

THE ASSESSMENT OF OSSEOINTEGRATED DENTAL IMPLANT FRACTURE: A CASE REPORT

OSSEOİNTEGRE DENTAL İMPLANT KIRIĞININ DEĞERLENDİRİLMESİ: OLGU SUNUMU

Yrd. Doç. Dr. Şeref EZİRGANLI * Yrd. Doç. Dr. Fatih SARI **
Doç. Dr. Hasan Hüseyin KÖŞGER ***

Makale Kodu/Article code: 544
Makale Gönderilme tarihi: 23.04.2011
Kabul Tarihi: 23.08.2011

ABSTRACT

Fracture of dental implants is a rare situation with severe clinical results. The aim of the present report was to describe the management of a fractured endosseous dental implant replacing the maxillary left canine.

In this article, the literature is reviewed and various causative factors that may lead to fracture of dental implants are presented. This case report was to present an osseointegrated dental implant, which fractured at the coronal portion, was removed together with ball-attachment and a treatment procedure. Fracture occurred 16 months after the implant placement. It was proposed that the cause of the fracture is metal fatigue occurred due to the prosthetic failure.

As a result of the applied dental implant, it could be minimalise fracture risk, if it had been inserted four implants and wider implants instead of two.

Key Words: Dental implant, fracture, ball-attachment systems.

ÖZET

Dental implantların kırılması, ciddi klinik sonuçları olan nadir bir durumdur. Sunulan bu raporun amacı, sol üst çene kanin bölgesine yerleştirilen kemik içi dental implant kırığının tedavisini tanımlamaktır.

Bu makalede, literatür gözden geçirildi ve dental implantların kırılmasına yol açabilecek çeşitli faktörler sunuldu. Bu olguda, boyun kısmından kırılan ball ataşman kısmıyla birlikte ayrılmış olan osseointegre dental implant ve tedavi prosedürü sunuldu. Kırık, implant yerleştirildikten 16 ay sonra meydana geldi. Kırığın nedeninin protetik hatadan kaynaklı metal yorgunluğu olduğu tahmin edilmektedir.

Dental implant uygulamasının sonucu olarak, eğer iki implant yerine dört implant ve daha geniş çaplı implantlar yerleştirilseydi kırık riski minimize edilmiş olunabilirdi.

Anahtar Kelimeler: Dental implant, kırık, ball ataşman sistem.

INTRODUCTION

Dental implants are extensively used for the rehabilitation of completely and partially edentulous patients.¹

Overdentures are classified as implant-retained and tissue-supported prostheses.^{2,3} They have the advantage of being integrated into the bone. Implant supported overdentures should be the first choice of care for edentulous patients.⁴ The implant-supported overdenture has been a common treatment for edentulous patients for the past 20 years. Main advantages are good stability, good retention,

improved function, improved aesthetics, reduced residual ridge resorption, simplest implant-supported prosthesis and possible incorporation of existing denture into the new prosthesis.^{5,6} Implant fracture is accepted to be rare and infrequent, however, when it occurs, its management is challenging because of its surgical, rehabilitative and emotional implications, and sometimes also for financial reasons.^{1,7}

The aim of the present report was to describe the management of a fractured endosseous dental implant replacing the maxillary left canine.

**Bezmialem Vakıf Üniversitesi Diş Hekimliği Fakültesi Ağız Diş ve Çene Cerrahisi Anabilim Dalı, İstanbul.

**Gaziantep Üniversitesi Diş Hekimliği Fakültesi Protetik Diş Tedavisi Anabilim Dalı, Gaziantep.

***Cumhuriyet Üniversitesi Diş Hekimliği Fakültesi Ağız Diş ve Çene Cerrahisi Anabilim Dalı, Sivas.



CASE REPORT

A 55-year-old woman was referred to the clinics of Oral and Maxillofacial Surgery Department with a chief complaint of fractured dental implant. Intraoral examination revealed that the fractured dental implant which was supported overdentures with ball-attachment systems, and was replacing the maxillary left canine (Figure 1). The clinical examination revealed an overdenture type prosthesis supported by two thread osseointegrated implants (Figure 2). The patient's implant placement and prosthesis had been done at another clinic. The implant was broken sixteen months after the prosthesis was placed (Figure 3,4). It was seen that the fractured implant was ITI (Straumann AG, Switzerland) cylindrical dental implant, 12 mm in length and 3.3 mm in diameter. Radiographic examination showed no signs of periimplantitis and lack of osseointegration in any of the inserted implants. The patient has class III occlusion and had any systemic problems except for hypertension. The patient's alveolar crest bone destruction was not present and alveolar crest was appropriate for insert a dental implant. The abnormal masticator forces were absent at patient. Because osseointegration of the fractured implant was perfect and its removal could have caused a quite much bone volume loss, we preferred not to remove the fractured implant and to insert a new dental implant next to the existing fractured one. In addition, we suggested to patient which insert an implant in the midline in both jaws. However, the patient did not accept extra implants because of economic reasons. A 12 mm in length and 4.1 mm diameter cylindrical Straumann dental implant was inserted in approximately 4 mm away from the fractured implant's distal area in our department (Figure 5). After six-months of healing period with no complications noted, clinical osseointegration was achieved (Figure 6,7), and then a new prosthesis was made and the patient was followed for the next two years. Fractured implant piece was not symptomatic. The patient had any complaint and was very pleased.



