



Management of a tooth with questionable prognosis using Guided Bone Regeneration(GBR)and Modified Vascularised Interpositional Periosteal Connective Tissue graft (VIP CT)

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ABSTRACT

Background - Guided bone regeneration is a reliable and effective method in augmenting osseous defects. But the management of ensuing gingival recession in grafted teeth is still a challenge. Even though, various surgical techniques are available for recession coverage, a reliable technique in a grafted site is still perplexing.

Methods –This case report describes management of periodontally compromised tooth with questionable prognosis in a 28 year systemically healthy male patient. Patient reported with functional and esthetic concern of maxillary central incisor, which is managed by guided bone regeneration and modified vascularised interpositional periosteal connective tissue graft (VIP -CT) with papilla preservation flap.

Conclusion- The use of modified vascularised interpositional periosteal connective tissue graft (VIP -CT) with papilla preservation flap has resulted in significant gain in clinical attachment level and tissue volume. Therefore, this technique could be considered as a valid option for management of recession coverage in a grafted tooth.

Key words - Palatoradicular groove, Guided bone regeneration, modified vascularised interpositional periosteal connective tissue graft (VIP -CT) , papilla preservation flap, questionable prognosis, favourable prognosis

INTRODUCTION

Maxillary incisors : the crown jewel of smile are responsible for incising food, articulating speech, support upper lip and contribute to the overall structure of face. Various morphological and anatomic abnormalities such as globulomaxillary cyst, supernumerary teeth, dens evaginatus, germination. fusion and palatoradicular groove are associated with maxillary anterior teeth^[1]. Of these palatoradicular groove (PRG) is an embryological anomaly which are more prone to periodontitis.

Periodontitis is a microbe associated, host mediated inflammation that results in loss of periodontal attachment. Clinically, this is detected by increased bleeding on probing, probing pocket depth, clinical attachment loss, tooth mobility and gingival recession. Radiographically, it is detected by bone loss^[2].

Periodontal involvement of the maxillary anterior teeth with mobility and gingival recession can have a significant impact on the function and appearance. Mobility is the degree of movement of a tooth in its socket resulting from an applied force and this can be caused by variety of factors. It has been an area of interest for researchers because of its practical and scientific significance, serving as an important diagnostic indicator to check the integrity and functional homeostasis of the periodontium. Tooth mobility with palatoradicular groove is related to loss of physical, biological and hydrodynamic properties of complex periodontal connective tissue system.

Faulty tooth brushing, periodontal disease, and malpositioned teeth are the common causes of gingival recession in the upper anterior teeth, where there is an apical shift in the marginal gingiva, exposing the root surfaces. This can lead to tooth hypersensitivity, root caries and aesthetic concerns.

Attachment loss and bone loss are characteristic features of periodontitis. Horizontal bone loss occurs more commonly than vertical bone loss. Intra-bony defects can be classified into one wall, two wall, three wall or combination of defects. Wade^[3], Ellegard and Loe^[4] have reported healing of bony pockets, if the patient has good oral hygiene maintenance. However healing mainly depends on type of bony defect.

This case report describes a periodontally compromised tooth with a questionable prognosis, exhibiting gingival recession, clinical attachment loss >50%, interdental bone loss, and grade II mobility. The conversion of teeth with questionable or poor prognosis into a favourable prognosis depends on the management of periodontitis. This report describes the multifaceted management of one such case.

Case report

A 28-year male reported with a chief complaint of mobility, pus discharge, and receding gums in upper front tooth region. Upon enquiring about his past dental history he reported no previous history of trauma. However, he had earlier episodes of pain and mild swelling for which he did not undergo any treatment. Medical history was non-contributory.

Intra-oral examination revealed an intact crown without any carious involvement in tooth 11. An interdental space of 2mm in the middle third of the crown of tooth 11 and 12 and 4mm of interdental space at the level of Cemento-enamel Junction (CEJ) were observed. The marginal gingiva was rounded, soft and pink in color. Upon probing, an indentation continuing as a linear groove could be felt in the disto-radicular region of tooth 11 with a probing pocket depth (PPD) of 10mm. A labial gingival recession of 4mm with Miller's grade II mobility was also present in tooth 11. Pus discharge and tenderness on percussion was noted in the same tooth. The electric pulp testing of tooth 11 revealed no response. An intra-oral periapical radiograph (IOPA) revealed interdental vertical bone loss extending up to the middle third in distal aspect of tooth 11 (Figure 1). Based on the clinical and radiographic

evaluation the patient was diagnosed with grade 3 endoperio lesion without any root damage.No abnormalities were detected in routine haematological investigations.

