Keywords
Peri-implantitis, Dental implants, Guided tissue regeneration, Connective tissue graft, Bone graft, Peri-implant soft tissue management.

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Treatment Modalities of Surgical Management of Peri- Implantitis: Case Reports

Abstract

Purpose: Peri-implant complications such as peri-implant bone loss and soft tissue recession can compromise both the functional stability and esthetic outcome of dental implants .The present case reports highlights the successful management of peri-implant defects using a combination of regenerative and mucogingival surgical procedures aimed at restoring peri-implant hard and soft tissue health.

Methods: In the first case, a 29-year-old male patient reported mobility associated with an implant in relation to 31, accompanied by peri-implant inflammation and deep peri-implant probing depths. Radiographic examination demonstrated considerable peri-implant bone loss. Following phase I therapy, surgical treatment was carried out with implant surface decontamination followed by regenerative therapy using a synthetic bone graft (NovaBone) and a guided tissue regeneration membrane (CollaGuide). Soft tissue closure and defect adaptation were achieved using a double papilla flap technique. In the second case, a 35-year-old female patient presented with buccal implant exposure in relation to 13, resulting in compromised esthetics. A connective tissue graft (CTG) procedure was performed to increase peri-implant soft tissue thickness and obtain coverage of the exposed implant surface.

Results: Both cases exhibited favorable healing outcomes during follow-up evaluations. Reduction in peri-implant inflammation, improvement in peri-implant tissue architecture, enhanced soft tissue stability, and satisfactory esthetic integration were observed. Radiographic and clinical assessments demonstrated successful management of the peri-implant defects with improved tissue health and patient satisfaction.

Conclusions: The combined use of regenerative and mucogingival surgical techniques offers a predictable and effective approach for the treatment of peri-implant defects. Appropriate management of both hard and soft tissues can significantly improve peri-implant stability, tissue health, and esthetic outcomes, thereby enhancing the long-term prognosis of implant-supported restorations.

Introduction

Peri-implant diseases are broadly categorized into peri-implant mucositis and peri-implantitis based on the extent of tissue involvement. Peri-implant mucositis is confined to a reversible inflammatory reaction within the peri-implant soft tissues, whereas peri-implantitis is characterized by progressive inflammatory destruction involving both the soft tissues and the supporting alveolar bone surrounding an osseointegrated implant[1]. Although these definitions are widely recognized, ambiguity still exists regarding standardized diagnostic criteria.

Bleeding on gentle probing is considered a key clinical indicator for peri-implant mucositis, reflecting inflammatory changes limited to the mucosa. In contrast, peri-implantitis is identified by the presence of bleeding on probing, often accompanied by increased probing depths, suppuration, and radiographic evidence of crestal bone loss[2]. These changes are generally irreversible and may compromise implant stability if not addressed in a timely manner.

The etiology of peri-implant diseases is predominantly microbial in nature[3]. The biofilm associated with peri-implant tissues typically consists of gram-positive facultative bacteria; however, gram-negative anaerobic species have also been detected, particularly in diseased sites. In addition to microbial factors, local contributing elements such as residual submucosal cement have been implicated as potential initiators of inflammatory reactions by acting as plaque-retentive foreign bodies. Moreover, non-microbial factors, including biomechanical overload, may contribute to implant complications and failure.

Peri-implant infections often develop gradually over time, resembling the progression pattern of periodontal diseases[4]. Evidence suggests that individuals with a history of periodontitis may exhibit an increased susceptibility to peri-implantitis, possibly due to the transfer of pathogenic microorganisms from natural teeth to implant surfaces[5]. This highlights the importance of achieving and maintaining periodontal health prior to and following implant placement.

Various methods have been proposed for the decontamination of infected implant surfaces, including mechanical, chemical, and laser-assisted techniques[6]. Despite extensive research, no single approach has been established as the definitive standard. Surgical intervention is frequently required in advanced cases to gain adequate access for thorough debridement and surface detoxification.[7]

In situations where the defect morphology is favorable, regenerative approaches using bone grafts and barrier membranes have demonstrated promising outcomes. Contained defects, in particular, provide an environment conducive to graft stability and bone regeneration. The combination of implant surface decontamination and reconstructive therapy has shown encouraging clinical and radiographic results in several studies.

