Case Report

The Successful Treatment of Peri-implantitis with Guided Bone Regeneration with an 8-Year Follow-up: Case Report and Literature Analysis

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ABSTRACT

Replacement of missing teeth or unrestorable ones with dental implant-supported restorations is a substantial part of the clinical treatment protocol. However, with the increase in dental implants being placed worldwide, complications with this treatment have also risen in numbers. Complications may result from poor selection of cases with inappropriate treatment planning, occlusal overloading, or with poor follow-up care. The most common complications are the ones related to the presence of inflammation and include perimucositis and peri-impantitis. Peri-implantitis is an inflammatory condition that affects the soft and hard tissues around osseointegrated implants and results in the establishment of a peri-implant pocket and the loss of supporting bone. Nonsurgical therapy, the use of locally and systemically given antibiotics, and surgical regimens intended to replace the lost bone and soft tissue around the implants are among the documented treatment options. The aim of this article is to present a case report on the successful management of a case of peri-implantitis with nonsurgical and surgical approach following the ITI treatment protocol with a 5-year follow-up, along with a review of some of the treatment options used in their management.

KEYWORDS: *Grafting, guided bone regeneration, peri-implantitis, perimucositits, regeneration*

CLINICAL RELEVANCE TO INTERDISCIPLINARY DENTISTRY

The case involves an interdisciplinary approach, with treatment of Periimplantitis and prosthetic corrections.

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INTRODUCTION

Lately, dental implants are regarded as an accepted treatment for replacing lost teeth in a variety of clinical settings. The therapy has a high level of predictability and an estimated survival rate of 90%–95% over 5–10 years.[1] Dental implants are increasingly used for prosthetic rehabilitation, which has led to an increase in biological and technological difficulties, raising serious and significant concerns. These issues may have significant financial repercussions. Peri-implant mucositis and peri-implantitis are the most frequent biologic implications observed, according to the consensus report of workgroup 4 of the 2017 World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions.[2] The global peri-implantitis treatment market is anticipated to be valued at US$ 2.3 Billion in 2023.[3] Peri-implantitis is an inflammatory reaction of the tissues around dental implants caused by plaque, which is followed by a gradual loss of supporting bone.[4] According to a recent systematic review and meta-analysis, the prevalence of

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peri-implantitis was 12.53% at the implant level and 19.53% at the level of patients. According to reports, the prevalence of peri-implantitis can range from 1.1% to 85%.[5] This means clearly, we need to have a good strategy for the management and a good preventive strategy to diagnose the problem clearly as there is often an easy way to manage it than when we wait too late. The treatment protocols differ depending on whether it is peri-implantitis or peri-mucositis.

Peri-implantitis is based on the presence of clearly visible inflammatory changes in the peri-implant soft tissues, including the presence of bleeding and/or suppuration on gentle probing with probing depths of ≥6 mm and bone levels ≥3 mm apical of the most coronal portion of the intraosseous part of the implant.[6]

In order to treat peri-implant diseases, a variety of therapeutic approaches have been recommended. This case report highlights the effective treatment of a moderate peri-implantitis case with a 5-year follow-up utilizing a procedure that includes comprehensive debridement, decontamination, and guided bone regeneration (GBR).

Case Presentation and management

A 52-year-old female patient reported to the dental clinic with pain, swelling, and foul smell from under her hybrid prosthesis on 4 tilted implants. The prosthesis was unscrewed and the site was probed with a plastic probe (Hu-Friedy) a probing depth of 9 mm was observed on the right mesial implant [Figure 1]. The treatment protocol was based on ITI Consensus Clinical Recommendations, as given by group 5, with the goal of resolution of infection and prevention of recurrence.[7] Thus, based on it, for the present case the treatment protocol was divided into six steps. Step 1: Pretreatment Phase, wherein risk factors were assessed, and occlusal adjustments were performed. In Step 2: Nonsurgical Debridement was performed involving, scaling with titanium curettes, along with local and systemic antimicrobial therapy. Step 3: Reassessment was done after a week of resolution of acute symptoms, and a cone-beam computed tomography (CBCT) was advised, based on the clinical and radiographic findings, it was classified as a moderate peri-implantitis case [Figure 2], the intraosseous defect was further classified as a contained defect.[8] Step 4-The patient was scheduled for surgical therapy. An hour before surgery, patient had 2 g amoxicillin and was thereafter put on a 500 mg amoxicillin regimen 3 times daily for 10 days following surgery. The patient was instructed to rinse for 60 s with 0.12% chlorhexidine gluconate daily for 2 weeks. The surgical procedure was performed under an operating microscope (Carl Zeiss). A full-thickness mucoperiosteal flap was raised flap to have access to the bone defect and mechanically remove the granulation inflammatory tissue around the implant. Titanium curettes (Am Eagle, U.S.) were used for mechanical cleaning [Figure 3]. To mechanically disinfect the implant surface, the surface was cleaned using a TiBrush at 800 RPM, mild pressure, and an angle of around 45°–60° to the implant surface. Chemical disinfection was then performed using 24% ethylenediaminetetraacetic acid (EDTA). The bone defect was then grafted first with a layer of autogenous bone, obtained from bone scrapping, and then with a deproteinized bovine bone mineral (Bio-Oss, Geistlich Pharma, Switzerland) [Figure 4]. The flap was closed with 5.0 Vicrylrapide sutures. Step 5: Immediate postoperative care and instructions were explained. The prosthesis was placed back after a waiting period of 3 weeks. The patient was put on maintenance recall visits. The implant site was probed after 9 months, as the prosthesis needed to be cleaned and was removed

