

CASE REPORT

Management of implant fracture: a clinical report

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Abstract

Implant fracture is a rare complication of dental implant treatment, but this complication represents failure of treatment. A case of fracture of an endosseous dental implant occurring in a middle-age woman, 18 months after placement is reported. The implant replaced the mandibular first premolar in a four-unit bridge supported by two implants. The treatment plan consist of placement of additional implants simultaneous with removal of the fractured implant and reconstruction of bone loss. The bone collected from implant placement and implant removal was used to regenerate surgical site.

Keywords: dental implant complication, implant fracture, occlusal load, management.

Introduction

Dental implants are widely used in dentistry and despite its high success rate initially reported, increases the occurrence of accidents and complications [1,2].

Many papers describe accidents and complications associated with dental implants therapy. Comparison between different data in dental literature is often difficult due to different classification criteria and due to confusion among accidents and complications.

Accidents are local events that occur during surgery and complications are conditions which appear postoperatively [3]. According to these authors complications of dental implant treatment are classified in early and late complication. Late complications are: perforation of mucoperiosteum, maxillary sinusitis, mandibular fractures, failed osseointegration, bony defects, periapical implant lesion, infection and implant fracture.

The incidence of implant fracture is small [4,5], but represents the failure of implant therapy and can be a delicate problem for dental team, because it usually involves loss of both the implant and the prosthesis.

This paper presents the management of implant fracture with reassessing the treatment plan.

Case report

A 47-years old woman make an appointment accusing raised mobility of a fixed implant-supported prosthesis, cemented 18 months ago. The clinical examination revealed a porcelain-fused-to-metal 4-unit mandibular

bridge supported by two osseointegrated implants. The fixed prosthesis replace both premolars, first and second molar and implants replaced first premolar and second molar.

The bridge was easily removed together with the fractured implant coronal portion (figure 1).

The treatment plan consist of placing additional implants for second premolar and first molar, removing fractured implant with piezotome, reconstruction the bone defect. After four months a new implant will replaced first premolar and final restauration will be a four-unit fixed partial denture supported on four implants.

Under local anaesthesia (Articaine® 1:100,000 Epinephrine) a mucoperiosteal flap was elevated exposing the fractured implant and one adjacent tooth along with posterior implant (figure 2).

Initially, the sites for implants that replaced second premolar and first molar were prepared. A trephine bur was used to collect bone from osteotomy sites (figure 3). Two implants were placed and then piezotome was used for osteotomy with the purpose of removing fractured implant together with surrounding bone (figure 4,5).

A mixture of autologous material, consisting of harvesting bone from implant sites, bone block from fractured implant and patient blood, and particulate xenograft from bovine material was prepared to regenerate surgical site and promote bone augmentation (figure 6,7,8).

A fixation screw hole was pre-tapped before block removal from donor site. The surgical

site was filled with mixture between particulate autologous bone and xenograft (figure 9) and fixation was done to secure the bone block (figure 10). The fixed block was covered with a cardiac membrane and sutures were done in two layers with 4-0 polypropylene (figure 11).



Figure 1.

Patient presented with a loose dental bridge. One implant is fractured and also one screw abutment.

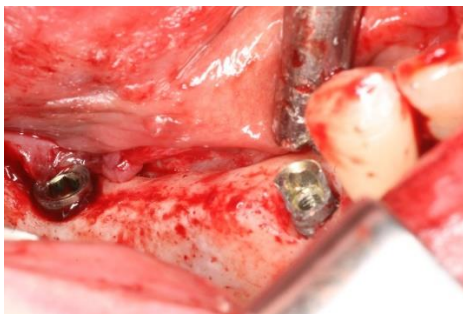


Figure 2.

Exposure of the bone with a full thickness flap utilizing a mid crestal incisions.



Figure 3.

Bone harvesting with trephine bur from new implant site.

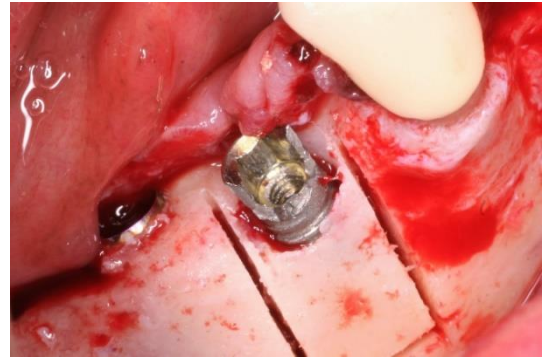


Figure 4.

Placement of additional implants and osteotomy around fractured implant.

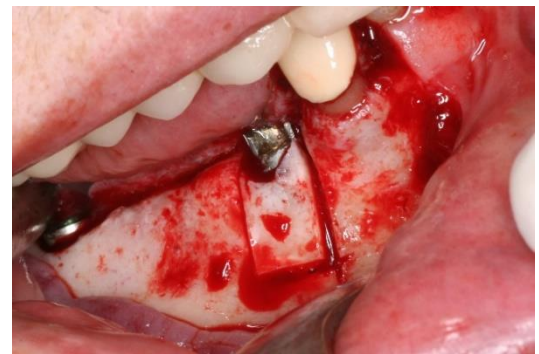


Figure 5.

Osteotomy of cortical bone around fractured implant.

