width of the keratinized tissue at twelve day postoperative was 4.8 mm [Figure 3]. No major postoperative problems developed and the pain levels reported by the patient were minimal.

The patient was seen at 8-week follow-up to monitor healing and plaque control. Plaque could barely be detected and there was only one point of bleeding on probing from the most distal implant [Figure 4]. The patient was referred to the Department of Prosthodontics for implant prosthesis.

The prosthesis was well in function up to the final examination, at 38 weeks after the operation. The soft tissue did not show any gingival inflammation and the width of the keratinized tissue was 3.7 mm [Figure 5A]. Panoramic radiograph taken 38 weeks after the treatment demonstrated stable result around implant [Figure 5B].

The value of vertical and horizontal dimension of keratinized tissue and the shrinkage of the graft material are demonstrated in [Table 1]. Table 2 shows the peri-implant probing depth, modified gingival index and modified periodontal index.

## DISCUSSION

The keratinized tissue provides increased resistance to the periodontium, contributes to the stabilization

of the gingival margin position and aids in the dissipation of physiological forces that are exerted by the muscular fibers of the alveolar mucosa.<sup>[5]</sup> It was also suggested that suboptimal oral hygiene may lead to greater tissue damage around implants within alveolar mucosa than around implants within keratinized tissue.<sup>[6]</sup>

FGG is one of the most predictable methods for augmenting gingival tissue dimensions.<sup>[7]</sup> It was reported that the maturation period for free gingival autograft was from 11 to 42 days.<sup>[8,9]</sup> Referral to the Department of Prosthodontics was done eight weeks after FGG procedure, to allow for sufficient healing period.<sup>[10]</sup>

The shrinkage of FGG is a well-known clinical phenomenon and overcorrection is sometimes needed.<sup>[11]</sup> The authors reported that 24.8% of vertical contraction and 10.2% of horizontal shrinkage were noticed at six months. Orsini *et al.* used free connected tissue and reported that the mean vertical shrinkage of the graft size was 37.2% at 6 months.<sup>[12]</sup> In this case, 26.7% of vertical shrinkage and 21.3 % of horizontal contraction were observed during a 38-week interval. The change of horizontal dimension is a very important criterion after mucogingival surgery, especially when it is related to the patient's discomfort, but there is limited study in this field.<sup>[11]</sup>

In my report, the shrinkage was more evident between baseline and eight weeks, although it occurred throughout the study period. The pattern of the vertical shrinkage was more linear than that of the horizontal shrinkage ( $R^2$  for vertical and horizontal shrinkage were 0.93 and 0.88 respectively.)

The thickness of the graft is another factor to consider. Goldman *et al.* have suggested a thickness of 1.5 to 2 mm as an optimal graft size.<sup>[13]</sup> However, thicker grafts have limitations for adaptation and the risk of hemorrhage may be increased.<sup>[11]</sup> In this report, a graft thickness of 1.0 mm was used to reduce the discomfort on the donor region of the patient.<sup>[14]</sup> The thickness of the graft also affects the shrinkage rate and Mörmann *et al.* reported that the thicker graft showed greater shrinkage.<sup>[15]</sup>

This case shows improved condition of peri-implant marginal tissue after the treatment. The modified plaque index and modified plaque index decreased after the procedure and were maintained up to the final examination. It may be suggested that increased zone of keratinized tissue lead to better plaque condition around endosseous implants.

## CONCLUSION

The increase of keratinized tissue improved the condition of peri-implant marginal tissue with FGG procedure. This procedure appears to show benefits for

**Table 1: The value of vertical and horizontal dimensions of keratinized tissue and the shrinkage of the graft material**

		12 days	8 weeks	38 weeks
Length (mm)	Vertical	4.8	4.3	3.7
	Horizontal	13.8	12.8	11.6
Shrinkage (%)	Vertical	5.0	14.0	26.7
	Horizontal	8.0	14.7	21.3

**Table 2: The mean value of peri-implant probing depth, modified gingival index and modified periodontal index**

	Baseline	12 days	8 weeks	38 weeks
Peri-implant probing depth (mm)	4	N/A	3.7	3.3
Modified plaque index	2	1	0	0
Modified gingival index	1	N/A	1	0

N/A: non-applicable

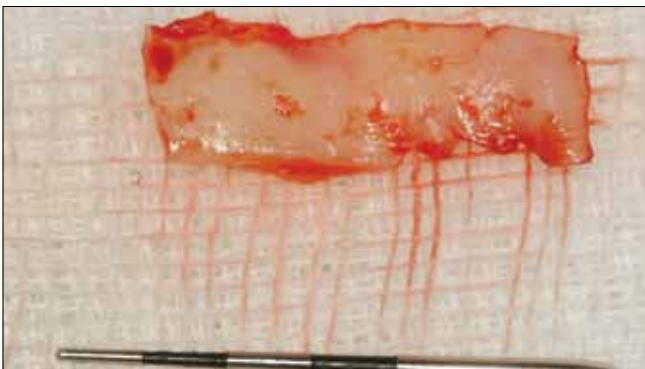
Park: Free gingival graft for increasing the keratinized tissue



**Figure 1A:** Clinical photograph taken at the initial visit



**Figure 1B:** Occlusal view showing minimal keratinized tissue on buccal side



**Figure 2A:** The FGG (length of 15 mm × height of 5 mm) was obtained from the palate.



**Figure 2B:** The graft was secured to the periosteum by sutures



**Figure 3:** A 12-day postoperative buccal view showing increased keratinized tissue



**Figure 4:** Buccal view at eight weeks after FGG surgery



**Figure 5A:** A 38-week postoperative facial view showing a well-maintained result



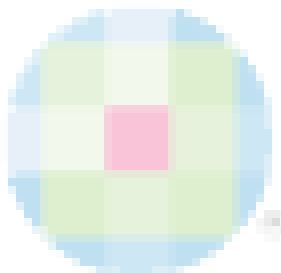
**Figure 5B:** Panoramic radiograph taken 38 weeks after surgery with prosthesis in function

oral hygiene, even though certain amount of shrinkage is seen both horizontally and vertically.

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