

## Influence of Keratinized Gingiva Width on the Resolution of Periodontitis in Cases of RT3 Recession at Lower Anterior Region: Case Series with Long Term Follow Up

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### Abstract

**Aim:** To evaluate the effect of soft tissue augmentation on periodontal health improvement and stabilization in cases of RT3 recession, using palatal free gingival graft.

**Method:** Ten cases were suffering from periodontitis, caused by either infection (plaque and calculus) or traumatic occlusion, led to recession of RT3 with deficient keratinized gingiva. All patients undergone phase one therapy successfully, followed by initial evaluation to ensure that the teeth periodontal health became stable. Phase two therapy then was done, through apically repositioned flap (APF) and palatal free gingival graft, in order to aid in continue the periodontal health stabilization and improvement through time, which will elongate the teeth life span.

**Results:** All the cases have showed improvement in periodontal condition at the treated sites, in terms of less or no bleeding with brushing and eating, less teeth mobility, less plaque accumulation and calculus formation and pink color of the tissue as well as the adjacent areas with partial root coverage.

**Conclusion:** Soft tissue augmentation using the gold standard type of soft tissue graft (free gingival graft) aid in improvement of periodontal health of affected teeth, making patient quality of life is better and elongate the life span of the teeth.

**Keywords:** *Keratinized Gingiva Width; Periodontitis; Creeping Attachment; Apically Positioned Flap; Free Gingival Graft; RT3 Recession*

### Introduction

Gingival recession can be defined as apical migration of gingival margin from the cemento-enamel junction (CEJ) leading to exposure of root surface [1]. It can be measured from the CEJ to gingival margin. Aetiology of gingival recession is multifactorial such as presence of plaque and calculus, tooth malposition, high frenal attachment, improper teeth brushing, faulty restorations, tooth movement by orthodontic forces and recession after some periodontal surgeries. Gingival recession leads to exposure of tooth root which is further associated with increased chances of sensitivity problem, formation of plaque retentive area, root caries and aesthetic compromising particularly in anterior aesthetic zone. In present era this becomes the major concern for the patient not only for facial aesthetic but personality as a whole [2].

Non-surgical/Surgical management of gingival recession and its outcome can be affected by type of gingival recession classification, position of tooth, gingival phenotype, amount of attached gingiva and patient compliance [3]. According to Lang and L oe, width gingiva less than 2 mm is inadequate for the maintenance of gingival health [1]. Other studies suggested that < 2 mm or no keratinized gingiva is also adequate, if person is able to maintain strict oral hygiene [4,5]. But practical wise the absence of sufficient keratinized gingiva will never guarantee the teeth periodontal condition stability.

Soft tissue augmentation includes various surgical procedures that aim to functionally and aesthetically improve the morphology of soft tissues around teeth and implants: several surgical techniques allow the correction of gingival recessions, or the creation of an adequate height and thickness of keratinized mucosa/soft tissues. The most predictable technique for increasing the zone of attached gingiva, improving the gingival phenotype and for gingival recession coverage is free gingival graft (FGG) by Bjorn, 1963 [6].

Since 1963, the autogenous free gingival graft (FGG) has been used in periodontal surgery to enhance the width of the attached gingiva around teeth [1,2]. The same technique was also used to cover exposed dental roots [3]. Later on, in order to achieve better esthetic results, complete root coverage, increased keratinized tissue width (KTW), and long-term treatment stability, an autogenous subepithelial connective tissue graft (SCTG) combined with a coronally advanced flap (CAF) has been largely used and, nowadays, is recognized as the surgical technique with the highest performance [4]. This approach is, therefore, acknowledged as the "gold standard" for treating both single and multiple gingival recession defects (GRDs) around teeth and dental implants [5].

