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AN INNOVATIVE METHOD TO SALVAGE AN IMPLANT WITH DAMAGED INTERNAL THREADS

Dental Science

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ABSTRACT

Abutment screw fracture is a challenging technical complication in implant retained restorations. When an abutment screw is fractured or deformed, it must be removed without damaging the implant body for the new abutment. Once the internal threads are damaged the clinician can either remove the implant and place a new one which will be an expensive and invasive option, or abandon the implant and cover it with soft tissue, which may lead to compromised function, phonation, or aesthetics. Therefore, salvage of an implant with a non-retrievable screw fragment or damaged internal threads may prove beneficial to the patients. This article describes a relatively cost effective and less time-consuming method for salvaging an implant with damaged internal threads using custom cast post and core.

KEYWORDS

Abutment screw loosening, Abutment screw fracture, Damaged internal threads, Custom cast post and core, Pattern resin

INTRODUCTION

The goal of modern dentistry is to restore the patient to normal contour, function, comfort, aesthetics, speech and health. The field of implant dentistry is unique in achieving this goal, regardless of the atrophy, disease, or injury of the stomatognathic system.[1] Implant supported prosthesis have become an effective, reliable, and predictable prosthodontic treatment option for the replacement of missing teeth in both partially and completely edentulous patients. Despite a high success rate of 97% to 99%,[2,3] numerous complications have been reported to occur. Implant complications and failure can be categorized into early failure and late failure. Early failure occurs prior to the insertion of the abutment and crown complex, and late failure occurs after the dental implant screw fixture has been loaded.[4] Late failure can be further subcategorized into biologic and mechanical complications.The biological complications include peri-implant radiolucency, peri-implantitis,and loss of osseointegration radiographically. Mechanical failure of implant components can manifest in the form of loosened screws, loss of retention, screw or fixture fracture, and porcelain or framework fracture.[5,6]Among the mechanical complications, screw loosening has been cited as the most common complication for a single tooth implant.[7] Frequent screw loosening sometime scan lead to screw fracture. Good acre et al reported an incidence of prosthetic gold screw fracture of up to 19%and abutment screws fracture of up to 8%.[7] Abutment screw fracture is a challenging technical complication in implant retained restorations and may occur due to bruxism, unfavourable superstructure, overloading, malfunction, premature occlusal contacts, metal fatigue after screw loosening, and component misfit.[7]

When an abutment screw is fractured or deformed, it must be removed without damaging the implant body for the new abutment.[8]Location of the fracture along the abutment screw determines the method of removing the broken fragments. If fracture occurs above the implant head, an explorer, haemostat forceps, or straight probe may be successful in removing the fractured fragments. When the fracture occurs below the implant head, other specialized removal systems are required and if the screw cannot be removed conservatively, rotary instruments can be used to retrieve the fractured screw. These methods have the disadvantage of causing damage to the internal threads of implants and thus the implants are rendered useless. Once the internal threads are damaged the clinician can either remove the implant and place a new one which will be an expensive and invasive option, or abandon the implant and cover it with soft tissue, which may lead to compromised function, phonation, or aesthetics. Under these circumstances, salvage of an implant with a non-retrievable screw fragment or damaged internal threads may be beneficial to the patients. This article describes a simplified method of fabrication of a custom cast post and core for the management of an implant with damaged internal threads.

CASE REPORT

A 35 years old male patient reported to the department of Prosthodontics, Govt. Dental College Thiruvananthapuram with a chief complaint of dislodged crown in relation to an implant in the lower right back tooth region. The implant was placed about six years back and was functioning well for the initial five years. Later the patient noticed mobility of the crown about one year back and consulted a Prosthodontist. The Prosthodontist managed the mobility with re-torquing of the abutment screw. There were no issues for one month and after that the crown got loose again. This time the abutment screw was replaced with a new one. This treatment option also provided only a temporary solution to the problem. In view of repeated screw loosening, the possibility of damage to the internal threads of implant was considered and was managed by converting the screw hole as a channel for custom fabricated post and core. After few months the patient reported to our department with a dislodged post and core restoration.

Intraoral examination revealed prepared post space in relation to implant in the region of 16 (figure 1). Radiographic examination showed an insufficient length of prepared post space. This insufficient length of post space could be attributed to the cause of dislodgement of crown. Hence, the treatment plan was to further prepare the post space to adequate length to provide sufficient retention of the post and fabricate a custom cast post and core followed by full veneer crown. Since the patient had only limited time to complete the treatment due to personal reasons, we decided to prepare the pattern of the post and shape the core to the morphology of molar followed by casting and cementation of the prosthesis thereby eliminating the additional steps of post and core cementation and core preparation to receive a full veneer crown.