Endodontic treatment followed by Guided bone regeneration was planned.If required, a second stage surgery for recession coverage was planned. The risks and the benefits of the procedure were explained to the patient, and a written informed consent was obtained.

Phase I periodontal therapy, along with root canal treatment of tooth 11 was completed. After three months, an improved gingival health and PPD reduction to 8mm was noted in tooth 11.Under local anesthesia, a full thickness flap elevated in teeth 12,11 and 21.Debridement and degranulation were performed. A shallow (<1mm) distoradicular groove extending from the central fossa to the apical third of the root and a deep combined intrabony defect extending to the apex of tooth 11 were noted (Figure 2).

Using a high speed diamond bur with continuous water supply, odontoplasty was carried out to eliminate the groove.The vertical bone defect was filled with demineralised bone matrix derived type I collagen (Osseograft^{*}) (Figure 3) followed by placement of resorbable collagen membrane (Healiguid[†]). The flap was then repositioned and approximated using 3-0 vicryl suture and a periodontal dressing was applied.

Post operative analgesics (Paracetamol 500 mg thrice daily) and antibiotics (Amoxicillin 500 mg thrice daily) were prescribed for five days.Post operative wound healing was uneventful.

One year following surgery, reduction in mobility and PPD were noted IOPA showed radiographic bone fill. A 8 mm of labial gingival recession was noted in tooth 11(Figure 4).

A second stage mucogingival surgery was planned after considering the following factors – i) To enhance esthetics ii) to increase the width of attached gingiva, iii) to improve oral hygiene maintenance.

Under local anesthesia, a full thickness papilla preservation flap raised in the distal aspect of 11 and a partial thickness tunnel created in the mesial aspect of 11 (Figure 5).The donor site for harvesting the connective tissue graft was prepared by making a horizontal incision angled 90⁰ to the palate, starting from the distal aspect of the prepared recipient bed on the palatal side. The horizontal incision was extended parallel to the gingival margin of teeth 12 to 15 and 3 mm apical to the gingival margin. Then, the blade was angled to dissect the subepithelial connective tissue graft from the superficial epithelium and underlying bone. At the distal end of the sub-epithelial dissection, a vertical incision was made.A second incision was then made internally, under tension, just at the apical extent of the preceding vertical incision, and extended anteriorly to tooth 11.A pedicle flap was raised with its base attached anteriorly(Figure 6). The graft was rotated and passed towards the recipient site between the interdental space of teeth 11 and 12, and through the tunnel in the mesial aspect of tooth 11.The graft was immobilised by placing sutures laterally and apically. The recipient site and donor site were sutured with absorbable sutures(Figure 7 and 8). Periodontal dressing was given. Post operative instructions were given.Amoxicillin (500 mg three times per day for five days) and ibuprofen (400mg SOS) were prescribed. For two weeks, patient was instructed to rinse with 0.12% chlorhexidine solution.

The post-operative wound healing was uneventful and there was a 5mm gain in clinical attachment level(Figure 9). After six months, the patient was referred to the Department of Prosthodontics for permanent rehabilitation and prosthesis fabrication. For the first year, the postoperative follow-up was done every three months.

Discussion

The Palatoradicular groove(PRG) is a developmental anomaly of variable extent and depth and that may involve a communication between pulp and periodontal tissue. PRG is also referred to as the palatogingival groove, radicular groove, radicular lingual groove, facial radicular groove, distolingual groove, distoradicular groove and developmental groove ^[5]. It is typically located in the midplatal aspect, but if the groove is present on the lateral surface, either mesial or distal, it is more commonly associated with periodontal pockets. This is because lateral surfaces are more susceptible to plaque accumulation and more difficult for plaque removal^[6].The PRG can be classified based on its depth or the degree of invagination into flat/shallow (< 1 mm), deep (> 1 mm), or a closed tube^[7]. According to its extent and complexity, it can be classified as mild, moderate and complex ^[8].The prognosis of a tooth with PRG depends on its location, extent and type of groove, access to the defect area, and the amount of supporting periodontal tissue destruction.

