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The Journal of Dental Panacea

Journal homepage: <https://www.jdentalpanacea.org/>

Case Report

A novel approach to retrieve fractured mini implants

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ARTICLE INFO

Article history:

Received 26-06-2021

Accepted 12-08-2021

Available online 20-08-2021

Keywords:

Mini implant

Fracture

Anchorage

Ultrasonics

Temporary anchorage device

ABSTRACT

Mini implant screws are accepted world wide as it provides a stable anchorage for the various types of orthodontic tooth movements. Use of mini screw implant includes risks such as screw fracture and screw failure. With the increased use of mini implants in dentistry, there is increase in cases of mini implant fracture. Reporting and management of fractured mini implant has not been given adequate importance. We are presenting a case of successful management of fractured mini implant using ultrasonic vibrations.

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1. Introduction

Anchorage forms an essential part of orthodontic treatment planning. For a successful orthodontic treatment, control of anchorage is a prerequisite. Various anchorage devices have been tried and tested over the years. Creekmore and Eklund suggested the use of metal screw as anchorage device in the year 1983, which later gave way to a whole new approach of miniscrew implants as anchorage in orthodontic treatment.¹ Later the term Temporary anchorage device (TAD) was introduced by Mah and Bergstrand in 2005 which encompass those devices that are temporarily fixed to bone to serve as anchorage for the tooth movement and later removed after its use.² Mini screw implants are available in various diameter and length. Though the diameter is small and the length is short, mini screws provide stable anchorage for different types of tooth movements.³ Inadvertent and irresponsible use of mini implants can result in fracture of the screw during its placement or during the removal. Although certain studies have reported a low incidence of 4% for miniscrew fracture, many cases go unreported.⁴ Screw fracture during

placement is closely related with insertion torque. The insertion torque value of mini screws are in the range of 3-10 Ncm, which is less than the breaking torque disclosed by the manufacturer.³ Screw fracture more frequently occurs in the mandible where cortical bone thickness is more.³ The proximity of the mini implant to the root and the torsional stress during the placement of the mini screw are some of the other contributing factors for screw fracture.¹ Mini screws are removed using a screw driver once their desired purpose is achieved. But the complexity of the procedure increases with the fracture of the implant screw and the size of the fractured portion. Here we have attempted to remove a fractured mini orthodontic implant lodged in the periodontal ligament space using ultrasonic vibrations.

2. Case Report

A 24 year old female patient undergoing orthodontic treatment was referred to the department of Periodontics, for the retrieval of fractured orthodontic mini implant lodged in the right posterior region (between 45 & 46) with an abscess at the site of the fractured implant. Patient's orthodontic treatment included placement of mini implants for anchorage in all the four quadrants between second

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premolar and first molar. The Implant size chosen was 1.4x9mm for all the four quadrants. A fracture of the mini implant in the region of 45 and 46 was encountered during the placement a few days ago.

On clinical examination an abscess in the posterior vestibular region with pus discharge from the fracture site was observed. Intraoral periapical radiograph revealed that the fractured fragment was lodged in the periodontal ligament space on the mesial side of the mesial root of 46 (Figure 1). Since the fractured fragment resulted in the development of abscess, surgical removal of the fragment was planned after initial treatment of the infection. The patient was prescribed a course of antibiotics (Cap. Amoxicillin 500mg t.i.d. for 5 days) and anti-inflammatory drug (Tab. Paracetamol b.i.d. for 3 days) and was scheduled for surgery.

Patient was informed about the procedure and written consent was taken. The area of the implant fracture was anesthetized with local infiltration of 2% Lignocaine with adrenaline (1:2,00,000). A conservative approach was planned wherein a stab incision at the fracture site (sinus opening) was made, to expose the fractured implant (Figure 2). A straight explorer was used to check for the mobility of the mini screw stump by passing the explorer tip all around the fractured stump. The implant fragment showed no signs of mobility. The conventional approach demands a periosteal flap reflection with removal of bone around the stump to engage a screw driver, so a conservative technique was planned to remove the fragment. A worn out ultrasonic scaler tip was used. When the activated ultrasonic tip came in contact with the fractured fragment, due to the ultrasonic vibrations the fragment loosened and later a cotton plier was used to retrieve the fractured implant stump (Figure 4). This approach is simple and there is minimal loss of the tissues and least amount of trauma to the periodontium.

