Use of the Free Gingival Graft as a Pre-prosthetic Procedure

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Abstract

Introduction: Teeth with a narrow zone of keratinized tissue and shallow vestibular depth may show higher gingival inflammation. The free gingival graft (FGG) is one of the most common and predictable methods for correcting gingival tissue dimensions. Aim: This case presentation describes the use of FGG for pre-prosthetic procedures. **Materials and Methods:** In the first case, FGG was used to overcome the patient's discomfort and to achieve improved conditions around the abutments and pontic area of a fixed prosthesis. In the second case report, the modified FGG technique was used to improve the gingival condition for future prosthodontic treatment using less donor tissue by placing the graft material in the most apical way with the periosteum coronal exposed to the graft. **Discussion and Conclusions:** By applying the FGG procedure as a pre-prosthetic procedure, an increase in keratinized tissue and vestibular depth was achieved. This procedure improved the condition of gingival tissue and appeared to show benefits for oral hygiene, even though certain amounts of shrinkage were seen vertically.

Key Words: Connective tissue, Dental prosthesis, Mouth mucosa, Oral health

Introduction

One objective of periodontal plastic surgery is the creation of adequate vestibular depth and an increase in the keratinized tissue [1]. 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 [2]. Improvement of oral hygiene was seen with the increase in keratinized tissue [3].

The free gingival graft (FGG) is known to be one of the most common and predictable methods for augmenting gingival tissue dimensions [4], and FGG was applied as a pre-prosthetic procedure in two cases. In the first case, FGG was used to overcome the patient's discomfort and to achieve a better condition around the abutments and pontic area for the fixed prosthesis. In the second case report, the modified FGG technique was used to achieve a greater increase in keratinized tissue using less donor tissue by placing the graft material in the most apical way with the periosteum coronal exposed to the graft.

Case Presentation

Case 1

A 58-year-old female was referred, seeking treatment for the mandibular left posterior area. The patient had a non-contributory medical history and was not taking any medications associated with a compromised bone-healing response. The patient complained of discomfort during tooth brushing. Clinical examinations revealed that the mandibular left first molar was missing, and restoration of the missing area was planned using a 3-unit fixed prosthesis.

The keratinized tissue on the buccal side was less than 1 mm and the clinical probing depths ranged from 2 to 3mm *(Figure 1A)*. Plaque could be seen and isolated bleeding spots were noticed when a North Carolina periodontal probe (Hu-Friedy, Chicago, IL) was passed along the mucosal margin. Soft tissue graft from the palate was planned after consulting with the patient about the treatment period and the possible complications, and after an informed consent was achieved.

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 injection, a horizontal incision was made with a No. 15 blade at the mucogingival junction *(Figure 1B)*. Muscle and loose connective tissue fibers were thoroughly scraped with a scalpel to prevent subsequent graft mobility. The raised partial thickness flap was positioned apically and secured to the periosteum by an absorbable suture (Ethicon, Johnson & Johnson Medical Inc., Arlington, TX, USA). The FGG (length of 25 mm × height of 7 mm) was obtained from the left palate in the molar area *(Figure 1C)*. 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 1D)*. The patient was placed on amoxicillin 500 mg 3 times per day for 5 days, aceclofenac 100 mg 2 times per day for 5 days, and chlorhexidine digluconate 0.12% 3 times per day for 4 weeks. The patient was asked

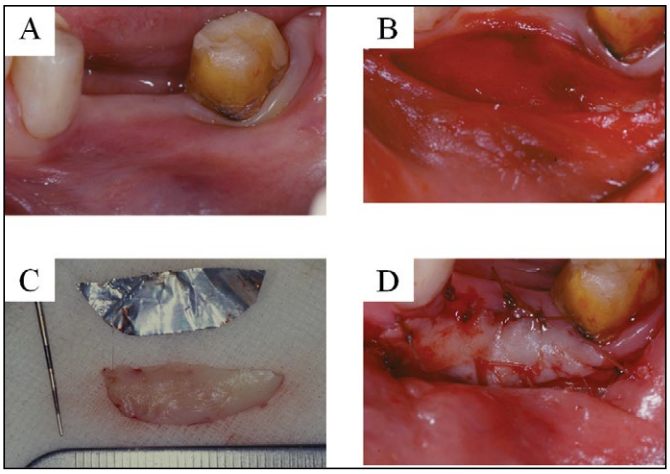

***Figure 1**. A. Clinical photograph taken at the initial visit, showing minimal keratinized tissue on the buccal side; 1B. A horizontal incision was made at the mucogingival junction and the raised partial thickness flap was positioned apically; 1C. The FGG (length of 25 mm X height of 7 mm) was obtained from the palate; 1D. The graft was secured to the periosteum by sutures.*

