Navigating Challenges in Dental Implant Screw Retrieval: A Detailed Case Report

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Abstract : Background: Implant-supported prostheses offer predictable functional and esthetic outcomes; however, their increased use has led to a higher incidence of mechanical complications, particularly screw loosening and fracture. Prosthetic screw fracture can compromise prosthesis stability, fit, and long-term success, posing a significant clinical challenge.

Case Presentation: This case report describes a patient with a mandibular full-arch implant-supported prosthesis who presented with impaired function due to a fractured prosthetic screw. Clinical and radiographic evaluations confirmed the presence of the screw fragment lodged within the implant body, complicating prosthesis retrieval and compromising stability.

Management: A careful diagnostic approach combined with a minimally invasive screw-retrieval technique was used to remove the fractured fragment without damaging the internal implant threads. Following retrieval, the prosthesis was rehabilitated with a new screw and evaluated for optimal fit and occlusion. Preventive strategies based on current literature were considered to minimise the risk of future mechanical complications.

Conclusion: Screw fracture remains a challenging mechanical complication in implant prosthodontics. Successful management requires an accurate diagnosis, the selection of an appropriate retrieval method, and the re-establishment of prosthesis stability. This article describes the successful clinical management of a fractured prosthetic screw, restoring prosthesis function and ensuring favorable short-term clinical outcomes.

Keywords: Dental Implants, Dental Prosthesis, Implant-Supported, Prosthesis Failure, Dental Abutments, Biomechanical Phenomena, Treatment Outcome.

Introduction

Dental implants are the standard of care for replacing missing teeth, with reported survival rates of 97%–99%[1,2]. Despite this high success rate, implants are susceptible to biological and mechanical complications, the latter involving prosthetic components such as screw loosening, screw fracture, and damage to the framework or abutment. Among these, prosthetic screw fracture—though less common than loosening—poses a significant clinical challenge because fractured fragments are often lodged deep within the implant body[3,4]. Retrieval is further complicated by factors such as occlusal overload, parafunctional habits, non-passive prosthesis fit, and metal fatigue, and improper management may lead to prosthesis instability, damage to internal implant threads, soft tissue irritation, or even implant failure[5,6].

The management of prosthetic screw fractures depends on the location and extent of the fracture, the condition of the implant body, and the tools available to the clinician. In some cases, the fracture can be managed conservatively using retrieval instruments or improvised techniques, whereas in others, surgical intervention may be necessary. This case report focuses on the conservative retrieval of a fractured prosthetic screw and rehabilitation with a new prosthesis designed to minimize mechanical complications[7].

Case Report

A 61-year-old male patient reported to the Department of Prosthodontics with complaints of pain and discomfort in the anterior mandibular region. The patient had received a mandibular full-arch implant-supported prosthesis 8 months prior. After approximately 7 months of function, he began to experience a dull, persistent pain in the lower anterior area. The patient reported no history of parafunctional habits such as bruxism or clenching but reported difficulty chewing.

Clinical examination revealed slight mobility of the prosthesis and localised soft tissue inflammation in the anterior region. No clinical signs of peri-implant bone loss or mucosal recession were evident. All implants were stable on percussion testing.

Investigations

Pre-operative investigations included digital radiographs (RVG) and an orthopantomogram (OPG) (Figure 1). The radiographs revealed no peri-implant bone loss or pathological findings. During the removal of the prosthesis, all prosthetic screws were retrieved intact except for one screw in the anterior region, which fractured during attempted prosthesis retrieval.

The fractured screw remained lodged inside the internal threads of the implant body, preventing prosthesis re-seating. This necessitated immediate retrieval to avoid additional complications.

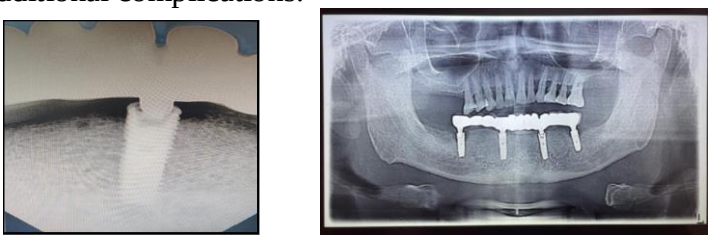

Figure 1: Pre-operative IOPA and OPG

Treatment Planning

The treatment objectives were:

1. Conservative retrieval of the fractured screw without damaging the implant threads.
2. Replacement of the angled abutment system with multi-unit abutments to improve parallelism.
3. Fabrication of a new mandibular full-arch prosthesis with optimized occlusion and fit.
4. Reinforcement of maintenance protocols to prevent recurrence.

