

## CASE REPORT

### Management of fractured components in Implant prosthesis- A Case Report

Sai kiran Koppolu<sup>a</sup>, Manoharan P S<sup>b</sup>, Seyed Asharaf Ali<sup>c</sup>

#### ABSTRACT

Dental implant treatment is a fast-growing field witnessing high success rate due to its osseointegration feature. Nevertheless, there are some complications relating to biological (Peri-implantitis; unsuccessful osseointegration) and mechanical (relating to implant prosthetic components) factors. Some of the mechanical factors which lead to failure are Prosthetic screw loosening, Prosthetic screw fracture, implant fracture, and framework fracture. Fracture of implant is a nemesis for the prosthodontist. Identifying the etiology and appropriate planning bring success to the treatment. This case report is about re- restoration of failed implant prosthesis with fracture at the abutment internal helix due to overload and active fixation. Multiple clinical difficulties were encountered (limited mouth opening, accessibility) during the procedure which were overcome by intra- orally adjusting the abutments (for parallelism and occlusal clearance) and proceeded with abutment level impression. The retainers were fabricated with an access hole for future retrievability in case of failure. Re-restoration with minimal intervention like modification of abutments intra-orally can be considered for a successful outcome. Sometimes, simpler choices may provide solutions for complex challenges.

**Keywords:** Abutment interface failure, Dental implants, Implant bone interface.

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#### INTRODUCTION

Restoration of the missing teeth with a prosthesis is considered with utmost care and precision. In the modern dentistry, implant therapy was considered as a good alternative to replace the lost teeth. Initially it was considered for rehabilitation of edentulous jaw which later expanded to treat partial edentulism condition. Due to the technical advancements and the strive to achieve better results, implant therapy is widely used.<sup>1</sup> Implants were broadly classified based on the anatomical location, material of choice, properties, implant attachments, and design of the implant. Titanium implants were most widely used due to its excellent osseointegration and superior mechanical properties. The longevity of the implants mainly depends on the stability of bone support and a stable implant abutment interface. Despite its high success rate, there are many failures involved in implant therapy.<sup>2, 3</sup>

Implant failures were mainly categorized into biological, mechanical, and aesthetic. The biological factors include unsuccessful osseointegration and peri-implantitis, while mechanical factors were again categorized into screw loosening, screw fracture, abutment fracture, implant fracture,

prosthesis dislodgement, and veneer debonding. This case report is about re-restoration of implant prosthesis with abutment fracture at internal helix.

#### CASE DESCRIPTION

A 55-year-old female patient reported to Department of Prosthodontics complaining of loosened implant supported prosthesis (which is 6 months old) in the lower right back tooth region. Clinical examination revealed mobile screw retained implant supported bridge with no mobility of the implant in relation to 46, 47 tooth region. Radiographic examination showed two root-form cylindrical implant with dimensions of 4.2 mm diameter and 11.5 mm length. The implant appeared to be well-positioned in all three –dimensions (mesiodistal, buccolingual, and apico-coronal) and the radiographic examination did not indicate any damage to the implant body. On further examination, there was a fracture at the internal helix of the distal abutment. The prosthesis was retrieved using a round bur and hex driver. Fracture at the internal helix was due to overload and active fixation of the prosthesis (*Fig 1*).

<sup>a</sup> Post Graduate student, Department of Prosthodontics, Indira Gandhi Institute of Dental Sciences, SBV University, Pondicherry.

<sup>b</sup> Professor & Head, Department of Prosthodontics, Indira Gandhi Institute of Dental Sciences, SBV University, Pondicherry.

<sup>c</sup> Professor and Head, Department of Prosthodontics, Government Dental College, Cuddalore, Tamil Nadu.



Figure 1: Fracture at the abutment internal helix

**Problems list:**

1. Fracture at the internal helix due to overload & active fixation.
2. Unfavourable embrasure.

**Diagnosis:**

- Fracture at the internal helix of the distal abutment.

**Treatment planning:**

- Restoring the prosthesis with proper functional harmony.
- 3- unit bridge with proper hygiene maintenance in the pontic region.