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not to chew or brush the surgical area for the first four weeks postoperatively. Seven days after surgery, the surgical area was cleaned and the loose suture was removed. Fourteen days after surgery, any remaining sutures were removed and the grafted area was carefully cleaned with a 0.12% chlorhexidine solution *(Figure 2A)*. The patient received oral hygiene instructions and was shown how to achieve a roll-stroke brushing technique. The patient was seen regularly to monitor healing and plaque control. The width of keratinized tissue at fourteen days after surgery was 6.0 mm. No major postoperative problems developed and the patient reported minimal pain levels. The prosthesis was functioning well up to the final examination at four months after the operation. The soft tissue did not show any gingival inflammation and the width of the keratinized tissue was 5.0 mm *(Figure 2B)*.

Case 2

A 45-year-old female was referred, seeking periodontal evaluation of the mandibular right posterior area. Clinical examinations revealed that the mandibular second molar had minimal clinical crown length *(Figures 3A-3B)*. Continuous bleeding spots were seen when a periodontal probe was passed along the mucosal margin and plaque could be seen with the naked eye. The clinical probing depths ranged from 4 to 5 mm. A soft tissue graft from the palate and a crown-lengthening procedure were planned.

The patient rinsed for two minutes with a 0.12% chlorhexidine digluconate solution (Hexamedine, Bukwang, Seoul, Korea) before the procedure. Following an injection of 2% lidocaine with an 1:100,000 epinephrine local anesthetic injection, a partial-thickness flap was reflected as close to the periosteum as possible to create the bed preparation in the mandibular right posterior area. The FGG (length of 17 mm × height of 7 mm) was obtained from the right palate. Efforts were made to locate the graft as apically as possible and an average of 4.0 mm of the periosteum was left exposed. The prepared graft was stabilized with sutures and routine postoperative instructions were given *(Figure 3C)*. The patient was placed on amoxicillin 500 mg 3 times per day for 5 days, mefenamic acid 500 mg initially, then mefenamic acid 250 mg 4 times per day for 5 days, and chlorhexidine digluconate 0.12% 3 times per day for four weeks. Two weeks after surgery, any remaining sutures were removed. A six-week postoperative buccal view showed good healing with increased keratinized tissue *(Figure 3D)*. The average amount of keratinized tissue was 10 mm.

The crown lengthening procedure was carried out six-weeks postoperatively *(Figure 4A)* and two single gold crowns were delivered to the mandibular first and second molars. The prosthesis functioned well up to the final examination, which was four months after the operation, with no signs of gingival inflammation or probing defects *(Figure 4B)*. The value of the vertical dimension of keratinized tissue and the shrinkage of the graft material is shown in *Table 1*.

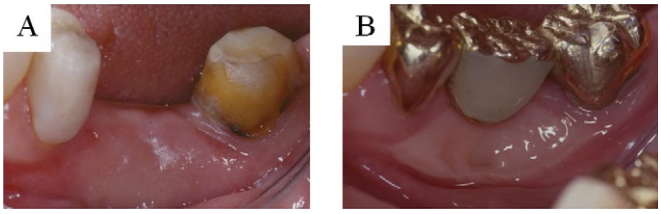

Figure 2. *A. A fourteen-day postoperative buccal view showing increased keratinized tissue; 2B. Buccal view four months after FGG surgery showing the stable result.*

