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Periosteal fenestration: A single stage surgical procedure for root coverage along with vestibular deepening

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Abstract

One of the most common mucogingival problems are gingival recession with decreased width of attached gingiva and shallow vestibule. Many techniques have been employed till date to increase the width of attached gingiva and for root coverage. But in all these techniques multiple surgeries had to be performed to achieve predictable results. In such procedures, firstly the width of attached gingiva is increased followed by a second surgery in which root coverage is carried out. In order to avoid patient discomfort, reduce the number of surgeries as well the number of surgical sites and to reconstruct the lost periodontal tissues, newer methods of root coverage need to be employed. Hence, in this paper we have described a single stage surgical technique for increasing the width of attached gingiva and root coverage with the use of periosteal pedicle flap.

Keywords: Gingival recession, width of attached gingiva, periosteal pedicle flap (PPF)

1. Introduction

Periodontal esthetic surgery not only emphasizes on rehabilitation of biological and functional problems that affect the periodontium but also focuses on the improvement in esthetic appearance. Periodontal plastic surgery is defined as a “surgical procedure performed to correct or eliminate anatomic, developmental, or traumatic deformities of gingival or alveolar mucosa [1]. Gingival recession is defined as exposure of root surface by the apical migration of junctional epithelium, resulting in an unesthetic appearance and dentinal hypersensitivity [2]. Gingival recession along with the inadequate width of attached gingiva and inadequate vestibular depth are very common clinical finding in the front region of the lower jaw.

A number of techniques have been used to attain sufficient root coverage and various grafting procedures can be employed for the same. However, the ideal requirements for a graft to be successful are : a. graft should have its own blood supply and it can be harvested adjacent to the recession defect without any need for a second surgical site and b. it should have the potential to promote the regeneration of lost periodontal tissue [3]. This case report describes an innovative surgical procedure to treat gingival recession, wherein vestibular deepening was done along with the fenestration technique and a layer of periosteum was scraped which was then used as a pedicle flap for root coverage procedure of a single tooth with gingival recession.

2. Case report

A 35-year-old systemically healthy male with no contraindications for periodontal surgery presented with a chief complaint of unaesthetic lower front teeth to the Department of Periodontology and Oral implantology, Rajasthan Dental College and Hospital (Figure 1). On clinical examination, 6 mm deep and 4 mm wide class II gingival recession (Miller, 1985) was observed on the lower right central incisor. (Figure 2 and figure 3). The patient also gave the history of tooth brush trauma. The width of attached gingiva and vestibular depth was inadequate in this region. Mobility was absent with respect to the associated tooth. A single stage fenestration technique was used for root coverage with the periosteal pedicle graft. This graft was obtained by the periodontal plastic surgery employed for the treatment of gingival

recession, inadequate width of attached gingiva and shallow vestibule. The surgical procedure was explained to the patient and an informed consent was taken from the patient. A general history, clinical examination and routine laboratory investigations were done for pre-surgical assessment of the patient. Phase I therapy i.e. oral hygiene instructions and scaling and root planing with ultrasonic and hand instruments was done prior to surgery. Surgical procedures were planned two weeks after phase I therapy. For the defined surgical procedure, bilateral local anesthesia was administered using a mental nerve block. No. 15 surgical blade was used to place a horizontal incision at the mucogingival junction and all of the attached gingiva was retained (Figure 4). A partial thickness flap was employed to expose the periosteum by removing all the muscles and tissues over it (Figure 5). A strip of periosteum was then elevated at the level of the mucogingival junction, creating a periosteal fenestration exposing the bone (Figure 6). Precautions were taken not to remove the periosteal strip completely and to leave it pedicled to the bone (Figure 7). Two horizontal incisions were placed at the recipient site. Initially, an intracrevicular incision was made followed by a second incision made parallel and apical to the first incision. This was followed by split thickness dissection of the facial tissue up to the level of the vestibular incision to create a tunnel (Figure 8). Root planing with curettes of the exposed roots was performed to remove bacterial contamination and root biomodification was done using the tetracycline powder mixed with saline. The donor periosteal tissue was then moved vertically towards the recession area, passing through the tunnel (Figure 9). The donor tissue was closely adapted to the recipient site by pressing for 3 min and was then sutured along with the overlying gingival tissue, to the recipient bed, using 5-0 resorbable sutures (Figure 10). Sutures were also placed in depth of the vestibule using resorbable 5-0 sutures (Fig 11). The operated area was then covered with a periodontal dressing (Coe-Pak; GC America Inc.) to prevent exposure of bone (Figure 12). Post-surgical medication included antibiotics (amoxicillin 500 mg, thrice daily) and analgesic (ibuprofen 400 mg twice daily) was prescribed for 5 days. Patient was instructed to discontinue tooth-brushing for the first 2 weeks at the surgical site and was instructed to use 0.2% chlorhexidine mouth rinse for 4 weeks after surgery. The periodontal dressing (Coe-Pak) was removed 10 days after the surgery and the patient was asked to maintain oral hygiene. Healing was uneventful and secondary wound closure was attained. 3 weeks post-surgery, healing was almost complete, without postoperative discomfort to the patient (Figure 13). At 6 months post surgery, nearly 100% root coverage of the recipient site was achieved with excellent esthetic result (Figure 14).