The post space within the implant was further prepared to increase the depth using a tungsten carbide bur in a high speed airotor handpiece under copious saline irrigation (figure 2). After sufficient depth preparation, an IOPA radiograph was taken to confirm the depth (figure 3). Pattern of the post was fabricated directly in the post space with pattern resin and an applicator tip was used to support the pattern resin in the post space (figure 4). Care was taken to prevent locking of the pattern inside the post space by removing and reinserting it several times before complete polymerization. After complete polymerization, core portion was also built with pattern resin. During

core build up care was taken to make broad proximal contact in order to resist rotation of the prosthesis. The core was then shaped in the form of a molar (figure 5,6). The completed pattern was sent to the laboratory for casting. In order to avoid the display of metal while smiling, it was instructed to add ceramic on the buccal aspect of casting (figure 7,8). The completed cast post and core was tried in the prepared post space and was cemented with glass ionomer cement (figure 9,10). The prosthesis thus fabricated had no lateral and protrusive interferences. The patient was followed up for six months and no complications or failure of the prosthesiswere reported till date.

Figure 1: Damaged internal threads of the implant

Figure 2: Increasing the depth of prepared post space by using tungsten carbide bur

Figure 3: IOPAR showing sufficient length of prepared post space

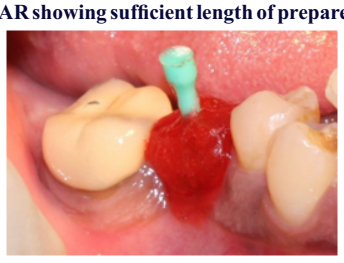

Figure 4: Post and core pattern build up using pattern resin

Figure 5: Shaping of the core to the morphology of molar

Figure 6: Completed pattern

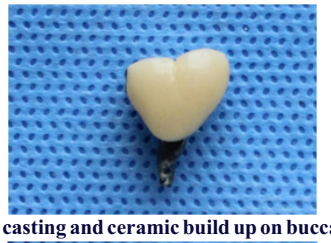

Figure 7: After casting and ceramic build up on buccal aspect

Figure 8: Lingual view of completed prosthesis

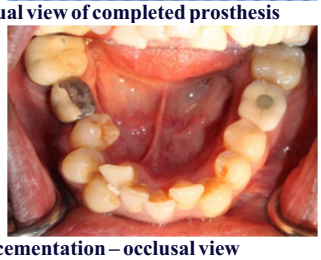

Figure 9: Post cementation – occlusal view

Figure 10: Post cementation - right lateral view

DISCUSSION

Fracture of an abutment screw is a challenging complication of implant-supported restorations. If there is a fractured implant screw, the treatment option is to retrieve the screw or to remove the implant. The more conservative solution is to attempt to retrieve the screw fragment so the implant can be reused again. One consideration is to distinguish if the fragment is located above the implant body or inside the implant body. If the broken screw is visible and above the implant body, a haemostat or a sharp explorer can be applied to the fragment in a counterclockwise direction to retrieve it.[8] However, if the broken screw is embedded inside the implant body, it may be more challenging to retrieve the screw fragment. There is also an inherent risk of damaging the internal threads of the implant body. Some techniques for removal of these kind of screw fractures are based on commercially available retrieval system, requiring the clinician to purchase the specific drill sets to retrieve the broken screws. Other techniques attempt to modify commonly available dental tools to allow screw retrievals. Williamson et al first described a technique where a small round bur is used to modify the superior portion of the broken screw into a slot like configuration. Then another round bur is modified to shape like a slot driver where it can be placed in a slow speed hand piece and applying a reverse torque to back up the loose screw fragment.[9] In some cases, Gootyet al. recommended using an ultrasonic scaler to loosen up the fragment if other instruments have not worked.[10] SatwalekarP et al. recommended modifying a spoon excavator to engage the fractured fragment after making a groove on the screw fragment.[11] In the case where the broken screws cannot be retrieved or there has been damage to the internal structure of the implant rendering it non restorable, Can polat et al have advocated making a custom dowel and cementing a locator abutment or something similar inside the implant body to be used as an over denture abutment.[12] Pipko et al also suggested a similar approach of fabricating a cast dowel core to support a single implant crown restoration.[13]

In the present case, a Prosthodontist had already attempted fabrication of a custom dowel core to support the implant crown restoration. The

failure of this could be attributed to insufficient length of post space to provide adequate retention. In order to enhance retention, the length of post space was further increased with tungsten carbide bur under copious saline irrigation. A custom cast dowel and core modified to the shape of molar was fabricated and cemented using permanent luting cement. Since the core was shaped to the morphology of molar, the additional steps of post and core cementation, core preparation to receive full crown, fabrication and cementation of full crown were eliminated.

The longevity of described technique and avoidance of complications such as loosening or fracture of the custom cast dowel, requires careful attention to various factors such as effective cementation of post, control of occlusion, elimination of interceptive contacts and avoidance of excessive masticatory force and parafunctional activities such as bruxism.

CONCLUSION

The custom cast dowel and core technique to salvage an implant with damaged internal threads described in this case report is relatively easy to perform, cost effective and time efficient and does not require any special equipment. The patient was followed up for six months and no complications were reported till date. However long-term follow- up studies are required to confirm the success of this technique.

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