

Immediate implant replacement after partial explantation of malpositioned dental implant: Case report and follow-up

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TO CITE THIS ARTICLE

Espinoza Espinoza DAK, Guerrero ME, Cáceres La Torre OA. Immediate implant replacement after partial explantation of malpositioned dental implant: Case report and follow-up. *J Osseointegr* 2019;11(4):540-543.

DOI 10.23805 /JO.2019.11.03.13

ABSTRACT

Aim It is not common to report in the literature about complications during intraoral dental implant removal and its immediate approach during implant surgery. This report describes the approach of an intraoperative accident during an explantation and its follow up.

Case report In this case, an immediate implant was placed in the presence of an implant remnant left after its partial explantation due to implant fracture during the procedure. A cone-beam CT scan was taken after six months post rehabilitation and revealed bone formation surrounding the replaced implant and the remaining titanium fragment.

Results There were no functional or aesthetic alterations that affected the outcome of the treatment after 2 years of follow-up.

Conclusions This satisfactory result suggests that this immediate solution can be used to obtain adequate results when failed dental implants cannot be completely eliminated, which reduces the duration of the treatment and the number of surgical procedures.

KEYWORDS Dental implants, Intraoperative complications, Dental implantation, Complications.

INTRODUCTION

Dental implant removal or explantation is a procedure indicated as the last alternative for implants placed in an incorrect three-dimensional position (1–3). This procedure can compromise bone availability required

to place a new implant in correct position (4). Different techniques for explantation have been reported in the literature using burs, elevators, forceps with high success rates (5). Nonetheless, the use of a torque wrench was the most predictable technique, allowing immediate placement of another implant. Also, the use of a laser was used to remove the bone around the dental implant without burning the calcium phosphorous and allowing the implant to be removed (6).

The immediate implant placement concept described by Lazzara in 1989, allows to place the implant beyond the apex of the extracted tooth to achieve a primary stability and maximize the available bone for osseointegration (7). This concept can be applied for the immediate replacement of failed dental implants when a conservative implant extraction technique is performed (8). Kim et al. (9) reported no significant differences observed between the prognosis of immediately and delayed failed implants replacement. It is important to select the most efficient technique for dental implant removal in order to achieve primary stability when a failed implant has been immediately replaced. The removal of an implant should cause the least surgical trauma and minor bone defects as possible (10). However, this procedure is not simple and complications can occur during surgery. This case report presents the follow-up of an osseointegrated dental implant placed in the presence of an implant remnant left after its partial explantation.

CASE REPORT

A 53 year-old caucasian female patient was referred by her restorative dentist for evaluation. The reason for the consultation was: "I want a dental implant treatment". The patient was in good general condition and declared having dental implants placed in the lower jaw two years before in another dental center. A thorough clinical examination revealed a Seibert Class III defect on the edentulous jaw ridge area. The panoramic radiography revealed five dental implants. Implant #31 was placed in an incorrect position, had peri-implant bone loss and was



FIG. 1 Patient evaluation: front view of the initial condition (a); digital panoramic radiograph showing five dental implants in the jaw (b); digital periapical radiograph showing a dental implant on position #31 close to tooth #41 (c).

compromising the radicular integrity of tooth #41 which presented mobility (Fig. 1).

Treatment planning

- Hygiene instruction and plaque control.
- Extraction of tooth #41.
- After 30 days: Explantation and immediate replacement of implant #31.
- After 4 months: Fixed screw-retained prosthesis on implants #31 to #37.

Surgical procedure

Under local anesthesia with 2% lidocaine and adrenaline, incisions were made and a full thickness flap was elevated. The explantation began with the osteotomy of the coronal third of the bone around the implant. Then,

the counter torque ratchet technique with a retriever was used to remove the implant. However, during this process the implant fractured in two parts increasing the degree of difficulty for its removal. The coronal part of the implant was removed, leaving the other part inside the bone. At that time, the implant fragment inside the bone was sectioned with a multilayer zekrya bur. Therefore, a thin fragment of the implant adjacent to the buccal bone table was left to avoid compromising the bone. Then, the drilling sequence and immediate implant placement was performed, placing a 3.5x12 mm dental implant (Alvim CM -Neodent™, Brasil), inserted at 35 Ncm/25 Rpm. in a better three-dimensional position. Additionally, particulate bovine bone graft was placed to fill the defect and it was covered with a resorbable collagen membrane. The flap was sutured with polyglycolic acid suture. Postoperative care consisted of: Amoxicillin 500mg, Ibuprofen 400mg and Ketorolac 10mg (three times a day) and chlorhexidine rinse (0.12% twice daily for one week). The patient follow-up was once a week for the first month and thereafter, every 30 days for a period of 5 months.

A second stage surgery was performed five months after dental implant placement. A radiographic control showed the proximity between the implant remnant and the placed dental implant (Fig. 2). Three weeks after the second stage surgery a screw-retained fixed partial prosthesis was placed (Fig. 3, 4).

Follow-up

The patient was controlled after six months in function



FIG. 2 (a) Occlusal view presenting the healing abutments 2 weeks after the second stage surgery. (b) Digital periapical radiography showing the osseointegrated titanium fragment close to the dental implant on position #31.



FIG. 3 Front view of final rehabilitation.



FIG. 4 Digital panoramic radiography after final case rehabilitation.

without any sign or symptom of complication. After one year, a cone-beam CT showed no alteration at the bone level (Fig. 5). The patient was instructed to follow maintenance therapy every six months. However, she did not return until after 2 years of function. The clinical evaluation showed marginal inflammation of periodontal and peri-implant soft tissues. No periodontal pockets were found. However, the oral hygiene index increased to 57% (Fig. 6). The radiographic evaluation showed a reduction of the crestal bone level compared to the previous radiographic control of implants 3.1 and 3.3. On the other hand, no signs of alteration at the bone level were

observed in relation to the contact between the implant and the titanium remnant (Fig. 7). Reinforcement of oral hygiene instruction was indicated with maintenance therapy and regular check-up appointments.

