

Extreme peri-implantitis

¹Ondine Lucaciu, ¹Mihai Tiriac, ²Florin Onisor, ¹Radu S. Campian

¹ Department of Oral Rehabilitation, Oral Health and Dental Practice Management, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania; ² Department of Oral and Maxillofacial Surgery, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania.

Abstract. Aim. The aim of the present report is to present a case where severe peri-implantitis causing complete peri-implant bone loss had to be managed by removing three implants, bone reconstruction and new implants. Material and methods. Case report of a 69-year-old patient rehabilitated 5 years before with a three implant supported fixed prosthesis at positions 2.4, 2.5 and 2.6, diagnosed with severe peri-implantitis affecting all three implants. Initial probing depths were 10, 9 and 5 mm, respectively. Implants at positions 2.4 and 2.5 showed mobility, implant at 2.6 was not mobile. Implants at positions 2.4 and 2.5 had to be removed. Ten weeks after removing the implants, we performed bone reconstruction with autologous bone and Bio-Oss and BioGuide membrane and we removed the implant at position 2.6. Results. Radiographic OPT and CBCT exams 5 months after bone reconstruction showed bone regeneration with an alveolar crest of 10 mm height and 5 mm width. Five months after bone reconstruction, we inserted two implants of 4 mm diameter and 10 mm height at the level of the reconstructed site. Controls followed at 3, 6 months. We uncovered the implants 6 months after loading; the periosteal value was -8. Conclusions: The follow-up of the implant supported restorations is very important. The lack of dispensarization of our patients can lead to severe peri-implantitis as in the above presented case. The management of advanced peri-implantitis is time consuming, very difficult for the patient to accept and requires financial investment.

Key Words: peri-implantitis, dental implant, bone reconstruction, prosthetic treatment.

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Corresponding Author: O. Lucaciu, email: ondineluc@yahoo.com.

Introduction

Peri-implantitis leads to gradual peri-implant bone loss. Patients with implant supported restorations should be monitored in order to avoid extreme cases of peri-implantitis, followed by implant removal.

The introduction of dental implants as a procedure to replace natural teeth lost due to dental caries, trauma or periodontal disease has been a major advance in the management of edentulous and partially edentulous individuals (Lindhe 2008). As nowadays the number of patients treated with dental implants continues to grow, the dentist and the patient must accept the challenges of maintaining these complex restorations. Peri-implant disease may only affect the peri-implant mucosa (peri-mucositis) or also involve supportive bone loss (peri-implantitis). Gradual peri-implant bone loss is determined by peri-implantitis. "Peri-implantitis" is defined as an inflammatory process affecting the soft and hard tissue around a functioning osseointegrated implant resulting in loss of supportive bone (Katsovilis 2008, Karoussis 2007).

The prevention of biological implant complications relies on careful planning, a thorough examination to assess etiological factors, and a regular maintenance recall schedule. Patients must be thoroughly educated and retrained before deciding to commence implant therapy. The ability of the patient to understand financial, time, and maintenance obligations is crucial. There is a need to understand the importance of maintenance as it relates to long term implant success (McDermott 2003, Misch 2007). With early diagnosis, biological implant complications should be managed based on the severity of peri-implant

disease, the amount of bone loss and the morphology of peri-implant bony defects.

Treatment modalities should be chosen based on the severity of peri-implantitis. For peri-implant defects with severe destruction of supportive bone, the removal of implants associated with guided bone regeneration is suggested (Silverstein 1998). The aim of this clinical case report is to present a severe case of peri-implantitis as a result of deficient maintenance associated with frequent loosening, absence of recall visits and poor oral hygiene.

Clinical presentation

A white 63-year-old male was referred to an oral surgeon in Cluj-Napoca, Romania, for evaluation of maxillary and mandibular edentation, in 2007.

The patient exhibited maxillary Kennedy class I and mandibular Kennedy class I subclass I edentation. The patient had lost his teeth because of mixed pathology in the maxillary and the mandibular region. A radiographic examination showed an insufficient alveolar bone height in the upper jaw due to the proximity of the maxillary sinus. In the lower jaw, radiographic examination showed a sufficient alveolar bone height. The patient's medical history included hypertension stabilized with medication. The treatment plan was to perform bilateral sinus lift, and to load 6 maxillary implants 8 months after surgery. Because no bone reconstruction was needed in the mandibular region, the treatment plan was to load 5 mandibular implants. The patient was referred to the oral surgeon only for implant therapy, prosthetic

treatment plan and indication of extraction being performed by the general practitioner.