Despite its high success rate, the SCTG shows some drawbacks, including the necessity for two surgical sites (recipient and donor), the technicality of the flap elevation and suturing, the problem of high frenal attachment within the flap or presence of shallow vestibule with high muscle attachment, limited ability for root coverage as it depends upon the class of recession, limitation pain and discomfort during donor site healing, and limited availability of donor tissue [7].

For RT3 cases, it is almost impossible to achieve root coverage through CAF and SCTG. The only chance for those teeth lay on using FGG for augment the deficient keratinized gingiva, improving the soft tissue quality, partially resolving most of the patient complains and achieving some root coverage by creeping attachment.

In this case series we will highlight the influence of augmenting the deficient keratinized gingiva width for RT3 case and its impact on periodontal condition of the treated teeth with long follow up.

## **Materials and Methods**

Ten patients, 9 females and one male, medically free, non-smoking, their ages ranged between 25 to 45 years old, were referred to my private clinic for management of their gingival recession at the lower anterior region. The etiologies of the cases caused such periodontal defects were due to bad oral hygiene (7 cases) and traumatic occlusion (3 cases).

After patient education and motivation, giving oral hygiene instructions, started phase one therapy through removing the cause via scaling and root planning (SRP) and occlusion analysis and adjustment for the cases with traumatic occlusion. After 6 weeks to 12 weeks for some cases, reassessment of non-surgical therapy was done through re-evaluation of the periodontal condition of the teeth, the oral hygiene status and do permanent splint for some cases with grade II mobility.

Surgical intervention with an autogenous FGG technique was planned. The patients were informed of the surgical procedure, and consents were taken. They were asked to rinse 0.12% chlorhexidine mouthwash for about 30 seconds. The infiltration of local anaesthesia and 2% lignocaine with epinephrine (1:200 000) at the planned recipient and donor sites were administered.

### **Preparation of recipient site**

The recipient site was prepared with an initial incision at the existing mucogingival junction using a #15c blade, and a mucosal (partial thickness) flap was elevated and repositioned apically and fixed with resorbable suture at the desired location, creating a proper vascular bed for the gingival graft, others wasn't sutured. The dimensions of the recipient site were measured by using the University of North Carolina 15 (UNC 15) probe for harvesting FGG at the donor site.

### **Harvesting the free gingival graft**

The partial thickness graft consisted of epithelium and a thin layer of underlying connective tissue was harvested from the first molar-premolar area of the palate. The incision was carried out with the incision 2 - 3 mm from the palatal gingival margin to avoid recession on these teeth. Hemostasis (blood clot) was achieved by applying compression with sterile gauze. Different ways had been used to manage the donor site, as platelets rich fibrin (PRF) with suturing, collagen sponge with suturing, Ora-Aid dressing and palatal stent.

### **Fixation of the graft**

The gingival graft was well adapted to the recipient bed and sutured to the periosteum to secure its position. The graft edge was placed to overlap the area where a bevel incision (de-epithelization) was made on the recipient site. Root surface conditioning and absolute immobilization of the graft are the key factors for the success of this procedure.

### **Post-surgical instructions**

Meanwhile, Post-operative instructions and care were given to the patient. The patients were instructed not to brush on the surgical site for two weeks and to rinse with 10 ml of chlorhexidine 0.12% mouthwash twice per day. Also, they were told not to eat at the surgical site and their diet through the two weeks should be soft diet. Sutures at the recipient site were then removed two weeks after the surgery with no signs and symptoms. After three months postoperatively, better healing of the recipient sites was noted. Six, twelve, 36 months postoperatively, the new band of keratinized tissues and thick gingival tissue were evident.

### **Results**

In all cases there are increased width of keratinized attached gingiva, with partial root coverage achieved through direct coverage with the graft positioned at the apical portion of exposed root and through creeping attachment i.e., coronal migration of epithelium, that occurred post-surgically through time, covering 70% of the recession depth [8]. 10 Less inflammation, less bleeding, less teeth mobility and less plaque and calculus formation were observed by both the patients and the dentist. Also, decrease in teeth grade of mobility was noticed in some patients that was initially suffering from tooth mobility.