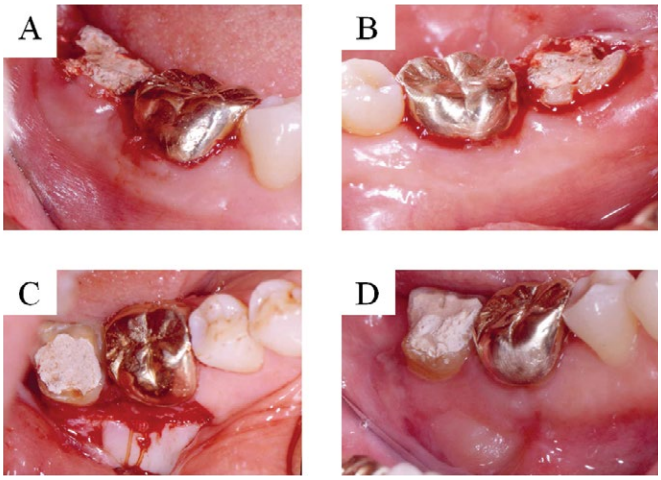

Figure 3. *A. Buccal view of the mandibular right molar region after initial examination; 3B. Lingual view showing the short clinical crown; 3C. The FGG (length of 17 mm X height of 7 mm) obtained from the palate was placed on the firm periosteal bed with the connective-tissue side against the periosteum; 3D. A six-week postoperative buccal view showing the good healing state.*

Discussion

The FGG procedure was applied as a pre-prosthetic procedure in this report. In both cases, the FGG seems to have given better oral hygiene with a reduction of gingival inflammation around the abutments.

In the first case, FGG was used to overcome the patient's discomfort by increasing the keratinized tissue. Additionally, this procedure was applied to make pontics that would be placed over keratinized tissue rather than alveolar mucosa, which would improve the condition of the soft tissue [5].

In the second case, the FGG procedure was applied to deepen the vestibular depth and to increase the keratinized gingival tissue. The preoperative vertical dimension was defined as the distance from the most apical keratinized tissue to the most coronal keratinized tissue, because the graft was placed as apically as possible and a portion of the periosteum was left exposed. The dimensional changes in the size of the

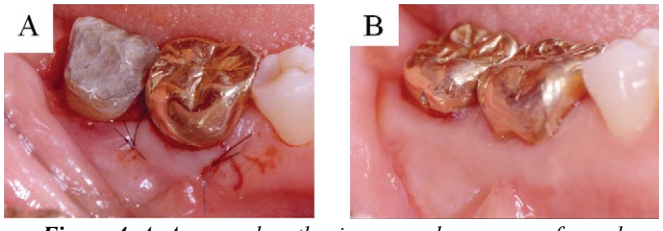

Figure 4. *A. A crown-lengthening procedure was performed to increase the length of the clinical crown; 4B. A four-month postoperative facial view showing a well-maintained result.*

Table 1. *The value of the vertical dimension of the keratinized tissue and the shrinkage of the graft material.*

Case	Time	7 days	2 weeks	4 months
Case 1	vertical length (mm)	6.0	6.0	5.0
	shrinkage (%)	14.0	14.0	29.0
Case 2	vertical length (mm)	12.0	11.0	9.0
	shrinkage (%)	7.7	15.4	30.8

width of keratinized tissue were determined to represent the shrinkage of the graft.

It was reported that the tissue maturation phase in the free gingival graft was from 11 to 42 days [6], and the crown lengthening procedure was performed 6 weeks after the FGG procedure to allow for adequate healing prior to additional surgery [7]. The supragingival margin was used in this case because a supragingival location of the crown margin is reported to show lower signs of inflammation [8].

The shrinkage of FGG is a well-known clinical phenomenon and overcorrection is sometimes needed [9]. The authors reported 24.8 % of the vertical contraction of the free gingival graft six-months postoperatively [10]. Orsini et al. used free connective tissue and reported that the mean vertical shrinkage of the graft size was 37.2 % at 6 months after surgery [11]. In this report, 30.0 % of vertical shrinkages were observed during a four-month interval, and the shrinkage was seen to be more evident between the baseline and two weeks, although it occurred throughout the study period.

Conclusion

The FGG procedure was applied as a pre-prosthetic procedure. The increase of keratinized tissue and vestibular depth improved the condition of gingival tissue and this procedure appears to show benefits for oral hygiene even though a certain amount of shrinkage was seen vertically. Further randomized controlled trials over long time periods are necessary to establish whether this procedure offers long-term benefits to patients.

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