The stab wound was then closed by placing simple interrupted suture (Figure 5) and the patient was given post surgical instructions. Patient was advised to use 0.2% Chlorhexidine mouthwash and recalled after a week for the removal of sutures (Figure 6).

3. Discussion

Anchorage in orthodontics can provide a treatment option and tooth movements previously thought to be difficult or impossible. The clinical use of miniscrew anchorage, accompanies some risks and complications, which occur during screw insertion, under orthodontic loading and during removal. Various factors are responsible for the fracture of mini screws like the insertion torque, insertion methodology, thread design, bone quality, osseointegration, pilot hole size etc.² Majority of mini screw fractures during their insertion are caused by high insertion torque and can be prevented by attending to their insertion torque which

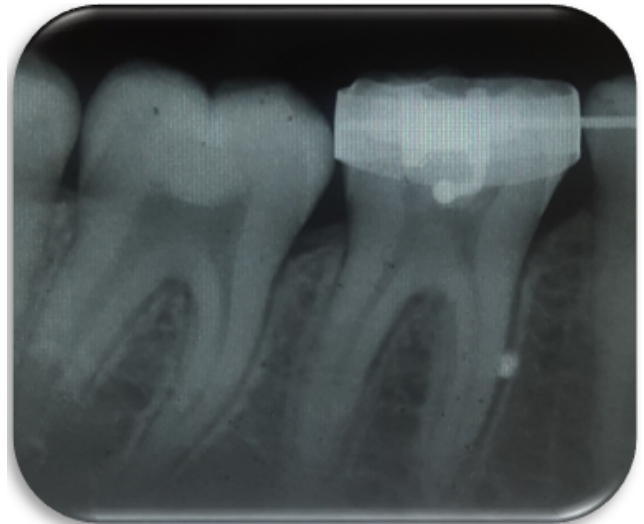


Fig. 1: IOPA radiograph showing the fractured implant in the PDL space



Fig. 2: Stab incision exposes the fractured mini implant



Fig. 3: Post retrieval of fractured mini implant



Fig. 4: Retrieved fractured portion of mini implant



Fig. 5: Simple interrupted sutures placed



Fig. 6: 1 week post op showing satisfactory healing

ranges from 3 to 10Ncm.⁵ Whenever there is a fracture of implant screws the decision to retrieve or not is the main issue as the implant is of a biocompatible material and can be retained in the jaw without any surgical intervention.^{2,3} If the decision is made to retain the fractured screw than periodic examinations, both clinical and radiological needs to be done. The decision to retrieve the mini screw depends on the location of the fracture, implant fracture site and the patient's consent.⁶

In the present case since the patient had developed abscess in the 45, 46 region and the fractured fragment was in the periodontal ligament space it was necessary to carry out surgical retrieval of the fractured portion. We decided to follow a conservative approach, instead of exposing the fractured mini implant using a full thickness mucoperiosteal flap. A stab incision was given from the sinus opening to gain access to the site and limit the extent of surgical exposure.

The conventional approach uses a screwdriver to retrieve the fragment for which a trough is created around the stump using a slow speed handpiece. In order to prevent loss of bone structure we decided to engage a worn out ultrasonic scaler tip with the fractured stump. As soon as the ultrasonic scaler tip came in contact with the fractured implant stump, due to the vibrations the fragment loosened. A cotton plier was later used to retrieve the fractured stump. This flapless conservative approach to loosen the fractured fragment of mini implants using high frequency ultrasonic vibrations is a novel simple technique which has various advantages over the other methods that have been used. It requires minimal surgical exposure, minimal technical skills, less chair side time and also provides a uneventful and optimal healing at the surgical site.

4. Conclusion

With no additional equipment or instrument required other than those present in any dental clinic, the surgical approach followed in the current case report involves least technical skill for the clinician to retrieve the fractured mini implant screw. Hence the technique followed in the present case will definitely ease the complexity of the procedure. But the success of the approach might also depend on the other factors such as the position and the location of the fractured implant portion.

5. Conflict of Interest

The authors declare that there are no conflicts of interest in this paper.

6. Source of Funding

None.

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Cite this article: Rajiv N P, Aruna D R, Avinash J L, Jagadish R, Gupta A. A novel approach to retrieve fractured mini implants. *J Dent Panacea* 2021;3(2):78-81.