**Technique:**

Several difficulties were encountered due to limited mouth opening, accessibility, angulation of copings, multiple failures of closed tray impression and jig trails. All the difficulties were overcome by usage of abutments which are milled and intra- orally adjusted for parallelism and occlusal clearance (Fig 2). Later an abutment level impression was made using addition silicone material (Photosil, DPI, Mumbai, India) (Fig 3). A 3- unit prosthesis was fabricated for proper hygiene maintenance in the



Figure 2: Intra-orally adjusted abutments in relation to 46 & 47

pontic region. An access hole was also provided over the retainers for any future retrievability on account of failure (Fig 4). The prosthesis was checked for the fit, marginal integrity and occlusal high points. The crowns were cemented with Glass

Ionomer Cement (GC Corporation, Tokyo, Japan) and the access hole was restored with composite (GC Everx Posterior). Follow-up was done after 6 months with satisfactory results (Fig 5).



Figure 3: Abutment level impression



Figure 4: Retainers with access hole



Figure 5: Final cementation with GIC

**DISCUSSION**

It is clinically essential to distinguish between failed implant and failing implant. It is considered that the implant has 'failed' when there is implant mobility and peri- fixture radiolucency that occurs due to poor osseointegration. The term osseointegration means the anchorage of implant to the bone of the host directly. On the other hand, the failure process might be slow and continuous. An implant is said to

be 'failing' when there is progressive bone loss without marked mobility.<sup>4</sup> Implant failures could be classified under 3 major headings such as biological, mechanical, and aesthetic. The biological failure can be further classified as early and late failures based on osseointegration. (Table 1)

Early failure	Late failure
Poor bone quality: Type 4 bone posterior upper jaws	Excessive loading
Poor bone quantity: Severe alveolar bone resorption	Peri-implantitis
Patient medical condition: AIDS, uncontrolled diabetes mellitus, osteoporosis, corticosteroids, bisphosphonates therapy, etc	Inadequate prosthetic construction
Smoking	
Infection	
Post-insertion pain	
Lack of primary stability	
Inadequate surgery and prosthodontics	

*Table 1: General causes of early and late implant failure.*<sup>5</sup>

Fracture of implant and its related superstructures falls under mechanical failures. Some of the mechanical failures include screw loosening, screw fractures, implant abutment fracture, and porcelain debonding. Screw loosening is dictated by two factors: Clamping factors (The factors which keeps the screw joint together) and Joint separating factors (The factors which loosens the screw joint). Screw tightening is achieved by maximizing the clamping factors and minimizing the joint separating factors. The major clamping factor is tightening torque. Inadequate torque leads to separation of screw joint resulting in screw fatigue and loosening. If the torque is too high, it leads to stripping of screw threads.<sup>6</sup> Other factors that influence screw loosening: preload, precision of mating implant component, presence and absence of anti-rotational features, inadequate pre-load, hand tightening, and usage of short screws. Factors relating to screw fractures are force on partially retained restorations, offset loading, and fatigue failure. Causes of implant fracture are defect in the design of the material, non-passive fit of the prosthetic structure, bio-mechanical or physiological overload, bruxism or large occlusal force, superstructure design, implant diameter, metal fatigue, and bone resorption around the implant.

When there is an osseointegration of implant, but it cannot be used as an anchorage because of wrong alignment due to violation of anatomical structures, it falls under the category of iatrogenic failures.<sup>5</sup>

## CONCLUSION

Abutment screw fracture at the internal hex is one of the common clinical complications associated with implant. It is utmost important to identify the etiology associated with fracture and plan a prosthesis to avoid further complications. Sometimes, simpler choices may provide solutions for complex challenges.

### Clinical significance:

Failure in implant prosthesis needs to be addressed from the etiology. Re-restoration with minimal intervention like modification of abutments intra-orally can be considered for a successful outcome.

## CONFLICT OF INTEREST

There is no conflict of interest

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**Corresponding Author:** Dr. Manoharan P S, MDS, PGDHPE, Department of Prosthodontics, Indira Gandhi Institute of Dental Sciences, SBV University, Pondicherry.  
E-mail: [manodent\\_2000@yahoo.com](mailto:manodent_2000@yahoo.com), Ph.No.: +91 9865019673

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