

# Accretion of Gingival Height by Gingival Thickness Augmentation: A Clinical Report

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## ABSTRACT

**Aim:** To describe gingival height augmentation after autogenous free gingival graft around teeth and laterally positioned flap with platelet rich fibrin around an implant.

**Summary:** Periodontal surgical procedures can improve soft-tissue quality resulting in a favorable treatment outcome. Root coverage by placing free gingival graft offers remarkable results in cases of shallow and narrow recession. However, complete root coverage has been obtained in the area of deep-wide recession by various methods also. Owing to insufficient gingival tissue in the apical area, and economic reasons, lateral positioned flap with PRF can be used for soft tissue augmentation around dental implant. This augmentation may be simulated with “bridging” phenomenon for coverage of denuded root on small avascular areas. This technique partially corrected mild notch in soft tissue of the alveolar ridge, augment zone of mucosa without and limitation of color blending.

**Keywords:** Free gingival graft, gingival biotype, gingival recession, platelet-rich fibrin

## INTRODUCTION

To achieve respectable periodontal esthetics is always an important, but difficult, yet predictable part of clinical practice in periodontology, for which gingival biotype has been the subject of considerable interest amongst periodontists, especially in the last decade. The bulky or thick (>1 mm), slightly scalloped marginal gingiva with short and wide teeth on the one-side and the thin (<1 mm), highly scalloped marginal gingiva with slender teeth on other-side, may serve to demonstrate the existence of gingival biotype.<sup>1</sup> Thence, the term “gingival biotype” has been described as the thickness of the gingiva in the faciopalatal dimension.<sup>2</sup>

Many papers have described significant inter-individual as well as intra-individual variations both in thickness as well as width.<sup>3</sup> Direct correlation has been suggested to exist between gingival biotype and the susceptibility to gingival recession following surgical and restorative procedures.<sup>2</sup> Soft-tissue biotype (gingival thickness) is a critical factor that determines the result of dental treatment. The initial gingival thickness is significant as it may predict the outcome of root coverage procedures and restorative treatments.<sup>4,5</sup>

Periodontal surgical procedures can improve soft-tissue quality resulting in a favorable treatment outcome. Numerous surgical procedures have been advocated to achieve predictable gingival augmentation. Amongst them, autogenous gingival grafting or epithelialized free gingival grafting is a well-established pure mucogingival procedure for increasing the zone of the attached gingiva and stopping progressive gingival recession.<sup>6</sup> More recently, laterally advanced flap with autologous platelet rich fibrin (PRF) has also been reported to be significant method of obtaining predictable results.<sup>7</sup> Present case reports intended to describe the gingival height augmentation achieved after free gingival graft around teeth and laterally positioned flap with platelet rich fibrin around an implant.

## CASE REPORTS

**Case 1:** Eighteen year old, female patient reported to the periodontology department with a chief complaint of sensitivity and elongated lower front teeth region for past one year. Patient's medical and dental history was non-



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contributory. Intraoral examination revealed, probing pocket depth of not more than 3 mm in any location, but bleeding on probing was present. The patient's oral hygiene status was judged to be below average. There was marginal gingival recession on right mandibular central incisor (41) that extended to the mucogingival junction. Attached gingiva apical to 41 was not present. Radiographic examination showed no bone loss. There was no clinical evidence of trauma from occlusion and fremitus test was not positive.

Clinical and radiographic findings were suggestive of clinical presentation of Miller's class II gingival recession with deep-narrow defect as per Sullivan-Atkin's classification.<sup>8</sup> Three weeks after nonsurgical periodontal therapy, the 41 showed apico-coronal 9 mm of gingival recession, and mesio-distally 4 mm of gingival recession (Fig. 1). After the obtaining written informed consent from the patient, the defect site was treated with autogenous free gingival grafting to achieve root coverage and augment the attached gingiva.<sup>9]</sup>



