Removal of Fractured Implants and Replacement With New Ones

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INTRODUCTION

Dental implants are widely used for replacing the missing teeth of partially or completely edentulous patients. 1,2 Many studies have confirmed that dental implants show predictable results with a high percentage of success. 3–5 However, clinicians must be aware of the mechanical complications, such as screw loosening, screw or implant fracture, and prosthetic framework fracture, which may result in implant failures. 6–11 Among these, the incidence of implant fracture is low (0.08–0.74%), 12 but it poses great difficulties for the clinician who must solve this problem. According to Balshi, 8 implant fractures may be the result of (1) defects in implant design or material, (2) nonpassive fit of the prosthetic framework, and (3) physiological or biomechanical overload.

The aim of this case letter was to analyze a dental implant fracture and define how to effectively manage this challenging situation.

CASE REPORT

In August 2008, a 56-year-old nonsmoking male patient was referred to our clinic (Baskent University, Faculty of Dentistry, Oral and Maxillofacial Surgery Department, Ankara, Turkey). The patient complained of pain, bleeding at the gingival margin, and loosening of a 4-unit implant supported prosthesis in the mandibular left premolar–molar region. The fixed prosthesis was mobile; however, the implant mobility was not present. The panoramic radiograph revealed no evidence of fracture or marginal bone loss around the implant (Figure 1).

The patient's anamnesis revealed the placement of two titanium implants (Astra Tech, Möln达尔, Sweden) in the mandibular left region (3.5 × 11 mm for tooth #21 and 4 × 13 mm for tooth #18) 4 years previously. An implant-supported fixed partial denture (FPD) with 2 pontics was performed. Two years after the FPD was completed, the patient complained about the mobilization of this unit and went to their own clinician. The fixed denture was removed and the gold screws of the crowns were retightened. Following this retightening the patient had no problems except for interim pain and spontaneous bleeding.

When the patient presented to our clinic, the patient's implant-supported bridge was loose and, therefore, it was removed. The abutments were also mobile and had to be removed. To evaluate the situation, a mucoperiosteal flap was raised and the implants were exposed. Unfortunately, it was not feasible to retain the same denture and implants because the buccal coronal portions of the implants were fractured and there was buccal bone loss (Figure 2). The treatment plan was to remove the implants, rectify the defect with autogenous bone grafting, and then insert the new implants. The implants were retrieved with a trephine bur under copious irrigation to reduce heat from friction (Figure 3). The defects were filled with synthetic bone graft (Osteobiol Gen Os, 250–1000 micron, 1 gr, Italy) and membranes (Osteobiol Evaluation, 30 × 30 mm, Italy).

Following a 6-month post-graft healing period, 2 implants (4 × 11 mm each) were inserted in the related region. However, tooth position #18’s grafted site was not suitable for inserting an implant; thus, the second implant was inserted in tooth position #19. After 3 months, a 4-unit bridge was placed with a single pontic and cantilever. The patient’s re-evaluation appointments after 6 months to 3 years showed no evidence of problems related either to the prosthesis or to the implants. (Figure 4)

DISCUSSION

Mechanical problems after implant insertion occur principally due to framework misfit, excessive occlusal force, poor prosthetic component design, and unfavorable leverage or parafunctional activities. 13 Sanchez-Perez et al 14 have provided a most comprehensive classification of the fracture risk factors. They categorized the fracture cases according to patient factors, implant-related factors, and prosthetic factors.

Patient factors are related to bone loss, bruxism, or pocket depth (PD). According to Rangert et al, 9 most of the patients (56%) with implant fracture had bruxism or heavy occlusal...
forces, which might lead to bone loss around the cervical area of loaded implants. Coronal bone resorption produces higher bending stress around the implant and also causes PD, bleeding, or an inflammatory response. In the present case, the panoramic radiographs did not reveal any bone resorption around the implant area. However, the existing resorption on the buccal part of the implant was easily observable when the mucoperiosteal flap was raised. This unusual event was quite confusing for properly diagnosing the problem. The patient was also evaluated for bruxism and parafunctional habits, but no evidence was found. Bleeding and interim pain of the patient were assumed to be caused by the edges of the existing prosthesis.

Implant-related factors include diameter, crown implant ratio, and implants design. A 4-mm implant has a 30% higher fatigue resistance compared to the 3.75-mm implant. In the present case, the diameters of the implants were 3.5 and 4 mm. Implants of at least 4 mm diameter are suitable for the molar region. However, a 4-mm diameter implant was also fractured, which might be due to the buccolingual and mesiodistal dimensions of the 4-unit bridge used for its restoration.

Prosthetic factors include cantilevers or loosening of the screws. Eckert et al.11 stated that insufficient or excessive torque to the retaining screws may also lead to improper prosthesis connection. Rangert et al.9 stated that most of the fracture cases (82%) had distal or mesial cantilevers. Conversely in our case, the 4-unit bridge with 2 pontics was fractured while the 4-unit bridge with 1 pontic and 1 distal cantilever had no problems even after 3 years. However, loosening of the screws occurred 2 times prior to the implant fracture. When screw loosening occurs, the clinician must immediately take precautionary measures so that the problem does not become more complicated.

Our treatment included complete removal of the fractured implants, bone grafting, and placement of 2 new implants with larger diameters. This treatment was chosen because of the chronic screw loosening and bone resorption on the buccal part of the implants. Wider and multiple implants may help prevent this problem. This treatment option is based upon previous reports concerning dental implant fractures.

Abbreviations

FPD: fixed partial denture
PD: pocket depth

Figure 1. The panoramic radiograph of the patient’s first visit.

Figure 2. Fractured buccal portion of the osseointegrated implants.

Figure 3. Extracted dental implants with trephine bur.

Figure 4. The panoramic radiograph of the patient after 3 years.
REFERENCES


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