

Pre Prosthetic Adjunct Orthodontic Tooth Movement for Prosthetic Replacement Using an Osseointegrated Implant-A Case Report

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ABSTRACT

With an increasing number of patients demanding quality dental health care, the interdisciplinary interactions between clinicians of different specialties of dentistry has increased considerably. Prosthetic replacement of missing teeth plays a major role in improving the overall quality of life. Comprehensive prosthetic rehabilitation often requires the services of an Orthodontist to move certain teeth before final restorations can be fabricated. Acceptance of adjunct orthodontic tooth movement in the adult population has increased the frequency with which it is being employed for pre prosthetic planning.

We present a case report of adjunct orthodontic tooth movement involving intrusion of a supra erupted maxillary molar in a long standing edentulous space in the mandibular arch followed by rehabilitation using an osseointegrated Implant.

Keywords: Adjunct, intrusion, osseointegrated

INTRODUCTION

One of the most common sequel of a long standing edentulous space because of a missing tooth in the dental arch is tipping of the adjacent teeth into that space and or supraeruption of the antagonist tooth. The former can be corrected with conventional adjunct Orthodontic treatment or by making a slight compromise with the mesio-distal crown width of the tooth to be replaced, but management of a supraerupted teeth into an edentulous space which is often cumbersome and difficult with conventional Orthodontic mechanics is required if successful rehabilitation is desired as adequate interocclusal clearance is a prime pre requisite for replacement of a missing tooth with fixed prosthesis.

Management of such a situation earlier involved extensive reduction of tooth material of the opposing tooth often needing intentional endodontic treatment and periodontal therapy. With the introduction of Orthodontic micro implants intrusion of an over

erupted tooth can easily be managed, thus facilitating the prosthetic rehabilitation.^{1,2}

An interdisciplinary approach with close coordination between the Orthodontist and the Prosthodontist is required for successful rehabilitation of such cases.

Acceptance of adjunct orthodontic therapy in adult population has increased considerably leading to increased interdisciplinary interaction between Orthodontist and specialist of other fields.

The following case report describes the pre prosthetic tooth movement involving mini screw implant assisted molar intrusion and successful prosthetic replacement using an oseointegrated implant.

CASE REPORT

A 23 year old female patient wanted prosthetic rehabilitation of a missing 36 tooth with an oseointegrated implant. On examination it was seen that the antagonist 26 had supraerupted (Figure 1) with the palatal cusp almost touching the crest of the alveolar

ridge. The interocclusal clearance of around 2.5mm was available as opposed to an inter occlusal clearance of about 5-8mm which is generally needed if an implant supported prosthesis is planned.³ With such a clinical scenario two treatment alternatives were presented to the patient.

Treatment Plan 1 -Intentional endodontic treatment with extensive coronoplasty and periodontal therapy of the supra erupted 26 to gain the desired interocclusal clearance followed by an implant supported prosthesis.

Treatment Plan 2 -Orthodontic micro implant assisted molar intrusion of the supra erupted 26 to gain the desired interocclusal clearance followed by an implant supported prosthesis.

The patient chose the latter treatment plan for the implant assisted molar intrusion of the supra erupted 26.

TREATMENT PROGRESS

It was planned to place 2 self tapping Orthodontic micro implants to intrude the supra erupted 26. 0.5 mL of local anesthetic (2% xylocaine with 1:100 000 epinephrine) was administered by infiltration and bone sounding was done on the palatal aspect to determine the soft tissue thickness over the palate (2mm). 1.3mm X 8mm implants (SK Surgicals) were planned to be placed. One implant was placed on the buccal aspect between the roots of 26 and 27(Figure 2) and the other on the palatal aspect between the roots of 26 and 25(Figure 3). Pilot drilling was done using a small round bur after which

the implants were placed with an angulation of 45° using the implant driver on the buccal aspect and the thumb driver on the palatal aspect.

Bondable buttons were placed on the buccal and the palatal surfaces of the 26 and power chains were placed from the implants directly to the buttons (Figure 4). The temporary anchorage devices were immediately loaded with a force of 150gms to intrude the molar. A gauge was used to measure the force and equal amount of force (75gms) from the palatal and buccal aspect was delivered to prevent tipping of the molar. The power chains were activated every 3 weeks.

