

An innovative technique for root coverage using inverted Periosteal

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Abstract:

The periosteum is highly cellular connective tissue with rich vascularity and regenerative potential, which make it suitable autogenous graft. The inverted periosteal technique utilized periosteal for coverage of denuded root surface. The purpose of this case report was to evaluate the inverted periosteal technique that involves a single surgical site, in terms of root coverage, gingival height, and probing depth. A patient with Miller class I gingival recession of 3.0 mm, gingival height of 2.0 mm and probing depth of 2.0 mm was treated by the inverted periosteal technique. At the end of 6 months, satisfactory results were achieved. The inverted periosteal technique can be used for the treatment of gingival recession defects in further.

Keywords: Gingival recession; Inverted periosteal technique; Periosteum, Root coverage

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I. Introduction

Gingival recession is defined as the displacement of the gingival margin apical to the cemento-enamel junction.¹ Gingival recession is a finding and mucogingival problem is a diagnosis. It may be localized or generalized. The prevalence and severity of gingival recession increases with age.² It is more found in females than in males. It was reported in 27% of males, can be seen in children where the prevalence found to be in 8% in 8-12 years old and 3% in the 11-13 years age group.³ It is found more in mandibular tooth region than maxillary tooth region. Buccal/labial gingival recession is more prevalence as well as incidence compared to palatal/lingual gingival recession.² Various etiological factors causes gingival recession such as trauma from occlusal⁴, temporary crown⁵, genetic factor⁶, excessive force during orthodontics treatment⁷, tooth position and alignment, the height and thickness of supporting bone, aberrant frenum, amount of attached gingiva and environmental factor such as plaque, calculus, inflammation, tooth brush trauma or deleterious oral habit⁸. A variety of technique⁹ have been there for the treatment of gingival recession such as sub pedicle connective tissue graft¹⁰, Lateral positioned pedicle graft¹¹, semilunar coronally positioned flap¹², subepithelial connective tissue graft¹³, free gingival graft¹⁴, guided tissue regeneration¹⁵. Among the soft tissue grafts, the sub epithelial connective tissue graft and the subpedicle connective tissue graft are the most used predictable techniques in the esthetic treatment of soft tissue recessions. Both techniques require a donor site for the connective tissue graft. To overcome disadvantages of all these surgical techniques a new technique "Inverted periosteal techniques has been proposed for root covering. As periosteum of bone is highly vascular it solves the, no donor site is required for this procedures The periosteum consists of progenitor cells responsible for regenerating new cells which differentiate into osteoblasts aiding in the formation of new bone and soft tissue.^{16,17} The clinical outcome with this technique is far much better.

II. Case report

A 32-years-old male patient had the complaint of receding gum in lower front tooth region [figure 1]. On intra-oral examination, an isolated Miller class I gingival recession at labial surface of the lower left canine (no. 33) was present due to trauma from occlusion. The recession depth was 3 mm recorded using University of North Carolina-15 periodontal probe-measured from CEJ to the gingival margin [Figure 2]. Gingival height was 2.0 mm when measured from the apical portion of the gingival margin to mucogingival line and probing depth was 2.0 mm as when measured from the bottom of the sulcus to the most coronal end of the gingival margin. The patient underwent phase I therapy scaling, root planning, polishing and occlusal adjustment, antimicrobial therapy and oral hygiene instruction. Tooth brushing technique roll technique was advised. All material and method was demonstrated to the patient and consent form was duly signed by patient before starting the surgical procedures. All instruments to be used in surgery were sterilized by autoclaving (temperature 121°C at 15 Psi

pressure for 15 minutes. Patient was asked to rinse oral cavity with 0.2% chlorhexidine and extra oral preparation was done 8% povidine iodine solution. The surgical procedure was performed under local anesthesia/infiltration with 2% lignocaine hydrochloride containing adrenaline at a concentration of 1:800,000. After hypersensitivity test, objective, subjective signs and symptoms are checked for obtaining adequate anesthesia at surgical site. With a number 15C blade, horizontal incisions were made perpendicular to the adjacent interdental papillae at the level of the CEJ preserving the gingival margin along with sulcular incisions on the facial aspect of the teeth [figure 3]. At the line angles of the teeth, vertical incisions extending beyond the mucogingival junction were given. A partial thickness flap was then elevated till an adequate amount of periosteum was exposed (Figure 4). A horizontal incision was then given at the apical extent of the periosteum where it was attached to the bone. A periosteal elevator was used to separate the periosteum from the underlying bone [figure 5], and was reflected coronally to an extent where it was still attached to the bone (Figure 6). The reflected periosteum was then inverted such that the cambium layer covers the denuded root (Figure 7). Once it was in place, it was sutured and secured with a 5-0 silk suture [figure 8]. The reflected partial thickness flap was coronally advanced such that it covered the periosteum and was sutured using a sling suture [figure 9]. The vertical incisions were sutured using an interrupted suture. The operated site was protected by placement of a periodontal dressing (coe-pack). Post-operative instructions were given and medication (Amoxicillin-500 mg to be taken and Ibuprofen 400 mg thrice a day to be taken daily for 5 days). Patient was instructed to be extremely cautious during mastication at meals and not to brush the teeth in the treated area for 2 weeks but to use 0.2% chlorhexidine mouthwash twice daily for 1 min. After this period, patient was advised to mechanical cleaning of treated tooth region using an extra soft toothbrush by coronally directed "roll" technique, together with 0.2% chlorhexidine mouthwash twice daily, 1 min for more 4 weeks. After this period, routine oral hygiene procedures could be reintroduced. Clinical follow-up was performed once a week in the 1st postoperative month, every 2 weeks in the 2nd postoperative month and once a month after that up to 6 months. From the second weeks of surgery patient were instructed to resume mechanical tooth cleaning using super soft brush. Modified Stillman technique was demonstrated. Healing was uneventful. Patient was satisfied with the treatment outcome. Complete epithelialization of the inverted periosteal was seen 2 weeks after surgery. As the postoperative time increased, the progressive adaptation and morphologic resemblance were observed. After 6 months, 3.0 mm that is, 100% root coverage, 5.0 mm of gingival height and 1.0 mm of probing depth were obtained [Figure 10].