The patient provided a written informed consent to be treated and for the use of pictures.

In 2007, a bilateral sinus lift with Bio-Oss L and Bio-guide 25x25 membrane was performed. Eight months after sinus lift, radiographic assessments demonstrated stability of the bone levels and Oral Tronics implants were loaded at positions 1.4 (3.75/12), 1.5 (4/12), 1.6 (4/12) and 2.4 (3.75/10), 2.5 (4/12), 2.6 (4/12).



Figure 1. Radiographic aspect 8 months after bilateral sinus lift

One hour prior to surgery, the patient received systemic coverage of 2-g amoxicillin, 400 mg ibuprofen, and a mouth rinse of 2% chlorhexidine gluconate was administered 20 minutes before surgery. Under local anesthesia (4% articaine, Septodont) a mucoperiosteal flap was raised and the implants were loaded.

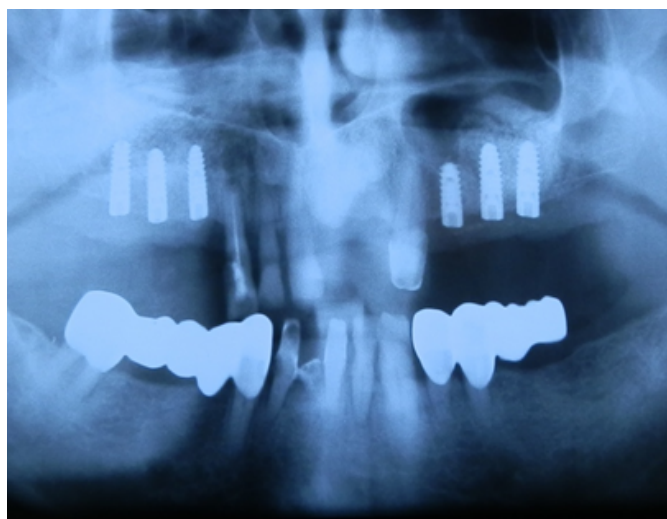


Figure 2. Radiological aspect with the maxillary implants loaded

Using the same technique, the implants (Mis Seven, Tel Aviv, Israel) were loaded at the site of missing teeth 3.5 (4.2/11.5), 3.6 (5/11.5), 4.2 (3.75/13), 4.5 (4.2/11.5), 4.6 (5/11.5) in the lower jaw. Six months later, the implants were exposed via a crestal incision displaced to the palatal side, and healing abutments were fitted.

The final fixed cemented maxillary and mandibular bridges were fitted 4 weeks later by a general dentist, not by the oral surgeon who placed the implants.

In 2013, the patient came back to the dental office for the first time 5 years after the initial treatment, and a clinical examination revealed mobility of the left fixed bridge, bleeding on probing, pus, increased probing depth (2.4>9, 2.5>7, 2.6>5), gingival recession, inflammation and hyperplasia of the tissue surrounding the implants. A bony lesion was formed from the marginal part to the apical region of the implant. Radiographic evaluation confirmed clinical examination. The patient reported loosening of the fixed cemented bridge at the level of 24,25,26 implants 4 times / year.



Figure 3. Radiological aspect of the bony lesion at the level of implants 24 and 25

Due to the lack of understanding by the patient of recall visits every 6 months, to the lack of cooperation and non-compliance with maintenance instructions after implant surgery, the patient was diagnosed with severe periimplantitis in the left upper jaw region. On the X-ray performed one can notice the periapical lesions at the level of 47 and 35 that were not extracted before the prosthetic rehabilitation of this case.

Case management

After removal of the fixed bridge, the implants at positions 2.4 and 2.5 were removed. Due to the absence of mobility, the implant at position 2.6 was maintained and a mucoperiosteal flap for debridement of inflammatory and granulation tissue around it was raised.