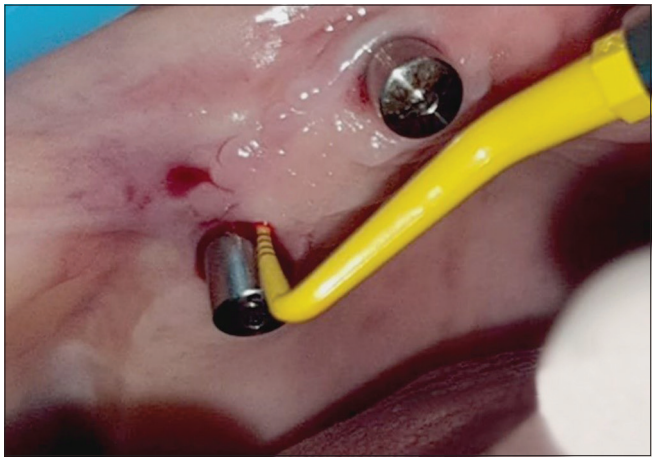

Figure 1: Periimplant probing depicting increase in probing depths

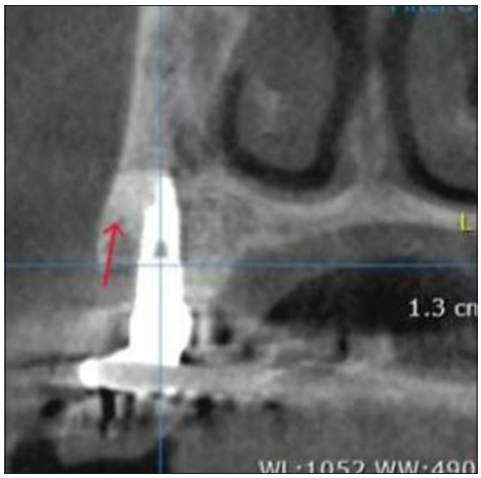

Figure 2: Cross section of the site of peri-implant bone defect with arrow pointing toward the defect

to probe the area, wherein a reduction in probing depth was observed. At 1 year of completion, new radiographs were taken. The radiographic examination revealed the radiolucent areas surrounding the implant appeared radiopaque, which suggested that the bony defect had healed that demonstrated complete resolution of the bony defect surrounding the implant. On completion of 8 years of treatment of peri-implantitis, the patient reported for the minor repair of the prosthesis, at that time a CBCT was also performed, and the results of the surgical treatment of peri-implantitis were found to be stable with radiographic bone fill [Figure 5].

Discussion

There is a plethora of information available on surgical techniques for the therapy of peri-implantitis, including several approaches for cleaning the implant surface and treating bone defects. Nonsurgical therapies can be used to treat peri-implant mucositis. However, if peri-implantitis is diagnosed then the treatment protocol depends on the intraosseous defects. Nonsurgical therapy is not helpful in the osseous defect. The clinical success of a surgical regeneration technique for the treatment of peri-implantitis lesions, as suggested by Schwarz *et al*., has been found to be significantly influenced by the configuration of the bone defect.[9]

This case report describes the surgical treatment of an implant with moderate peri-implantitis with a bone loss between 25% and 50% of the implant length with a 3-wall intraosseous defect following the ITI recommendations protocol. In the present case report, the surgical protocol was performed under an operating microscope, as it provided good illumination and magnification that helped in enhanced visual access to the surgical field. A triple method of implant cleaning and decontamination was performed, using a titanium curette, then again, a Titanium brush and EDTA to completely clean and decontaminate the implant surface, as EDTA offers the advantage of neutral pH. A randomized control clinical trial by Wohlfahrt *et al*. reported a greater reduction in pocket depth, wherein titanium curettes and 24% EDTA were used for implant surface decontamination.[10] A thorough literature search reveals numerous reports on several implant surface disinfection techniques, including the use of sterile sodium solution, hydrogen peroxide, tetracycline HCl, chlorhexidine, EDTA, and air powder abrasives. However, there is no evident method that seems to be superior to the others, among the many approaches and there seems to be a lack of a gold standard for implant surface disinfection.[11]