The present two case reports aims to demonstrate the clinical outcomes of surgical management of peri-implant defects using regenerative techniques & Perio plastic procedures emphasizing the role of effective implant surface decontamination and the application of bone graft substitutes in achieving favorable healing and long-term stability.[8-9]

Case Description

Case 1

A 29-year-old male patient, systemically healthy with no known allergies or contraindications to surgical intervention, reported to the Department of Periodontics, ITS dental college and Research centre and Hospital Greater Noida, Uttar Pradesh, India, with the chief complaint of mobility and inflammation associated with a dental implant in the mandibular anterior region (31), placed approximately 6 months prior. The patient also reported bleeding and discomfort during function. Clinical examination revealed inflamed peri-implant soft tissues with bleeding on probing and increased probing depths of 8–10 mm. (Fig 1) The implant exhibited Grade I mobility, and approximately two implant threads were clinically exposed. Radiographic evaluation demonstrated a peri-implant radiolucency suggestive of significant bone loss. The patient also presented with an aberrant frenum pull in relation to the peri-implant region, which contributed to continuous movement and tension of the marginal peri-implant soft tissues during lip function. This mechanical traction was considered a contributing factor to plaque accumulation, soft tissue instability, and progression of peri-implant inflammation. (Fig 2) Therefore, prior to definitive peri-implant surgical therapy, a diode laser frenectomy was performed to eliminate the high frenum attachment and reduce the tension on the peri-implant mucosa. Following adequate healing and improvement in soft tissue mobility, regenerative surgical treatment was carried out to achieve better soft tissue stability and favorable peri-implant healing outcomes. After satisfactory healing of the laser frenectomy site, surgical management of the peri-implant defect was undertaken.

A diagnosis of peri-implantitis was established, and an initial phase of nonsurgical periodontal therapy was performed to reduce inflammation. Following re-evaluation, surgical management was planned. (Fig 3)Under local anesthesia, a full-thickness mucoperiosteal flap was elevated, revealing granulation tissue surrounding the implant, which was carefully debrided. Mechanical decontamination of the implant surface was performed using implant-safe curettes, followed by chemical detoxification to enhance surface biocompatibility.(Fig4) During the surgical procedure, laser biostimulation therapy was also performed to enhance healing and tissue regeneration. Low-level laser therapy (LLLT) was utilized because of its beneficial effects on cellular activity, angiogenesis, collagen synthesis, and reduction of postoperative inflammation.(Fig5)The resulting circumferential osseous defect was managed using a regenerative approach. A synthetic bone graft substitute (NovaBone) was placed into the defect, followed by coverage with a guided tissue regeneration (GTR) membrane (CollaGuide) to facilitate selective cell repopulation and stabilize the graft.(Fig6)A double papilla flap technique was then employed to achieve adequate soft tissue coverage and tension-free primary closure.(Fig7) Sutures were placed

to ensure optimal healing.Postoperative care included systemic antibiotics, analgesics, and chlorhexidine mouth rinse. Healing was uneventful, and sutures were removed after 10–12 days. (Fig8)At 6 months follow-up, there was a marked reduction in probing depths, absence of bleeding on probing, and improvement in peri-implant tissue health. Radiographic evaluation demonstrated satisfactory bone fill in the defect area, and the implant showed improved clinical stability, indicating successful management of the peri-implantitis lesion through a combined regenerative and soft tissue corrective approach.

Figure 1- Pre-operative view showing peri-implantitis in mandibular anterior region(31) with inflamed peri-implant soft tissue and bone loss around the implant

Figure 2 - Laser-assisted mandibular anterior (31) frenectomy

Figure 3- After healing flap reflection and Intraoperative laser biostimulation performed

Figure 4- Surgical exposure and debridement of the peri-implant defect & Placement of bone graft

Figure 5- Defect dimension was measured with the periodontal probe and GTR membrane trimmed accordingly

Figure 6- GTR membrane stabilized over the grafted site with double papilla flap closure .