Graft shrinkage is twofold more in vertical direction than horizontal, the mean vertical graft shrinkage ratio was 6.10 - 10.63% (0 to 30 days), 5.16 - 8.70% (30 to 90 days), 10.87 - 13.56% (0 to 90 days), then it showed a stabilized dimension after that.

### **Discussion**

There are different number of techniques for gingival recession coverage and for increasing the width of attached gingiva like coronally advanced flap, different types of pedicle flaps (lateral repositioned flap, tunnel technique, laterally closed tunnel technique, VISTA), with the use of connective tissue graft, acellular dermal matrix (alloderm) which can be obtained by approved tissue bank but the long- term



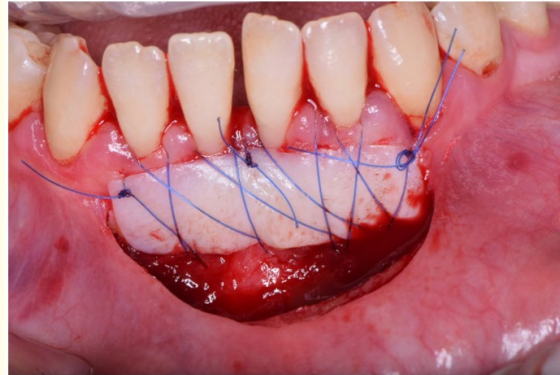
**Figure 1 (Case 1):** Baseline, RT3 recession, lack of keratinized gingiva, high frenum attachment and shallow vestibule.



**Figure 2 (Case 1):** Vascular bed preparation, through partial thickness apically repositioned flap.



**Figure 3 (Case 1):** Free gingival graft harvested from the palate.



**Figure 4 (Case 1):** Free gingival graft fixation, using 5/0 prolene suture, using continuous horizontal figure 8 suture technique slinged around teeth coronally.



**Figure 5 (Case 1):** Two weeks at time of suture removal.



**Figure 6 (Case 1):** Follow up after 3 months of surgery.





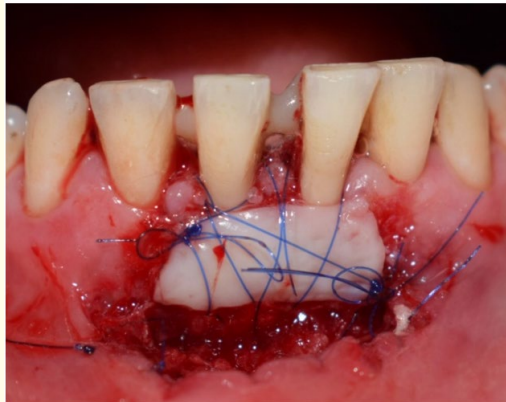
**Figure 7 (Case 1):** One year follow up post-surgically.



**Figure 8 (Case 1):** Two years follow up post-surgically.



**Figure 1 (Case 2):** Baseline of RT3 case with deficient keratinized gingiva.



**Figure 2 (Case 2):** Vascular bed preparation, partial thickness apically positioned flap with graft fixed in place.



**Figure 3 (Case 2):** Three weeks post-surgical, well integrated graft.



**Figure 4 (Case 2):** Three months follow up post-surgical.



**Figure 5 (Case 2):** One year follow up post-surgical, note the creeping attachment resulted in partial root coverage specially at right central incisor.



**Figure 6 (Case 2):** Three years follow up, still stable condition with decreased mobility grade.



**Figure 7 (Case 2):** Five years follow up with stable clinical parameters (no bleeding, no inflammation, less mobility).