Clinical Procedure

Initially, the failed prosthesis was removed, and all the prosthetic screws were removed except the one which was retrieved only half (Figure 2). Initially, ultrasonic scaler tips were used to vibrate the fractured screw segment in an attempt to loosen it. However, due to the depth and tight engagement of the screw fragment, this method proved ineffective (Figure 3).

Figure 4: Failed prosthesis and removed prosthetic screws

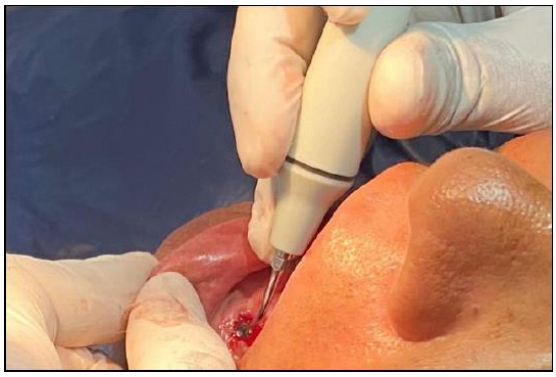

Figure 5: Ultrasonic scaler used to loosen up the screw

A minimally invasive retrieval approach was then chosen. A small notch was created on the surface of the fractured screw using a narrow flat-end carbide bur and an air-rotor handpiece (Figure 4). This notch allowed the screw to be engaged by an improvised retrieval instrument. Since conventional implant screwdrivers were too large for the confined space, mini screwdrivers commonly used in watch repair or miniature precision screwdrivers were sterilised and adapted for the procedure (Figure 5).

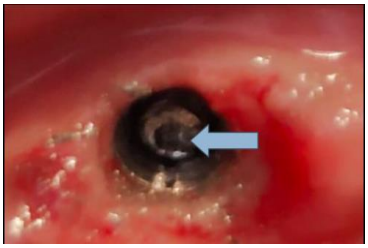

Figure 2: Notch on the prosthetic screw

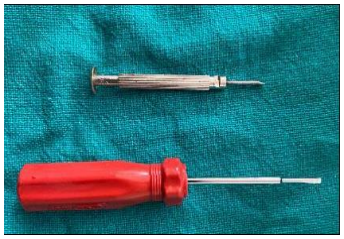

Figure 6: Mini screw drivers

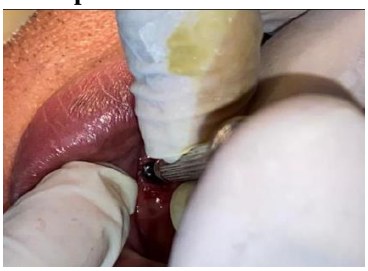

Figure 3: Unscrewing the fractured screw and removed fracture segment

The screwdriver was carefully engaged into the notch, and steady counter-clockwise torque was applied (Figure 6). The screw fragment loosened and was retrieved without damaging the implant's internal threads (Figure 6). A radiograph was taken to confirm complete retrieval.

Once the retrieval was successful, the platform was cleaned and inspected. To improve the biomechanical

environment, multi-unit abutments were placed on the implants to provide parallelism and a common path of insertion. An intraoral digital scan was obtained using scan MUA bodies to ensure precise prosthesis fabrication (Figure 7).

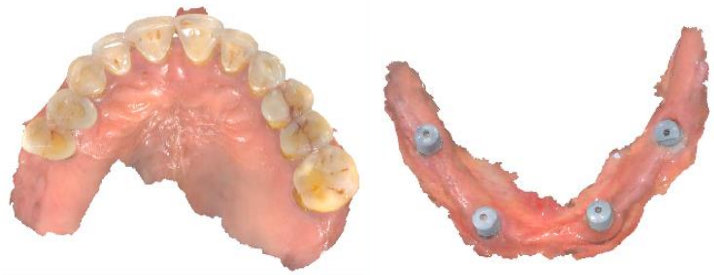

Figure 7: Intraoral scan with MUA digital scan bodies

A PMMA verification jig was fabricated and checked intraorally to confirm passive fit. Jaw relations were recorded, and a DMLS (Direct Metal Laser Sintering) metal framework was fabricated (Figure 8). A metal trial was carried out to ensure accurate fit and occlusion, followed by a bisque trial for esthetic and phonetic verification. Shade selection was completed, and the final prosthesis was processed (Figure 9).

