



FREE EPITHELIALISED SOFT TISSUE AUTOGRAFTS - APPLICATIONS IN PERIODONTOLOGY AND IMPLANT DENTISTRY

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ABSTRACT

A knowledge of periodontal plastic surgery procedures is a must in clinical practice. Root coverage procedures, ridge preservation/reconstruction, maintenance / reconstruction of interdental papillae, esthetic soft tissue surgery around implants are procedures that clinicians should be familiar with so as to impart the best treatment outcomes to their patients, either by themselves or with the help of a specialist. These surgeries are quite technique sensitive. However, proper case selection, delicate handling of soft tissue and meticulous execution of surgical steps increase the predictability of outcome of these procedures. In the present article, we present cases where the free epithelialised soft tissue auto grafts have been used in various clinical situations. The patients were treated at the Department of Periodontology, Bharati Vidyapeeth Deemed University Dental College and Hospital, Pune.

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INTRODUCTION

The free gingival graft is a surgical procedure frequently used in periodontal therapy.

According to Glossary of Periodontal Terms, 2001, a graft is a piece of living tissue placed in contact with injured tissue to repair a defect or supply a deficiency.¹ An autograft is a tissue transferred from one position to another within the same individual. Free soft tissue grafts are so called as the donor site is distant from the recipient site and so the graft carries no blood supply of its own. The recipient bed - the connective tissue, periosteum or the osseous bed - provides microvascular perfusion which maintains the viability of these free grafts.

The term Free Gingival Graft (FGG) was introduced by Nabers in 1966, when he used the gingival tissue discarded after a gingivectomy as the donor tissue.² Although Miller demonstrated the applicability of this technique for root coverage, Bjorn had demonstrated the first photographic evidence way back in 1963.^{3,4} The process involved in the healing of this type of gingival graft was further described by the extensive work of Drs. Sullivan and Atkins in 1968.⁵ Later, Pennel *et al* in 1969 used the masticatory mucosa as the donor tissue and the technique is still in use.⁶ Meltzer in 1979 first reported on the use of free gingival grafts to correct an esthetic vertical ridge defect.⁷ Sibert in 1983, in a series of articles

described the soft tissue onlay graft and its application for ridge correction.⁸

Free epithelialised soft tissue autograft is thus a versatile modality of treatment and can be used in a variety of clinical situations in periodontal therapy. In the present article, we would like to present cases where the free gingival autograft has been used to increase the width of attached gingiva around teeth and dental implants, for vestibular extension, as a pre-implant soft tissue augmentation procedure, as an onlay graft for papillary reconstruction between the pontics of a fixed partial denture and also as a root coverage procedure.

Free epithelialised soft tissue autograft to increase the width of attached gingiva and vestibular extension.

Case 1

In the present clinical situation, the teeth in the mandibular anterior region presented with gingival inflammation, marginal soft tissue recession (Miller's Class III recession in 31, 41 and Class I recession in 42) and absence of attached gingiva in 31, 41 thus presenting with a mucogingival problem.^{9,10} The labial vestibular fornix was shallow (Figure 1.). Phase I therapy was carried out. A modification of brushing technique and the use of a soft brush were advocated. After a follow up period of 6 months, the marginal soft tissue recession in 31, 41 and 42 was found to be stable. So no root coverage was contemplated. However to facilitate plaque control and oral hygiene

maintenance, gingival augmentation to increase the vestibular depth and also to increase the width of attached gingiva was planned. A free epithelialised soft tissue autograft was harvested from the palate and sutured at the recipient bed (apical to the recession) in 31, 32, 41, 42 regions (Figure 2). Suture removal was carried out after 10 days. 1 year follow up shows thick keratinised tissue, increased width of attached gingival (WAG) and increased vestibular depth in the lower anterior region (Figure 3).



Figure 1- Shallow vestibule



Figure 2- Surgical steps



Figure 3 Increased WAG and vestibular depth

Case 2

A sixty year old, systemically healthy male, denture wearer for past 5 years, reported with the chief complaint of ill fitting and loose mandibular denture. The maxillary denture had attrited teeth but a good fit. The patient wanted a pair of new dentures. The edentulous mandibular ridge was a Type I Division C-h.¹¹ An implant supported mandibular overdenture (treatment option OD-1) was planned as cost was a major deterrent for the patient.¹² However, it was seen that the lower vestibule was very shallow and the alveolar mucosa extended right upto the mid crestal region (Figure 4). So a free epithelialised autograft harvested from the palate was planned to achieve good vestibular depth and also an adequate width of attached gingiva at the potential implant sites. The grafts were harvested bilaterally from the palate and sutured at the recipient bed in the mandibular anterior region (Figure 5). Sutures were removed after 10 days. Figure 6 shows post operative evaluation at 2 months. Vestibular extension and soft tissue biotype achieved post surgery was favourable for implant placement.

