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RESEARCH ARTICLE

RETRIEVAL OF A HEALING ABUTMENT WITH A DISTORTED HEX- A CASE REPORT

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ABSTRACT

Inability to retrieve a healing abutment is a rare mechanical complication. There is scarce literature on etiology and removal techniques for the same. However, it can pose a serious problem and the healing abutment needs to be removed, without damaging the internal threads of the implant, to initiate the prosthetic phase of implant therapy. Although some manufacturers offer retrieval kits, in some cases, these are very time consuming and not always effective. The aim of this paper is to report our experience with the retrieval of healing abutment with a distorted hex. This article summarizes a case report on a simple yet effective technique to retrieve a healing abutment. There is no single universally applicable method of screw retrieval. In this particular case, the healing abutment was successfully removed using the authors' technique.

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INTRODUCTION

Dental implants aim at providing a predictable long -term rehabilitative outcome with minimal risk to the patient. High survival rates and low complication rates of the implant prostheses are important prerequisites for the general success of treatment, as failures of the prostheses may result in failures of the entire implant rehabilitation (1). Moreover, implant failure renders the implant site devoid of necessary bone and keratinized tissue for subsequent implant placement, thus necessitating complex hard and soft tissue augmentation procedures prior to implant placement and prolonging the implant therapy. Esposito, et al. stated that the reasons for failure of dental implants include biological failures (related to biological processes such as inadequacy in maintaining osseointegration) and mechanical failures (including fractures of implants, coatings, connecting screws, and prostheses) (2).According to Jung, et al. peri-implant mucosal lesions are the most common biological complications, while the most common technical complication, is abutment or occlusal screw loosening, fracture of the implant body or prosthetic components, degradation of the luting cement, and fracture of the veneering are the most common mechanical complications (3,4).

One of the most distressing and rare complications an implant dentist may encounter in clinical practice is cold-welded healing abutment retrieval, without damaging the internal threads of the implant to complete the prosthetic phase of implant therapy. In the previously reported studies, the primary reason for the cold-welded cover screw has been considered to be the blood and bone debris that remains in and around the implant, wedges in the delicate threads, and thus affecting the seating of the screw. The bloods fibrin binds the two parts together (3,5). Other situations encountered where retrieval is difficult are: manufacturing error (of either component), wearing out of the threads of the hex-driver (stripped hex), and distortion of the hex insert of the healing abutment due to multiple use. However, thorough understanding of the etiology and the frequency of complications with healing abutment are lacking. In this case report, an uncommon complication and its management has been presented.

Case Presentation: A 39-year-old female patient reported to the department of prosthodontics with the chief complaint of missing upper central incisor, and right lateral incisor. Various available treatment options were explained to the patient, and she finally decided to go for the implant option for replacing