III. Discussion

The main aim of periodontal surgery is to achieve complete restitution of all periodontal tissue resulting in healthy and aesthetically satisfying periodontal conditions. Covering denuded root surfaces is one of the important goal of surgical periodontal treatment and the best results can be achieved by choosing the most appropriate technique. Classification plays a vital role in choosing the technique along with width and thickness of attached gingiva. While small and flat recessions on single teeth can be treated successfully by using surgical flap technique alone, in case of large and deep defects with no attached gingiva, the use of free gingiva or connective tissue graft or memberane becomes more important for achieving the best possible results¹⁸. One of the important goals of the periodontist is to obtain predictable root coverage in patient with gingival recession defects using the most appropriate technique.[19]The osteogenic capacity of periosteum to form bone and cartilage was studied by Cohen et al in 1955[20].The use of supraperiosteal envelope in soft tissue grafting of root coverage is carried out by Andrew L Allen in 1994[21]The location of chondrocyte precursor in periosteum was determined by Ito et al in 2001[22].Shimizu et al in 2001 studied osteoblastic differentiation of periosteum derived cells promoted by physical contact with bone matrix in vivo. The periosteum contain osteoprogenitors that differentiate to osteoblasts in bone growth and repair[23].John et al in 2005 studied the osteogenesis from periosteal autografts in ulnar defects in dogs[24]. Gomal and Mailot clinically examined the effects of a novel marginal periosteal pedicle graft as guided tissue memberane for treating proximal intrabony defects in comparison to an open flap debridement[25].Gomal et al used marginal periosteal pedicle graft as an autogenous guided memberane to treat localized intrabony defects there is significant reduced in probing depth and CAL[26] Mahajan et al used the periosteal pedicle graft for treatment of gingival recession.[16].Periosteum was highly vascular so it prevents the necrosis and make it a suitable graft over avascular root surface. After 1 year follow up recession defect was completely covered. Verma et al [27] used the periosteal memberane for Buccal grade II furcation defect in lower molar . After 6 months, the mean gain of vertical and horizontal bone level were 1.67 mm and 1.50 mm, respectively. In this study, periosteal membrane maintained its vascular supply as it was attached at one side to the mucoperiosteal flap. This was important for the healing and maintenance of the vital cambium layer that has the potential to stimulate bone formation. Kumar et al [28]used a periosteum as a barrier membrane with and without an alloplastic bone graft in periodontal osseous defects .After 9 months, they found that alloplastic graft material supplementation results in better regeneration with the periosteum used as a barrier membrane. The periosteal stimulates the osteogenesis in the periodontally involved

area by the ability to stimulate osteogenic factors and provides the wound area with osteoprogenitor cells that may compensate for the deficient cells available in the periodontal defect. In this case report, we choose inverted periosteal technique because the technique is based on using the marginal periosteum as a vascularized transplant graft for root coverage. The periosteum is separated from the mucoperiosteal flap. The periosteum remains inverted and coronally transposed without retraction forces. The vascularized periosteum can be used for defect coverage in a similar way as to a connective tissue graft and can be epithelialized by the neighboring mucosa as a vital and well-vascularized tissue. The advantage of the inverted periosteal technique is the presence of periosteum adjacent to the defect and in sufficient quantity avoiding two surgical sites, resulting in less surgical trauma, postoperative complications and better patient satisfaction.

IV. Conclusion

Gingival recession defects are one of the most common finding in periodontal practice and represent an important problem affecting individuals of almost all ages to some degree. Gingival soft tissue recession included in mucogingival deformities and conditions around teeth. It exposes the underlying cementum, often leading to hypersensitivity, plaque retention, root caries and loss of esthetics. Gingival recession occur in populations with high or low oral hygiene levels. The purpose of developing newer technique for root coverage is to increase predictability, reduce the number of surgical sites, and improve patient comfort together with the need to reconstruct the lost periodontal tissues. One such technique is the inverted periosteal technique. Without requiring any second surgical site, and has the potential to promote the regeneration of lost periodontal tissue. The technique described, although simple, need surgical dexterity on the part of the operator during lifting up of the periosteum which is firmly adherent to underlying bone and inverting to cover the denuded root surface. The long term complications of the technique, the potential for resorption of root surface by the periosteum are yet to be assessed. Although the results of the inverted periosteal technique, further studies are necessary to support its regular use.

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Legends of figures:



Fig. 1: Preoperative clinical situation showing gingival recession in no. 33



Fig. 2: UNC 15 Probe Showing gingival recession.



Fig. 3: Placement of PRF membrane over the exposed root surface.



Fig. 4: Partial thickness flap reflected.



Fig. 5: Periosteum raised.



Fig. 6: Separate the periosteum from the underlying bone.



Fig. 7: Periosteum inverted and coronally placed over the denuded root surface.



Fig. 8: The inverted periosteum sutured.



Fig. 9: The inverted periosteum covered with overlying mucoperiosteal flap and sutured.



Fig. 10: Six months postoperative showing complete root coverage.

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