As an initial interocclusal clearance of 2.5mm was already present a minimum of 2.5mm of molar intrusion was required if implant supported prosthesis was required.

Total molar intrusion of 3 mm was achieved over a period of 4 months (0.75 mm per month). Intra oral periapical radiographs were taken to measure the amount of molar intrusion achieved (Figure 5). To standardize the pre and post intrusion IOPA radiographs, a digital sensor holder (Dentsply Rinn XCP-DS) and a customized occlusal bite jig made using a polyvinyl siloxane putty were used. Distinguishable landmarks (cusp tips) on the adjacent teeth were identified and a line joining them was used as a reference line to measure the amount of molar intrusion.

In the same visit an Implant (4.2X11.5 mm) was placed using a flapless approach in the 46 region. The healing abutment was placed which was not touching the overhanging palatal cups of 26 (Figure 6). After 4



Figure 1 Supra erupted 26



Figure 2 Implant on the buccal aspect



Figure 3 Implant on the palatal aspect



Figure 4 Bondable buttons on the buccal and the palatal surfaces



Figure 5 IOPA Radiograph showing molar intrusion

months, during which molar intrusion was completed the osseointegrated implant was loaded with a cement retained prosthesis (Figure 7).

DISCUSSION

Prosthetic rehabilitation of a missing tooth is required to maintain the integrity of the arch, and any delay has its subsequent outcomes, the most common being supra eruption of the opposing tooth into the edentulous area. Pre prosthetic preparation is often required before a fixed prosthesis can be planned; this may even require planned tooth movement. This planned tooth movement may not require a comprehensive orthodontic appliance but a partial set up. Such a type of

adjunct orthodontic treatment has gained acceptance among adult population.

Advances in the field of orthodontics has led to the development of orthodontic micro implants, which have made intrusion of an over, erupted molar easier than it was with conventional mechanics.

Various methods have been described in the literature for the intrusion of maxillary molar. Methods ranging from High pull headgear⁴, High pull headgear with splint⁵, Magnetic bite blocks⁶, Spring loaded bite blocks⁷, Rapid molar intrusion device⁸, Corticotomy⁹ and Osteotomy¹⁰ assisted molar intrusion have been described in the literature. Molar intrusion achieved by these means are usually associated with a cumbersome