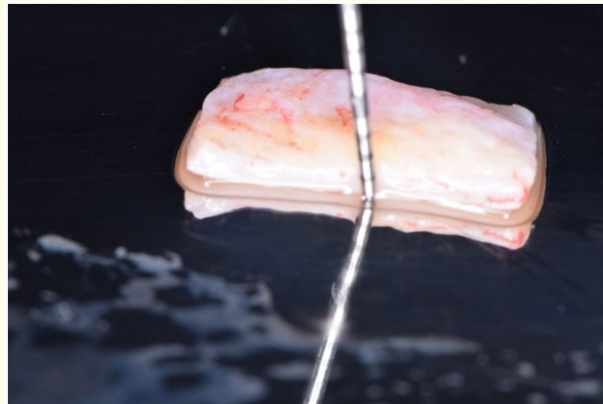
**Figure 8 (Case 2):** Seven years follow up. Patient satisfaction and appreciation is very high.



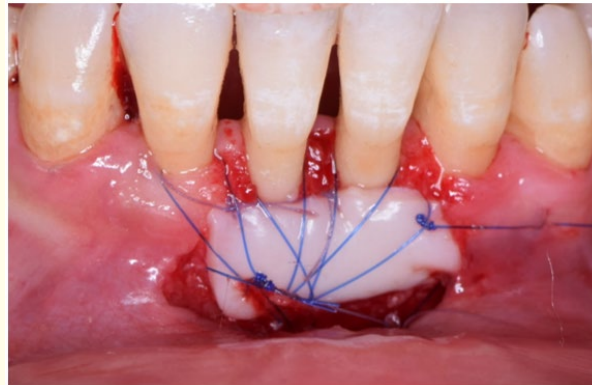
**Figure 1 (Case 3):** RT3 case with deficient keratinized gingiva.



**Figure 2 (Case 3):** Preparation of the vascular bed through partial thickness apically positioned flap, suture apically with 6/0 PGA suture material.



**Figure 3 (Case 3):** Free gingival graft harvested from the palate and adjusted.



**Figure 4 (Case 3):** Graft fixation and suturing.



**Figure 5 (Case 3):** Two weeks post-surgical, graft is well integrated.



**Figure 6 (Case 3):** Three months post-surgical.



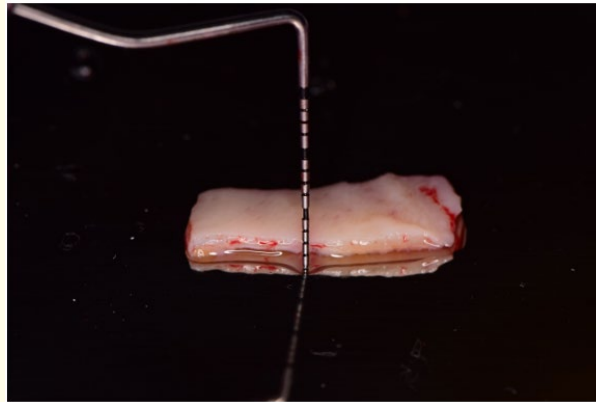
**Figure 7 (Case 3):** One year follow up, with noticed creeping attachment and less inflammation signs.



**Figure 1 (Case 4):** Baseline, RT3 case with deficient keratinized gingiva.



**Figure 2 (Case 4):** Vascular bed preparation, through partial thickness apically repositioned flap.



**Figure 3 (Case 4):** Free gingival graft harvested from the palate.



**Figure 4 (Case 4):** Two weeks post-surgical at time of suture removal.





**Figure 5 (Case 4):** One year follow up, note the creeping attachment partially covering the roots.



**Figure 6 (Case 4):** Three years follow up, the result still maintained.



**Figure 7 (Case 4):** Seven years follow up, with better root coverage through creeping attachment...the graft dimension still stable through years.



predictable result for recession coverage, increasing the width of attached gingiva and for ridge augmentation is free gingival graft [9,10]. Sullivan and Atkins outlines need of different thickness of graft for different procedures, 0.5 mm or 0.75 mm (thin or intermediate graft) thickness ideal for increasing the width of attached gingiva as it has minimal amount of elastic fiber so it has less primary contraction [11].