**Figure 1: Pre-operative (after completing phase I therapy)**

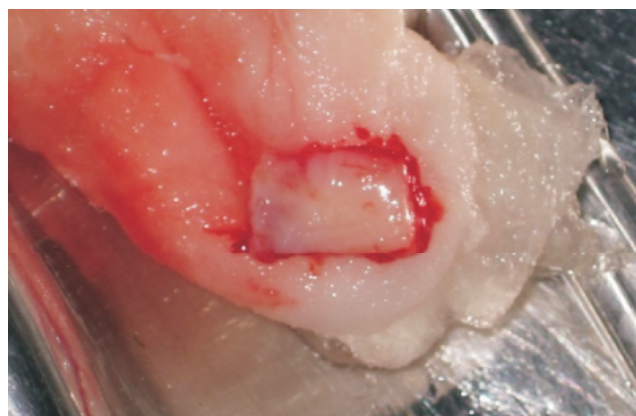
**Preparation of recipient bed:** After achieving adequate local anesthesia (2% lignocaine with 1:80,000 adrenaline), the exposed root surface was planed thoroughly with a Gracey 1-2 curette. At the level of cemento-enamel junction (CEJ), horizontal incisions were made extending through the line angle of neighbouring teeth on either side of the recession deep into the papilla, while producing a well-defined butt-joint margin. Vertical incisions were given at the terminal ends of the horizontal incision, extending into the alveolar mucosa, so that it is 3 mm beyond the apical extent of the recession. Thus, recipient bed was established, by partial thickness flap that was elevated and excised apically (Fig.2).

**Preparation of donor tissue:** The amount of donor tissues needed was accurately determined by using a foil template. The template was made by adapting it to the recipient site. The left side of the palate was selected by measuring the

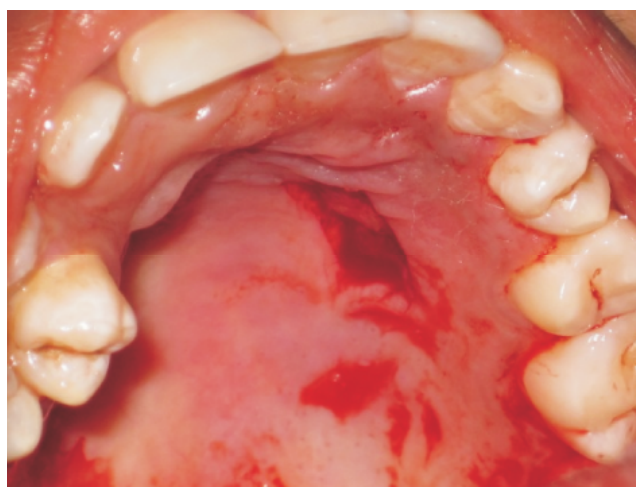


**Figure 2: Preparation of recipient bed.**

thickness of the tissue using an endodontic file with a stopper. The area between first and second premolar was selected to obtain the donor tissue. The initial incision was outlined by the placement of tinfoil template with a # 15 scalpel blade. All palatal incisions were made in such a fashion as to create a butt joint margin in the donor tissue (Fig. 3 and 4).



**Figure 3: Procurement of free gingival graft from palate.**



**Figure 4: Donor site after graft procurement.**



This butt-joint margin of the graft will be butted alongside the butt joint margin in the papilla and the accentuated enamel margins at the cemento-enamel junction. A bevel access incision was made to get an even thickness of the graft. An incision was made along the occlusal aspect of the palate with # 15 scalpel blade held parallel to the tissue, continued apically, lifting and separating the graft. Tissue pliers were used to retract the graft distally as it is being separated apically and dissected, until the graft is totally freed. The graft obtained was inspected for any glandular or fatty tissue remnants. The thickness of the graft was also checked to ensure a smooth and uniform thickness.

The harvested graft was placed on the recipient bed (Fig. 5), and suture by means of interrupted sutures (4-0 black silk sutures) at the coronal and apical borders (Fig. 6). A vertical stretching suture was given for close adaption of the graft to the tooth surface. After suturing a periodontal dressing was placed to protect the surgical site (Fig. 7). The palatal wound was also protected by periodontal dressing and stabilized by Hawley's retainer already prepared during the pre-surgical phase.



