

**Retrieval of an osseointegrated fractured implant - A case**

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**Conflicts of Interest:** Nil

**Abstract:** The recent advances in the field of dental surgery as led to a widespread use of osseous fixtures for rehabilitating patients with complete or partial loss of dentition.

In accordance, the of failures and complications associated with the same has also increased over the years. One of such complications is fracture of the dental implant which leads to ultimate loss of the fixture and a challenge for the clinician to aptly handle the ensuing inconveniences. Even an experienced clinician can find themselves in a fix when it comes to managing such cases where the implant as well as the adjoining anatomical landmarks need to be given fair consideration. The following article reports a case of implant fracture, it’s management and the following

post- operative complications that need to be considered and managed appropriately.

**Keywords:** Implant fracture, Implant retrieval, Biomechanics, Paresthesia

**Introduction**

Osseointegrated dental implants provide an edge to modern dentistry, and have become an interesting option for the rehabilitation of missing teeth in partially or totally edentulous patients, with a very high success rate. Despite this, complications associated with treatment with implants may occur, and one of such rare and irreversible complication is the fracture of implants. This presents as a grim setback not only for the patient but also for the clinician, because it usually leads to loss of both the implant and the prosthesis.

Removal of the fractured dental implant poses a remarkable challenge for the clinician especially when the implant has osseointegrated and the removal would compromise the bone and the surrounding anatomical structures. This article reports a fracture of a dental implant and the successful removal of the same followed by management of the complication succeeding the procedure.

### **Case history**

A 33 years old female reported to the department of Periodontology and Oral Implantology with pain and a swelling in the alveolar mucosa of the mandibular right molar region since the last 15-20 days (Figure 1). Upon further questioning the patient revealed that she had undergone surgical placement of dental implant in the same region followed by placement of implant supported prosthesis 5 years ago, but the prosthesis fractured and separated from the implant 1 year ago. The patient however ignored the issue and delayed reporting to a dentist which led to soft tissue overgrowth in that area. At the time of presentation, the alveolar mucosa in the region of tooth 46 showed presence of an abscess. The patient had no previous documentation and radiographs taken at the time of the initial procedure and was unaware of the implant system used.

Radiographic examination showed a discernible fracture in the implant present in the region of 46. There was presence of typical saucer shaped bone loss around the coronal third of the implant extending up to the 5<sup>th</sup> thread (Figure 2). There was a periapical pathology present in tooth 45 which showed an obturation that was short of the apex and the part of the implant below the fracture appeared to be completely osseointegrated. A surgical removal of the implant was planned following necessary laboratory investigations. Pre-operative

Antibiotic prophylaxis of 2 gm Amoxicillin was prescribed 60 min before the procedure.

Supracrustal incision was given followed by reflection of a full thickness flap. The submerged part of the implant was exposed and the fractured rim of the implant was visualized (Figure 3). Guttering of the bone was carried out circumferentially around the implant using a piezoelectric device and a diamond coated flat metal insert (Figure 4). The implant was gradually loosened and removed with a luxator. A small fragment of the cancellous bone was also removed attached to the implant (Figure 5). The socket was cleaned with a surgical curette and irrigated with betadine and saline. The site was grafted with demineralized freeze-dried allograft and a collagen membrane (Perio Col<sup>TM</sup>) was used to cover the bone (Figure 6). The reflected tissue was sutured back using 4-0 silk sutures and patient was prescribed post operative medications; a combination analgesic of paracetamol and ibuprofen and antibiotic dosage of 500mg amoxicillin thrice daily for 5 days. (Figure 7).

Sutures were removed 14 days after the procedure and uneventful healing of the site was noted. At the time of recall the patient presented with paraesthesia in the right quadrant extending from the corner of the lip till the angle of the mandible and the right lateral border of the tongue. A prescription of vitamin B complex tablets (Neurobion Forte) and multivitamin nutrition supplement capsules were given and patient was kept under periodic recall. 2 months post operatively the paraesthesia had reduced in span and persisted only in the premolar region but it had not completely reverted to normal. The 2 months postoperative radiograph shows bone fill in the socket and an otherwise uneventful healing was present (Figure 8). The patient was referred

to the endodontist for re- root canal treatment of 45and was kept under regular follow up.