Similarly, there is a lack of a gold-standard regenerative approach. In the present case report, a composite grafting

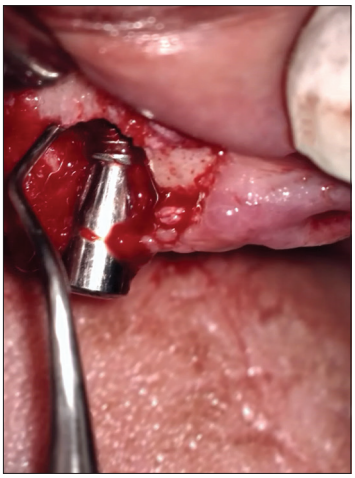

Figure 3: Mechanical cleaning of the implant surface with titanium curettes (am eagle TM) at ×1 factor

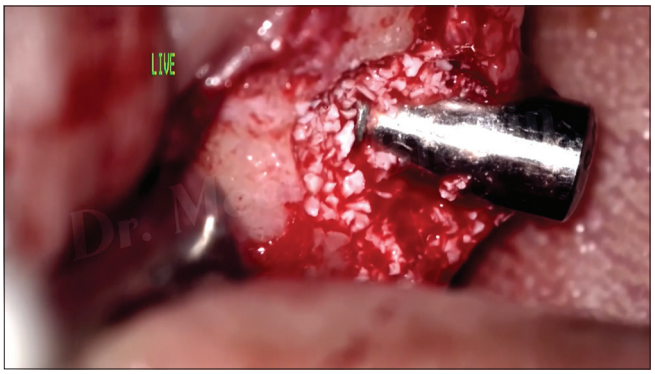

Figure 4: Placement of graft into the defect: Autogenous plus bioss (geislitch pharma AG) seen at × 2.5 factor

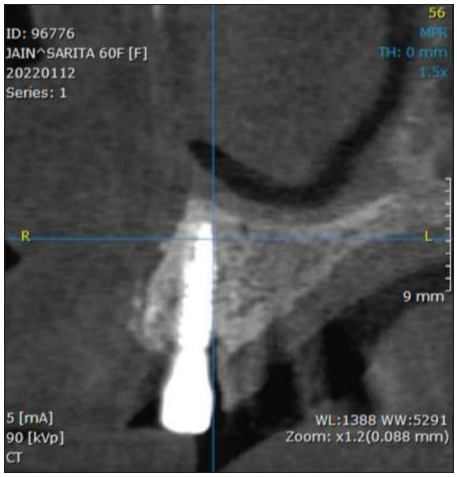

Figure 5: Cross section of cone-beam computed tomography taken at 8 years of follow-up

method was chosen, with the first layer adjacent to the implant surface of autograft (autogenous bone scrapings obtained from the adjacent edentulous site, and the second layer xenograft was chosen as the grafting material in a ratio of 50:50. The only available augmentation material that combines osteoconductive, osteoinductive, and

osteogenic properties is autologous bone. Autologous bone grafts have been recognized as the "gold standard" and most efficient material in bone regeneration treatments because of its properties and lack of immune reactions.[12] However, autogenous bone resorbs at a faster rate, so it was combined with a xenograft. The advantage of the xenograft material is that it is slow resorbing and radiolucent. At the follow-up visits, the grafting material's gradual mineralization and the defect's bone fill may be seen. In this case report, no barrier membrane was used to cover the bone substitute, as it was a contained defect, and adding a membrane would just add to the cost of the treatment. In an randomized controlled trial by Jepsen *et al*., no barrier membrane was used to cover a contained defect, and no difference in results was noted in terms of bone fill in tests and control groups.[13] Another review paper examining the outcomes of surgical management of peri-implantitis observed that access surgery caused a 58% resolution of the lesions with various degrees of success have been reported with the use of regenerative techniques.[14]

Even though this research is merely a case study, it does demonstrate the ability of 3-wall peri-implant defects to repair. The biological potential around implants, when GBR guidelines are followed, is confirmed by this case report. There is certainly a need for additional research in this field. In conclusion, the surgical and antimicrobial methods described produced a clinically healthier environment surrounding many of the treated implants, allowing for the full maintenance of their function.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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