The present case describes a tooth that is compromised periodontally and had a questionable prognosis. This tooth exhibited a moderate and shallow distoradicular groove, gingival recession, clinical attachment loss of more than 50%, interdental bone loss and grade II mobility. Various treatment modalities have been recommended for periodontitis with a palatoradicular groove such as scaling and root planning, flap surgery, guided bone regeneration, guided tissue regeneration (GTR) and odontoplasty, restoration of the defect, and if necessary, root canal treatment.

In the present case, since the tooth was non vital, root canal treatment was carried out. Furthermore, an odontoplasty was carried out as the groove was shallow and moderate. Followed by bone graft with GTR membrane to manage periodontal tissue destruction and interdental bone loss. One year following the surgery, the patient exhibited labial gingival recession and because of the functional and esthetic concern a second stage mucogingival surgery was planned.

Sclar^[9] described a pedicle connective tissue graft technique for soft tissue augmentation in the implant site called vascularised interpositional periosteal connective tissue graft (VIP-CT) in his work named "Soft Tissue and Esthetic Consideration in Implant Therapy." He recommended two vertical incisions in the palatal donor site, two exaggerated curvilinear cutback incisions in the receiver site, and a subepithelial connective tissue graft with periosteum was undermined and reflected. The raised pedicle graft was advanced to the donor site and sutured. The author has suggested that this method has a number of benefits, including colour matching, less post-operative shrinkage, vascularity, and shorter operating times. However, it has certain limitations, such as the inability to use it in shallow vestibular depth, deep palatal vault, and decreased palatal thickness. In 2012, Kim et al. suggested a

modified VIP-CT graft with a papilla preservation flap in the recipient site and proposed less postoperative shrinkage and the prevention of papillary loss^[10].

Several periodontal plastic surgery procedures are available for recession coverage however, in the present case, a modified vascularised interpositional periosteal connective tissue graft (VIP -CT) with papilla preservation flap was planned after considering the following factors – i) Minimal postoperative shrinkage, ii) The risk to benefit ratio is better than with other harvesting methods because the donor site is largely protected, iii) An intact blood supply from donor site minimizes graft necrosis and reduces the amount of postoperative graft shrinkage, and the fact that recipient site is a grafted site, iv) prevention of papillary loss v) Adequate interdental space (Minimum 2mm of interdental space required for successful VIP CT rotation and stabilisation). The rotation of the palatal soft tissue from donor to recipient site has improved the flexibility and stability of the graft.

Conventionally, VIP-CT is used for soft tissue augmentation around implants or edentulous sites. However, in this particular case, VIP-CT was used for recession coverage with certain modifications. The use of this technique resulted in successful recession coverage in the maxillary central incisor, which had a questionable prognosis, and achieved a satisfactory aesthetic result.

Conclusion

The distoradicular groove is an uncommon developmental anomaly on the maxillary central incisor that occasionally leads in combined endodontic-periodontal lesion with significant periodontal destruction of the tooth, which has been associated with a poor or questionable prognosis. With the understanding of the characteristics and therapeutic principles, the current case is treated. A significant gain in clinical attachment level, bone fill, and tissue volume has been achieved.

Despite the lack of long-term follow-up on the case, the adoption of the VIP-CT flap appears to be a good substitute for currently available procedures for recession covering in the grafted tooth. More research, however, is required to confirm these findings in a larger number of patients.