Figure 1. The intra-oral image of the patient

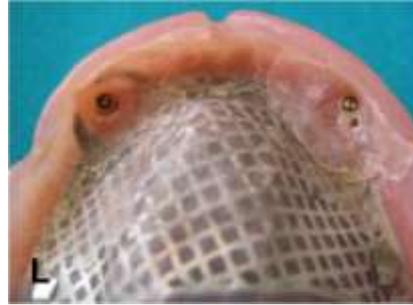


Figure 2. The overdenture type prosthesis supported by two dental implants



Figure 3. Radiography showing that the fractured dental implant was osseointegrated



Figure 4. The fractured dental implant



Figure 5. Dental implant was inserted in to the fractured implant's distal area

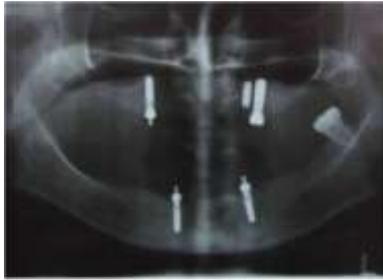


Figure 6. Final panoramic radiograph



Figure 7. Final appearance of the implants

DISCUSSION

The use of osseointegrated implants as an endosteal anchorage device to provide support for dental prosthesis is a reliable and widely accepted treatment modality.⁸ For many years clinicians realized that placement of osseointegrated implants under a removable prosthesis would provide the definitive advantages of bone preservation, prosthetic retention, stability, and a degree of occlusal support resulting in improved function, facial esthetics, and comfort.³ The most common risk factors for failure of dental implants are smoking, factors that affect healing of bone (such as diabetes, use of steroids), untreated periodontal disease, poor bone quality, insufficient practitioner training, experience or both, anatomy (if bone in recipient site is inadequate), and the patient compliance concerns. With proper diagnosis and treatment planning, the limitations and risks of implant placement are manageable.⁶

Several factors as a design or production flaws, insufficient fit of the superstructure, load factors are related to occlusal forces, the existence of occlusal parafunctional activity such as bruxism, the implant's bearing forces, number, position, location, design of implant, implant size (small diameter implants tend to fracture more easily than large ones), restoration are insufficient to the site needing rehabilitation, metal fatigue and an marginal bone loss around the implant have been suggested as possible causes for dental

implant fractures.^{1,7,9} In this case, we estimate that the cause of the fracture is metal fatigue occurred due to the prosthetic failure. Other causes can be the implant's small diameter, and the patients' class III occlusion.

Ball and bar attachments are two main systems for retention in implant supported overdentures.⁴ Traditional overdentures are classified as implant-retained and tissue-supported prostheses. If the patient's residual ridge is inadequate to provide the majority of vertical occlusal support in function, as in cases of extreme "knife-edge" or chronic mucosal soreness due to the nature of the tissues, then more implants or splinting of the implants may be indicated to provide more implant support and decreased loading of the tissues. The benefit of placing three to four implants (as opposed to only two) is the ability to ease the load on a less-than-ideal ridge, decreasing mucosal bearing areas during occlusal function. Additional implants may also be more desirable when fixtures of reduced length or diameter are necessary due to limited bone volume. The benefit of splinting implants (ie, bar restorations) is potential distribution of the forces to more osseointegrated surfaces to share the load.³

The literature review indicates dental implant fracture is extremely rare event with severe clinical results.^{1,9,10} In this article, the literature is reviewed and different factors that may lead to fracture are presented.

Fractured implants were first described by, who reported 13 fractured implants on a total of 1618 (0.8%) osseointegrated implants.

Balshi¹¹ reported eight fractured implants (0.2%) of 4045 implants placed in during a 5-year period and determined that all fractures had associated marginal bone loss. Parafunctional habits were diagnosed in all patients with fractured implants. Mericske-Stern et al¹² found that only one case is fractured in 66 ITI implants, whereas Zarb and Schmitt¹³ could not find any fracture in a series of 274 implants. Gargallo Albiol et al⁷ reported that implant fracture was more common in males than in females (15:4).

