International Journal of Advanced Biotechnology and Research (IJBR)
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-8, Issue-3, 2017, pp1826-1830
http://www.bipublication.com

Research article

Rapidly correction of severe rotated central maxillary incisor with auxiliary whip spring: 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 with fix orthodontics appliance. A 14 years-old Iranian girl with a Class I malocclusion complained of a severely rotated of upper right central incisor. A Whip appliance whichmade of0.014 stainless steel and placed in auxiliary tube of first right molar's band and engaged on the bracket that had been bonded on right central incisor. After 3 months, the upper right central incisor was orthodontically brought into proper alignment and at the same time leveling and alignment was done. In present case, we treated severe central maxillary rotation in patient with other orthodontic problems by using fix orthodontic appliance and auxiliary whip spring at the same time.

Key words: Orthodontics, rotation, whip appliance

INTRODUCTION
Tooth rotation, which is one of the most prevalent dental anomaly, is defined as observable mesiolingual or distolingual intra-alveolar displacement of the tooth around its longitudinal axis.[1]rotation is classified into three groups(<45°,45° to 90°, >45°).[2]Mild rotation can be treated by removable appliance(containing z-spring and labial bow) or semifixed appliance(whip). The treatment of choice for more severe rotations is fixed appliance.

Derotation can be done by number of ways with fixed appliances such as engaging NiTiarchwire into bracket slot,offcentered placement of brackets, using rotation wedge, Palatal/lingual attachments and ligature rotation tie,[3] but in the cases of extremely severe rotation these methods mentioned above, may need prolong treatment time and/or require many meetings with short intervals.

Sidiq et al.(2015) placed bondable buttons on the rotated tooth and engaged elastics to a removable plate composed loops to derotate a severe rotated anterior tooth.[4] Jain et al.(2013) gave a full coverage metal-ceramic crown for aesthetic correction of a maxillary central with 180 degree rotation.[5]

Auxiliary springs have been used in orthodontics since long for correction of single

tooth malocclusions produce adverse effects on adjacent teeth.[6]

Whip is a semifixed appliance consist of a removable plate, a bonded bracket or tube on rotated tooth and a contilever spring that can effectively correct severely rotated anterior teeth in a short time.[7, 8]

Parisayet al.(2014)[9]Jahanbin et al.(2014)[10] and Afzali et al.(2015)[11]Successfully used the whip device to correct rotation of maxillary central incisors.

In this case report we used two couple whip spring as an auxiliary spring along with comprehensive treatment to accelerate and facilitate treatment process with minimal adverse effects.

Case Report:

A 14 years-old girl was referred to the Faculty of Dentistry of Kerman University of Medical Sciences with chief complaint of crowding of teeth.

The extra oral examination of the child revealed straight profile, and in frontal view she was mesoproscopic, had a symmetric face and competent lips at rest (Fig. 1).

The child's medical history was non-contributory.

The intraoral examination revealed permanent dentition in both arches with class I molar and canine relation at left side and class II molar and canine relation at right side with normal overjet and overbite and posterior crossbite. The maxillary right central incisor was mesiolingually rotated about 140 degree (Fig. 2).

A Class I skeletal pattern with no vertical dysplasia was confirmed by routine cephalometricanalysis. In radiographic examination no pathologic findings such as supernumerary tooth or odontomawas observed.

The parents reported no history of any traumatic injury to dentition (Fig 3).

Space analyzes revealed adequate space to resolve inter and intra-arch problems.

Oral hygiene was fair with mild gingivitis.