Figure 4. Radiological aspect after removal of implants 24 and 25

After 4 months, surgery was carried out for the extraction of the implant at position 2.6 and the reconstruction of the bony defect with autologous bone and Bio-Oss (Geistlich Pharma, Wolhusen, Switzerland) with a particle size of 0.25-1.0 mm, covered with Bio-Guide, thus attempting to re-establish a normal height in the crestal hard tissue.

The patient was premedicated with 2 g amoxicillin 1 hour before surgery, and additionally, a mouth rinse of 0.2% chlorhexidine gluconate prior to surgery. Local anesthesia was obtained by blocking the left posterior superior alveolar, left middle superior alveolar and left greater palatine nerve. The local anesthetic used was 4% articaine (Septodont). A midcrestal incision between 2.3 and the implant in position of 2.6. was made, with terminal releasing incisions into the buccal vestibule in the 2.3 region and distal to the implant in position of 2.6. Elevation of full thickness mucoperiosteal flaps revealed extensive bone loss due to peri-implantitis. After soft tissue debridement, we extracted the implant in position of 2.6 due to infiltration on the surface of the implant and to extensive bone loss. The recipient site between 2.4 and 2.6 was packed with autologous bone and Bio-Oss xenograft (Geistlich Pharma, Wolhusen, Switzerland) with a particle size of 0.25-1.0 mm, and covered with Bio-Guide (Geistlich Pharma, Wolhusen, Switzerland) 25x25 mm, which was passively adapted over the graft to re-establish a normal height in the crestal hard tissue. The buccal flap was advanced coronally after periosteal release for passive closure using horizontal mattress sutures. Non-resorbable cytoplast 4.0 PTFE monofilament sutures were used to close the wound. At the midcrestal incision level, single point sutures were made. Amoxicillin was continued for 7 days at a dose of 4x500 mg per day. The patient was instructed to gently rinse his month with 0.12% chlorhexidine gluconate (Curasept) two times daily. Postoperative discomfort was managed with Ibuprofen 800 mg twice a day as needed.

At two weeks, healing appeared uneventful, and the single sutures were removed from the vertical incision and from the horizontal incision at the alveolar ridge. The horizontal mattress sutures were removed after 3 weeks.

The healing process continued to be monitored every 3 to 4 weeks. There was no sign of dehiscence with exposure of the barrier and there was no infection of the operative site.

Clinical outcomes

Five months postoperatively, an OPT and CBCT was taken to display the newly augmented crestal bone. CBCT was performed with a palatal plate provided with 3 metal fingers for establishing the further position of implants and the height and width of the alveolar ridge (Fig 5). Imaging examination showed an alveolar ridge height of 8.4 mm and a width of 10 mm for the further position of implants 2.4 and 2.5 (Fig. 7 and Fig. 8). CBCT and clinical examination evidenced a sufficient width for loading 4 mm diameter dental implants (Fig. 6). Five months after ridge augmentation, the site was exposed and dental implants were placed at the site of 24 and 25.

Under the same surgical protocol including premedication, medication, anesthesia, incision design described for alveolar ridge augmentation, a full-thickness flap toward the facial and the palatal aspect was raised. We used the same surgical guide

that we used for determining the position of the implants and the bone height on the CBCT exam. An AnyRidge implant was placed at the site of 24 (dimensions 4/10) with internal sinus lift. At the site of 25, we placed an AnyRidge implant (dimensions 4/10). Each osteotomy site was enlarged and shaped according to the manufacturer's protocol before insertion of the implants. Cover screws were placed on each implant, and the surgical site was closed using 4.0 horizontal mattress sutures and single point sutures.