Figure 1

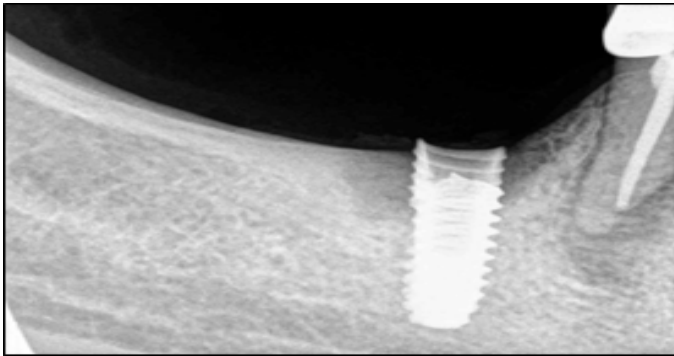


Figure 2

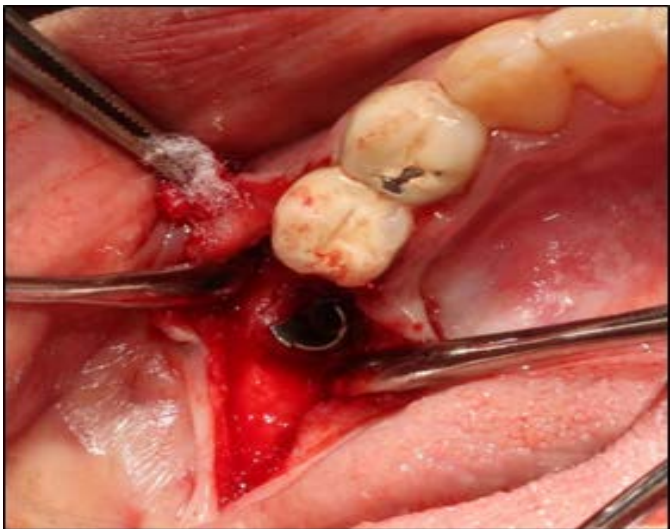


Figure 3

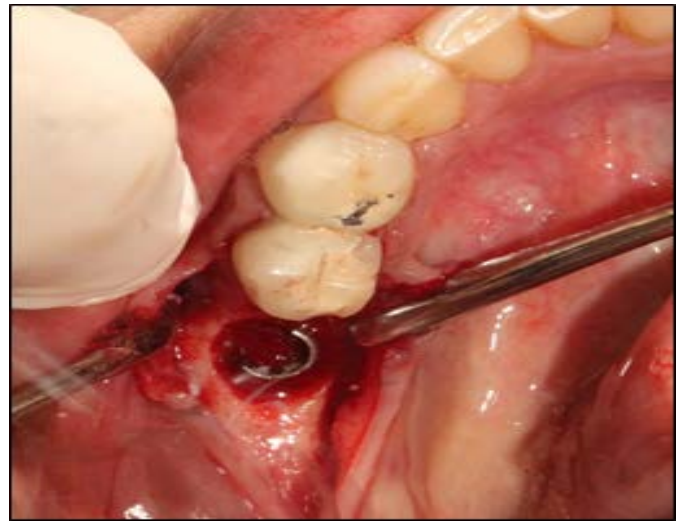


Figure 4



Figure 5

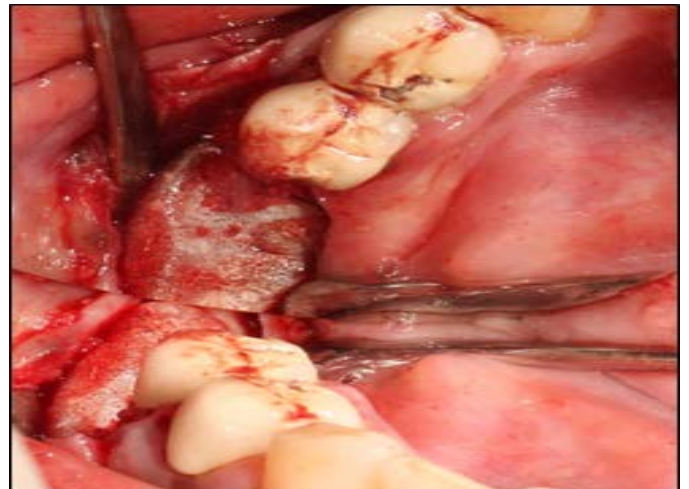


Figure 6





Figure 7

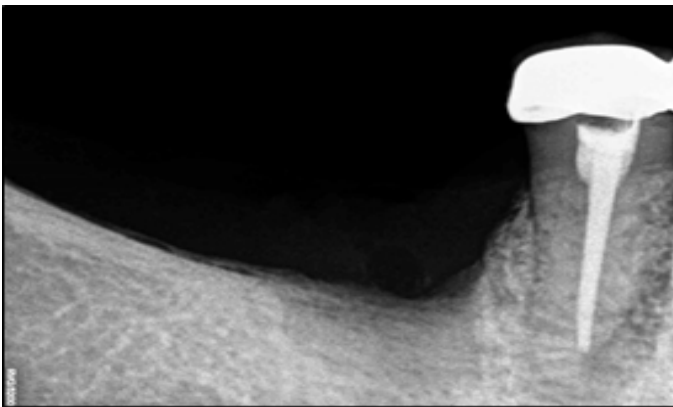


Figure 8

### Discussion

Fracture of dental implants is a rare phenomenon. According to a study by Balshi<sup>[1]</sup>, only 0.2% of 4045 implants that were placed incurred fractures during 5 years of function. A similar study carried out by Adell<sup>[2]</sup>, in which 4636 implants were placed, showing an average total fracture rate of 5%- 6% in the maxilla and 3% in the mandible upon 5 years of follow-up. Eckert<sup>[3]</sup> had reported that of the 4937 implants placed, the fracture rate was just 0.6%, and there was no statistically significant difference noted between the two arches.

The causes of implant fracture can be broadly categorised into 3 classes:

- (1) defects in the material and design
- (2) nonpassive fit of the prosthetic structure, and

- (3) biomechanical or physiological overload. Biomechanical and physiologic overload seems to be the most common cause of dental implant fracture; overload may be caused primarily by two factors: parafunctional habits and prosthesis design.<sup>[4]</sup>

The current case report represents a fracture of a commercially available pure titanium implant caused by a fatigue failure mechanism triggered by unfavorable loading conditions.

In any clinical situation, the presence of an extension or cantilever considerably increases the load on implants<sup>[5]</sup>.

In this case, an increased vertical cantilever can be considered as a possible factor for the fracture of the implant. Due to absence of the periodontal ligament; as is present within natural teeth and the direct apposition to bone, the dental implant is restricted to move under loading to accommodate for occlusal forces. This usually results in excessive overloading leading to mechanical failures.

