Case Report

DOI: 10.7860/JCDR/2023/64123.18531

Dentistry Section

Surgical Success in Peri-implantitis Management using Guided Bone Regeneration: A Case Report with 2-Year Follow-up

BASKARAN SHIVAKUMAR[1], KULANDAIVELU GAYATHRI[2], ARUMUGANAINAR DEEPAVALLI[3]

ABSTRACT

Dental implant-supported restorations have become a potential treatment option for edentulous patients. However, complications may arise due to an inappropriate selection of patients and/or inadequate treatment planning, along with irregular maintenance. In such scenarios, peri-mucositis and Peri-Implantitis (PI) may occur as sequelae to dental implants. The prevalence rates of these complications are reported to be high. Inflammation of peri-implant soft tissue and resorption of supporting bone are significant features of PI. Routine evaluation should include Probing Pocket Depth (PPD) measurement and radiographic assessments to determine pathological changes in the peri-implant tissue. Treatment modalities for PI include non-surgical therapy, local drug delivery, anti-infective therapy, and surgical management focused on regenerating the lost peri-implant tissue. This case report demonstrates successful surgical management of PI in a 22-year-old male patient who presented with exudate in relation to an endosseous implant in the 12 region, with a PPD of 7 mm and peri-implant bone loss. Meticulous planning and comprehensive management led to the implant finally being restored to a healthy and fully functional status.

Keywords: Allograft, Peri-mucositis, Probing pocket depth, Xenograft

CASE REPORT

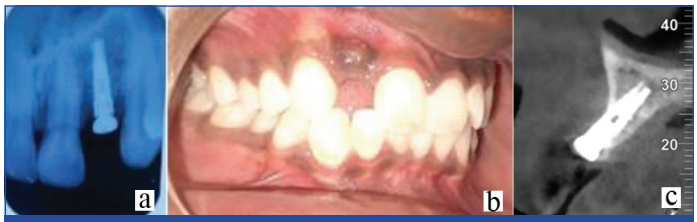
A 22-year-old male patient presented to the Department of Periodontology, Ragas Dental College and Hospital, Chennai, with a chief complaint of exudate present in the right upper front region for one week. The patient reported a history of trauma and fracture of the right upper lateral incisors (#12) two years ago, which required extraction. A dental implant was placed as a replacement, but prosthetic rehabilitation was postponed due to the COVID-19 pandemic.

During clinical examination, exudate was observed upon digital pressure, and there was Bleeding On Probing (BOP) along with a lack of keratinised tissue (1 mm) in relation to #12, with a PPD of 7 mm. An Intra-Oral Peri-Apical (IOPA) radiograph revealed angular bone loss up to the coronal third on the distal aspect of the implant. Cone Beam Computed Tomography (CBCT) showed a Class III b defect, as defined by Monje A et al., which included 2-3 walled defects with horizontal bone loss [1]. Therefore, a diagnosis of PI in relation to the #12 region was made [Table/Fig-1].

Based on the clinical findings, a treatment plan was formulated, which involved non-surgical debridement followed by surgical treatment with bone replacement graft and connective tissue membrane for regeneration. The patient provided written informed consent prior to the treatment.

Surgical Therapy

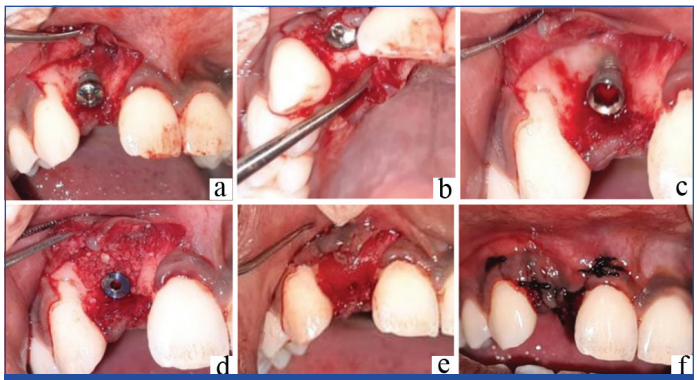
After completion of phase I therapy, the patient underwent a four-week maintenance period to allow for the resolution of inflammation. The patient was then scheduled for surgical management and received local anaesthesia (1:100,000 epinephrine). Access to the osseous defect was achieved by reflecting a trapezoidal mucoperiosteal flap. Clinically, extensive horizontal and vertical bone loss was observed, with exposure of 5-6 implant threads and a buccal dehiscence of 7 mm in relation to #12 [Table/Fig-2a,b]. The healing abutment of the implant was removed, and thorough degranulation and decontamination of the defect site and implant