DISCUSSION

The technique selection to remove a dental implant from the jaw bone should be based on preserving hard and soft tissues. In this case report, dental implant removal and its replacement was indicated taking into account the availability of bone volume. The surgical approach reported offers some clinical advantages when faced with iatrogenic dental implant failures like malpositioned dental implants. As reported in the literature, implants placed immediately after implant removal could have similar outcomes obtained with implants placed immediately after tooth extraction (11). Removal of malpositioned dental implants in the jaw bone can often compromise surrounding bone tissues (10). It can decrease the possibility of placing a new implant or the aesthetic outcome of the treatment. We consider that the degree of difficulty for osseointegrated dental implant removal is related to bone density, implant design and length. In this case, type II bone density and 11.5 mm length increased the complexity of the procedure. Consequently, implant replacement may be at greater failure risk when compared with a first implant placement in a pristine site. When replacing a dental implant, the clinician should clearly know its predictability and long-term prosthetic prognosis (12–14). A recent case report, reported on a partial explantation of fractured dental implants, that violated the mandibular canal with a history of discomfort, which was completely solved 3 months after implant placement (15).

Literature presents five surgical techniques for removal of dental implants: the bur–forceps, bur–elevator–forceps (BEF), trephine drill, high torque wrench, counter torque ratchet technique (CTRT) and scalpel–forceps (5). The BEF technique begins with the removal of mesial and

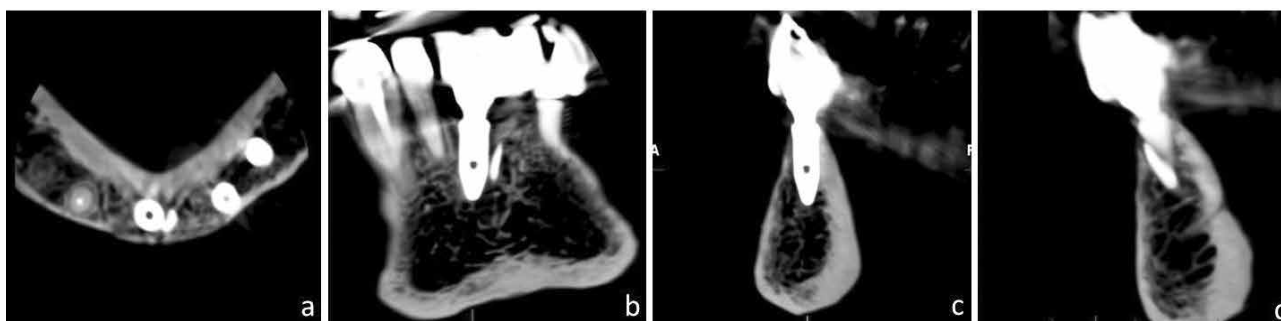


FIG. 5 Six month CBCT control. Axial view showing bone formation around dental implant #31 and the titanium fragment (a). Coronal view of the titanium fragment close to the implant on position #31 surrounded by bone (b). Cross-sectional view of the dental implant #31 surrounded by bone (c). Cross-sectional view showing bone formation around the titanium fragment (d).



FIG. 6 Clinical aspect after 2 years.

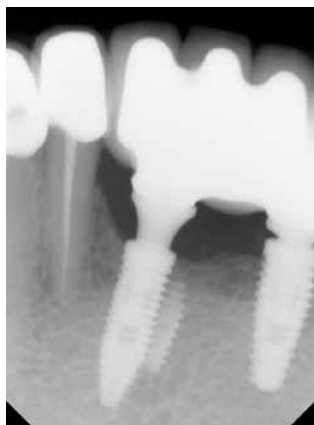


FIG. 7 Periapical radiography after 2 years in function.

distal bone around the implant. The CTRT is used when the connection with the implant is intact and the dental implant is strong enough to be 'torqued out' without fracture, but this technique requires an intact firm and solid implant connection to counteract deformations (2). Based on the complexity of the case, two techniques were combined: BEF and CTRT technique. However, the dental implant got fractured and a thin remnant of titanium was left. The complete explantation attempt of this fragment could have compromised more bone structure. So, it was decided to preserve enough bone to place another implant in the same site immediately. The implant was placed in a ridge with a 4-wall bone defect leaving more than 2 mm gap that required a guided bone regeneration (GBR) procedure (16,17). A split thickness flap was performed in order to achieve a tension-free wound closure. This soft tissue approach reduces the risk of complications such as membrane exposure (18).

In this case report, no complications during the healing process were reported. However, after 2 years in function and not having attended maintenance therapy regularly, the patient presented soft tissue swelling and crestal bone loss around the implants. This was determined to be associated with bacterial plaque accumulation due to poor hygiene, which is normally observed in patients who are not regular with maintenance therapy.

Finally, the remained implant fragment kept inert. As observed in this case report, the osseointegration of the immediate implant placed in the presence of an implant remnant was not compromised and did not show any

functional or aesthetic alteration that affects the result of the treatment after 2 years of follow-up.

Conflict of interest

The authors declare that they have no conflict of interest.

CONCLUSION

As observed in this case report, the osseointegration of the immediate implant placed in the presence of an implant remnant left after its partial explantation did not show any functional or aesthetic alteration that affected the result of the treatment.

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