Balshi<sup>[1]</sup> has suggested three methods for treating fractures of dental implants: (1) removal of the fractured implant (replace the implant and manufacture a new prosthesis), (2) alteration of the existing prosthesis and maintenance of the osseointegrated fractured part, and (3) alteration of the fractured implant and remanufacturing of the prosthetic portion. In this case, the fractured implant was removed using piezoelectric device. Basically, a circumferential osteotomy is done with a diamond-coated insert attached to a piezoelectric device. Thereby, the implant-bone interface is destroyed by ultrasonic waves; an intermitting application mode and proper cooling with saline solution is, however, also mandatory. The osteotomy is performed as close as possible to the implant surface in order to remove only the least necessary amount of bone. According to Froum et al.<sup>[6]</sup> compared to trephine bur surgery, the

postoperative healing of bone in cases where piezoelectric devices are used is better.

Furthermore, the complications associated with removal of the fractured implant can be varied and a systematic protocol for the management of the same needs to be established. The most important anatomical structure present in the mandibular posterior region is the inferior alveolar nerve. Although the inferior alveolar nerve is relatively protected by its tunnel led course through the bony mandible there is still potential lower lip sensation to be altered<sup>[7]</sup>. In this case the patient reported with a lower lip and partial tongue paraesthesia which was managed by vitamin B12. B12, also known as cobalamin, is a neurotrophic substance and helps in maintaining and regenerating peripheral nerves by promoting the process of myelination<sup>[8]</sup>. Hence it was considered here as a treatment option for correcting the paraesthesia.

### Conclusion

It is therefore suggested that careful, periodic occlusal evaluation and analysis before and after implant restorations should be carried out. A sound adoption of biomechanical principles must also be considered in the planning of combined tooth and implant supported partial dentures.

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