[Table/Fig-1]: Preoperative clinical and radiographic representation. a) IOPA reveals bone loss upto coronal third; b) preoperative clinical picture; c) CBCT reveals bone-loss upto middle third.

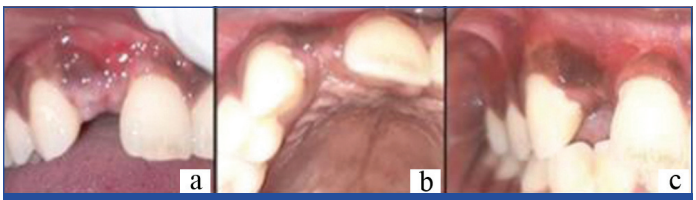
were performed using titanium-coated curettes and saline rinse [Table/Fig-2c]. After proper irrigation, a cover screw was placed, and the defect was grafted with 0.5 cc of Demineralised Freeze-Dried Bone Allograft (DFDBA) with particle size <500 microns (obtained from Tata Memorial tissue bank), which was hydrated with saline [Table/Fig-2d]. A 15×20 mm bioresorbable porcine collagen membrane (Geistlich Mucograft®) was trimmed, adapted, and placed over the defect site [Table/Fig-2e].

The flap was repositioned and sutured using 4-0 synthetic absorbable sutures to achieve primary wound closure [Table/Fig-2f]. Systemic



[Table/Fig-2]: a,b) Mucoperiosteal flap was raised; c) complete debridement was done; d) Defect grafted with DFDBA; e) Mucograft adapted over the defect site; f) Sutures placed.

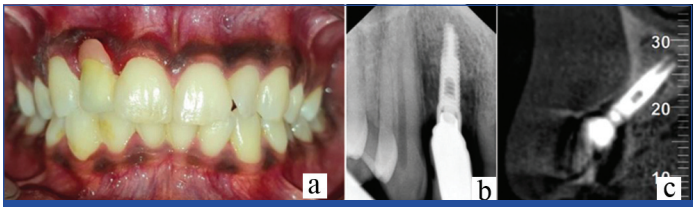
antibiotic therapy was prescribed. The patient was instructed to use topical 0.12% chlorhexidine twice daily and to avoid flossing and brushing at the surgical site for two weeks. The patient experienced uneventful postoperative healing, and the sutures were removed 14 days after surgery [Table/Fig-3a,b].



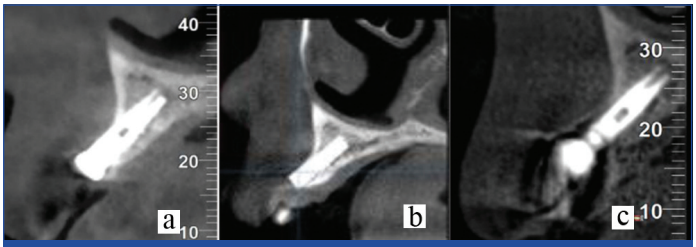
[Table/Fig-3]: A-2 week post-up, B-8 week postoperatively, C-6 month post-up.