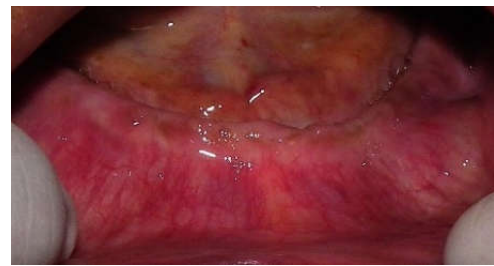


Figure 4 - Shallow vestibule

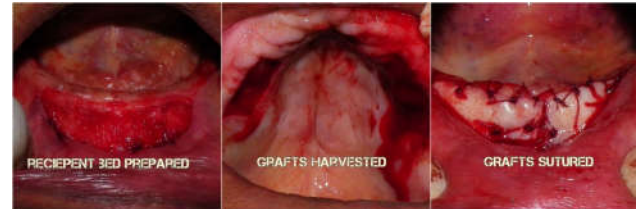


Figure - 5 Surgical steps



Figure 6 - Increased vestibular depth and keratinised tissue

For gingival augmentation around implants

Case 3

A 45 year old female patient was referred from the Department of Prosthodontics, Bharati Vidyapeeth Deemed University Dental College and Hospital, Pune. Implant supported FP-3 prosthesis in lower anterior region had been delivered to the patient three months back.¹³ The patient came with a chief complaint of greyish discolouration of mucosa with one of the implants in the front region of the lower jaw. On examination, it was seen that 31, 32, 33, 41 and 42 were replaced by a fixed restoration supported by two implants. The implants were in 31 and 42 regions. The implant in 42 region had approximately 2 mm of attached gingiva but the implant in 31 region lacked attached gingiva completely and the collar of the implant was visible intraorally (Figure 7). Also, the mucosa covering the implant had a greyish hue. Probing depth was around 3 mm. There was no evidence of peri implant mucositis with either of the implants. A free epithelialised soft tissue autograft was carried out with the implant placed in 31 region. Two months post operative picture shows a thick, pink, keratinised tissue imparting a width of nearly 3 mm to the attached gingiva in 31 region (Figure 8).



Figure 7 - Implant collar seen



Figure 8 - Thick pink keratinised tissue

For onlay grafting

Case 4: A 40 year old male patient who had met with a road traffic accident 6 months back was referred from the Department of Prosthodontics. The maxillary central incisors of the patient had avulsed during the mishap. Due to monetary constraints, the patient had opted for a tooth supported fixed prosthesis. Crown preparations had been done with 12 and 22. An interim prosthesis with good emergence profile had been given. However, a black triangle was evident between the pontics in central incisor region. On intraoral examination after removing the temporary prosthesis, it was seen that the edentulous ridge had retained normal buccolingual and apico-coronal dimensions. So a free epithelialised onlay graft was planned to deal with the black triangle. Recipient bed was created on the ridge crest. A thick, free epithelialised soft tissue graft was harvested from the palate and sutured at the recipient site. The interim prosthesis was placed after 1 week so as to allow the soft tissues to sculpt around the pontics in 11 and 21. The tissue is still in the healing phase but it is evident that the black triangle could be corrected. Final prosthesis will be delivered to the patient after a period of 4-6 months when the tissue form matures and stabilises.



Figure 9- Black triangle between 11, 21



Figure 10- Free epithelialised soft tissue onlay graft done

Free epithelialized autograft for gingival recession coverage

Case 5: A 28 year old female patient who had just completed her orthodontic treatment was referred from the Department of Orthodontics. On intra oral examination, Miller's Class III marginal soft tissue recession was evident with 41.⁹ There was a high frenal attachment extending to the free gingival margin

of 41. The periodontal biotype was thin. Root coverage using a free epithelialised soft tissue autograft was planned. The graft was harvested from the palate and sutured at the recipient bed coronal to the recession in 31, 41 region. The patient was advised to use a soft tooth brush. Modification of brushing technique was demonstrated. The patient was recalled on the 10th day for suture removal. At one month's follow up, 80% recession coverage was evident. The patient was regularly followed up at every two months.

Thick free epithelialised autografts that replace the gingival margin in root coverage cases frequently show creeping attachment. Matter and Cimasoni have reported a creeping attachment leading to an increase in root coverage of approximately 1 mm over a 1 year period after grafting.¹⁴ The result was reported to be stable over a 5 year period.¹⁵

One year follow up of our patient showed 100% recession coverage. The phenomenon of **creeping attachment** can be very well appreciated in this case.



Figure 11- Surgical steps



Figure 12 -Creeping attachment seen 1 year post surgery.