It goes 25 - 45% of secondary contraction (Ratertschak and colleagues, 1979; Ward, 1974) due to cicatrization as it binds the graft to the underlying bed. 1.25 mm or 2 mm (thick or full thickness graft) can be used for root coverage procedure or ridge augmentation procedure it has higher primary contraction due to this it delays the revascularization as compared to less secondary contraction due to thicker lamina propria (Barsky and colleagues, 1964) also it creates the un-esthetic patch. According to systematic review by SD Deo13 FGG best alternative for the treatment of gingival recession presents with inadequate width of attached gingiva and depth of vestibular fornix [12].

FGG consists of epithelium and underlying connective tissue without fatty and glandular tissue. The advantages of the FGG technique include increased keratinized tissue width and gingival thickness, graft predictability, technique simplicity, and minimal post-operative pain. Meanwhile, the disadvantages of this procedure include the secondary intention healing of the palate, post-operative discomfort, and risks for complications, including haemorrhage at the donor site, palatal sensory dysfunction, infection, and/or increased surgical time, high post-operative pain and swelling [3,4]. The discomfort can be reduced by protecting the harvested area with a stent or a periodontal dressing [13]. The FGG is contraindicated in patients with esthetic demands as the outcome may have the risk of white scar appearance of grafted tissue with adjacent soft tissues. Deep and wide recession defects and the presence of deep facial probing pockets associated with gingival recession also might limit the use of FGG as a treatment of choice [14]. Lack of good adaptation between the graft and underlying vascular and avascular portion of the recipient site or its borders may result in necrosis of the grafted tissue [15].

Adequate graft dimension is necessary for the longevity of the graft placement. It must be sufficiently thin to enable adequate nutrition from the recipient site during the re-epithelization process. However, thinner FGG leads to incomplete root coverage and lack of desired thick gingival phenotype. In contrast, a thicker graft will impair adequate nutrition. Additionally, the harvested gingival graft should be 15 - 25% larger than the desired final size. This is to overcome primary (immediate) and secondary (during healing) contraction [15].

The healing of the graft depends on the survival of the connective tissue. Sloughing of the epithelium is expected, but the fibrous vascularize of the interface between the graft and the recipient bed occurs within 2 to several days. The graft is nourished by the process of the diffusion of fluid from the host bed, adjacent gingiva, and the alveolar mucosa. On the first day, the connective tissue becomes edematous and vascularize and undergoes degeneration and lysis of some of its elements. On the second or third day, the graft vascularized with the proliferation of the capillaries from the recipient bed [16]. These networks of capillaries anastomose with the pre-existing vessels. The central section of the surface is the last to vascularize, but this is complete by the 10<sup>th</sup> day [18]. There will be increasing vascular density for up to 7 days, followed by a gradual reduction and a return to a normal vascular pattern after 14 days [16,17]. On the 14<sup>th</sup> day onwards, a complete junctional embodiment of graft to the recipient site is formed. An average of ~20% shrinkage is expected during healing. A thin graft will have less primary contraction but more secondary contraction. Meanwhile, a thick gingival graft will have more primary contraction and less secondary contraction [18].

Likewise, to achieve those factors care must be taken while harvesting the soft tissue graft. The graft should be of uniform thickness to ensure even intimate contact of the inner surface of the graft and the recipient site. The composition of the graft can influence the nourishment of the graft-adipose and glandular tissue may hinder the nourishment of the rest of the graft so they should be dissected from the graft [18].

## **Conclusion**

FGG is the best alternative for the treatment of gingival recession presents with inadequate width of keratinized gingiva and shallow depth of vestibular fornix in RT3 gingival recession cases, with maintained results for years, allowing for extending the teeth life span with

more favorable periodontal condition. The main disadvantages of FGG is un-esthetic appearance and two donor site, donor site morbidity. So proper case selection along with definitive treatment planning for every case is necessary.

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