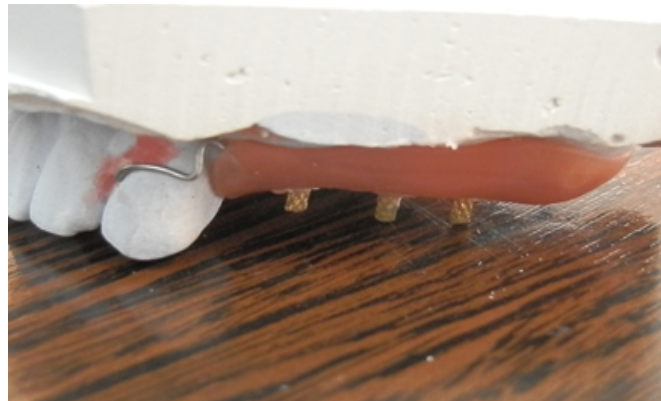


Figure 5. Palatal plate provided with 3 metal fingers



Figure 6. Clinical aspect of the augmented ridge

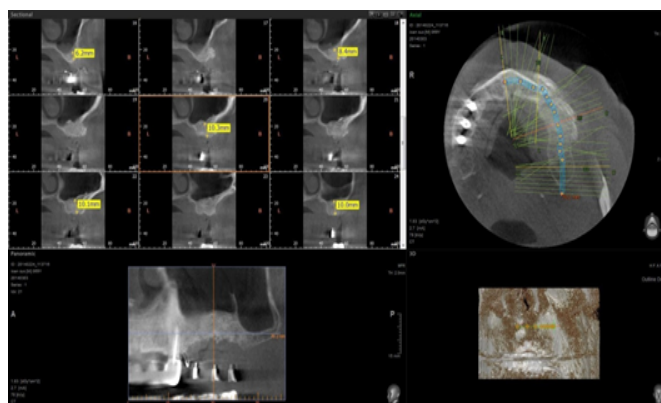


Figure 7. CBCT image of the reconstructed site 5 months after reconstruction

The same postoperative protocol regarding pain management, antibiotics, and surface tissue debridement used for ridge augmentation surgery was followed. The healing went well and the single point sutures were removed at 2 weeks and the horizontal mattress sutures at 3 weeks.

Radiographic examinations were performed at 3 months and showed a marked improvement in bone levels and the osseointegration of implants (Fig. 10).

Six months after implant loading we uncovered the implants, the peritest value was -8.



Fig. 8 Radiological aspect of the reconstructed site 5 months after reconstruction



Figure 9. Implants with the cover screws in position

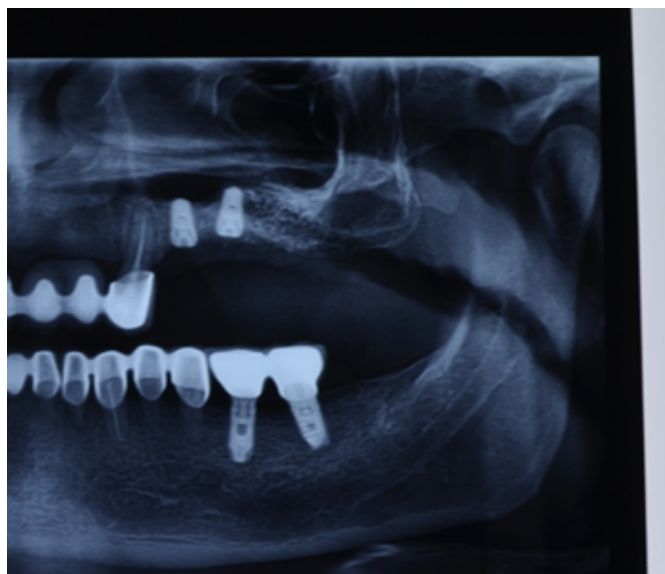


Figure 10. Radiological aspect with the AnyRidge implants in position

In order to prevent loosening of the new implant supported bridge we recommend a screw-retained bridge at the level of 24-25 implants.

Discussion

This clinical case report presents the loss of dental implants due to lack of recall visits, poor oral hygiene and occlusal overload problems of the fixed bridge. The absence of recall visits in correlation with the frequent loosening of the fixed bridge in the left upper region and the cementation of the bridge in different dental offices with no dispensarization of the patient led in the authors' opinion to the loss of implant-prosthesis rehabilitation in the upper left region.

Zitzmann and Berglundh described the prevalence of peri-implant disease in their review, including cross-sectional and longitudinal studies with more than 50 implant-treated subjects exhibiting a function time greater than five years. Peri-implantitis was identified in between 28% and 56% of the subjects and in 12% and 43% of the implant sites (Eser 2014, Zitzmann 2001). Koldslund *et al.* assessed prevalence in relation to the severity of peri-implantitis with different degrees of bone loss. Out of 99 subjects with 351 dental implants inserted with a mean functional loading time of 8.4 years, they assessed peri-implantitis at different levels of severity and concluded a substantial variance in prevalence, 11.3% to 47.1% in the study population (Koldslund 2010).

