최소침습적 임플란트 식립체 제거법 : 식립체 분할법

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Introduction of minimally invasive implant fixture removal technique: Fixture split technique

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Abstract

Retrieval of failed implants is a problematic procedure in the field of implant dentistry. Since the procedures for removal of fixed implants are aggressive or require specific tool sets for each implant system, a new technique that is less invasive and universally applicable to all implant systems is desirable. The aim of this study was to show a new technique of vertically splitting the fixture into half which is both minimally invasive and universally applicable for the removal of all failed implants. Removing the problematic implant with the new technique is described.

1. Introduction

Since the introduction of dental implants, reported success rates have been high and the procedure is regarded as a standard treatment [1-3]. However, some implants do fail, and these cases may be classified as biological or mechanical failures according to the failure mode. Biological failure involves the failure or loss of osseointegration and can occur either before or after prosthetic loading; which is referred to as early and late failure, respectively[4,5]. Mechanical failure includes fracture of fixture, thread damage, platform damage, or malpositioning,[6] and can occur due to poor planning or mishandling of the implant. Some of these failures can be recovered, but others cannot. In addition, late failures and mechanical failures are often characterized by no mobility.

A new technique has been introduced to remove immobile implants in a minimally invasive and universally applicable manner and is discussed in further detail below.

2. Materials and methods

The process began with isolation of the fixture on the maxillary left posterior area (Implantium 5 mm x 10 mm; Dentium, Seoul, Korea) (Fig. 1, 2) to be removed with a rubber dam (Dental Continental, S.A. de C.V., Jalisco, Mexico) (Fig. 3, 4). If the clamp (Hu-Friedy USA 9; Hu-Friedy, IL, USA) did not engage the implant, the flap was opened and minimal removal of the bone around the implant platform was considered (Fig 3, 4).

Fig. 1 Pre-treatment radiographic view

Fig. 2 Pre-treatment CT scan image

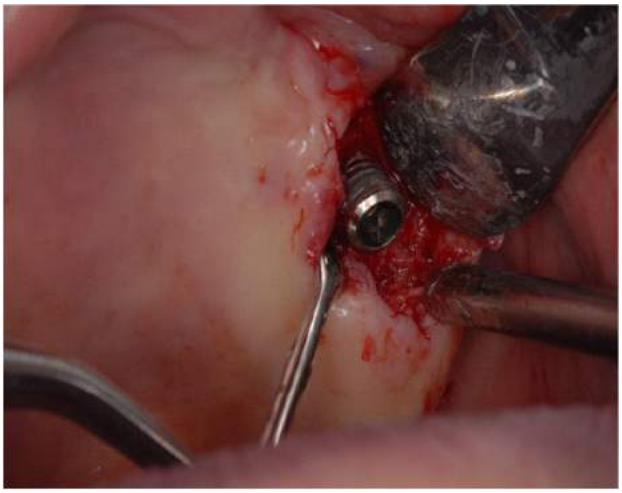

Fig. 3 Approch to implant fixture

Fig. 4 Rubber dam clamp engagement

In order to control the burs, we measured the length of the fixture and then cut the implant vertically into 2 pieces (Figs. 5 and 6). We used common tactile sense to determine when to stop grinding since the sensation of grinding the titanium and the bone differs greatly. Fixtures made of commercially pure titanium could be cut both by round (FG-2SL; SS White Inc., NJ, USA) and fissured (E0151; Dentsply, ballaigues, Swiss) carbide burs with ease. However, some fixtures made of titanium alloys may have more resistance on grinding. When the fixture is split, split pieces were separated from the bone by the clamping force of the rubber dam clamp (Figs. 7, 8). Alternatively, hemostatic forceps can be used to remove the implant from the bone. Using this approach the implant fixture can be removed easily with less trauma such that one can see the thread on the bone (Fig. 9, 10). After removing the fixture, another implant can be used or the flap may simply be closed.

Fig. 5. Implant fixture cutting procedure

Fig. 6. Implant fixture cutting procedure

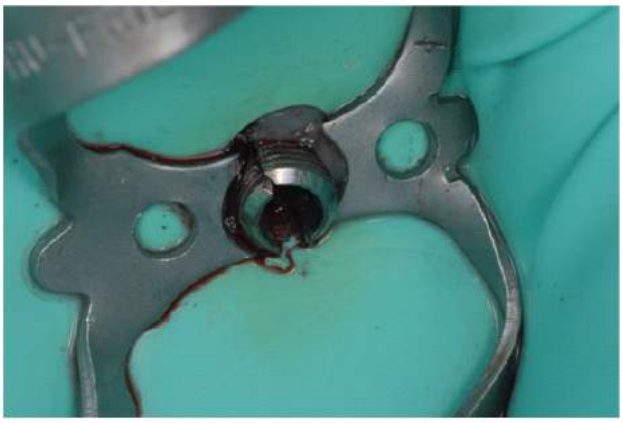

Fig. 7. Split implant fixture

Fig. 8. Disintegration from alveolar bone

Fig. 9. Removed split implant fixture

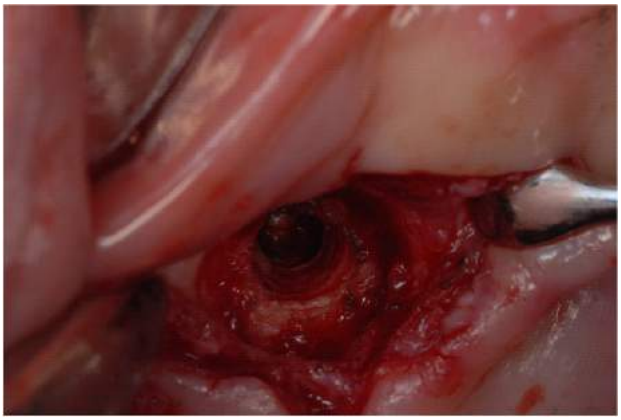

Fig. 10. Alveolar socket

3. Discussion

Should an immobile implant need to be removed as a last resort, there are many methods to be considered[7]. Those methods include counter torque ratchet technique, reverse screw technique, bone removal technique, laser[8], and a combination of these approaches. Counter torque ratchet technique depends on intact implant connection and implant fracture during the procedure can occur. Reverse screw technique can be indicated in cases of implant connection damage, but this technique still demands an intact thread. These 2 techniques cannot be applied in many cases of mechanical failure. Furthermore, a special set of tools and significant physical strength on the part of the practitioner is required to overcome the shear resistance of osseointegration. The risk of bone fracture during retrieval of implants using these approaches cannot be overlooked. Bone removal technique using Piezo, hand piece, or trephine burs[9] can be used regardless of the implant condition. However, this approach carries the significant disadvantage of potential lasting defects on completion of this destructive procedure [10,11].

4. Conclusion

The fixture split technique removes the defective implants with minimal trauma, which will promote a better and faster healing process. However, there are some factors to be considered, such as heat generation[12] and titanium particle blast on bone[13]. More studies, which are currently underway, are needed to clarify these factors.

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