**Figure 5:** Free gingival graft placed at recipient site.



**Figure 6:** Graft sutured at the recipient area using 4-0 silk sutures



**Figure 7:** Surgical site covered with periodontal dressing

*Postoperative instructions:* The patient was asked to refrain from tooth brushing at the surgical site for two weeks, and written postoperative instructions were given to protect the surgical site. Chlorhexidine (0.2%) mouthwash for 2 weeks, along with antibiotics and anti-inflammatory for 5 days were prescribed. The periodontal dressing was removed 2 weeks post-operatively; the graft was well accepted by the recipient site, although erythema and granulation tissue was present at the recipient site, complete coverage of the root was visible (Fig. 8). The healing of the palatal wound was satisfactory and patient did not complain of any discomfort (Fig. 9). The patient was instructed to use a soft toothbrush with a roll-technique followed by a 60-second rinse with mouthwash for the next 2 weeks. Patient was motivated to maintain a good oral hygiene and recalled after one month (Fig. 10) and four months interval (Fig. 11). However, at the scheduled interval patient's oral hygiene measures was not satisfactory and mild erythema and mild recession was obvious at the operated site. Overall the healing was satisfactory at recipient as well as donor site. Patient



**Figure 8:** Post operative view of surgical site after suture removal.



Figure 9: Satisfactory healing of donor site.



Figure 10: Surgical operating site at one month follow up.



Figure 11: Surgical operating site at 4 months follow-up.

was again motivated and educated. Patient is currently under active follow-up and has been required to maintain meticulous oral hygiene at subsequent visits.

**Case 2:** Nineteen year old otherwise systemically healthy, non-smoker male patient was referred to the postgraduate clinic of the periodontology department for management of soft tissue discrepancies in left upper anterior region around

implant collar. Dental history revealed placement of single unit dental implant for last 8 months. Clinical examination revealed deep notch in the gums with insufficient zone of attached gingiva apical to single unit implant collar around satisfactorily osseointegrated dental implant in the left lateral incisor (21) area, along with the absence of keratinized gingiva apical to implant in maxillary 21 area (Fig. 12).



Figure 12: In-sufficient gingival biotype in 21 area. Staining with KI solution revealed absent attached gingiva apical to implant color.

Laterally positioned flap with platelet rich fibrin was performed to correct the soft tissue defects. Before starting the surgical procedure, a 10 mL blood sample was taken from the cubital region of the forearm in a 10 ml test tube without anticoagulant and immediately centrifuged using a table-top centrifuge (REMI Laboratories, India) at 3000 rpm for 12 minutes. The resultant product consisted of following three layers: (a) RBC at the bottom, (b) PRF clot in the middle and (c) upper most layers consisting of platelet poor plasma (PPP). Platelet rich fibrin (PRF) in middle clot thus obtained was carefully collected using a glass rod (Fig. 13).<sup>10,11</sup>

Epithelium was removed around the apical area of the exposed collar of the implant so that exposed connective tissue could act as recipient site. Full thickness flap was raised from the distal area. With #15 blade vertical incisions from the gingival margin to outline a flap distal to the recipient site were made till periosteum and extended into the oral mucosa to the level of the base of the recipient site (Fig. 14). Platelet rich fibrin collected was placed on the recipient site. Flap is slide laterally onto the recipient bed over PRF, repositioned and sutured without tension (Fig. 15 and 16). Barricade dressings protect both surgical sites (donor and recipient). Written postoperative instructions were given to the patient and analgesic (Ibuprofen 400 mg thrice daily) was prescribed for 3 days. Antibiotic (Amoxycillin 500 mg thrice daily) for seven





Figure 13: Platelet rich fibrin (PRF) prepared after centrifugation of 8 ml of blood.

