



Derotation of incisors with a semi-fixed couple force system appliance

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Abstract

Rotations are very common components of malocclusions. Couple forces bring about a quick and an efficient correction but the two anchorage units from which the force is being derived should be stable in order to prevent the reaction forces. In this case report, derotation of a central tooth with a couple force system appliance without deleterious effects on the surrounding teeth has been presented.

Background and Aim

Supernumerary teeth are developmental anomalies that cause an increase in tooth number and are often seen in the anterior part of maxilla (1). Most of them are placed palatally to the central incisor (2). Theories such as excessive growth of the dental lamina, dichotomy of the tooth germs and genetically determined conditions have been proposed for this anomaly (3). Complications of such supernumerary teeth could be dental impaction, delayed eruption and severe rotation of anterior teeth (4, 5).

Orthodontic treatment involves correcting different malocclusions. Rotations are very common components of malocclusions. Correction of incisor rotation can be accomplished with removable appliances, in which one point contact leads to an uncontrolled tipping, which is not ideal. In earlier fixed orthodontic appliances like Begg or Tip Edge, auxiliary derotation springs were used but they are not the appliance of choice for pre-adjusted edgewise appliances (6).

For the correction of rotations from the force system point of view, either a single force system or a couple force system can be used. A couple force is a pair of equal and opposite forces applied to teeth and results in the creation of a pure moment to rotate teeth around their center of resistance. Both these systems have advantages and disadvantages. Couple forces bring about a quick and efficient

correction but the two anchorage units from which the force is being derived should be stable in order to prevent the reaction. In this case report, derotation of a central tooth with a couple force system without deleterious effects on the surrounding teeth has been presented.

Case Report

A patient reported with a severely mesiopalatally rotated maxillary right central incisor, with a bilaterally Class I molar and canine relationships (Figure 1). There was a supernumerary tooth palatally positioned between the right central and lateral incisors.

After clinical examination and taking OPG and intra and extra oral photographs, the extraction of the supernumerary tooth was carried out under local anesthesia. A few weeks after the extraction, two buttons were bonded on the labial and palatal surfaces of the rotated tooth.

Next, impression of the upper jaw was carried out and an orthodontic appliance was made. The appliance consisted of a soldered transpalatal arch as well as two palatal and two buccal extensions made from 0.036 inch stainless steel wires running from the molar bands to the interproximal surface of the canines and the first premolars in both sides (Figure 2).

Elastic chains were used for generating couple force by connecting the labial button to the left



Figure 1: Patient before treatment



Figure 2: The two couple force systems for central incisor derotation



Figure 3: Elastic chain attached from labial button to the buccal extensions in both sides



Figure 4: End of treatment

buccal wire extension; in addition, they were used in connecting the lingual button to the right palatal wire extension (Figure 3).

Once the derotation was half way, the labial button was attached to the buccal wire extensions in

both sides, since the use of palatal extension would bring about excessive lingual tipping of the incisor.

Elastomeric chains were pre-stretched for 10 seconds and were then engaged and changed every 4 weeks. Maintaining a pure derotation force around

the long axis of the tooth by low continuous force is of prime importance. Frequent changing of power chains should be avoided so as to allow simultaneous formation of new PDL architecture, which is imperative to the treatment. At the end of the derotation, no side effect was observed in the dentition (Figure 4).

The circumferential supracrestal fiberotomy was performed after the treatment in order to prevent the relapse. In addition, a bonded fixed lingual retainer was placed and a Hawley retainer was given to the patient. CSF procedure does not bring any harm to the tooth or the surrounding periodontium (7).

Discussion

As the patient was in the permanent dentition phase, we could use a fixed orthodontic treatment; however, with a continuous arch wire, some side effects would occur in the adjacent teeth. As a result, the couple force system is used in this case without the strap up of the complete arch.

Derotation can be achieved by a number of ways using fixed appliances:

1. By engaging NiTi archwire into the bracket slot
2. By off-centered brackets that bring a slight over correction of rotations which exert a greater pull force on the side having the maximum rotation
3. By using a rotation wedge that achieves correction by exerting a push force
4. By palatal/lingual attachments that help in engaging the force from the lingual side, thus a couple force can be applied (from labially/buccally placed brackets and lingual attachments)

Nevertheless, the first three techniques have some side effects on the adjacent teeth, but our method applies a relatively light and continuous force over a period of time and brings effective tooth movement.

Conclusions

Derotation was successfully achieved with this technique followed by appropriate retention protocols.

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