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Review Article

Periosteal Pedicle Graft as a Root Coverage Approach: A Case Series

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Abstract

Various techniques have been incorporated in the field of periodontics for recession coverage, out of which Periosteal Pedicle Technique stands at the forefront presenting a paradigm shift in addressing gingival recession. This innovative surgical approach harnesses the regenerative potential of the periosteum, utilizing it as a pedicle graft to enhance the coverage of exposed tooth roots. Offering a unique blend of esthetic refinement and functional restoration, this technique holds immense promise in elevating the standard of care for patients experiencing gingival recession. Cells in the periosteum can differentiate into skeletal myocytes, chondrocytes, fibroblasts, adipocytes, and osteoblasts at any age. Bone and cementum, which contains periodontal ligament fibers, are made by these cells. No research has looked at the use of periosteum for gingival recession deformities, despite the fact that its osteogenic potential has attracted a lot of interest as a grafting material for the repair of bone and joint abnormalities. In this case series, two patients with in the age group of 42 years and 36 years respectively diagnosed with Miller's class I and class II recession defects in maxillary & mandibular anterior teeth without any periapical pathology were selected. Periosteal pedicle graft technique was planned as the treatment protocol for isolated recession defects in both patients. In this case series, we delve into the intricacies of the Periosteal Pedicle Technique, exploring its clinical applications and the potential transformative impact it holds in periodontal therapy.

Keywords: Gingival recession, Periosteal pedicle graft, Partial thickness flap, Bone and periosteum.

1. Introduction

The displacement of the marginal tissue apical to the cemento-enamel junction (CEJ) is known as gingival recession [1]. Gingival recession may be brought on by a variety of circumstances. Therefore, an appropriate treatment is recommended to stop additional loss of periodontal tissues and to improve aesthetics, as untreated recession sites in patients are more likely to worsen than sites treated with gingival augmentation treatments [2]. Numerous methods have been developed to achieve consistent root coverage [3]. Along with the need of restoring the lost periodontal tissues, the goal of creating improved techniques for root coverage is to increase predictability, decrease the number of surgical sites, and improve patient comfort [4].

A graft that can be harvested next to the recession defect in adequate quantities without the need for a second surgical site is required. It should also have the ability to encourage the regeneration of lost periodontal tissue [5]. The cells of periosteum have the capacity to differentiate into fibroblasts, osteoblasts, chondrocytes, adipocytes, and skeletal myocytes at any age [6]. These cells create bone and cementum, which contains periodontal ligament fibers. Although the periosteum's osteogenic potential has drawn a lot of interest as a grafting material for the repair of bone and joint defects, no study has addressed the use of periosteum for gingival recession deformities [7]. Based on the above facts, A case series of two cases presents a periosteal pedicle technique to treat the gingival recession by using the periosteum as an autograft.

1.1. Case Description

Case 1: A 36 years old female patient reported to outpatient department of periodontology and oral implantology with a chief complaint of sensitivity to cold and elongation of teeth in upper region of mouth. Patient also experienced a sharp shooting pain on taking cold food and drinks. Medical and dental history was non-contributory. On thorough intra oral examination, there were multiple isolated recession sites present with RT1 gingival recession defects. Periodontal examination revealed 2 mm of gingival recession with respect to maxillary first premolar. On hard tissue examination, Class V caries was seen with respect to mandibular first premolar. Based on the clinical diagnosis, treatment plan was made for RT1 gingival recession coverage by periosteal pedicle graft technique as explained and is shown below fig. 2a- 2i.

Figure 2: (2a) Pre-operative clinical view showing RT1 gingival recession (2b) Horizontal incisions (2c) Vertical incisions (2d) partial thickness flap elevation (2e) Elevation of periosteum (2f) Suturing of Periosteal Pedicle graft covering recession defect (2g) Split thickness flap covering Periosteal Pedicle graft and suturing (2h) Periodontal Pack placement (2i) Post-operative follows up after 3 months.