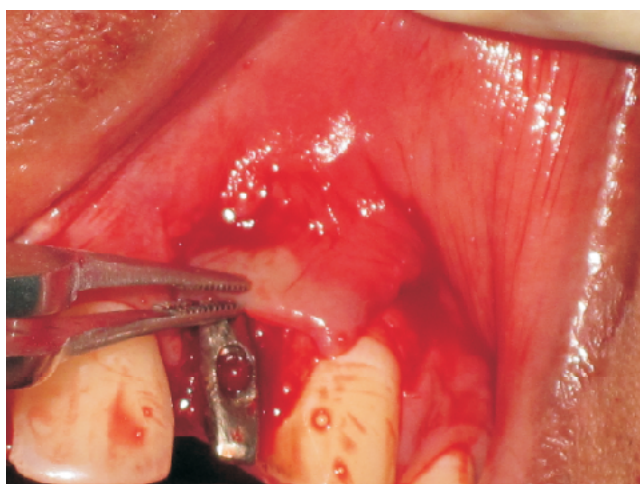


Figure 14: Coronally positioned flap raised and recipient site prepared

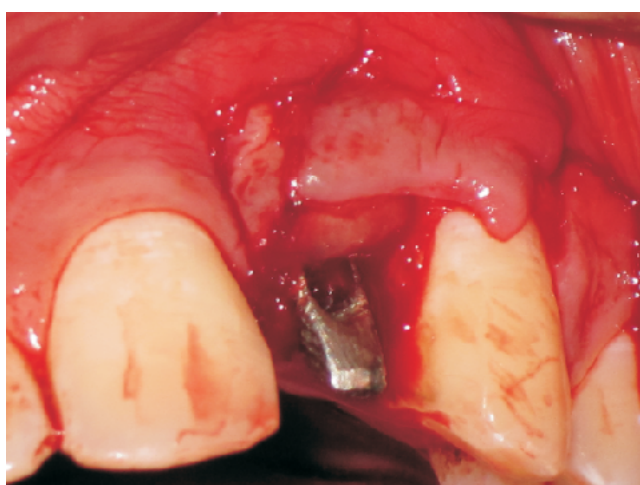


Figure 15: Placement of PRF under the repositioned graft.

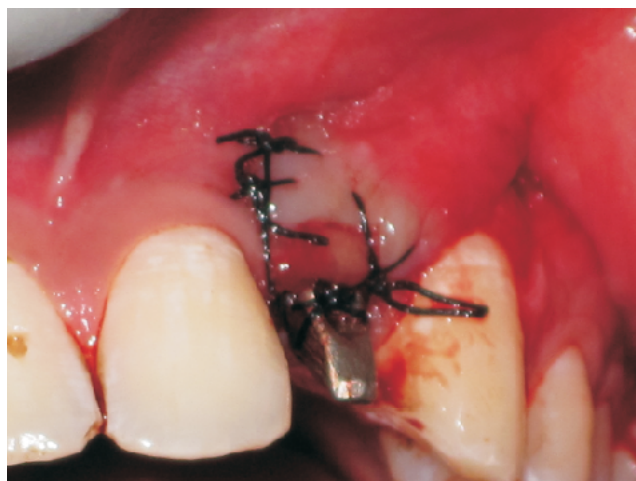


Figure 16: Suture placement after PRF placement and covered with coronally positioned flap

days and 0.2% chlorhexidine mouth rinse was instructed for 10 days. Sutures were removed 14 days after the surgical procedure, when patient reported with uneventful healing. Patient was instructed to maintain meticulous oral hygiene and was recalled after every 4 weeks initially for four months. Patient remains asymptomatic when he last reported three months after the procedure. Although, soft tissue augmentation was observed, however, an indentation was present on the suture site (Fig. 17). Patient was recalled for gingivoplasty, however, patient revealed his resistance for the procedure, as he was satisfied with results therefore, crowns were replaced. Patient was posted to another city, due to which could not be followed up.



Figure 17: Surgically operated site at 3 months follow-up.

## DISCUSSION

Present case reports described augmentation in gingival height accomplished after autogenous free gingival graft around teeth and laterally positioned flap with platelet rich fibrin around an implant. The free gingival graft added many

dimensions for the correction of mucogingival problems and gingival recession.<sup>8,9,12,13</sup> The method has been proven to be reliable in increasing attached gingiva and stopping the progressive recession. Root coverage by placing free graft was first described by Sullivan and Atkins,<sup>8</sup> they reported that the free gingival graft offers best results in cases of shallow and narrow recession. However, in Miller's study complete root coverage has been obtained in the area of deep-wide recession by various methods.<sup>9</sup> Shallow vestibule and multiple recessions do not pose any problem for the resulting outcome, but a shallow palatal vault, rough texture of the graft, discrepancy in color of the tissues after healing, and donor site morbidity is important consideration. Also, the classical free gingival grafting procedure cannot offer a solution for root coverage of an area more than three teeth.<sup>14</sup>

