

CASE REPORT

Extrusion of a Traumatically Injured Tooth with a Vacuum-Formed Splint

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This report describes the use of a clear, vacuum-formed splint to extrude a central incisor that was intruded into the maxillary bone by trauma. Although orthodontic archwires are generally used to provide anchorage for dental extrusion,¹⁻³ the vacuum splint offers an alternative to bonding brackets and bending a passive, heavy archwire. It can save time in treating dental trauma in patients with anterior crowding or partially erupted teeth, and it may also be better tolerated than orthodontic brackets by patients with limited cooperation. Additionally, a splint can distribute the extrusive elastic force along the occlusal surfaces of multiple teeth and provide many directions of pull for moving the tooth into the arch.

Diagnosis

A 13-year-old male patient was referred for treatment of a traumatically injured maxillary permanent incisor (Fig. 1). The right central incisor was fractured and the left central incisor was intruded 5mm after the boy fell from his wheelchair. His medical history included spina

bifida, non-ambulation, cognitive delay, and limited motor movements. The patient had been caries-free prior to his referral, but because of his poorly controlled arm movements, his oral hygiene was only fair and needed constant supervision by his parents.

Orthodontic examination showed severe anterior crowding with two rows of maxillary incisors and a Class II malocclusion. The maxillary incisor roots were fully developed and closed.

Treatment

Initial attempts at bonding a heavy orthodontic archwire in an uncooperative patient resulted in moisture contamination and bond failures. The decision was made to use a removable

splint. To lessen the discomfort of an impression, wax and cotton were used to block out undercuts and the area that the incisor would erupt into. Alginate impressions were then taken without problems. A maxillary stone cast was made with the vestibular areas trimmed back and a hole drilled in the palate for vacuum access.

A Biocryl acrylic sheet* was heated and drawn over the cast under vacuum pressure. After the clear splint was removed from the cast and trimmed to the gingival margin, two metal buttons with bondable surfaces were added to the anterior portion of the splint (Fig. 2). The spacing and location of the buttons allowed for adjustments in elastic tension and direction of pull. If more adjustment was

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Fig. 1 13-year-old male patient with traumatic intrusion of maxillary left central incisor.



Fig. 2 Vacuum-formed splint with buttons added to anterior region.



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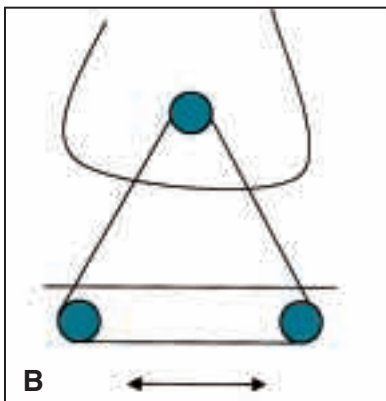


Fig. 3 A. Splint with elastic traction added to button on intruded incisor. B. Effect of button position on elastic tension.



Fig. 4 Complete extrusion of maxillary incisor in three weeks.



Fig. 5 Patient after restorative treatment.

needed, more buttons could be added to the splint.

A button was bonded to the available enamel surface of the intruded central incisor. The parents were instructed to stretch an elastic over the buttons on the splint and the intruded tooth (Fig. 3). Elastics of different sizes were provided to allow for the decreasing distance between the buttons.

Surprisingly, the patient readily accepted the acrylic splint after resisting the earlier attempts at bonding brackets. Within three weeks, the tooth was extruded into its proper position in the arch (Fig. 4) and was restored by the pediatric dentist (Fig. 5).

Discussion

The goal of this treatment was to extrude the tooth through the middle of the alveolar ridge. That was accomplished by controlling the direction of pull with the position of the buttons on the acrylic splint. The elastic tension

was dictated by the distance between buttons, the diameter of the elastic band, and the elastic thickness. The tension also served to keep the splint in place.

Advantages of the vacuum-formed splint include improved patient comfort, reduced bonding time, protection of injured teeth, elimination of custom wire bending, ability to control the direction of pull, ease of access to the teeth and splint for oral hygiene, and lack of dietary restrictions. Disadvantages include laboratory time and the need for patient compliance with alginate impressions, wearing the splint, and changing the elastics, as well as the necessary adjustment to eating and speaking with the splint in place.

The acrylic splint may be a useful alternative to orthodontic brackets and archwires in managing traumatic dental intrusion, especially in young children who are missing teeth adjacent to the intruded teeth, uncooperative or handicapped patients, and patients with severe crowding.

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