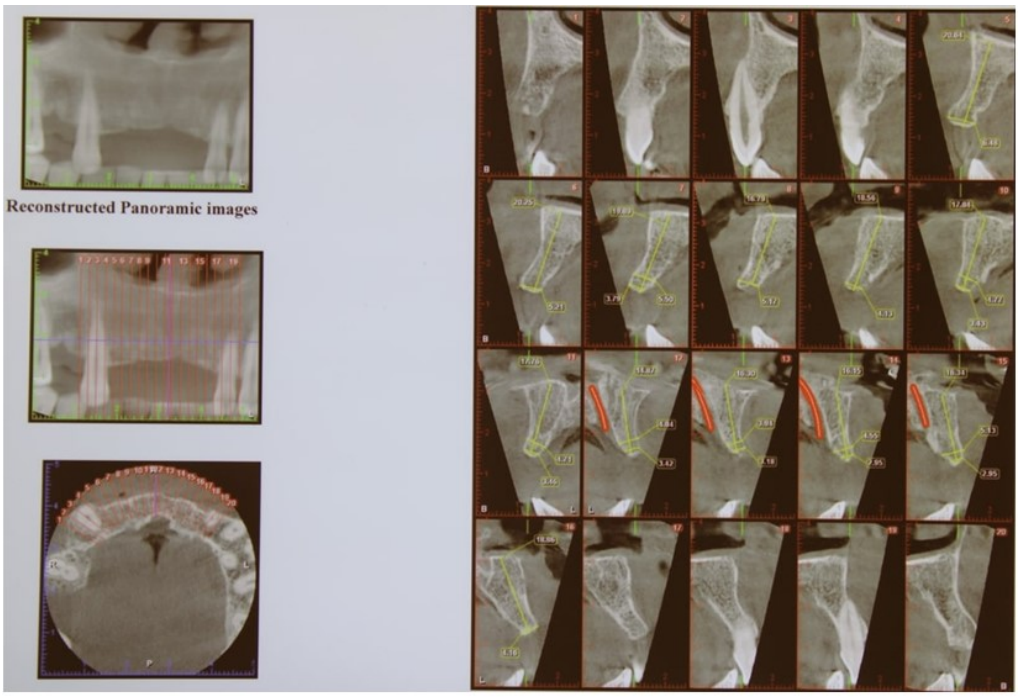

Figure 1. Radiographic evaluation for implant placement

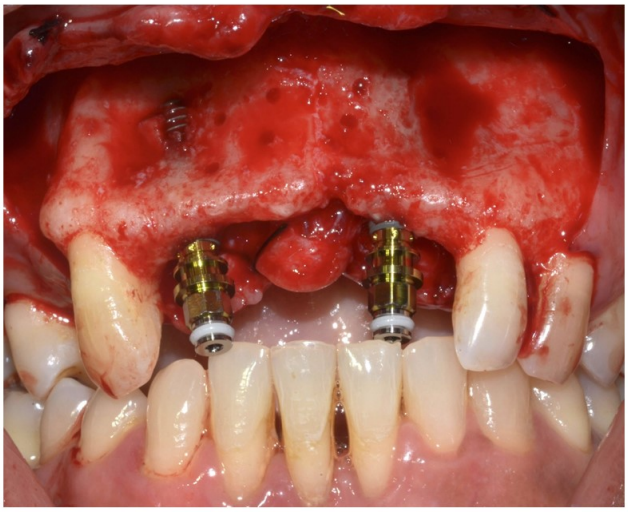

Figure 2. Implants placed in 12 and 21 region

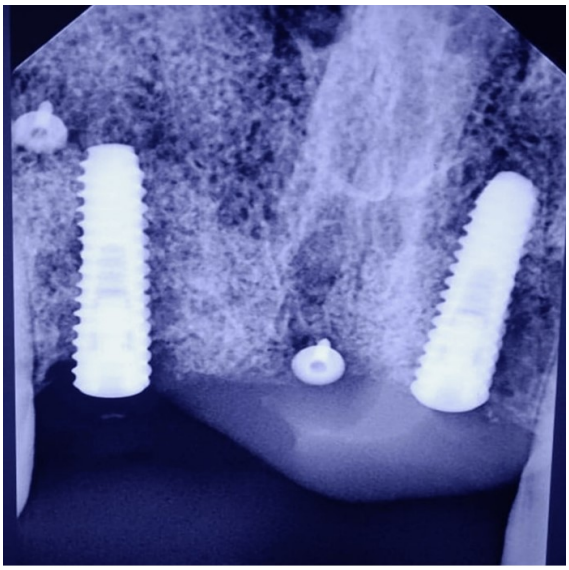

Figure 3. Radiographic verification of implant positions

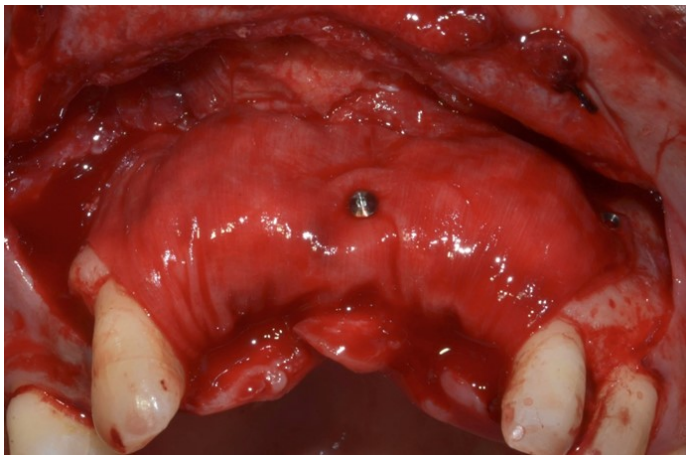

Figure 4. simultaneous Guided bone regeneration done after implant placement

Figure 5. Slot preparation on the head of healing abutment

Figure 6. Screwdriver engaged into the slot and turned in an anticlockwise direction

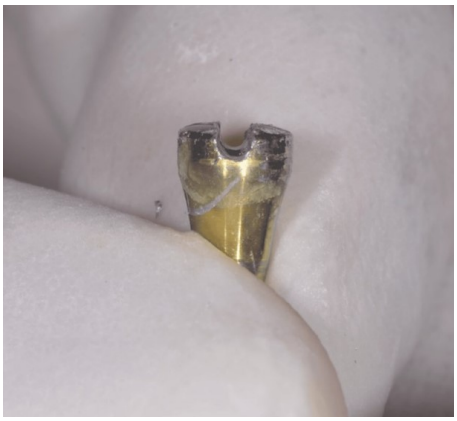

Figure 7. Lateral view of retrieved healing abutment showing the depth of the slot

