

Treatment of gingival recession using a novel technique of split periosteal pedicle graft. A case report

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ABSTRACT

Background: The problem of gingival recession is becoming more and more prevalent. When anterior teeth are involved, it impacts the patient's overall aesthetics and is particularly noticeable in patients who have a gummy smile. Gingival recession has been treated with a variety of surgical procedures. The goal of developing novel procedures and grafting materials is to improve root coverage predictability while lowering patient discomfort by reducing the number of surgical sites and process time. The present case study successfully demonstrated a technique for treating gingival recession abnormalities using the periosteum as an autograft. The split periosteal pedicle graft is a new procedure that divides the periosteum into two layers: a surface cambium layer and an interior cellular layer. The root coverage is provided by the superficial cambium layer, which keeps the inner cellular layer intact. The benefits of split periosteal graft (SPPG) over sub-epithelial connective tissue graft (SECTG) include that the SPPG does not require a second surgical site, surgical trauma is decreased, and postoperative complications are reduced. There is speedy healing and patient satisfaction is good. The current approach has shown to have a good post-operative outcome with few problems.

Keywords: Split Periosteal Pedicle Graft (SPPG), Root Coverage, Gingival Recession, Sub Epithelial Connective Tissue graft (SECTG).

INTRODUCTION

The exposure of the root surface by an apical shift in the position of gingiva is classically termed gingival recession.¹ It is a known fact that untreated recession sites are more likely to progress than sites treated with gingival augmentation procedures.² Hence, appropriate treatment is indicated to prevent further loss of periodontal tissue as well as to improve esthetics.

Various techniques have been developed to obtain predictable root coverage. The sub epithelial connective tissue graft is considered to be the gold standard in the treatment of gingival recession defects.³ Drawbacks like the requirement of a second surgical site, limited soft tissue availability and patient morbidity could limit its use. To overcome these drawbacks, researchers have harnessed different grafts and grafting techniques

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like the use of PRF membranes,⁴ acellular dermal matrix graft (ADMG),⁵ platelet concentrate graft along with envelope flaps,⁶ minimally invasive VISTA technique and so on.⁷ Amongst the grafts, the periosteal pedicle graft (PPG) has attracted greater attention as it is autogenous, has intact blood supply, doesn't require a second surgical site and affords lesser patient morbidity.⁸

But in the process of obtaining PPG, a part of the alveolar bone is left exposed, which might delay healing and lead to cortical bone resorption. To overcome these drawbacks, a modification of periosteal pedicle graft (PPG) the split periosteal pedicle graft (SPPG) has been presented here.

The split periosteal pedicle graft is a novel technique based on the concept of splitting the periosteum into a superficial cambium layer and an inner cellular layer. The superficial cambium layer is used for the root coverage keeping the inner cellular layer intact. The advantages of this technique are:

1. It does not require a second surgical site.
2. There is an intact blood supply to the graft.
3. This periosteal graft is rich in fibroblasts, mesenchymal stem cells and vascular endothelial growth factors
4. Healing is uneventful, since the inner layer of the periosteum is intact.

CASE REPORT

A 33 year old male reported to our department with a chief complaint of an elongated appearance of teeth on the left side of the upper jaw. On examination, Miller's class - I gingival recession (Recession depth - 3mm, Recession width - 4mm, Probing pocket depth - 1mm) was evident in relation to 22, 23 & 24 (Figure 1). The patient was a non smoker and had a non contributory medical history. His personal oral hygiene history revealed that he used a hard bristled tooth brush and adopted the horizontal scrub technique for cleaning his teeth. The patient was educated about the right choice of brush and technique for brushing his teeth. Oral prophylaxis was done for the patient and written informed consent was taken for the root coverage procedure.

Procedure

Local anaesthesia was achieved using 2% lidocaine with 1: 80,000 epinephrine. An intra sulcular incision was made with a no.15 bard parker surgical blade on the buccal aspect of involved teeth 22, 23 & 24. Two horizontal incisions were made at right angles to the adjacent inter-dental papilla with relation to 22, 23 & 24 respectively at the level of CEJ (Figure 2). Preserving the gingival margin of adjacent teeth, vertical incisions were extended beyond the mucogingival junction. A full thickness muco-periosteal flap was then raised 2-3 mm apical to the osseous crest (Figure 3).

The flap was then stretched buccally to create tension on the periosteum, till the extent it was attached to bone, to raise enable a partial thickness flap. The partial thickness flap was extended to expose a significant amount of periosteum (Figure 4).

Then using a no.11 bard parker surgical blade and micro surgical knives the periosteum was split into a superficial cambium layer and inner cellular layer - the osteogenic periosteum (Figure 5). Leaving the osteogenic layer of periosteum intact, the superficial layer was repositioned coronally to cover the recession defect and was placed such that the coronal margin of periosteum is at the level of the CEJ. To allow for tension free coronal advancement of superficial periosteal layer, the osteogenic periosteum was slightly elevated from the bone on either sides of SPPG (Figure 6).

