

Orthodontic Management of a Severely Rotated Maxillary Central Incisor in the Mixed Dentition: A Case Report

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Abstract

The aim of this case report was to introduce an appliance for correcting severe rotation of anterior teeth in the mixed dentition period. A 9-year-old Iranian boy with a mixed dentition Class I malocclusion complained of a severely rotated of upper right central incisor. There was a mesiodens between the central incisors. The supernumerary tooth was first extracted and then a Whip appliance which is composed of a removable plate, a cantilever spring and a central bracket on the rotated tooth was utilized. After 8 months, the upper right central incisor was orthodontically brought into proper alignment. Circumferential supracrestal fibrotomy was performed on the overcorrected tooth. One week after surgery, the device was removed and the retention was started. The whip appliance is a removable appliance that can effectively correct severe rotation of anterior teeth especially during the mixed dentition period.

Key words: Orthodontics, rotation, whip appliance.

Introduction

The supernumerary tooth is derived from a developmental disturbance during odontogenesis (1,2). The mesiodens is a common supernumerary tooth which occurs between the maxillary central incisors and is more common in the permanent than the primary dentition (2). If there is no sufficient space in the dental arch, a mesiodens can cause delay in or even block the eruption of the central incisors (3,4). Tooth rotation is one of the most common side effects of a mesiodens (5). Correction of a rotated upper incisor in the mixed dentition needs a removable appliance with minimal force; however, severe rotations need to be corrected by a fixed appliance (6).

When a fixed appliance is used to correct only some of the teeth in the mixed dentition, arch wire spans are longer, the wire is springier and large movements are easily possible. However, it may be difficult to use fixed appliances correctly during the mixed dentition since the available permanent teeth are grouped into anterior (incisor) and posterior (molar) segments. In addition, anchorage control becomes difficult as only the first molars serve as anchorage in the posterior segment of the arch (7). The aim of this case report was to introduce a fixed-removable appliance which can be prescribed for patients with severely rotated anterior teeth.

The Whip appliance was first introduced by Houston and Isaacson in 1980. The original appliance has been slightly modified to better satisfy the therapeutic needs (8). This appliance consists of a removable orthodontic plate, a cantilever spring and a bracket or bonded tube that enables efficient correction of severely rotated anterior teeth in a short time. Better anchorage control, simple force system, easier dental plaque control and less critical patient cooperation are the advantages of the

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appliance. The removable appliance has an acrylic base plate and suitable retentive clasps on the primary canines and molars. Initially, for mesial-in rotations an Adams clasp must be placed on the molars of the same quadrant and for distal-in rotations it must be placed on the molars of the opposite quadrant. Molar Adams clasps and circumferential clasps for canines are made of 28 mil (0.7 mm) and 24 mil (0.6 mm) stainless steel wire, respectively (Fig. 1). In case of occlusal interferences, posterior biteplates can be added to the appliance. A central incisor bracket or a mandibular first molar bondable tube is then bonded directly on the labial surface of the rotated tooth.

To make the Whip spring, a vertical loop is formed by first bending the 14 mil stainless steel wire upwards and then immediately bending it downwards at its end.

The mesial end of the spring is ligated in the bracket slot or inserted into the tube and is bended towards the gingiva. Then the hook at the distal wire end is hooked over the bridge of the upper primary second molar Adams clasp.

After over correcting the tooth rotation, a periodontist can perform circumferential supracrestal fibrotomy to prevent relapse. One week after fibrotomy, the appliance is removed and retention begins using a modified Hawley retainer with an acrylic bar on its labial bow.