Clinical Outcomes

The surgical site healed without any complications. At the six-month postoperative evaluation, the implant site showed normal sulcus depth in all six sites. CBCT imaging of the site indicated the presence of new bone formation, approximately 3 mm coronal to the existing crestal bone [Table/Fig 3c]. The implant remained stable during the torque test evaluation, and the tissue covering the buccal aspect of the implant had a thick biotype of about 2 mm, which was considered adequate. With the periodontium stabilised, prosthetic loading was initiated using an all-ceramic crown. After six months postoperatively, a healing abutment was placed, and a customised abutment was fabricated and cemented with an all-ceramic crown. The probing depth at the peri-implant site was measured as 3 mm with no BOP, and the attached gingiva showed satisfactory biotype during prosthetic rehabilitation. Radiographically, CBCT imaging revealed bone regeneration and osseous fill-up up to the implant collar. The patient diligently followed a maintenance protocol, and at the 2-year follow-up, a probing pocket depth of 3 mm was observed around the stable implant [Table/Fig-4,5].



[Table/Fig-4]: a) Two years postoperative; b) IOPA 2 year postoperatively; c) CBCT 2 year postoperatively.



[Table/Fig-5]: a) Preoperatively; b) six months postoperatively; c) two year postoperatively.

DISCUSSION

Peri-implantitis (PI) is a plaque-associated pathological condition that affects the peri-implant tissue, resulting in inflammation and loss of supporting alveolar bone [2]. The management of PI can involve either surgical or non-surgical methods, depending on the severity of the disease. This case report focuses on the surgical management of PI, which initially presented with buccal bone dehiscence and proximal bone loss, as classified by Schwarz F et al., 2010 [3]. The interoperative defect was classified as Class IIIb, which refers to buccal dehiscence along with semi-circular bone resorption that extends to the middle of the implant body [4]. Pesce P et al., in their systematic review, identified plaque accumulation and overloading as major causative factors for PI. Other potential factors that can influence peri-implant bone healing include bone quantity and quality, systemic illness, parafunctional habits, implant characteristics, surgical techniques, and medications [5]. In this case, the aetiology of bone loss may be attributed to poor bone quality at the time of implant placement, as supported by Romanos GE et al., who identified various aetiological factors for peri-implantitis, including pre-existing bone pathology, contaminated implant surface, poor bone quantity and quality, and surgical trauma such as cortical bone perforation [6]. Additionally, the patient's failure to attend regular follow-up visits may have contributed to the unnoticed inflammation and progressive bone loss around the implant.

Claffey N et al., stated that there is no single superior method for treating PI, and the choice of treatment depends on individual cases [7]. In this case, Demineralized Freeze-Dried Bone Allograft (DFDBA) was used due to its osteoinductive and osteoconductive properties, as well as its radiolucent nature, which allows for the evaluation of bone fill in the defect area [8]. A resorbable collagen barrier membrane was also utilised to avoid the need for a second surgery, reducing costs and patient morbidity [9]. While non-surgical therapy can be effective in treating peri-implant mucositis, Renvert S et al., concluded that it is ineffective in the treatment of PI [10]. Nociti Jr FH et al., stated that there is insufficient evidence to support the use of resorbable collagen membranes to enhance reosseointegration around previously contaminated implant surfaces in dogs [11]. Chiapasco M and Zaniboni M, in their systematic review, stated that there is no reliable grafting material or barrier membrane for correction dehiscence/fenestration defects [12].

Claffey N et al., reported a success rate of 58% for surgical management of PI with regeneration [7]. The clinical outcomes of this case report demonstrated the potential for healing 2-wall peri-implant defects, as evidenced by a decrease in PPD and a reduction in clinical signs of inflammation. This case report highlights the positive biological response around implants when Guided Bone Regeneration (GBR) protocols are followed. The GBR technique employed in this case effectively addressed a 7-mm 2-wall bony defect associated with the implant, and an increase in keratinisation of the attached gingiva was observed.