After the coronal advancement of SPPG (Figure 7), a periosteal suture was placed at the apical end of superficial layer of periosteum (Figure 8) to maintain the graft in position. The coronal end of superficial periosteum was sutured to the de-epithelized interdental papillae using 5-0 vicryl sutures. The partial thickness flap was then advanced over the SPPG and positioned coronal to CEJ using sling sutures (Figure 9).

RESULTS

The healing was uneventful. Sutures were removed 14 days from the day of surgery. Patient maintained good oral hygiene status all through the follow up period. At the first week, one month, three month & six month (Figure 10) post surgical appointment there was progressive adaptation of the edge of the

flap. There was absolute preservation of esthetics. The sulcus probing depth increased by 0.5mm on all 3 teeth. There was 100 % root coverage on 23 and 60% on 22 & 24 respectively.

DISCUSSION

Gingival recession is a raising concern. It affects the overall esthetics of the patient when anterior teeth are involved and is more visible in patients with a gummy smile. A variety of surgical techniques have been introduced to correct the condition. The purpose of developing new techniques and grafting material is to increase the predictability of root coverage and reduce the patient discomfort by reducing the number of surgical sites and time involved in the procedure. More importantly, it is to address the esthetic needs of the patient with respect to color and contour. The adult human periosteum is highly vascular and comprised of 2 layers, an inner cellular layer rich in progenitor osteogenic cells and an outer fibro-vascular layer, which harbors mesenchymal stem cells that promote the repair process.⁹

Due to its osteogenic potential, periosteum is widely used as a graft material for repair of the bony defects. Studies have shown good results when periosteum is used for the treatment of gingival recession defects. Mahajan .A reported the successful treatment outcome by using PPG for treating gingival recession defects.⁸ Studies have reported the release of VEGF by periosteal cells. Lekovic and kwan used periosteum as a barrier membrane for the treatment of periodontal defects.⁹ The present case report case report successfully demonstrated a technique utilizing the periosteum as an autograft for the treatment of gingival recession defects.

The advantages of split periosteal graft (SPPG) over sub-epithelial connective tissue graft (SECTG) are that the SPPG does not require a second surgical site, there is sufficient amount of tissue that can be obtained adjacent to the defect, surgical trauma minimized and the postoperative complication are reduced. There is rapid healing and acceptable patient satisfaction.

The present technique has demonstrated an excellent post operative outcome with negligible complications. The success of the technique can be

attributed to high vascularity of the graft, intact blood supply, single surgical site, less chair-side time and presence of growth factors like VEGF accelerated healing process.

Some of the limitations of this procedure include advanced surgical skills required for procuring the graft and the thickness of the periosteum at the surgical site. Further clinical studies and research on this technique may help to achieve complete root coverage with SPPG.

CONCLUSION

Although the results of SPPG are encouraging, it is very rudimentary to compare this graft technique with SECTG. To assess the regenerative potential of SPPG and its efficacy over PPG further clinical and histological studies need to be carried out in future.



Fig1: Pre operative - Miller's class - I gingival recession in relation to 22 23 & 24



Fig 2: Incisions - Intra sulcular, Horizontal and vertical incisions in relation to 22, 23 & 24



Fig 3: A full thickness muco-periosteal flap raised 2 - 3 mm apical to the osseous crest.



Fig 4: The partial thickness flap with exposed periosteum.

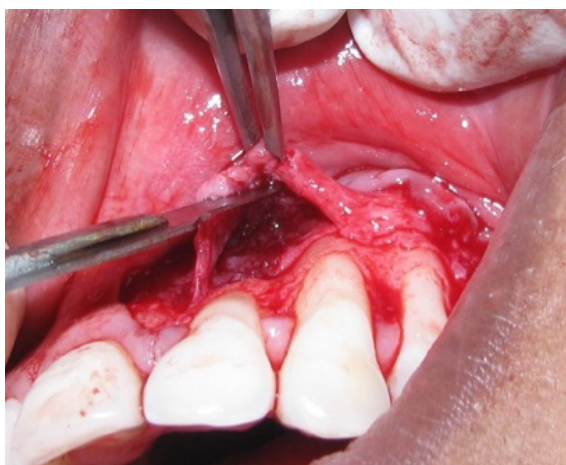


Fig 5: The periosteum was split into a superficial cambium layer and inner cellular layer.



Fig 6: The osteogenic periosteum was slightly elevated from the bone on either sides of SPPG.



Fig 7: The superficial layer was repositioned coronally to cover the recession defect.



Fig 8: A periosteal suture was placed at the apical end of superficial layer.



Fig 9: Flap closure with coronal advancement.



Fig10: 6 Months - Postoperative Picture

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