When free graft is placed over recession, some amount of "bridging" can be expected because a part of grafted tissue that is covering the root will survive by receiving the circulation from the vascular part of the recipient site.<sup>8</sup> In addition to bridging, "creeping attachment", which is defined by Goldman<sup>15</sup> as the postoperative migration of the gingival marginal tissue in a coronal direction over portions of a previously denuded root can also result in a postoperative coronal migration of free gingival margin. Factors that favor creeping attachment are the narrowness of the recession, the presence of bone positioned interproximally at a coronal level on the facial surface, lack of gross tooth malposition, and adequate plaque control. Matter and Cimasoni<sup>16</sup> described that width of the recession, position of the graft, interproximal bone resorption, position of the tooth and the patient's dental hygiene are important factors that seemed to have a definite influence on creeping attachment. Creeping attachment does occur in root coverage techniques that combine a connective tissue graft and a pedicle flap. The occurrence of creeping attachment is common, but complete root coverage as a result of creeping attachment is not predictable in all situations.<sup>17</sup> Bell *et al.*<sup>18</sup> showed that creeping attachment did not occur at a constant rate but seemed rather be the result of successive episodes of recession and creeping. They recommend placing free autogenous grafts over exposed root surfaces and that if the aspect of bridging does not occur, some creeping attachment may be expected over a period.

Second case report utilized laterally positioned flap with PRF for soft tissue augmentation around implant. The main goal was to correct the mild buccal ridge deficiency and enhance the marginal gingiva associated with dental implant. In addition, to accomplishing esthetic results, achieving and maintaining an adequate marginal gingiva thickness as well as a sufficiently keratinized tissue around the dental implant, is important in preventing mucosal collapse.<sup>19</sup> Furthermore, presence of thick masticatory mucosa around implants is an important area of concern for clinicians to obtain its long-

term success and implant maintenance.<sup>20</sup>

Numerous techniques have been described for the gingival tissue augmentation around dental implants including free gingival graft, coronally positioned flap, subgingival connective tissue graft, connective tissue pedicle graft, combination of onlay and interpositional graft, modified rolled technique, rolled split palatal flap, beveled palatal approach, pouch roll technique<sup>19</sup> and pouch with alloderm.<sup>21</sup> Also, due to single unit implant placement, rolled technique involving palatal tissue tucking was not feasible. In the present case, in order to obtain better patient cooperation by avoiding palatal trauma and the second surgery, and owing to inadequate attached gingival tissue in the apical area, and economic reasons, lateral positioned flap with PRF was preferred. Use of platelet rich fibrin (PRF) provides the necessary cells, growth factors, and inhibitors to initiate the osteogenic biomineralization cascade.<sup>7</sup> Soft tissue augmentation achieved around the dental implant may be simulated with "bridging" phenomenon for coverage of denuded root on small avascular areas, as advocated by Sullivan and Atkins.<sup>13</sup> In the present case, this method partially corrected mild notch in soft tissue of the alveolar ridge, augment zone of mucosa without and limitation of color blending.

It is well established that the gingival recession is influenced by the periodontal biotype and even at implant restorations, the gingival biotypes have been described as one of the key elements decisive for a successful treatment result.<sup>1</sup> Many studies have reported that thin gingival biotype has been associated with a propensity to gingival recession following restoration, periodontal, and implant surgical procedures.<sup>2</sup> Correlation between the increase in the height of the gingiva and the increase in the thickness of the periodontal tissue has been advocated by many clinical<sup>22</sup> and histologic orthodontic research.<sup>23</sup> Wennstrom<sup>23</sup> further hypothesized that the ratio of the height and width of the free gingiva is about 1.5:1. Bengazi *et al.*<sup>24</sup> based on Wennstrom's hypothesis suggested that the height of peri-implant mucosa is dependent on the physical form, which consists of bone level and soft tissue thickness. Based on above published reports and as advocated by Nozawa *et al.*<sup>25</sup>, "it may be desirable to augment the width of buccal supra-implant mucosa to about 1.5 times that of the height, to prevent the recession in the thin periodontal biotype". It may be hypothesized that, by augmentation of gingival thickness, gingival height can be augmented. Further, postoperative "creeping attachment" achieved after free gingival graft may somehow also be correlated to the thickness of the soft tissue achieved after surgical intervention.

The results of the present paper were based on cases with limited follow-up time, and were without controls. Nevertheless, it provides a thought to ponder upon that

every millimeter of the biologic tissue is important and every effort should be exercised to augment gingival/soft tissue that may result in prolonging the longevity of the teeth, restoration and implant. Both case reports described gingival augmentation in the apical area of tooth and dental implant, and an increase in gingival thickness may, in certain situation, be considered as an endpoint of success. However, further long term randomized clinical trials are required to confirm the hypothesis of gingival height augmentation by augmenting gingival thickness.

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