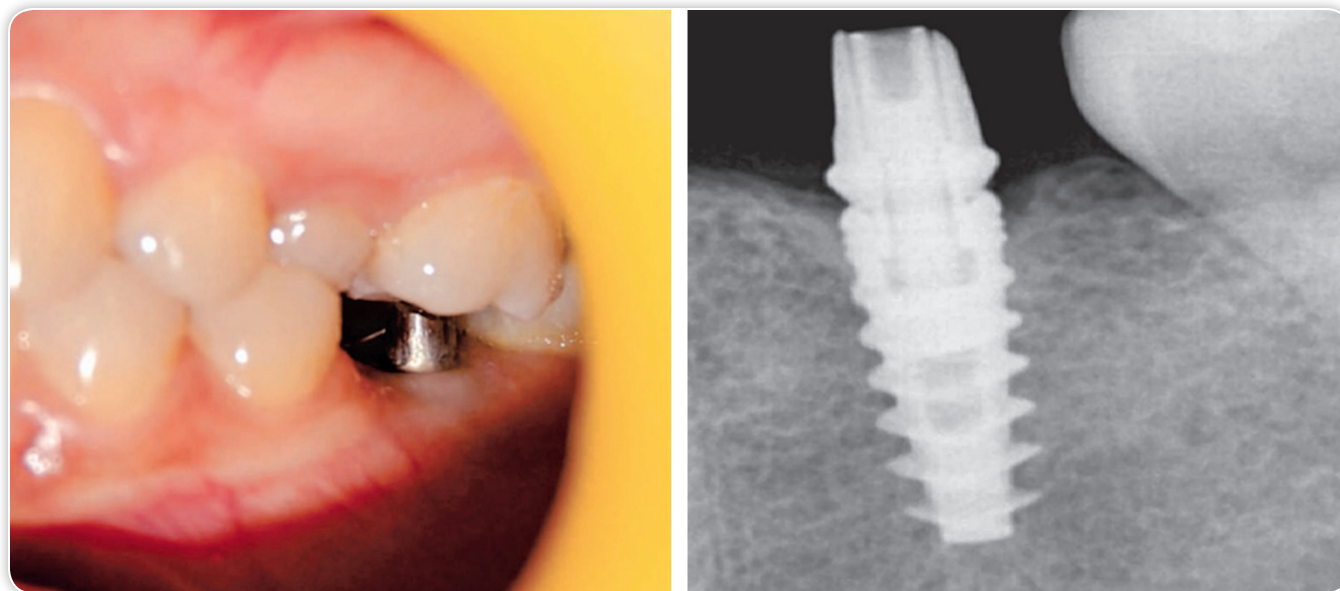


Figure 6 Healing abutment& IOPA Radiograph of the implant placed



Figure 7 Cement retained prosthesis

assembly or reactionary tooth movement of the adjacent teeth.

Umemori et al¹¹ was first to use implant assisted molar intrusion for the correction of open bite. Since then implants have been used routinely to intrude molar without the need of an elaborate appliance and patient compliance.

In the present case, self tapping implants were used which required an initial pilot drilling. 1.3X8 mm implants were employed as bone sounding on the palatal mucosa revealed a soft tissue thickness of 2 mm, and a minimum of 6mm of implant length should be engaged in the bone to achieve primary stability so a implant length of 8mm was chosen.¹² The diameter of

the implant is limited with the amount of inter radicular bone available, a diameter of greater than 1.2mm is desirable as an increase in diameter reduces the amount of stress generated in the bone hence a diameter of 1.3 mm was chosen.¹³

The centre of resistance of the maxillary molar is slightly palatal to the furcation thus it is at the centre of the occlusal table. Any force away from the centre of resistance will generate a moment which would tip the molar. To prevent this, force from both the buccal and the palatal area should be applied in such a manner that the resultant force vector passes through the centre of resistance (Figure 8). In the present case two implants were used in the similar fashion. The implant on the palatal side was placed anteriorly between the roots of the second pre molar and maxillary first molar to prevent injury to the greater palatine nerve and vessels.

Various authors have recommended different force levels for molar intrusion, Kalra¹⁴ recommended a force level of 90gms whereas Melson and Fiorelli¹⁵ used forces as low as 50gms. A force of 150gms was used to intrude the molar as recommended by Erverdi et al.^{16,17}

The micro implants were inserted at an angulation of 45° to prevent injury to the adjacent roots of the teeth as recommended by Petrey et al.¹⁸

The door wedge effect as described by Kravitz¹⁹ was not observed in this particular case and the molar intrusion was achieved without the need of elastic separators.

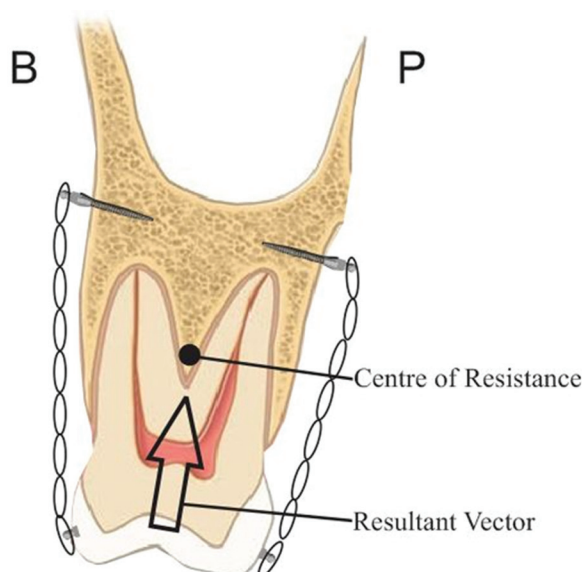


Figure 8 Resultant force vector passing through the Cres

CONCLUSION

Inter disciplinary interactions of an Orthodontist is becoming increasingly common in order to provide better comprehensive oral care to the patients. Tools like Orthodontic micro implants have become indispensable in the armamentarium of an Orthodontist, which enable him to accomplish tooth movements, which would be very difficult to achieve using conventional mechanics. The case report presented here demonstrates the use of Orthodontic micro implants to facilitate intrusion of an over erupted maxillary molar and further prosthetic rehabilitation.

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