Management of Failing Dental Implants following Orofacial Trauma: A Case Report

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Abstract

Dental implant failure can be caused by several biomechanical and biological factors. Management of failed multiple adjacent dental implants can be challenging, as the amount of bone loss around these implants is often high. This necessitates the need to restore the supporting bone and replace the failed implants with new implants in optimal positions and with a favorable dental prosthetic option. This report describes a case of a 27-year-old female who presented with failed multiple adjacent maxillary dental implants following orofacial trauma and with a significant amount of supporting bone loss. The patient was managed by implants removal, bone grafting and implant-supported fixed hybrid prosthesis, which resulted in a positive outcome, despite several challenges.

Keywords: Bone graft, bone loss, failed dental implant, dental prosthesis failure, orofacial trauma

INTRODUCTION

Orofacial injuries can result in the loss of both soft and hard oral tissues. In addition to the physical and emotional damages, esthetic and functional aspects are a concern. In the past, a conventional removable dental prosthesis was the only choice. However, more recently, osseointegrated dental implants are increasingly being used for the treatment of partially and completely edentulous patients. Overdentures are the most effective treatment modality when substantial loss of hard and soft tissue has occurred. Overdenture treatment improves the lip and facial support, is easier to maintain and is more esthetic than an approach using a fixed prosthesis. However, fixed prostheses are often preferred by patients because they are fixed and similar to natural teeth in function and appearance. In addition, fixed prostheses improve the psychological status of patients. Several factors contribute to the failure of dental implants, such as patient-related factors (e.g., health status, psychosocial habits, soft and hard tissue quantity and quality as well as oral hygiene maintenance), implant restoration-related factors (e.g., occlusal trauma and biomechanical overloading).

Here, the author reports a case where several challenges were encountered while dealing with failing implants. Proximity of dental implants, remnant cement, soft tissue swelling and significant amount of vertical and horizontal bone loss were noted. Accordingly, this case report provides a management option for such cases.

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CASE REPORT

A 27-year-old Caucasian woman was referred to us by a general practitioner for prosthodontic evaluation and treatment in 2010. The patient’s chief complaint stemmed from a car accident in 2002, in which she lost a few teeth. At that time, an iliac crest graft was performed, following which a dental bridge was placed. The bridge lasted for 8 years but had become unstable when the patient presented to us. In addition, the patient experienced some discomfort and bleeding. Based on a review of her medical history, the patient was classified as an American Society of Anesthesiologists Class I patient (i.e., a normal healthy patient), and she had no systemic disease and was not on any medications.

Clinical examination showed implants in the locations of missing teeth 9, 11, 12 and 13 with a fixed prosthesis. Hyperplastic tissues on the labial side and bleeding were noted, and suppuration was presented on palpation. The fixed prosthesis was infrapositioned, which resulted in an open bite situation [Figure 1]. The patient did not recall any parafunctional habit and did not have signs of occlusal wear. Remnants of cement were seen around the platform of the failed prosthesis. Head and neck examination revealed no cervical or submandibular lymphadenopathy as well as no facial deformities or asymmetries. The patient showed adequate interarch space at the approximate vertical dimension of occlusion. According to House’s classification, the patient was classified as a Class I patient (i.e., accepts dentist’s judgment and instructions and likely to best prognosis). The patient exhibited a Class III prosthodontic diagnostic index and a Class I residual ridge relationship and had reasonable expectations and desires about the anticipated dental treatment. Radiographic examination demonstrated moderate to severe bone loss around the dental implants [Figures 2 and 3].

The patient was referred to both oral and maxillofacial and orthodontic departments for consultation. Existing implants were judged to be failing, and minor orthodontic treatment was recommended. The treatment plan’s benefits, risks and alternatives were discussed with the patient; she agreed for implant removal, bone grafting and a fixed hybrid prosthesis but rejected orthodontic treatment, and her signed consent for the treatment was obtained.

Preliminary impressions were made for the fabrication of an immediate interim prosthesis. The implants and the implant prosthesis were removed under local anesthetic using gauze and hemostats. Given the substantial bone loss, multiple grafting procedures were planned and the same was discussed with the patient. The autogenous iliac grafting was performed first. After 9 months of healing, radiographic evaluation was carried out to document the vertical and horizontal bone gain. In the second grafting procedure, a 20 mm × 20 mm titanium mesh was fixed with 6- and 8-mm bone screws on the buccal and lingual sides of the ridge with a 0.5 cc of Geistlich Bio-Oss (Geistlich Pharma, Wolhusen, Switzerland) bovine bone, 0.5 cc Puros cortical particulate allograft (Zimmer Biomet Dental, Palm Beach Gardens, FL, USA) and a small amount of recombinant human bone morphogenetic protein-2 combined with an absorbable collagen sponge (INFUSE Bone Graft, Medtronic Sofamor Danek, Memphis, TN, USA). After 1 year of healing, radiographic evaluations were done [Figure 4], and the titanium mesh was surgically removed. At this stage, alginate impressions were obtained for both arches, and a diagnostic wax-up was achieved to evaluate the prosthetic space. The radiographic template was fabricated, and a cone-beam computed tomography scan was completed while the patient wore the template. The scan was uploaded to in vivo 5 (Anatomage, San Jose, CA, USA) for implant planning, and the digital imaging and communications in medicine file was exported. A tooth-supported implant guide template was ordered.

