Implant success lies in complications management: A report of two cases

Sapna Rani, Jyoti Devi, Mahesh Verma

Abstract

At present, implant supported or retained prostheses are considered as a first therapeutic alternative for patients. Although the success rate of dental implants is very high, no treatment is without complications; same applies to implants also. Implant failure can be due to biological factors, i.e., loss of osseointegration or due to technical complications. This case report presents implant complications involving both factors along with the management of these cases. In implant supported overdenture patient, loss of implant on the right side and implant body fracture of the left side implant is reported and in another patient abutment screw fracture and its management is reported.

Keywords: Abutment screw, edentulism, implant fracture, overdenture

Introduction

Implant supported restorations has the benefit of preserving dental tissues as well as recovery of functions of the stomatognathic system. Despite the high-success rate of implant-supported prostheses, implant complications and failure are prone to occur. The success of dental implants is based primarily on the extent of osseointegration, but technical complications which involve loosening or fracture of prosthetic or abutment screw may also lead to implant failure. Hence, failure of dental implants is not only due to biological factors, such as unsuccessful osseointegration or the presence of peri-implantitis, but may also result from technical complications.[1]

Dynamics involved in implant dentistry and attachment of prostheses with screws results in a complex load with frequent loosening and fracture of screws.[2] Implant body fracture is another complication encountered in implant dentistry and usually results in loss of both the implants and the prostheses. Implant fracture is a late complication clinically seen as prostheses instability or bleeding at the gingival margin in case of the implant-supported fixed prosthesis.[3]

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Possible factors influencing implant fracture include design and production flaws, inadequate fit of superstructure, bruxism or heavy occlusal forces, implant size, progressive bone loss, metal fatigue, and galvanic activity.[4]

The aim of this case report is to analyze dental implant complications and define how to effectively manage these situations.

Case Reports

Case 1

A 55-year-old completely edentulous male patient [Figure 1a] was referred to the department of prosthodontics for replacement of missing teeth. Medical history was noncontributory, but the patient was a chronic smoker. Keeping in mind patient preference for either fixed or retentive removable prosthesis and his financial constraints, mandibular implant retained overdenture was decided for the patient. For overdenture fabrication, conventional upper and lower complete denture was fabricated for the patient with balanced occlusion. The subject was seen for follow-up appointments and necessary adjustments were done until the patient was comfortable with the new denture. Conventional complete denture was duplicated in clear acrylic (DPI-RR Cold Cure, Dental Products of India, Mumbai) and radiographic markers (Cavitemp, Ammdent, India) were placed on both the right and left canine region to make a radiographic stent. A panoramic radiograph was obtained with radiographic stent in place to evaluate alveolar bone quantity and determine

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the locations of vital anatomical landmarks for implant placement. The radiographic stent was later converted into a surgical stent by removing labial and lingual flanges from anterior region.

Implant osteotomies were performed using Branemark protocol, and the surgical guide was used for proper angulation and position. The final osteotomy was done after evaluating bone quality which was found to be D3. Two endosseous overdenture implants (Leader, Tixos 2.7 mm × 10 mm) [Figure 1b] were placed interforaminal in the region of A and E under local anesthesia (Lignocaine with Adrenaline, Unijules Life Sciences Ltd., India) using a limited midcrestal incision. Sutures were placed, and mandibular denture was seated in the patient's mouth and adjusted after relieving denture base resin to provide clearance in the region of ball attachments. Relining of denture was done with soft relining material (Viscogel, Dentsply) and occlusion was evaluated. The patient was instructed not to remove the overdenture for 24 h to minimize swelling. Postoperative instructions were given.

The patient was recalled after 24 h and assessed for denture stability, occlusion. Sutures were removed after 7 days. After 3 months, orthopantogram was taken to evaluate osseointegration which was found to be satisfactory. No vertical bone loss around implant was found. Female nylon cap was picked up using autopolymerizing resin (DPI-RR Cold Cure, Mumbai, India) chairside in the denture.

After 4 months, the patient reported with failed implant in the region of A. Treatment for failed implant was discussed with the patient, i.e. insertion of another implant in the region B and making a new overdenture for the patient. The patient was not ready for another surgery, so nylon cap was removed from the denture from the region of implant loss, and hard relining was done. After 1 month, patient again reported with fracture of other implant in the region of E [Figure 1] on which overdenture was supported. An intraoral periapical radiograph was taken which revealed implant body fracture [Figure 1c]. As the patient was not ready for another surgery, remaining part of the implant which was submerged in bone [Figure 1d] retrieved by using trephine and again conventional denture was fabricated for the patient.