CONCLUSION(S)

PI is characterised by inflammation in the peri-implant mucosa and loss of supporting alveolar bone due to oral biofilm. The treatment approach for PI can be either surgical or non-surgical, depending on the severity of the disease. This case report emphasises the potential for successful healing of peri-implant defects when identified early in the inflammatory process and when proper guidelines for the GBR technique are followed, along with adherence to a strict maintenance program.

REFERENCES

[1] Monje A, Pons R, Insua A, Nart J, Wang HL, Schwarz F. Morphology and severity of peri-implantitis bone defects. Clinical Implant Dentistry and Related Research. 2019;21(4):635-43.
[2] Berglundh T, Armitage G, Araujo MG, Avila-Ortiz G, Blanco J, Camargo PM, et al. Peri-implant diseases and conditions: Consensus report of workgroup 4 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. Journal of Periodontology. 2018;89:S313-18. Available at: https://pubmed.ncbi.nlm.nih.gov/29926491/.
[3] Schwarz F, Sahm N, Schwarz K, Becker J. Impact of defect configuration on the clinical outcome following surgical regenerative therapy of peri-implantitis. Journal of Clinical Periodontology. 2010;37(5):449-55.
[4] Zabtotsky MH, Diedrich DL, Meffert RM. Detoxification of endotoxin-contaminated titanium and hydroxyapatite-coated surfaces utilizing various chemotherapeutic and mechanical modalities. Implant Dentistry. 1992;1(2):154-58.
[5] Pesce P, Menini M, Tealdo T, Bevilacqua M, Pera F, Pera P. Peri-implantitis: A systematic review of recently published papers. International Journal of Prosthodontics. 2014;27(1)15-25.
[6] Romanos GE, Froum S, Costa-Martins S, Meitner S, Tarnow DP. Implant periapical lesions: Etiology and treatment options. Journal of Oral Implantology. 2011;37(1):53-63.
[7] Claffey N, Clarke E, Polyzois I, Renvert S. Surgical treatment of peri-implantitis. J Clin Periodontol. 2008;35(8 Suppl):316-32.

[8] Mellonig JT. Autogenous and allogeneic bone grafts in periodontal therapy. Crit Rev Oral Biol Med. 1992;3(4):333-52.
[9] Hämmerle CH, Jung RE. Bone augmentation by means of barrier membranes. Periodontol 2000. 2003;33(1):36-53.
[10] Renvert S, Roos-Jansåker AM, Claffey N. Non-surgical treatment of peri-implant mucositis and peri-implantitis: A literature review. J Clin Periodontol. 2008;35(8 Suppl):305-15.
[11] Nociti Jr FH, Sallum EA, Stefani CM, Sallum AW, Machado MN, Caffesse RG. Evaluation of guided bone regeneration and/or bone grafts in the treatment of ligature-induced peri-implantitis defects: A morphometric study in dogs. J Oral Implantol. 2000;26(4):244-49.
[12] Chiapasco M, Zaniboni M. Clinical outcomes of GBR procedures to correct peri-implant dehiscences and fenestrations: A systematic review. Clin Oral Implants Res. 2009;20(Suppl 4):113-23.

PARTICULARS OF CONTRIBUTORS:
1. Head, Department of Periodontology, Ragas Dental College and Hospital, Chennai, Tamil Nadu, India.
2. Lecturer, Department of Periodontology, Ragas Dental College and Hospital, Chennai, Tamil Nadu, India.
3. Reader, Department of Periodontology, Ragas Dental College and Hospital, Chennai, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Kulandaivelu Gayathri,
Ragas Dental College and Hospital, 2/102, East Coast Road, Uthandi,
Chennai-600119, Tamil Nadu, India.
E-mail: kulandaivelugayathri@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Mar 24, 2023
- Manual Googling: May 23, 2023
- iThenticate Software: Jul 22, 2023 (8%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Mar 20, 2023**
Date of Peer Review: **May 01, 2023**
Date of Acceptance: **Jul 25, 2023**
Date of Publishing: **Oct 01, 2023**