

**Review Article****Periosteal pedicle grafts for treatment of gingival recession- A review***Priyalochana Gajendran¹**Periodontist & Oral Implantologist¹, Shree Annai Dental Clinic, Chintadripet, Chennai*

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*Received: 04.08.2022**Accepted: 17.08.2022**Web published: 25.08.2022***ABSTRACT:**

Gingival recession is the apical migration of marginal tissue and is one of the most common defects of periodontium encountered. Many treatment options are available for management of gingival recession. The use of periosteal pedicle grafts has been a recent development and has gained much attention and usage. Periosteum is a rich source of pluripotent stem cells and is highly vascular. Periosteal pedicle grafts have the ability to promote regeneration of lost periodontal structures. Unlike other grafts harvesting periosteal graft does not require second surgical site and hence healing is faster. Although there are many advantages of using periosteal grafts, limited number of scientific literatures is available for proper usage of grafts in treatment of gingival recession. The current review aims at providing an insight into current evidence on the role of periosteal grafts in management of gingival recession.

Keywords: *Mucogingival surgery, Periosteum, Regeneration, Recession, Pedicle graft*

Address for Correspondence:*Dr. Priyalochana Gajendran,**Periodontist & Oral Implantologist, Shree Annai Dental Clinic,**55/25, Agraharam Street, Chintadripet, Chennai, India – 600002**Email- priyalochana.87@gmail.com***INTRODUCTION**

Gingival recession is described as the shift of the gingival margin apically resulting in the exposure of the root

surface to the oral cavity [1]. The causative factors for gingival recession were found to be periodontitis, trauma to gingiva, tooth mispositioning, prominent root surface, high and aberrant frenal attachment, orthodontic tooth movement, alveolar bony dehiscence, thin gingival biotype and other iatrogenic and restorative factors [2,3]. Recession of gingival margins remains a highly prevalent problem due to its impact on aesthetics and in causing dentin hypersensitivity [4].

A narrow band of attached gingiva is insufficient to safeguard the periodontium from various frictional and pull forces developed due to the muscles of the adjacent alveolar mucosa on the gingival margin. Additionally, it might also result in the sub gingival plaque formation, resulting in further attachment loss leading to disability in performing adequate oral hygiene practice. Although gingival recession is un-noticed by few patients, esthetic problems and root hypersensitivity are major clinical complaints for many of them. The non-carious cervical lesions and root caries were also added complications of gingival recession.

Mucogingival surgeries are procedures done to treat such problems and prevent further complications. Periodontal plastic surgery is described as a “surgical procedure performed to correct or eliminate anatomic, developmental, or traumatic deformities of gingival or alveolar mucosa [5]. The most favorable outcome for periodontal therapy is to regenerate the lost supporting tissues [6]. Various techniques and procedures for gingival recession coverage have been described which includes pedicle flaps, autogenous grafts, allografts and the use of various bioactive agents. Techniques used for single tooth gingival recession coverage were tunnel and pouch technique [7], double papilla flap [8], lateral pedicle flap [9], sub epithelial connective tissue grafts along with coronally advanced flaps [10] and the sub pedicle connective tissue grafts [11]. Vestibular deepening with recession coverage is of prime importance in reduced vestibular depth. The sub epithelial connective tissue graft (SCTG) technique is still considered the gold standard for gingival recession coverage. This technique involves the second donor site for graft harvest from the palate combined with limited donor tissue, complications and pain resulting from the procedure [12,13,14].

The particular selection of a single technique depends on different etiological factors related to defect such as the amount of keratinized tissue adjacent to defect, recession size, dimensions of interdental soft tissue, aberrant frenal attachment and vestibular depth, while other patient related factors includes reduction of the number of surgeries and intraoral surgical sites along with the requirement to satisfy the patient’s aesthetic demands such as final tissue colour and tissue blend of the grafted area.

To overcome the disadvantage of free grafts, pedicle grafts have gained importance over the past few years. A pedicle graft is a soft tissue graft which involves repositioning the donor soft tissue from an adjacent area to receded gingiva and cover the exposed root surface. Pedicle grafts have an added advantage of retaining its own blood supply from the base of the flap, which can aid in the better regeneration of lost periodontal tissue. Thus, the current review aims to highlight the "Need of the hour" pedicle graft, for management of gingival recession with its current level of literature evidence.

PERIOSTEUM: The periosteum is a connective tissue sheath rich in vascularity covering the outer surface of all the bony structure except for the sites of bony articulation and muscular attachment [15]. The periosteum comprises of two layers, cellular or cambium layer present in the inner surface, and fibrous layer in the outer surface [16]. The inner cambium layer contains numerous osteoblasts and osteoprogenitor cells, and the outer fibrous layer is composed of dense collagen fiber, fibroblasts, and their progenitor cells [17]. These progenitor cells have the potential to differentiate into fibroblasts, osteoblasts, chondrocytes, adipocytes, and skeletal myocytes. The quality of the tissues produced by these cells include cementum with periodontal ligament fibers and bone [18], The osteogenic progenitor cells derived from the periosteal inner or cambium layer along with osteoblasts helps in the initiation and cell differentiation process of bone repair which is seen by the development of the early fracture callus and subsequent remodeling.