The prosthesis was inserted, and occlusion was refined to remove any premature contacts (Figure 10). Post-insertion instructions were given, emphasising the importance of hygiene maintenance and regular follow-ups.

Figure 8: Shade selection and bisque trial

Figure 9: Final prosthesis delivered

Discussion

Fracture of prosthetic screws is a documented mechanical complication of implant-supported prostheses, often occurring due to a combination of biological and prosthetic factors. The risk increases in full-arch restorations due to higher occlusal loads and complex load distribution[4,8].

In this case, the fracture was likely precipitated by an angled abutment design that resulted in non-parallelism, uneven force distribution, and increased stress concentration on the prosthetic screw. Replacing the angled abutments with multi-unit abutments corrected these discrepancies, allowing a more passive fit and improved load distribution.

Literature describes several techniques for screw retrieval. Manufacturers offer specialised retrieval kits such as Nobel Biocare and Biomet 3i, which are highly effective but often expensive and system-specific. Alternative approaches using ultrasonic tips, fine burs, periodontal probes, or custom instruments can be equally effective when performed carefully[10].

Multi-unit abutments also provide significant prosthetic and surgical flexibility. By allowing angulation correction and ensuring passive fit, they minimise biomechanical stress on screws and implants. Studies have shown that passive fit is crucial to the long-term survival of implants and prosthetic components[11].

This case demonstrates that conservative, non-system-specific techniques can be effective when carefully executed[12].

A conservative approach was preferred to retrieve the fractured screw to preserve the internal implant threads and avoid iatrogenic damage to the implant–abutment interface. Techniques such as ultrasonic vibration and manual engagement are minimally invasive, cost-effective, and readily available. They are particularly effective when the fracture is located at or above the implant platform.

However, conservative methods have limitations, including reduced effectiveness in deeply seated or apically fractured screws, dependence on operator skill,

and the need for adequate access and visibility. In such situations, system-specific retrieval kits or more invasive techniques may be required as a secondary option[14].

Different Techniques for Screw Retrieval[13]

Fracture Level (Chowdhary et al., 2023	Retrieval Technique	Method Summary	Clinical Considerations
Type I – Above implant platform	Ultrasonic scaler vibration technique Notching technique	Ultrasonic tips are used in an anticlockwise direction to loosen the fragment. First-line, minimally invasive, high success rate	First-line, minimally invasive, high success rate Simple and effective when coronal access is present
Type II – At the implant platform level	Manufacturer-specific retrieval kits Ultrasonic vibration + explorer	Use of system-specific kits (Nobel Biocare, Biomet 3i Certain®) Combination approach to disengage moderately embedded fragments	Controlled retrieval with reduced thread damage Preserves internal threads
Type III – Below the implant platform	Reverse drilling technique Improvised chairside tools	Technique Central hole drilled to allow reverse engagement Modified explorers, mini screwdrivers	Technique sensitive; risk of internal thread damage Variable success; used when kits are unavailable
Type IV – Apical / non-retrievable	Implant replacement	Retrieval is not feasible without damaging the implant	Last resort

Conclusion

The management of fractured prosthetic screws requires a systematic approach involving early diagnosis, appropriate retrieval techniques, and corrective prosthetic planning to preserve the implant and avoid invasive treatment. This case demonstrates the successful use of a simple, conservative retrieval method employing improvised chairside instruments. The incorporation of multi-unit abutments and proper prosthetic design helped minimize further mechanical complications.

Regular follow-up played a crucial role in monitoring prosthesis stability and function. At the six-month review, the patient reported satisfactory comfort, masticatory efficiency, and esthetics, with no evidence of prosthesis instability or functional discomfort. This outcome highlights the clinical effectiveness of a minimally invasive approach in managing fractured prosthetic screws while maintaining implant integrity and patient satisfaction.

Informed Consent

Written informed consent was obtained from the patient for the publication of this case report and all accompanying clinical images. The patient was informed that all efforts would be made to ensure anonymity and that no identifying information would be disclosed.

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