Figure 7- Flap secured using sling and mattress suturing technique ensuring primary closure and stability

Figure 8- 6-months follow-up demonstrating satisfactory soft tissue healing along with evident formation of keratinized tissue around the implant

Case 2

A 35-year-old female patient, systemically healthy with no significant medical history, reported to the Department of Periodontics, ITS dental college and Research centre and Hospital Greater Noida, Uttar Pradesh, India, with the chief complaint of buccally implant exposure and compromised esthetics in the maxillary anterior region wrt 13. The patient expressed concern regarding the unaesthetic appearance of the implant, especially during smiling. (Fig9)Clinical examination revealed buccal exposure of the implant fixture with thinning of the overlying soft tissue. The peri-implant mucosa appeared delicate with thin biotype, although no significant bleeding on probing or suppuration was noted. The exposed implant threads were clearly visible on the buccal aspect, indicating soft tissue deficiency rather than an active inflammatory lesion.

Considering the esthetic concern and soft tissue inadequacy, a mucogingival surgical approach was planned. After initial phase therapy and oral hygiene reinforcement, a connective tissue graft (CTG) procedure was performed to augment the peri-implant soft tissue. (Fig10)Under local anesthesia, a full thickness flap was carefully elevated at the recipient site to create a pouch for graft placement.(Fig11) A connective tissue graft was harvested from the palatal donor site using a Zucchelli technique and was positioned over the exposed implant surface wrt 13 to increase tissue thickness and achieve coverage. (Fig12-13) The graft was stabilized, and the overlying flap was repositioned to ensure adequate adaptation and vascularization. (Fig14) Sutures were placed to achieve primary closure.

Postoperative care included analgesics, chlorhexidine mouth rinse, and instructions to avoid mechanical trauma to the surgical site. Healing was uneventful, with satisfactory graft integration observed during 6 month follow-up visits. (Fig15) A significant improvement in soft tissue thickness and coverage of the previously buccally exposed implant threads was noted. The peri-implant tissues appeared healthier, with enhanced esthetic outcomes and patient satisfaction. This case highlights the effectiveness of connective tissue grafting in managing peri-implant soft tissue deficiencies and improving esthetics in the anterior region.

Figure 9- Pre-operative view showing thin gingival biotype leading to implant exposure

Figure10- Incision & Flap reflection

Figure 11- Flap reflection of the exposed implant surface

Figure 12- Measurement for CTG harvesting from the donor site

Figure 13 –Harvesting CTG from donor site

Figure 14– Harvested CTG

Figure 15 – CTG adapted and Flap repositioned and primary closure over the

Figure 16- 6 months follow up demonstrating satisfactory soft tissue thickness and implant

Discussion

Peri-implant defects require a tailored therapeutic approach based on the underlying pathology and tissue involvement. In cases presenting with peri-implantitis and associated bone loss, surgical intervention with regenerative therapy plays a crucial role. The use of bone graft substitutes such as NovaBone in combination with a guided tissue regeneration (GTR) membrane like CollaGuide facilitates defect fill by promoting osteoconduction and preventing epithelial downgrowth [10]. Adequate implant surface decontamination and stable flap closure further enhance the healing outcome, resulting in reduced probing depths, resolution of inflammation, and improved implant stability.

In situations involving peri-implant soft tissue deficiencies, particularly in the esthetic zone, connective tissue grafting remains a predictable and effective modality. CTG improves soft tissue thickness, enhances the width of keratinized mucosa, and provides better coverage of exposed implant surfaces. This leads to

improved tissue stability and esthetic integration [11].

Overall, successful management of peri-implant conditions depends on proper diagnosis, appropriate surgical technique, and strict postoperative maintenance to ensure long-term clinical success.The successful management of peri-implant conditions relies on accurate diagnosis and an appropriate selection of surgical techniques based on defect characteristics. Regenerative therapy using bone grafts and GTR membranes can effectively restore lost peri-implant bone and improve implant stability in cases of peri-implantitis. Similarly, connective tissue grafting serves as a predictable approach for enhancing soft tissue thickness and achieving satisfactory esthetic outcomes in cases of implant exposure [12].

With meticulous surgical execution and proper maintenance, both approaches can lead to favorable clinical outcomes and long-term stability of dental implants.

Conflict of Interest

No potential Conflict of interest relevant of this article was reported.

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