In a study conducted by Misch *et al.*, prosthetic overload was mentioned as a reason for peri-implantitis (Misch 2007). Factors associated with occlusal overload or occlusal trauma probably consist of implant alignments, a significant deviation of the implant axis from the function axis, an important ratio of crown height /implant length, a discrepancy in dimensions between the implant head and the occlusal table. An occlusal overload can cause the complete bone loss of an osseointegrated implant (Engel 2001). Bone destruction is accelerated if occlusal trauma is combined with peri-implant infection. In fact, marginal bone loss due to overload is often accompanied by attachment loss and deepening of the pockets. After some time, the newly created anaerobic environment will inevitably harbor perio-pathogenic flora (Tung *et al* 2012). In our case we could not evaluate the prosthetic overload due to the lack of recall visits of the patient. The authors can only assume that frequent loosening of the upper left bridge led to overloading of the implants. The residual cement after luting that remained in the perimplant sulcus could be another cause that could have caused the loss of the implants (Smeets 2014).

The clinical and animal studies analyzed focused on two possible causes of peri-implantitis: plaque accumulation and overloading (Koka 2012). However, multifactorial aspects (the host's general health, bone quality and quantity, surgical procedure, implant macro- and microcharacteristics, parafunctional habits, occlusal overloading, medications, bacterial insult, etc.) potentially affect bone healing and induce peri-implant bone damage (Pesce Paolo 2014).

This case highlights potential causes of peri-implantitis such as lack of patient dispensarization, missing recall visits and occlusal overloading, frequent loosening of the implant supported bridge and cementation. In the authors' opinion, more statistically significant studies are required to establish a connection between occlusal overload and the loss of dental implants.

Conclusions

This was an extreme bone damage case that occurred only in the implants on the right side of the mouth.

Proper monitoring and maintenance is essential to ensure the longevity of the dental implant and its associated restoration through a combination of appropriate professional care, evaluation, and effective patient oral hygiene. Recently, the focus of implant dentistry has expanded from obtaining osseointegration, which is highly predictable, to including the long-term maintenance of the health of peri-implant hard and soft tissues (Meffert RM 1992). This can be achieved through appropriate professional care and patient cooperation via effective home care. Patients must accept the responsibility for implant maintenance, therefore the patient selection process should take into account the patient's willingness to maintain the fixture and restoration. During the maintenance visit, the dental professional should concentrate on the peri-implant tissue margin, the implant body, the prosthetic abutment-to-implant collar connection, and the prosthesis. Usually, during the first year after the implant is restored, a 3-month maintenance schedule should be implemented, especially if the patient has lost teeth because of periodontal disease (American Academy of Periodontology. *Annals of Periodontology*, 1996). However, if after 12 months the patient's implants are stable and peri-implant tissues are healthy, then a 4 to 6 month maintenance regimen can be implemented. The clinician must be cognizant of each patient's level of home care effectiveness, systemic health, and status of the peri-implant tissues when determining these intervals. In more recent years, implant maintenance and effective patient home care have been emphasized as two critical factors needed for the long-term success of dental implants (Silverstein 2006). Any opinions or comments about this extreme bone loss case will be appreciated.

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Authors

- Ondine Lucaciu, Department of Oral Rehabilitation, "Iuliu Hatieganu" University of Medicine and Pharmacy, 15 Victor Babes Street, 400012 Cluj-Napoca, Romania, EU, email: ondineluc@yahoo.com
- Mihai Tiriac, Department of Oral Rehabilitation, "Iuliu Hatieganu" University of Medicine and Pharmacy, 15 Victor Babes Street, 400012 Cluj-Napoca, Romania, EU, email: tiriacstefan@yahoo.com
- Onisor Florin, Department of Oral and Maxillofacial Surgery, "Iuliu Hatieganu" University of Medicine and Pharmacy, 15 Victor Babes Street, 400012 Cluj-Napoca, Romania, EU, email: dr_onisorf@yahoo.com
- Radu Septimiu Campian, Department of Oral Rehabilitation, "Iuliu Hatieganu" University of Medicine and Pharmacy, 15 Victor Babes Street, 400012 Cluj-Napoca, Romania, email: rcampian@email.com

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