CASE 2: A 42 years old male patient reported to outpatient department of periodontology and oral implantology with a chief complaint of food impaction and elongation of teeth in upper and lower region of mouth. Patient experiences sharp shooting pain on taking cold food and drinks. On thorough intra oral examination, there was generalized RT1 gingival recession present with respect to maxillary and mandibular teeth. Periodontal examination revealed 3 mm of gingival recession with respect to maxillary first premolar. On hard tissue examination, Cervical abrasions were also present with respect to maxillary & mandibular molars. Based on the clinical diagnosis, treatment plan was made for RT1 gingival recession coverage by periosteal pedicle graft technique as explained and is shown below

Figure 3: (3a) Pre-operative clinical view showing RT1 gingival recession (3b) Horizontal incisions (3c) Vertical incisions (3d) partial thickness flap elevation (3e) Elevation of periosteum (3f) Periosteal Pedicle graft covering recession defect (3g) Split thickness flap covering Periosteal Pedicle graft and suturing (3h) Periodontal Pack placement (3i) Post-operative follow up after 3 months.

1.2. Surgical Procedure

Complete oral prophylaxis was done before the procedure. Local anesthesia was administered with concentration of 2% lignocaine with 1:80000 adrenaline. An intrasulcular incision was made with no. 15 Bard Parker surgical blade at the buccal aspect of the involved tooth. Two horizontal incisions were made perpendicular to the adjacent interdental papillae, at the level of the CEJ preserving the gingival margin of the neighboring teeth (fig.1a). Two oblique vertical incisions were extended beyond the mucogingival junction and a split thickness flap was raised beyond 3-4 mm of mucogingival junction (fig. 1a). The flap was then pulled buccally to create tension on the periosteum. An incision was made through the periosteum where the flap was still attached to bone, to create a partial thickness flap (fig. 1b). The partial thickness flap was extended to expose a sufficient amount of the periosteum which was then separated from the underlying bone. Periosteum was then lifted slowly in a coronal direction and was not separated completely from the underlying bone, leaving it attached at its coronal most end (fig. 1c). The periosteal pedicle graft thus obtained was then turned over the exposed root surface and was sutured with 5-0 resorbable sutures (fig. 1d). After stabilizing the periosteal pedicle graft the split thickness flap was pulled coronally and was sutured with 5-0 resorbable sutures with interrupted suturing covering the periosteal pedicle graft (fig. 3a).