The great majority of fractured implants (80.9%) were located in the molar and premolar regions, and most fractured within 3-4 years after loading⁷ Rangert et al¹⁰ reported that 90% of fractured implants occurred in the posterior region and 77% of the prostheses were supported by one or two implants. In the present case, we reported a previously inserted implant, which was placed at the

maxillary left canine, and fractured after 16 months of placement.

Gargallo et al⁷ reported that it was important to know and apply the measures required to prevent implant fracture and to seek the best individualized solution for each case, though complete implant removal is usually the treatment of choice. In the present case, a wider dental implant from the same brand was inserted in the fractured implant's distal side without removing the fractured implant.

Although as few as two to four implants may be used for support, it is beneficial to use more than two implants in the unlikely event that one of the implants fails to function during the patient's life span⁶ Three or four implants will provide greater retention and level of implant support and minimize anterior-posterior rocking from the unsupported long extension of the denture base. The cuspid position has traditionally been the site of choice for the two-implant overdenture. In a larger ridge, consideration of two cuspid and one additional incisor implant-for a total of three implants-is more favorable to prevent the anterior-posterior rock and provide a tripod of support³ We suggested to patient which insert an implant in the midline in both jaws. However, the patient did not accept extra implants because of economic reasons. As a result, we placed a larger implant were approximately 4 mm away from the fractured implant's distal and the inner part of the prosthesis was adapted for new inserted implant. In the event of a broken again, it was explained to the patient that the same procedures would be repeated.

In conclusion, it should insert four implants and wider implants instead of two to minimalise fracture risk on apply dental implants.

REFERENCES

1. Capodiferro S, Favia G, Scivetti M, De Frenza G, Grassi R. Clinical management and microscopic characterisation of fatigue-induced failure of a dental implant. Case report. Head Face Med 2006;(18):1-5.
2. Zitzmann NU, Marinello CP. A review of clinical and technical considerations for fixed and removable implant prostheses in the edentulous mandible. Int J Prosthodont 2002;(15):65-72.
3. Vogel RC. Implant overdentures: a new standard of care for edentulous patients current concepts and techniques. Compend Contin Educ Dent 2008;(29):270-276.
4. Karabuda C, Yaltirik M, Bayraktar M. A clinical comparison of prosthetic complications of implant-supported overdentures with different attachment systems. Implant Dent 2008;(17):74-81.
5. Schwartz-Arad D, Kidron N, Dolev E. A long-term study of implants supporting overdentures as a model for implant success. J Periodontol 2005;(76):1431-1435.
6. Doundoulakis JH, Eckert SE, Lindquist CC, Jeffcoat MK. The implant-supported overdenture as an alternative to the complete mandibular denture. J Am Dent Assoc 2003;(134):1455-1458.
7. Gargallo Albiol J, Satorres-Nieto M, Puyuelo Capablo JL, Sánchez Garcés MA, Pi Urgell J, Gay Escoda C. Endosseous dental implant fractures: an analysis of 21 cases. Med Oral Patol Oral Cir Bucal 2008;(13):E124-128.
8. Gokcen-Rohlig B, Yaltirik M, Ozer S, Tuncer ED, Evlioglu G. Survival and Success of ITI Implants and Prostheses: Retrospective Study of Cases with 5-Year Follow-Up. Eur J Dent 2009;3:42-49.
9. Tagger Green N, Machtei EE, Horwitz J, Peled M. Fracture of dental implants: literature review and report of a case. Implant Dent 2002;(11):137-143.
10. Rangert B, Krogh PH, Langer B, Van Roekel N. Bending overload and implant fracture: a retrospective clinical analysis. Int J Oral Maxillofac Implants 1995;(10):326-334.
11. Balshi TJ. An analysis and management of fractured implants: a clinical report. Int J Oral Maxillofac Implants 1996;(11):660-666.
12. Mericske-Stern R, Steinlin Schaffner T, Marti P, Geering AH. Peri-implant mucosal aspects of ITI implants supporting overdentures. A five-year longitudinal study. Clin Oral Implants Res 1994;(5):9-18.
13. Zarb GA, Schmitt A. The longitudinal clinical effectiveness of osseointegrated dental implants: the Toronto study. Part III: Problems and complications encountered. J Proshet Dent 1990;(64):185-194.

Yazışma Adresi

Şeref EZİRGANLI
Bezmalem Vakıf Üniversitesi Diş Hekimliği
Fakültesi Ağız Diş ve Çene Cerrahisi AD.
Adnan Menderes Bulvarı Vatan Cad. 34093
Fatih/İSTANBUL
Tel: +90 212 453 17 00
Fax: +90 212 533 23 26
E-posta: seref.ezirganli@gmail.com

