Mini Screw Orthodontic Implant as Temporary Crown Restoration to Replace Unilateral Missing Lateral Incisor Post-Orthodontic Treatment

Ajit J. Kalia, BDS, MDS

INTRODUCTION

A Bolton’s ratio discrepancy and congenitally missing permanent teeth are common clinical findings in patients seeking orthodontic therapy.\(^1\)\(^-\)\(^3\)

The goal of active orthodontic treatment is to consolidate and restore the lost space and replace the missing teeth using either a Maryland bridge or a removable retainer with a pontic or with an implant-retained prosthesis. Drawbacks of a Maryland bridge include inevitable permanent damage of the adjacent natural tooth structures and that it does not accommodate transverse dimensional changes of the dentition. A removable partial denture with a pontic has its own disadvantages in the form of excessive masticatory stress distribution on the supporting adjacent permanent teeth and a compromised esthetic result. The ideal treatment option is the use of an implant-retained prosthesis for the replacement of the missing tooth at the end of orthodontic treatment.\(^4\)\(^,\)\(^5\) However, this interdisciplinary treatment approach at the end of the orthodontic treatment can sometimes be cumbersome and costly to the patient, requiring visits to various clinics, which might delay completion of orthodontic treatment. This article describes the use of a self-drilling one-piece orthodontic miniscrew as a temporary abutment for the replacement of the congenitally missing right lateral incisor. Advantages include the ease of placement for the orthodontist using closed method\(^6\) as they are not formally trained and equipped for the placement of implant-retained prosthesis. In addition, an orthodontic mini-implant temporary crown can serve as a permanent dental restoration for a growing child if the mini-implant is well maintained throughout his or her growth period without significant changes of skeletal morphology.\(^7\)\(^-\)\(^9\)

CASE DESCRIPTION

A 16-year-old girl came to our office with a chief complaint of excessive spacing of teeth in the upper jaw. The patient wished to have all spaces closed and to have an esthetic smile.

Clinical examination reflected a moderately straight profile, competent lips, normal mentolabial sulcus, and lower facial height.

Intraoral examination revealed (Figure 1) Class I molar and Class I canine relationships on the left and right sides. There was an overjet of 1.5 mm and an overbite of 3 mm with excessive spacing in the upper and lower anteriors. The patient had a congenitally missing right lateral incisor on the orthopantomogram (Figure 2). In addition, the upper left lateral incisor and both maxillary canines were smaller in size.

The treatment objectives were to orthodontically consolidate the spaces in the upper and the lower arches, dentally restore the ideal mesiodistal width of the maxillary canines and lateral incisors,\(^10\) and reestablish the space loss of the maxillary right lateral incisor for future replacement. The recommended treatment plan was discussed with the patient and the parents.

Roth prescription .022-inch brackets (American Orthodontic) were bonded in both arches. After orthodontic consolidation of spaces, a Class I molar and canine relationship was established with an ideal overjet of 2 mm and an overbite of 2 mm (Figure 3). Adequate space was left mesial and distal to the left lateral incisor, mesial to the left canine, and mesial to the right canine in order to accommodate composite buildups and enhance the dental esthetics. Caution was taken while building up the right canine, and a space equal to the mesiodistal width of the left lateral incisor was maintained for future replacement of the right lateral incisor (Figure 4).

The patient was informed of the treatment options for replacement of the right lateral incisor along with the advantages and disadvantages of all modalities. Those options included a removable partial denture/a Maryland bridge and an implant-retained prosthesis. It was agreed that implant-retained prosthesis was the ideally suited treatment option for replacement of the missing tooth. However, considering the patient’s young age and anticipated residual growth potential, an implant-retained prosthesis was not recommended until her general growth was complete. Hence, after parental consent, an orthodontic mini-implant–supported temporary restoration was recommended for the patient to satisfy her esthetic concerns until her general growth was complete in the next 1½ years.
After the buildup of the left lateral incisor and canines was accomplished, a titanium miniscrew (AbsoAnchor, 1.4 mm diameter × 10 mm) was inserted in the maxillary alveolus of the right lateral incisor (Figures 4 and 5).

As we had used a single-piece micro-implant, the undercuts on the head of the micro-implant were blocked out (Figure 6), and a rubber-based impression of the implant and the dentition was taken and sent to the laboratory for fabrication of a porcelain fused to metal (PFM) crown. A PFM crown was cemented using glass ionomer luting cement (GIC, glass ionomer luting and lining) (Figure 7).

The patient was kept on a regular recall schedule for 12 months, and no incidence of implant mobility was noted (Figure 8). She was instructed to maintain oral hygiene around the implant-retained prosthesis using an interdental brush and mouthwash. The patient was happy and satisfied with the facial esthetics achieved at the end of treatment (Figure 9).

**DISCUSSION**

An implant-retained prosthesis is the treatment of choice for permanent restoration of an edentulous area.11–16 However, an implant-retained prosthesis involves high cost, a multidisciplinary approach, and additional visits to various clinics, which are time-consuming and lead to a delay in completion of the entire orthodontic therapy.

Micro-implants used to retain a temporary crown restoration in order to replace a single missing tooth can be a more ideal treatment option than a removable partial denture or a Maryland bridge as described by Graham.17 The miniscrew stimulates the alveolar ridge and thus helps prevent ridge atrophy, and it prevents the adjacent roots from drifting into the edentulous space.18 According to Chen and colleagues,19 the critical factors for success of orthodontic miniscrews are initial mechanical stability and bone quality and quantity. The closed method does not require an incision for periodontal flap surgery, which is an added advantage and is indicated when full width of alveolar bone is intact on palpation.6 No alveolar bone loss around the implant was observed for 12 months during the recall visits (Figure 10).

Most of the single-piece implants do not have surface treatment, which does not allow osseointegration between the mini-implant and the bone. Hence, the implant can be easily removed at the end of skeletal growth and replaced.
FIGURES 3 AND 4. **Figure 3.** Predebonding intraoral before composite buildup. **Figure 4.** Predebonding intraoral after composite buildup and placement of micro-implant.

FIGURES 5–10. **Figure 5.** Close-up view of orthodontic miniscrew post debonding. **Figure 6.** Model portraying blocked out undercuts of miniscrew. **Figure 7.** Post treatment with temporary crown (intraoral). **Figure 8.** Posttreatment orthopantomogram with crown. **Figure 9.** Extraoral depicting esthetic smile. **Figure 10.** Periapical radiograph demonstrating no bone loss at 12 months.
with the prosthetic dental implant.\textsuperscript{20–22} It is understood that a micro-implant for temporary crown restoration is recommended to temporarily satisfy the esthetic needs of the patient and can be used as a space maintainer option until the general growth of the patient is complete and the patient is monetarily ready to undergo further restorative treatment. The parents must be informed that their child would need to have a final implant-retained prosthesis upon completion of final growth.\textsuperscript{23,24}

According to Lim and colleagues,\textsuperscript{25} any treatment plan involving anchorage from miniscrews should consider the possibility of failure, since their initial stability cannot be guaranteed or predicted. Nevertheless, a single-piece micro-implant can be used as a temporary treatment option in order to retain edentulous space after active orthodontic treatment until an implant-retained prosthesis is made.

\textbf{ABBREVIATION}

PFM: porcelain fused to metal

\textbf{REFERENCES}