SURGICAL PROCEDURE

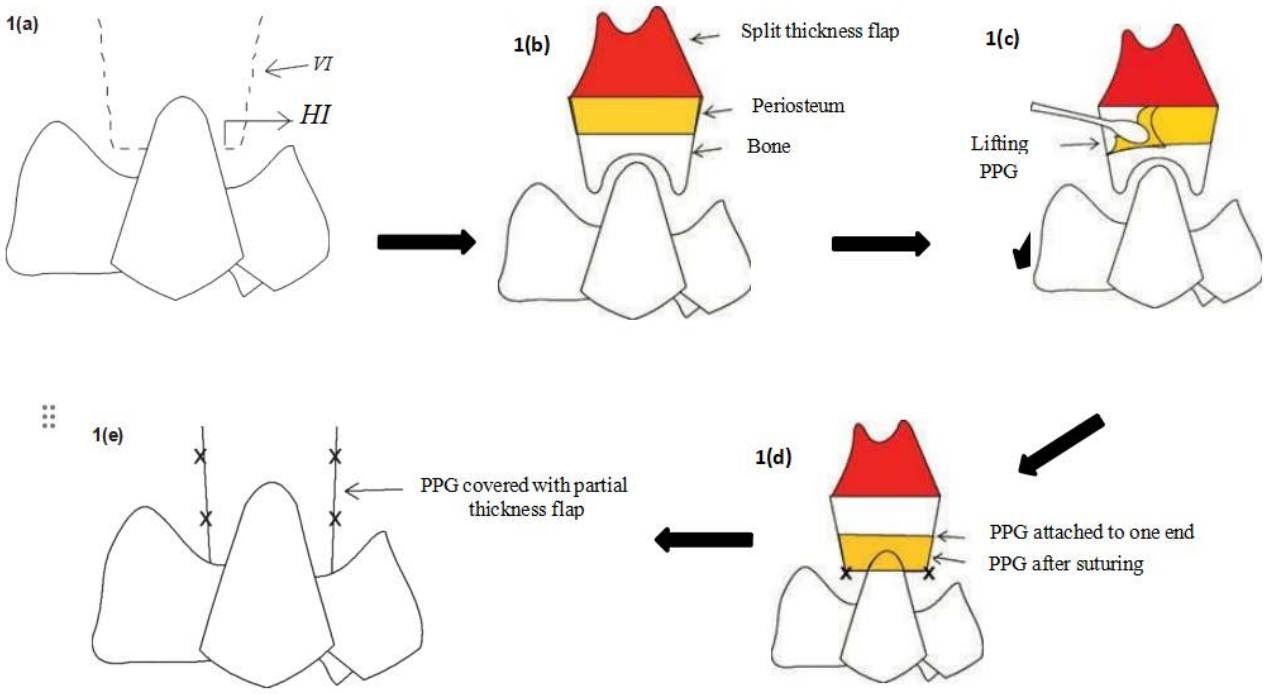

Figure 1: Vertical incision (VI) and Horizontal incision (HI). (1b) Periosteum and bone after raising split thickness flap. (1c) lifting the adhered periosteum from the bone. (1d) Periosteal pedicle graft after suturing. (1e) Periosteal Pedicle graft covered with the split thickness flap after surturing.18 (Mahajan A et al 2009).

Post-operative instructions were given and antibiotics Tab. Amoxiclav 625mg BD and Tab. Ketorol DT 10mg BD for 5 days were prescribed. Patient was recalled after 7 days for periodontal pack replacement. Follow up was done after 1 and 3 months which revealed complete root coverage and no sensitivity to hot and cold food.

2.Discussion

To achieve consistent root coverage in patients with gingival recession problems, numerous investigations have been conducted over the years [8]. The periosteum is a highly vascular connective tissue sheath covering the external surface of all the bones except sites of articulation and muscle attachment [9]. There are two layers that make up the periosteum: an outer fibrous layer and an interior cellular or cambium layer [10]. The periosteum has enormous regenerative potential since its outer layer is made up of dense collagen fiber, fibroblasts, and their progenitor cells, and its inner layer is home to a large number of osteoblasts and osteoprogenitor cells [11, 12]. Periosteum has long been used in dentistry and medicine. Numerous scholarly articles elucidating the osteogenic potential of human periosteal grafts have been published.

Lekovic et al. conducted a study in 1991 on the use of periosteum as a barrier membrane for the treatment of periodontal abnormalities [13]. Lekovic et al. and Kwan et al. repeated the same study in 1998[14, 15]. In their study, they replaced the periodontal deficiency with donor tissue using connective tissue grafts taken from the palate, and then they sutured gingival flaps over the donor tissue. The outcomes of this process were comparable to those of barrier membrane advancements. After mucogingival surgery, wound healing depends on blood supply maintenance, revascularization, and clotting [16]. Furthermore, on an avascular root surface, a vascular graft has a higher chance of survival. There is a rich vascular plexus in the periosteum [17]. Periosteal cells secrete vascular endothelial growth factor, according to a recent study.

The subepithelial connective tissue graft is considered the gold standard but it does have a number of shortcomings: the surgery requires a second operation to obtain the donor tissue from the palate, the amount of donor tissue is limited, the procedure significantly increases the complications and pain resulting from the surgery due to the need to surgically open a second site to obtain the donor tissue. The advantage of the periosteal graft 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 [18]. Despite being straightforward, the technique requires surgical precision from the operator, particularly during the periosteum, which is securely attached to the underlying bone, being raised. The operator should have good manual dexterity with very good skills. Also, the number of patients operated in this study was less. We have not yet evaluated the technique's long-term consequences, such as the pos-

sibility of root surface resorption via the periosteum. Randomized controlled trials comparing the outcomes of this method with previously developed methods ought to be a part of future research. Research on periosteal pedicle graft technique should also be tested histologically to analyze the regeneration potential of the tissue.

3. Conclusion

The periosteal pedicle graft technique emerges as a promising and innovative approach for addressing gingival recession defects. Its ability to avoid the creation of a second surgical site enhances patient comfort and reduces post-operative pain, while consistently yielding positive outcomes in the treatment of isolated recession defects. However, as with any evolving procedure, ongoing research is crucial to solidify its place as a routine intervention in periodontal care. By further investigating its safety, efficacy, and long-term results, we can confidently integrate this technique into our armamentarium for optimal management of gingival recession defects, ultimately enhancing patient outcomes and satisfaction.

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