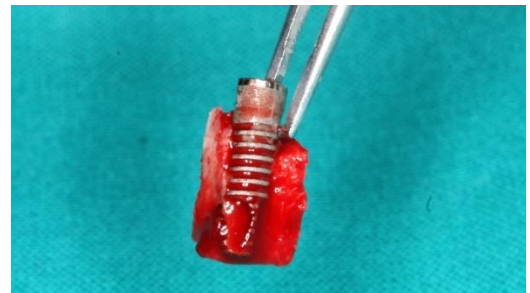


Figure 6.

Osseointegrated implant removed with adjacent bone.



Figure 7.

Implant surrounding bone was collected and prepared to use as bone block to graft osteotomy site.



Figure 8.

Mixture of autologous material and xenograft soaked in patient venous blood.



Figure 9.

Surgical site filled with particulate bone.

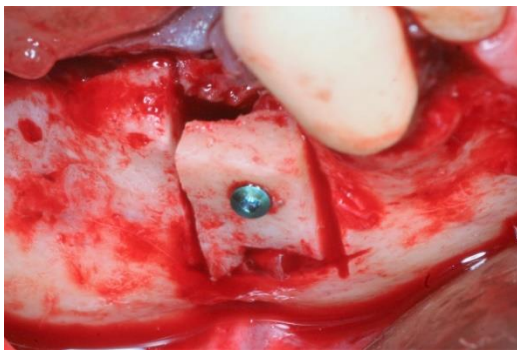


Figure 10.

Fixation of bone block.

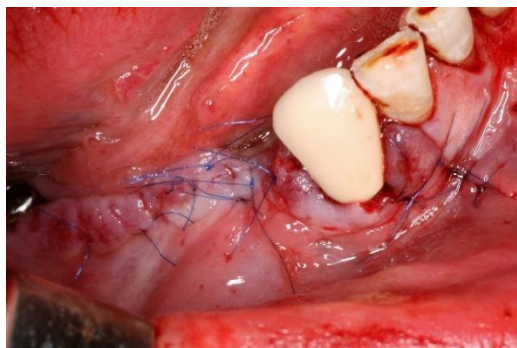


Figure 11.

Postoperative aspect.

Discussion

Implant fracture is a rare complication: 2 cases of 2000 implants after Gargallo Albiol J. et al. 2008 [6]. This complication is more

frequent in case of small diameter implant, especially in posterior region where is high occlusal load [7,8]. Also narrow-diameter implants were associated with abutment fracture [9] and more marginal bone loss compared with regular-diameter implants [10].

Causes of implant fracture are: manufacturing-induced fracture, restoration-induced fracture and overloaded-induced fracture [11]. Defects in the production and design of dental implants are very unlikely reasons for fracture [11].

The most common cause for implant fracture seems to be physiological or biomechanical overload. The stress caused by retaining screws of prosthesis without passive fit may result in continuous tension on the implant, predisposing to fracture. Frequently, loosening the screw of implant is a warning sign related to restoration supported by implant and precedes implant fracture [12].

Main cause is bone loss or overload of implants (incorrect restoration, bruxism). Parafunction like bruxism is identified as major etiological factor related with implant fracture [13]. Load factors are related to the magnitude and direction of occlusal forces. Majority of endosseous implant fractures are located in the molar and premolar area, where chewing forces and lateral movements associated with cusp inclination generate detrimental forces [14,15].

In this case, two implants, which replaced first premolar and second molar, supported a four-unit bridge in lateral area. According to Misch and Resnik [16] there are key implant position in order to withstand to occlusal load. The key implant positions when missing premolars and molars are: first premolar and second molar as terminal abutments and first molar to support high occlusal forces. First molar has a key position, for both maxilla and mandible, because occlusal load doubles at first molar compare with premolar area. Rarely, two implants are sufficient to replace four posterior teeth.

Management of implant fracture includes: removal of fractured implant, replacement of implant and fabrication of a new prosthesis or modification of existing prosthesis leaving fractured implant in place.

Removal of fractured implant and replacement includes following options:

- immediate replacement with a wider diameter implant,
- simultaneous replacement with guided bone regeneration,
- delay approach with rebuilding of the lost tissues and implantation after site healing.

The purpose of treatment plan was to fabricate an implant-supported fixed partial denture able to support occlusal load in lateral area of a health adult female patient with antagonist tooth-supported fixed partial denture. The new prostheses will be supported be four implants and failed implant will be replaced be a wider diameter implant.

Due to complexity of the case the following treatment plan was establish: placement of two additional implants simultaneous with removal of fractured implant and grafting the surgical site. Placement of a new implant in grafted site and fabrication of a new prosthesis: four-unit splinted fixed partial denture.

Piezosurgical removal of fractured implant was performed because it has the advantages of easy control, selective cutting, and rapid healing [17].

Because complete removal of the implant could result in significant bone loss [18], implant site were regenerated with bone graft and a mixture of particulate bone. Four months later a new implant could be placed.

Adequate prosthetic planning is essential to reduce dental implant fracture rates: biomechanical factor and achieving a passive fit of the prosthetic restoration must be taken into consideration from the moment when is elaborated the treatment plan, continuing with implants placement until prostheses are installed.

Conclusions

In this case management of fractured implant consists in removing the fractured part and grafting the surgical site for placing a new wider diameter implant later. Bone collected from surgical site was used to its reconstruction.

Conflict of interest: None to declare.

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