The computer-aided design/computer-aided manufacturing implant guide was placed intraorally. Sequential osteotomies were performed using NobelActive surgery kit (Nobel Biocare AB, Göteborg, Sweden) in the sites of missing teeth 9 (3.5 mm × 11.5 mm), 11 (4.3 mm × 11.5 mm) and 13 (4.3 mm × 10 mm). Implants were placed with 40 N/cm of torque. All the surgeries were performed under local anesthesia. Then, after 8 months of healing, the implant uncovering procedure was performed under local anesthesia. Healing abutments were placed and hand torqued. Six weeks later, open-tray impression copings were placed and connected intraorally with dental floss (Oral-B, Procter and Gamble) and Filtek Supreme Ultra Flowable Restorative composite (3M ESPE, St Paul, MN, USA). Periapical radiographs were made to confirm the seating. Polyvinyl siloxane (PVS) impression material (Aquasil, Dentsply, Konstanz, Germany) was used to make impressions for both arches. Interocclusal records were obtained using PVS Regisil 2X VPS bite registration material (Dentsply). The custom abutments and framework were tried intraorally, and radiographs were made to confirm the seating. Later, Noritake porcelain system (Kuraray Noritake Dental, Tokyo, Japan) was used to fabricate the provisional prosthesis. After 4 months of healing, impressions were made for the fabrication of the final prosthesis. The provisional prosthesis was removed, and a new custom abutment was placed. impressions were made for the fabrication of the final prosthesis. The provisional prosthesis was removed, and a new custom abutment was placed. The custom abutment was placed, and the definitive prosthetic framework was fabricated. After 4 weeks, the definitive prosthesis was tried and evaluated. The definitive prosthesis was cemented with a resin cement (Aquacem, Dentsply, Konstanz, Germany) and finished and polished. The patient’s chief complaint was resolved, and she was satisfied with the final prosthesis.
Japan) was used. Tooth shade B1 was selected for the cervical and middle thirds, and NW 0.5 was selected for the incisal third. For the gingival shade, a mix between G3 and G4 was used. The prosthesis was tried intraorally in bisque porcelain, and necessary adjustments were made. The prosthesis was finished and glazed. The hybrid prosthesis was cemented with TempBond (Kerr Dental Products, Romulus, MI, USA) [Figure 5]. Excess cement was carefully removed after making impression of the intaglio surface of the prosthesis. The hybrid prosthesis was cemented, and bitewing and periapical radiographs were taken. PVS impression material was used to make impressions of both arches for fabrication of an occlusal guard. The occlusal guard was placed, and the patient was instructed to maintain the prosthesis using Oral-B Superfloss and interdental brushes. At the follow-up appointment in 2015, the patient was satisfied with the treatment, with the occlusion, periodontal health and remaining teeth condition being stable. The patient was given home care instructions and a program for recall visits. In 2017, a panoramic radiograph revealed stable connection between implants and maxillary bone as well as no proximal bone or periapical changes were detected [Figure 6].

**DISCUSSION**

In this clinical report, remnants of cement were noted around the platform of the failed dental prosthesis. Pauletto
et al.[4] reported the following complications that arose after crown cementation on dental implants: peri-implant inflammation associated with swelling, increased probing depths, exudation on probing and signs of peri-implant bone loss. Cement extrusion into the sulcular area can also cause soft tissue swelling, bleeding or exudation on probing, [4] which may cause implant failure. [5] Wadhwani and Piñeyro[6] presented a technique for controlling the cement for an implant crown by making an impression of the intaglio surface of the crown using the abutment. Desirable cement would be applied between the intaglio surface of the crown and the impression replica. Then, extruded cement should be removed. This technique will help minimize excess cement. It should be noted that implant proximity could potentially lead to bone loss. [7] Tarnow et al.[7] studied two groups of adjacent implants (≥3 mm and <3 mm) and found that the crestal bone loss increased as the interimplant distance decreased. In our case, Figure 3 shows a <3 mm interimplant distance between implants 11, 12 and 13.

An infrapositioned single implant situation associated with facial growth is well documented. [8,9] Long-term studies from Jemt et al.[8] and Andersson et al.[9] showed that females have a higher risk of potential infrapositions. In this report, the patient presented with an infrapositioned prosthesis [Figure 1]. However, it was a five-unit fixed partial denture supported by implants. At the time of reporting this case, there were no studies discussing an infrapositioned multi-implant prosthesis. Therefore, the author recommends further research and study in this area.

CONCLUSION

Dental implant failure can occur due to different reasons. To overcome such problems, reconstruction of the bone and soft tissues might provide predictable results. The prognosis of this patient, the stability of the remaining teeth and the prosthesis suggests that this method results in a favorable outcome, provided the patient maintains good oral hygiene and is periodically evaluated.

Declaration of patient consent
The author certifies that he has obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the Journal. The patient understands that her name and initials will not be published, and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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