DISCUSSION

The most important goal of mucogingival surgery is to create or widen the zone of attached gingiva around teeth and implants. The topic is highly debated in periodontal literature. It was thought that an adequate zone of gingiva was essential for maintenance of gingival health and the prevention of attachment loss. Lang and Loe, 1972, proposed a presence of a 2-mm width of keratinized gingiva (with 1 mm of attached gingival tissue and 1 mm of free gingiva) surrounding the teeth as adequate for maintaining periodontal health.¹⁶ Maynard and Wilson, 1979, have reported that a width of about 5 mm of keratinized mucosa is necessary in prosthetic restorations with subgingival margins.¹⁷ Stetler and Bissada, 1987 reported that greater levels of gingival inflammation are present around teeth with submarginal restorations when a narrow zone (< 2 mm) of attached gingiva is present when compared to teeth with a wide zone of attached gingiva.¹⁸ However, longitudinal clinical studies carried out by other authors have proven that there was no significant difference in the gingival health of test and control teeth with and without adequate attached gingiva.^{19,20,21,22} The same holds true regarding the ideal width of keratinized mucosa required for peri-implant homeostasis. Although some authors argue that the peri-

implant health can be maintained without keratinized mucosa, others believe that its absence can be associated with more plaque accumulation and inflammation of the tissues.^{23,24,25,26,27} According to Abrahamsson *et al*, 1996, a certain width of keratinized mucosa is necessary, otherwise bone resorption can occur in an attempt to establish an adequate biologic width around dental implants.²⁸

Thus based on these studies no minimum width of attached gingiva has been established as a standard necessary for gingival/peri-implant health. However, teeth which serve as abutments for fixed or removable restorations, edentulous ridge in relation to dentures and tissue surrounding implants are all benefitted by the presence of attached gingiva. Keratinised tissue forms a strong seal around an implant, abutment or restoration, that is resistant to retraction with masticatory forces and oral hygiene procedures.

Free epithelialised soft tissue autografts (free gingival grafts) are frequently used to create a widened zone of attached gingiva. The palate, tuberosity and keratinised tissue over edentulous areas can be used as donor sites. Based on the thickness of the donor tissue, the grafts can be categorised as thin (0.5-0.8 mm), average (0.9-1.4 mm) and thick (1.5 -2 mm). Thin grafts give the best color match and are best suited to increase the width of attached gingiva apical to the recession. These grafts heal the fastest of the three different thicknesses but shrink the maximum (25% to 30%).²⁹ The average thickness grafts are best suited for all types of grafting except recession coverage. The thick grafts are best suited for root coverage and onlay grafting. These have initial primary contraction but less secondary contraction than thin and average grafts. However, the healed thick graft has the least esthetic qualities. It may give a patch like appearance and the least color match. A stent made up of poly methyl methacrylate is recommended to be placed on the palate with absorbable collagen sponge used as a haemostatic agent. The palatal healing is usually uneventful. Healing of the recipient and the donor site is usually completed by 8 weeks.

Clinical tips

The height of the palatal vault and the thickness of the palatal tissue should be assessed as it would give us an idea as to how much tissue can be harvested. A study by Reiser *et al*, 1996, reported that the greater palatine neurovascular bundle may be located at a distance of 7-17 mm from the cemento-enamel junctions of the maxillary molars and premolars (17 mm in high palate, 12 mm in average palate and 7mm in shallow palate cases). The thickest graft can be harvested from the region between the distal of the canine and the mesial of the first molar.³⁰

The greater primary contraction of thick grafts causes collapse the blood vessels within the graft which may interfere with revascularisation. So these grafts should be slightly stretched before suturing to keep the blood vessels open and help in establishing a blood supply quickly after surgery.³¹

A dead space between the graft and the recipient bed will delay healing. So an intimate adaptation of the graft to the recipient bed and proper stabilisation with sutures is mandatory to ensure better blood circulation thus increasing the predictability of the procedure.

A prefabricated palatal stent with absorbable collagen sponge should be placed at the donor site to encourage blood clot

formation and also to protect the palatal wound from tongue, food and drink thus reducing postoperative pain.

In case the surgeon encounters bleeding from the palatal vessels, a sequence of application of a pressure pack for minimum 5 minutes, placement of a suture proximal to the bleeding site or reflection of a full thickness flap and ligation of the vessel is recommended as and when required.³⁰

CONCLUSION

Free epithelialised autograft is versatile treatment modality applicable in a variety of periodontal and peri-implant clinical situations. It is an important tool in the periodontists' armour. Proper case selection, delicate handling of the grafts and meticulous execution of surgical steps will surely aid in the predictability of the procedure. Although controversial, the presence of a keratinised gingiva definitely helps in maintaining periodontal and peri-implant tissue health.

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