Case 2

A 44-year-old female patient reported in prosthodontic department for replacement of missing 11, 12, 21, 22 and 31, 32, 41, 42 [Figure 2a]. Implant-supported fixed prosthesis was planned for the patient. Severe bone loss was there in the maxillary region with respect to 11, 12, 21, and 22; also 13, 23 showed gingival recession and Grade II mobility. In First stage surgery, two implants (Adin [Touareg CloseFit - NP], 3 mm × 11.5 mm) were inserted in mandibular 31, 41 region and 13 and 23 were extracted and also socket preservation was done using Tata Memorial DFDBA graft, PerioCol GTR membrane, and platelet rich fibrin obtained from patient's blood before achieving the primary closure of the site. After a period of 6 months, the second stage surgery was done, and cover screw was replaced with gingival former (NP healing abutment ∅4.5×3 mm Length). After a healing period of 10 days, impressions were made using custom made tray and polyether impression material (closed tray method) (3M ESPE). Straight solid abutments (NP 1 mm) were used for prosthesis fabrication. Metal try in was done, and passive fit of framework was checked [Figure 2b]. Before final prosthesis cementation, abutments were preloaded with a torque driver at 20Ncm. While tightening the abutment screw of the left mandibular implant abutment, abutment screw was fractured at the level of 20Ncm. Two treatment options were considered: Attempting to retrieve the fractured screw, or removing the implant and replacing it with a new one. After discussion and consent with the patient, it was decided that the fractured screw should be removed and the implant to be restored. Hence, to retrieve abutment screw, the flap was reflected to achieve visibility and access, and a groove was made with the help of 169 L straight carbide bur in the broken part of abutment screw inside in the implant. Ultrasonic scaler with the smallest pointed tip (Ems, Instrument P) was operated in a counter-clockwise direction at a slow speed to help in the removal of screw [Figure 2c]. Fine single flat ended composite filling instrument which was fitting in the prepared slot was later used to open the screw. The broken part of the screw which came out was retrieved by forceps [Figure 2d]. The flap was closed using a resorbable suture (Ethicon Vicryl 4-0), and abutment was tightened with a new abutment screw [Figure 2e], and the prosthesis was cemented using zinc phosphate cement [Figure 2f]. At subsequent review, the patient was asymptomatic and comfortable with prosthesis.

Discussion

Despite implant therapy has been consolidated with high success rates as demonstrated in literature,[5] problems may arise with this type of treatment. Despite its low incidence, consensus in the literature suggests that one of the possible

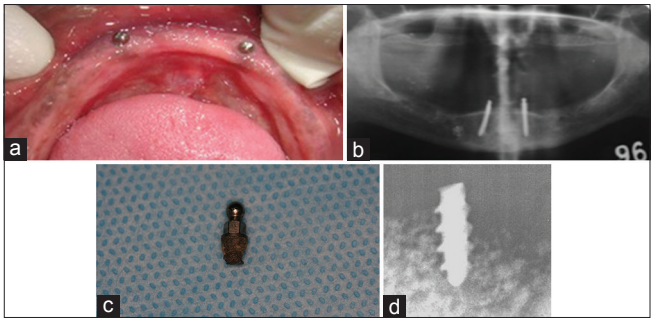

Figure 1: (a) Intraoral view of osseointegrated implants. (b) Orthopantomography showing placement of implants. (c) Remaining fractured part of implant. (d) Intraoral periapical radiograph showing fractured implant

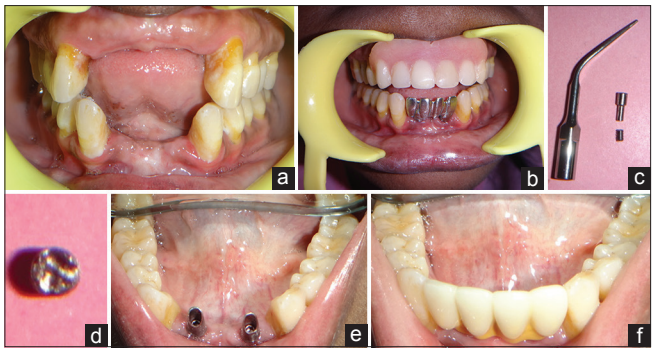

Figure 2: (a) Preoperative intraoral photograph showing missing 31, 32, 41, 42. (b) Metal try-in of prosthesis. (c) Scaler tip used for retrieving abutment screw and fractured abutment screw. (d) Slot made in abutment screw fragment. (e) Abutments tightening done after placement of new abutment screw. (f) Postoperative intraoral view

complications that may occur with dental implants is a fracture.[6] While facing an implant fracture, three options of treatment are available.[3,7]

1. Remove the fractured implant using trephines
2. Removal of the coronal portion of the fractured implant with the purpose of placing a new prosthetic post
3. Removal of the coronal portion of the fractured implant, leaving the remaining apical part integrated in the bone.

The small diameter of implant may be a cause for implant fracture. Other factors for implant fracture are (1) defects in implant design or material, (2) nonpassive fit of the prosthetic framework, and (3) physiological or biomechanical overload.[8] Sánchez-Pérez *et al*.[9] have provided a most comprehensive classification of the fracture risk factors. They categorized the fracture causes according to patient factors, implant-related factors, and prosthetic factors. Patient factors are related to bone loss, bruxism, or pocket depth. Implant-related factors include diameter, crown-implant ratio, and implants design. Prosthetic factors include cantilevers or loosening of the screws. The cause of implant fracture in the presented case report may be small diameter implant and less number of implants. Complete removal of implant was chosen as a remedy because fracture occurred in the middle third of body of implant and also it is considered as a best treatment option.[3]

Once an abutment screw fracture has occurred, the fractured screw segment inside the implant must be removed. Otherwise, the implant may remain osseointegrated but will lose its ability to retain the prosthesis, so that the existing prosthodontic restoration can no longer be used.

The methods employed to grasp the broken fragments or screw are determined according to the location of the fracture abutment screw above or below the head of the implant.[10] If an abutment screw fractures above the head of the implant, an explorer, a straight probe, or hemostats might be successful. If the screw fracture occurs below the head of the implant, several repair kits are available.

In the second case report reason for abutment, screw fracture may be design flaws or more force exerted in tightening of abutment screw.

Conclusion

It is recommended to increase the number of implants and use of wide diameter implants wherever possible to limit the complications. Proper diagnosis and treatment planning will minimize the risk of complications. Although the prime aim of a dentist should be to provide successful treatment to the patient if complications occur goal should be diverted to the management.

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Conflicts of interest
There are no conflicts of interest.

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