Fig 1: Class II Miller's recession in lower right central incisor.



Fig 2: 6mm length of recession.



Fig 3: 4mm width of recession.



Fig 4: vestibular deepening performed.



Fig 5: Periosteum being elevated to be used as graft.



Fig 6: Fenestration created.



Fig 7: Pedicled graft prepared.



Fig 8: Crevicular and horizontal incisions being placed to create a tunnel.



Fig 9: Area of recession covered with periosteal pedicle graft through the prepared tunnel.



Fig 10: Periosteal graft sutured at area of recession.



Fig 11: Sutures placed at area of recession and vestibular depth.



Fig 12: Coe-pak applied.



Fig 13: 3 weeks post-operative view.



Fig 14: 6 months post-operative view.

3. Discussion

Gingival recessions and shallow vestibule may occur without any symptoms, but this may cause discomfort for the patient due to unesthetic appearance, difficulty to perform plaque control procedures, dentinal hypersensitivity, etc., Several studies indicated that role of adequate depth of vestibule is very important for the maintenance of oral hygiene. Wennstrom and Pini Prato reported that combination of the shallow vestibule and inadequate width of attached gingiva might favor accumulation of food during mastication and difficulty in maintaining the oral hygiene [4].

Gingival recession can lead to root sensitivity, cervical root caries, decreased width of attached gingiva, and unpleasant esthetics. Miller defined complete root coverage as the location of soft tissue margin at the Cementoenamel junction presence of clinical attachment to the root, sulcus depth of 2 mm or less and absence of bleeding on probing [5]. Gingival recession defects can be corrected using various surgical techniques that have been developed over the years. Goldman was first to introduce the rationale and techniques of the emerging field of mucogingival surgery in 1956 [6]. Kazanjian first introduced techniques to deepen the vestibule in edentulous patients in 1924 [7]. Several techniques have been developed since 1956 but most of them are unsatisfactory due to scar formation and frequent relapse of the state of the vestibule because of all these technique exposing the extensive areas of bone. The purposes of developing new techniques are to increase predictability and to reduce patient discomfort by reducing the number of surgeries and the number of surgical sites, along with the satisfaction of the patient's esthetic demands, which include the final color and a tissue blend of the grafted area [8].

The ideal graft is one that should have its own blood supply and the potential for promoting the regeneration of lost periodontal structures. So in the present case report periosteal pedicle graft was used because the adult human periosteum is highly vascular and is made up of fibroblasts and their progenitor cells (i.e., Osteoblasts) and stem cells. The periosteum has the ability to differentiate into fibroblasts, osteoblasts, chondrocytes, adipocytes, and skeletal myocytes. These cells produce tissues which include cementum with the periodontal ligament fibers and bone; also, the periosteum is suitable for graft as it is present in sufficient amounts adjacent to gingival recession defects [9]. Very few studies have demonstrated the use of periosteum for the treatment of gingival recession defects successfully. Mahajan *et al* in 2009 reported the successful treatment outcome by using the periosteal pedicle graft for treating gingival recession defects [10, 11]. Lekovic *et al.* and Kwanm *et al.* used periosteum as a barrier membrane for the treatment of periodontal defects in

their studies [12, 13, 14]. A recent study reported that periosteal cells release a vascular endothelial growth factor [15]. The present case report successfully demonstrated a single stage technique for the treatment of inadequate width of attached and keratinized gingiva as well as gingival recession coverage utilizing the periosteum as autograft

In the present case, satisfactory reattachment occurred after the use of the pedicled periosteal flap and the vestibular deepening procedure resulted in an increased width of keratinized gingiva. According to LoMelcher such periosteal activation may result in the differentiation of cells portraying the ability to produce cementum and connective tissue and may lead to enhanced cementogenesis and fiber reattachment to tooth structure, demineralized in situ [16]. Histologic studies done by Wilderman and Wentz have shown connective tissue attachment of the replaced tissues to previously denuded root surfaces [17]. Hence, it can be safely said that there is some kind of connective tissue reattachment with the osteostimulated repositioned periosteal flap.

The major advantages of using this technique may be:

- a. High vascularity of the graft.
- b. Single surgical site.
- c. Patient comfort.
- d. Reduced intraoperative time and minimum postoperative complications.
- e. Low cost.

The patient maintained good plaque control throughout the follow up time period, and hence the plaque did not have any influence on the final result that was achieved.

4. Limitations

- a. Technique sensitive.
- b. Can only be used for single tooth recessions.

5. Conclusion

In the present case, excellent post-operative results were reported showing increase in width of attached and keratinized gingiva alongwithroot coverage. The surgical procedure yielded great results by achieving a greater degree of gingival coverage Also, there were no potential complications reported at any appointment for follow up. The quality of life was improved as the procedure met the esthetic demands of the patient, hence we can conclude that a periosteal pedicled flap, when combined with a fenestration technique for vestibular deepening, offers a successful and viable alternative for the coverage of localized gingival recessions.

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