Figure 1. The Whip appliance



Figure 2. Intraoral examination of patient before treatment



Figure 3. Radiographic view of patient before treatment

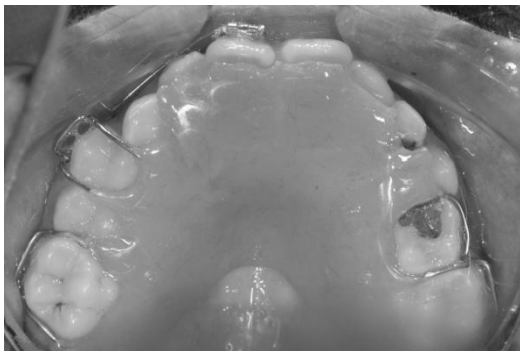


Figure 4. Intraoral examination of patient during treatment



Figure 6. Intraoral photograph of patient after removal of appliance

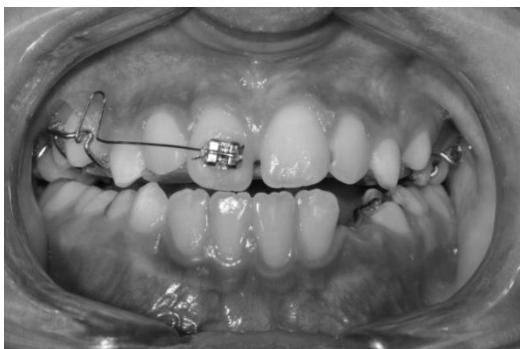


Figure 5. Intraoral photograph of patient after 8 months

Case Report

A 9-year-old Iranian boy was referred to the Faculty of Dentistry of Mashhad University of Medical Sciences with a chief complaint of severe rotation of the upper anterior tooth (Fig. 2). The child's medical history was non-contributory for pertinent findings.

Extra oral examination showed a mildly convex facial profile, symmetric face and competent lips at rest. Intra oral examination revealed Class I malocclusion with severe rotation of right central maxillary incisor due to a supernumerary tooth between maxillary central incisors. There were no transverse problems (Fig. 3). A Class I skeletal pattern with no vertical dysplasia was confirmed by routine cephalometric analysis. Oral hygiene was poor as evidenced by mild gingivitis.

Radiographs confirmed a mesiodens and severe rotation of the upper right central incisor. The mesiodens was extracted by an oral surgeon under local anesthesia. After 10 days, an alginate impression was taken of the upper jaw on which the removable appliance was constructed. The patient was instructed how to use the appliance. A central incisor bracket was placed on the labial surface of the rotated tooth. A Whip spring was constructed and hooked into the place (Fig. 4). The mesial end of the wire was bent to prevent the wire from dislodging.

Routine orthodontic adjustments were scheduled every four weeks. After 8 months, the upper right central incisor was repositioned to its normal position (Fig. 5). After over correcting the rotation, circumferential supracrestal fibrotomy was performed by a periodontist in order to prevent relapse.

One week after fibrotomy, the appliances were removed and retention was started using a modified Hawley retainer (Fig. 6).

Discussion

One of the most common causes of severe rotation of upper incisors is the presence of supernumerary teeth. The associated complications include lack of eruption of permanent teeth, deviation from the eruption path, rotations and root resorption (9).

Several clinical treatment options have been suggested in the literature for correcting tooth malpositions (10-12). The typical appliance is a fixed "2 × 4 appliance" in the mixed dentition (2 bands on first molars and 4 bonded brackets on incisors). With a fixed appliance just on a few number of teeth, as the inter-bracket span increases, larger moments are created and the wire becomes springier but weaker. All of these would decrease treatment efficacy (9). First molars are available for anchorage in the posterior segment of the arch in the mixed dentition. Anchorage control is more difficult and critical (8). With the use of removable

appliance in the Whip device, a good anchorage unit is provided from the entire palate and the maxillary dentition. This reduces most side effects. Thus we suggested the Whip appliance for correcting a severely rotated central incisor in the mixed dentition.

The Whip appliance has advantages that make it suitable for the mixed dentition (9-11):

- 1- Offering a solution in the mixed dentition
- 2- Less critical anchorage control
- 3- Relatively simple force system
- 4- Easier oral hygiene management
- 5- Less critical patient cooperation.

Patient compliance is less critical since removing the appliance from the mouth causes discomfort as the distal end of the Whip spring hurts the buccal mucosa.

Problems that may be encountered during treatment are debonding of the bracket and distortion of the spring. Satisfactory compliance can minimize these problems. Other undesirable effects are extrusion and slight labial tipping of upper incisors during treatment.

Since derotated teeth are prone to relapse, they must be overcorrected and retained for a minimum of 6 months. The Whip appliance is a fixed-removable appliance that efficiently corrects severely rotated anterior teeth in a short period of time. By employing this appliance, it is possible to start the treatment in the mixed dentition and not to wait until the permanent dentition. This improves patient's self-image by enhancing smile esthetics during preadolescent years.

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