the missing teeth. After radiographic examination (Fig.1), two, 3.5 X 13 mm Osstem implants (OSSTEM IMPLANT CO., LTD., Seoul, South Korea) were placed in 12 and 21 positions (Fig.2,3) for an implant supported fixed partial denture with simultaneous guided bone regeneration (Fig.4). After four months, 2nd stage was performed. Prior to the placement of the healing abutments on 12 and 21, Implant stability Quotient (ISQ) was assessed using Penguin RFA unit (Penguin Integration Diagnostics, Sweden). ISQ of 75 and 77 respectively for both the implants placed, suggested a good secondary stability and hence osseointegration. After one week, healing abutments were removed, and an intraoral scan was done with scan bodies to fabricate CAD/CAM temporaries and the healing abutment was placed back. On the day of CAD/CAM temporaries trial, the healing abutment on 12 could not be unscrewed. Multiple attempts to retrieve the healing abutment using the unigrip hex driver and torque wrench were unsuccessful. The authors also tried to retrieve the healing abutment by holding it directly with a straight artery forcep (6). Even after achieving a firm grip on the healing abutment, it could not be retrieved. Finally, it was decided to create a single, deep slot upto the depth of the hex on the healing abutment (Fig.5) with a straight fissure diamond bur to fit a single slot screw driver.The screw driver was then engaged into the slot and was turned in an anticlockwise direction. (Fig.6). A considerable force was required to unscrew the healing abutment successfully (Fig.7). The internal threads of the implant were inspected thoroughly to check for any damage to the threads. A new healing abutment was placed, after thorough irrigation of the internal hex of the implant and verified radiographically.

DISCUSSION

Implant retained restorations can have both biological and mechanical failures. Mechanical complications and fatigue of implant components are considered a sequela of biomechanical overload. Cold welding is a rare mechanical complication of abutments. Cold welding refers to an increase in the loosening torque with respect to the tightening torque, which complicates the abutment retrieval. Nonetheless, it can be a serious problem and a cold-welded abutment needs to be retrieved without damaging the internal implant thread (3).The cold-welding phenomenon at the implant/abutment connection may occur in two areas namely between the abutment screw and implant, and between the abutment and body of implant (3). Some factors are important to prevent cold welding such as correct treatment planning, appropriate tightening torque, familiarity with various retrieval systems, and taking adequate precautionary measures before tightening of the abutment screw (5). The connection between the healing abutment and the implant is termed a screw joint. A screw joint between the implant and abutment is tightened by applying a torque to the screw abutment. Friction fit is necessary to maintain the integrity of two components. The force generated within the screw by applying torque is known as the preload. Screw tightening produces tension in the screw, which causes elastic recovery and pulls the abutment and implant toward each other, creating a clamping force (7-9). Large magnitudes of preload cause plastic deformation or permanent change in the material, at which point the screw is no longer retrievable, which is sometimes referred to as cold welding. Cold welding is defined as an increase in loosening torque with respect to tightening torque, resulting in lack of retrievability (9). Applying an adequate preload has some advantages such as lower micromotion of implant-abutment screw interface, less frequency of screw loosening, improvement of fatigue resistance, and the locking of implant-abutment connection (9,10). The amount of torque suggested by manufacturers for Osstem (OSSTEM IMPLANT CO., LTD., Seoul, South Korea) healing abutments is 10Ncm, and a torque wrench is required to obtain a consistent torque value (9,10).The torque wrench provided by different companies is not completely accurate, and components may corrode after autoclaving many times, which may increase torque applied to the screw joint. Hence, autoclaving of the hand torque wrench in an open position is advocated (9). The recommended amount of torque for a preload to prevent this condition and ensure the safety of screw joint should be 75% of the total amount commonly applied for tightening (11).

The reasons hypothesized by the authors for the inability to retrieve healing abutment are blood and bone debris wedged between the implant surface and the abutment, leading to cold welding. It is believed that the fibrin in the blood glues the two parts together. Dried blood, bone or any debris can also wedge in the delicate threads and thus affect the seating of the screw. In either of the situations, the cold-welded healing abutment will create a preload with the top surface of the implant that exceeds the ability to unscrew (12).Other possible reasons could be wearing out of the hex insert of the healing abutment due to multiple uses, occlusal overload in the transition phase between 2nd stage and prostheses delivery as the patient continued chewing food on the healing abutments unaware of the possible consequences, meanwhile the healing caps probably got cold welded. So in this case, a slot was created on

the surface of the healing abutment, and an appropriate screw driver was used to remove it. This technique is simple, cost effective and can be incorporated in clinical situations where the clinician does not have access to retrieval kits.

CONCLUSION

Inability to retrieve a healing abutment is a rare complication. Adequately cleaning the internal hex of the implant before placement of the healing abutment, taking precautionary measures like monitoring the number of times a healing abutment is used, regularly inspecting the hex inserts, and using manufacturer recommended torque for tightening the implant components can reduce such complications. The authors believe that this simplified approach towards management of healing abutment retrieval can help many young implant surgeons globally and improve their treatment outcomes without procuring expensive retrieval kits in early days of their practice.

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