The periosteum is described as three discrete zones [19] with Zone 1 having an approximate width of 10–20µm which consists of osteoblasts predominantly representing 90% of cell population, while collagen fibrils comprise 15% of the volume. In zone 2 Fibroblast cells are the predominant type of cells with endothelial cells comprising the remainder. Zone 3 has the highest quantity of collagen fibrils and fibroblasts among all the three zones. Fibroblasts take up more than 90% of the cells in zone 3. Although fibroblasts can occur in all the 3 zones their external morphology differs in each zone. Periosteum is considered to be the ideal graft for the management of gingival recession defects as the osteogenic potential and presence of it close to the gingival recession defects in sufficient amounts accounts for it.

RATIONALE FOR USING PERIOSTEAL GRAFTS: The use of periosteum for the management of gingival recession is based on the following facts that [20]

1. Periosteum is a rich source of pluripotent stem cells, which when stimulated can regenerate different cell types and result in the regeneration of lost periodontal tissues.
2. Periosteum is high in vascularity.
3. Periosteum has an ability to promote vasculogenesis because of the release of various growth factors like vascular endothelial growth factors [21].
4. Periosteal graft has its own blood supply, which can be harvested adjacent to the recession defect in sufficient amounts without the requirement of any second surgical site.
5. According to Lo Melcher, periosteal activation results in the differentiation of cells with the ability to produce cementum and connective tissue which leads to enhanced cementogenesis and fiber reattachment to tooth structure, demineralized in situ [22].
6. Histologic studies carried out by Wilderman and Wentz have shown connective tissue attachment of the replaced tissues to previously denuded root surfaces is possible with the osteo stimulation of repositioned flap [23].
7. There is no limit on the quantity of the graft that could be harvested in case of Periosteal pedicle grafts. Hence Periosteal pedicle grafts are of great advantage to treat multiple adjacent gingival recession defects.

8. Being a pedicle graft periosteal graft is highly vascular and is ideal for placement over avascular root surfaces during root coverage procedures.

LIMITATIONS AND DISADVANTAGES: The limitations of this technique are

- a) It is a highly technique sensitive procedure
- b) Ideal for only single tooth recessions with an inadequate width of attached gingiva.

The technique described, still simple, requires surgical hand skills and dexterity of the operator skill, especially technical sensitivity during the lifting up of the periosteum firmly adherent to the underlying bone should also be carefully done. The long-term complications of this technique are the potential for the root surface by the periosteum undergoing resorption are yet to be completely assessed. Randomized controlled trials need to be done for future studies comparing this technique with the known techniques. Histological studies regarding the regenerative potential of PPG should also be undertaken.

Studies done regarding use of periosteal grafts: The use of periosteum in dentistry has been there for a very long period. The osteogenic potential of these human periosteal grafts has been explained in detail in various research papers [24,25,26,27]. Lekovic et al. used periosteum as a barrier membrane for the treatment of various periodontal defects which were published in 1991[28] and again in 1998[29] and Kwan et al [30]. In those above studies, they harvested the connective tissue grafts from the palate and the periodontal defect was covered with donor tissue before suturing with gingival flaps. This procedure produced similar results to those found with barrier membrane placement.

Rajpal et al. [31] and Shah et al. [32] reported similar cases where the Periosteal Pedicle Flap reflected during vestibular extension was used for root coverage procedure in a single tooth with Miller's Class II gingival recession. Mahajan et al reports successful management of multiple gingival recession defects utilizing Periosteal Pedicle Graft in twenty teeth in six subjects with Miller class I and II recessions [33]. About 90.95% of root coverage was obtained with significant increase in attached gingiva width. Kumar et al. reported good regeneration utilizing the periosteum as barrier membrane and alloplastic graft material [34]. Greenwell H et al [35] in 2005 showed that periosteal cells have ability to produce cementum, periodontal ligament and bone. Since Periosteum is present adequate near to the donor site area, it serves as an ideal tissue for root coverage procedures.

The Periosteal Pedicle Graft in two-wall intrabony defects was used by Singhal et.al and a 48.88% decrease in bone defect area after 6 months was reported [36]. In a case report by Harshavardhana et al ,periosteal pedicle grafts were used to treat two adjacent Millers class II recession defects. He reported an almost complete coverage of recession areas with reduced sensitivity [37]. Mishal et al reported a case with treatment of a class II Miller recession defect in lower anterior tooth with pedicle graft harvested from periosteum. A favourable outcome was obtained with nearly 100% coverage of recipient site [32].

CONCLUSION

In the current era of evidence-based dentistry, the Periosteal pedicle graft has become a dependent option for treatment of gingival recession defects even though it is early to predict long term success associated with Periosteal pedicle grafts. Future studies with long term follow-ups and histological evidences associated with healing of grafts with clinical photographs as well as randomized control trials comparing results of this technique with the techniques of established grafts used for management should be done to establish the use of Periosteal pedicle grafts as a treatment for gingival recession defects.

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