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FIGURE LEGEND

Figure 1 - Pre operative image depicting recession and probing pocket depth (PPD) in tooth 11 and intraoral periapical radiograph (IOPA)

Figure 2 - Intraoperative photograph showing intrabony defect and distoradicular groove in distal aspect of tooth 11 after flap reflection

Figure 3 - Bone graft placement in the intrabony defect

Figure 4 - One year post operative clinical photograph and IOPA depicting bone fill in distal aspect of tooth 11

Figure 5 - Depicts recipient site preparation

Figure 6 - Vascularised interpositional periosteal connective tissue graft (VIP-CT) harvest from the right side of palate

Figure 7- VIP-CT placement and suturing in the recipient site

Figure 8 – Suturing the donor site

Figure 9 - Post operative photograph



Figure 1

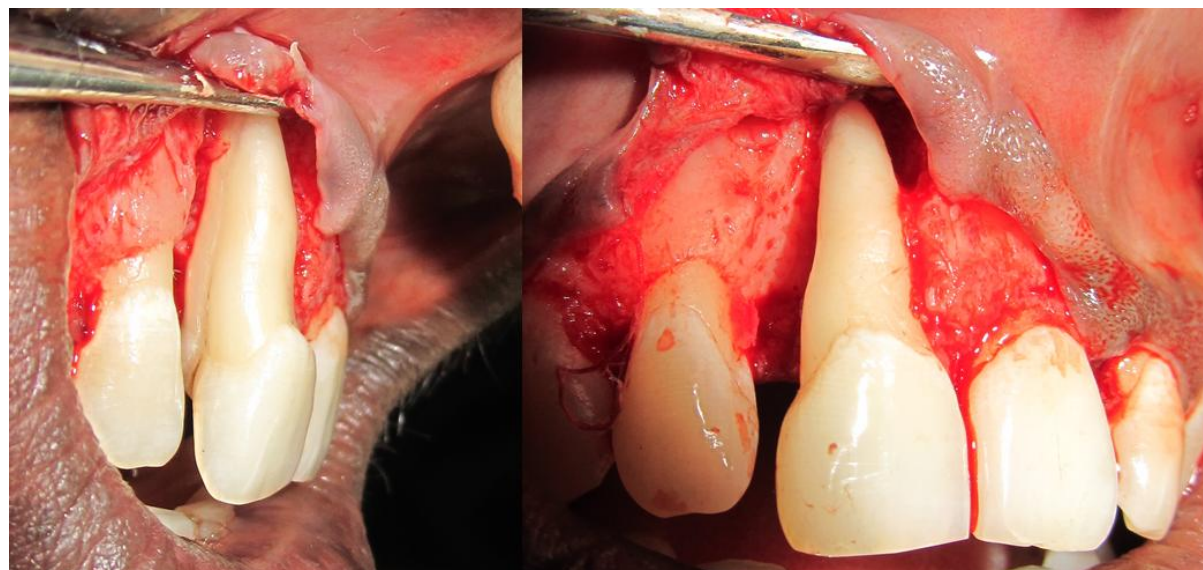


Figure 2

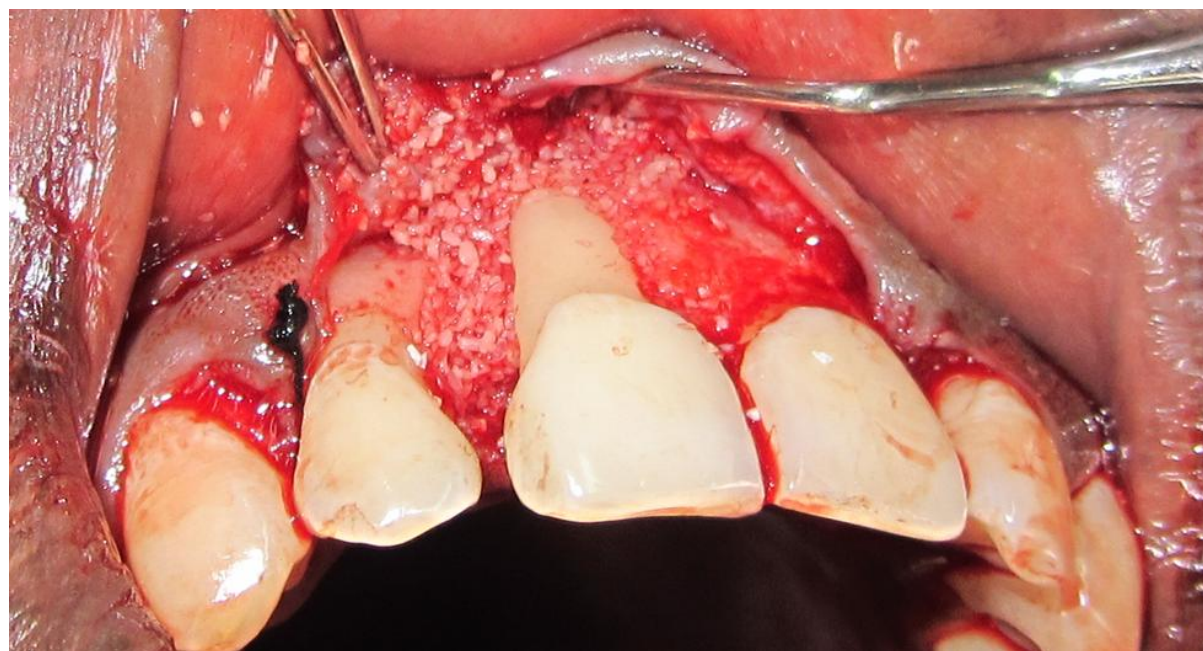


Figure 3

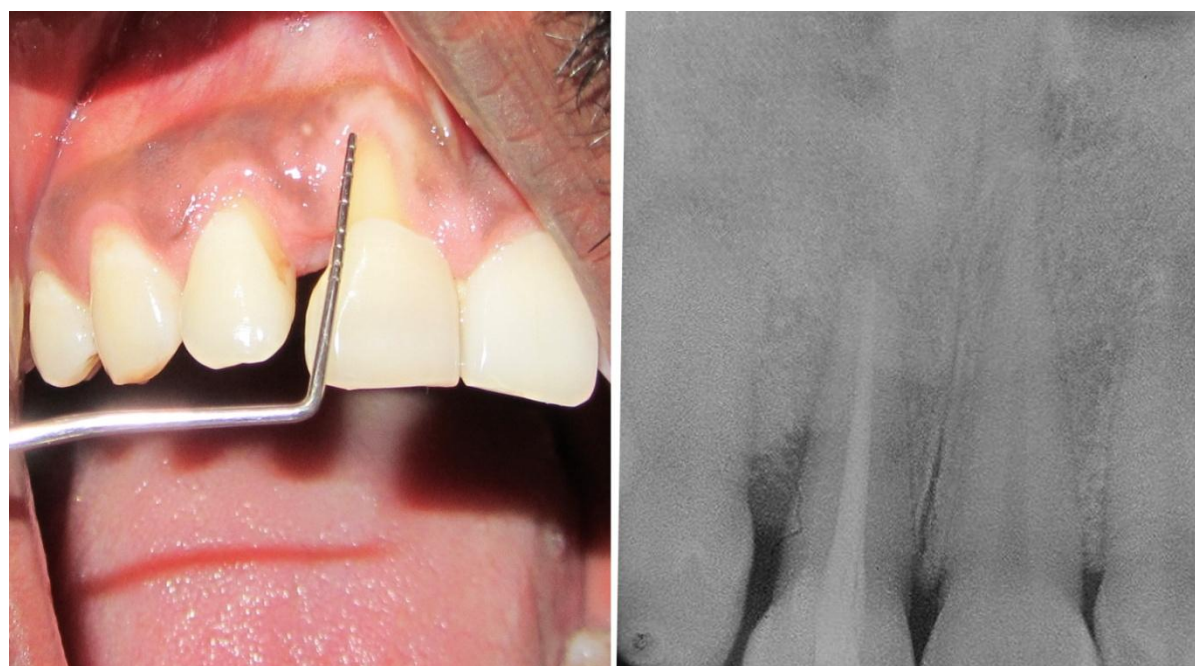


Figure 4

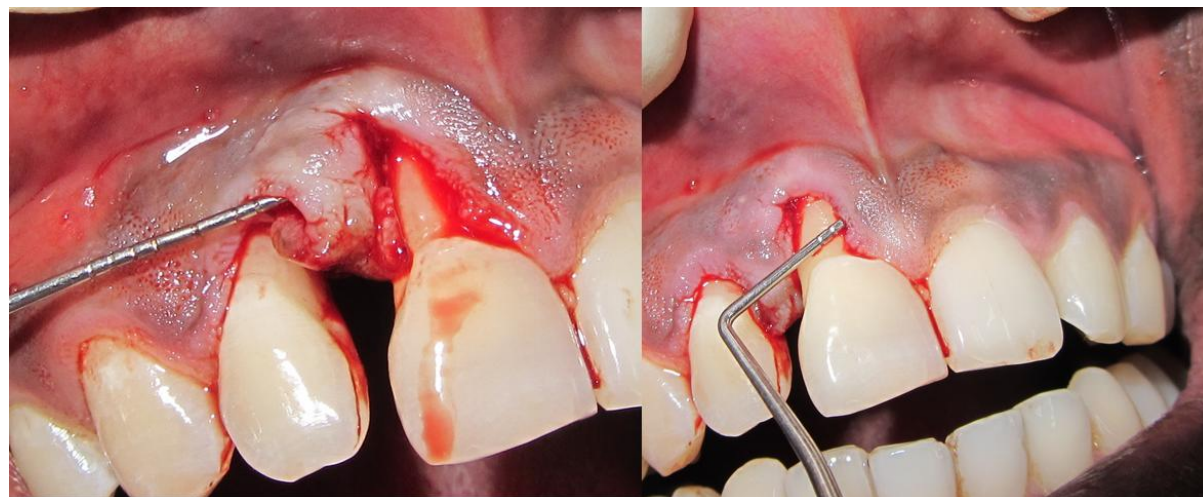


Figure 5

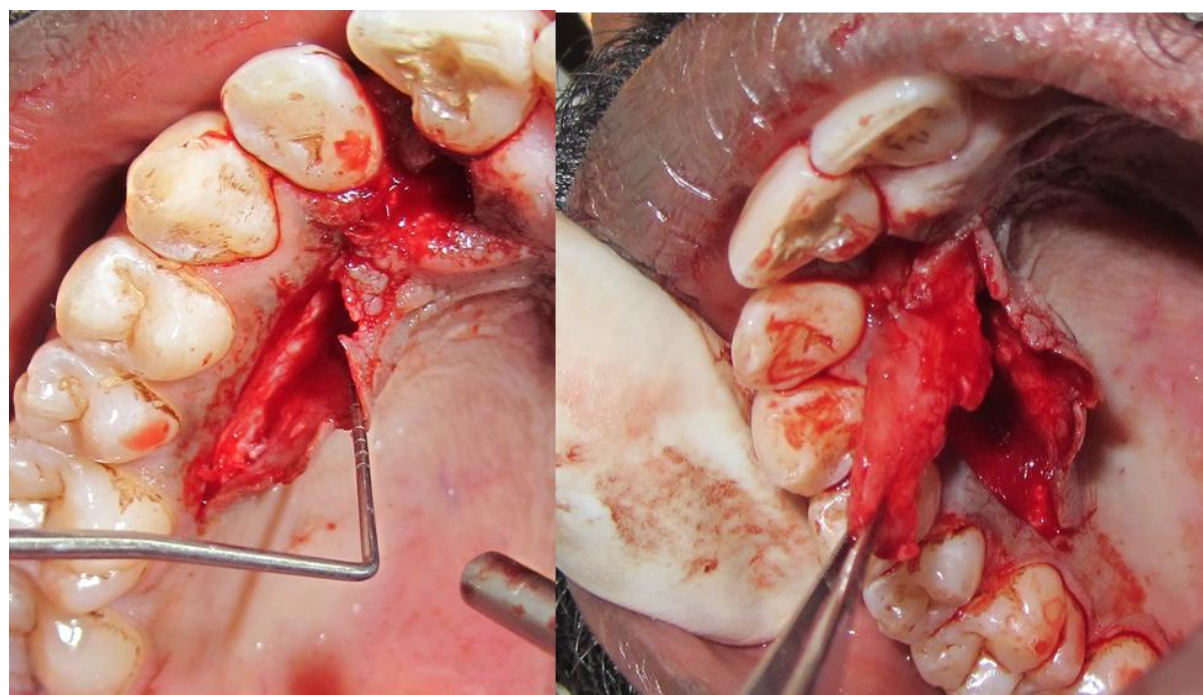


Figure 6



Figure 7



Figure 8



Figure 9