Figure 1: pretreatment extra oral photographs

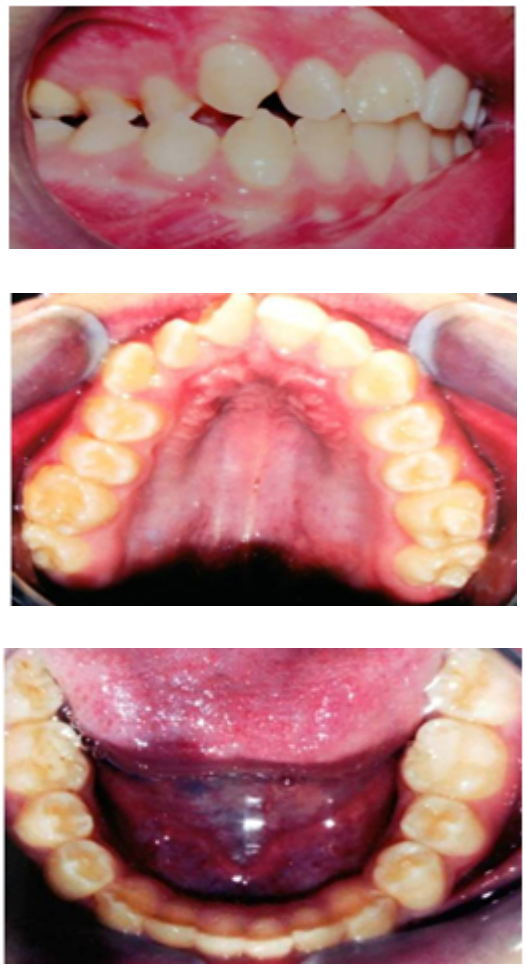

Figure 2: Pretreatment intraoral photographs

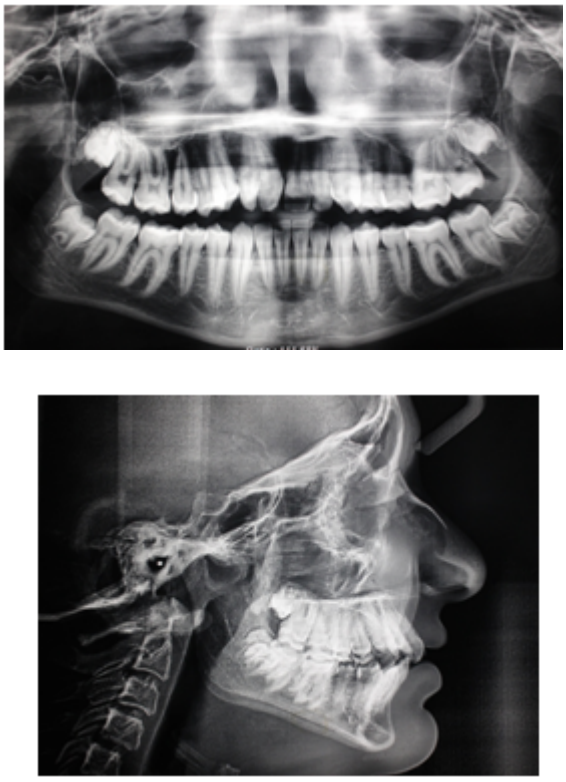

Figure 3: Pretreatment cephalometric and panoramic radiographs

Treatment progress:

Fixed orthodontic treatment was started by placement of pre-adjusted edgewise appliance (MBT 0.022 inch slot) in the maxillary arch. Initial alignment and leveling was accomplished with the use of a 0.014" Nickel Titanium arch wire; simultaneously the wipe spring was made of 0.014 stainless steel and placed in auxiliary tube of first right molar's band and cinched. Other side of whip spring engaged on the bracket that had been bonded on right central incisor. Bite raisers were placed on the upper posterior teeth to open the bite(Fig. 4).

After one month whip spring activated by tightening of vertical loop that had been mounted on spring.

After two months of treatment some of rotation was corrected but more space was needed and adequate space for upper right central incisor obtained by active open coil spring in 0.018 inch stainless steelwire. Also we used elastomeric chain to accelerate treatment process (fig. 5).

After 3 months from starting the treatment rotation was corrected and leveling and alignment accomplished (fig.6, 7).

Figure 4: Intraoral photograph of patient at beginning of treatment

Figure 5: Intraoral photograph of patient after 2 months

Figure 6: Intraoral photograph of patient after 3 months

Figure 7: Panoramic radiograph of patient after 3 months

DISCUSSION

Rotations is the most common anomaly among the whole dental malocclusion. The majority of tooth rotations are between 45° and 90°, followed by <45° rotations.[2]biomechanical principles involve application of single or couple of force for correction of rotation. Rotated teeth can be corrected by removable, semifixed or fixed appliance depending upon the severity of rotation.[3]The treatment of choice for severe cases is fixed appliance and in the case of extremely severe rotation an auxiliary spring in addition to fixed appliance may be needed. Whip device is a removable appliance with fixed attachment and a cantilever spring for treatment of the incisor rotation which is able to correct 90° and lesser rotations in a short time. In this appliance, a force couple to rotate a tooth can be applied by a whip spring.[9]

In present case we treated severe central maxillary rotation in patient with other orthodontic problems by using fix orthodontic appliance and auxiliary whip spring simultaneously to reduce time of treatment. This spring is consistent with the comprehensive treatment, has a long range of activation with light continues force and consequently just by once activation great amount of rotation can be corrected.

Another technique that is commonly used to correct rotation is auxiliary NiTi wire as a piggy back .this approach is more efficient than engagement of mainNiTiarch wire but it needs at least 0.018 stainless steel (SS) mainarch wire and this means that until the alignment of otherteeth are done to allow engagement of 0.018 SS wire, correction of the rotated tooth should be postponed.

Another way is to use rotation tie. This method requires weekly visits to tightening ligature tie. Hipara, by using a modified rotation tie,which consist of ligature and elastomeric chain, increased appointments intervals to every 2 weeks.[3]In this case we used whip spring that have some advantages:this spring is compatible with fix comprehensive treatment therefore correction of rotated tooth initiated at the same time with another teeth alignment. Furthermore the long range of action in this spring provided a light continuous force. Because of this long range of action at once activation large amount of rotation was corrected. Insufficient space for correction of rotated teeth is one of the problems with rotated teeth. In this case we used light NiTi open coil to gain adequate space while derotating the teeth that led to save time. This auxiliary spring has some disadvantages that the most distinct problem is patient discomfort and wire deformation.By correct adjustment and patient cooperation in diet this problems can be reduced.

CONCLUSION

This study, shows that, severe rotated teeth in patient with other orthodontic problems can be treated by using auxiliary whip spring and fix

orthodontic appliance at the same time and reduce time of treatment .

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