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Asymmetric extractions in a patient with unilateral maxillary canine-premolar pseudo-transposition and torsi-version of both maxillary canines

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Abstract

Correction of transposition and torsiversion is a time-consuming procedure. In this case report, a female patient who was 19 years old came to the orthodontic department with pseudo-transposition and torsiversion. Patient has skeletal class III malocclusion and dentally she had super class I on both sides. Her profile was slightly concave with procumbent lower lip. Treatment plan included extraction of carious upper left second premolar and remaining all first premolars. Couple mechanics were applied for the correction of both upper canines which were in torsiversion. The treatment duration was 36 months. Both pseudotransposition and torsiversion were corrected. Proper overjet and overbite was achieved with improvement in the lower lip procumbency.

Keywords: Extraction; rotation; skeletal class III; torsiversion

Introduction

Exchange of position between teeth is known as Transposition.[1] There are two types of transposition true and pseudo or complete and incomplete.[2] The complete or true type is the exchange of both the crown and the root part of the tooth. While in pseudo type, only crown has changed its position, while roots are in their original location. The etiology of transposition is that it can be due to trauma, genetic cause, and exchange of tooth buds during development, failure of resorption of root of deciduous canine, premature shedding of deciduous teeth, and failure of exfoliation of deciduous teeth.[3] According to Peck and Peck, transposition is classified into following types in the descending order of their prevalence. The most common type in maxilla is between canines and first premolars. In mandible, however it's rare, the most frequently occurring type is between incisor and canines.[4]

The treatment options available are as follows. In non- extraction cases, two options are considered. First is to align the transposed teeth in their original position and second is to accept the teeth in its transposed position. In extraction cases, extract the transposed tooth and align the other.[5] Whichever treatment modality is selected, factors that need to be taken into consideration for good prognosis are location of the crowns and roots, gingival topography of involved teeth, susceptibility to caries treatment duration.

Torsiversion is the rotation of a tooth on its long axis. It can be described in degrees like 45°, 90°, 135° and 180°. Rotated tooth results in a non-ideal buccal intercuspation having contacts of buccal and lingual surfaces instead of proximal surfaces.[6] Not commonly seen in a clinical setting but it can be due to inappropriate placement of avulsed tooth. [7] The cause of severe rotation is still unknown. Possible etiology could be presence of extra tooth, crowding, abnormal position of tooth or tooth bud, cleft lip and palate, genetic

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cause or failure of exfoliation of deciduous teeth .[8,9]

This case report shows the resolution of pseudo- transposed teeth which were maxillary canine and first premolar in their actual positions with extraction treatment.

Case Report

Diagnosis and Etiology

A 19-year-old Pakistani girl came to the orthodontic department at Dow University of Health Sciences in Karachi, Pakistan. Her chief complaint was that she is not satisfied with her smile. She had no significant medical history. She did not undergo any orthodontic treatment in the past. The clinical pictures taken before treatment showed a symmetric face with a straight profile (Fig 1). The intraoral examination showed super class I molar relationship on both sides, Class I incisor relation and crossbite of multiple teeth. Both maxillary canines were in torsi-version and there was pseudo-transposition of upper left canine and first premolar. The incisal edge of upper left maxillary incisor was fractured and upper left second premolar was carious. Dental midlines were coincident with facial midline. Radiographic examination showed unerupted bilateral upper and lower third molars and lower left third molar was horizontally impacted. (Fig 2).

The analysis done on lateral cephalometric radiograph showed that the position of the maxilla was normal and the mandible was slightly positioned anteriorly as compared to Pakistani standards (SNA, 81°; SNB, 82°; AN -1°). The patient had a skeletal Class III relationship. The maxillary incisors were proclined, but the mandibular incisors showed mild retroclination (Fig 2, Table I). The calculation for crowding showed –10 mm crowding in the maxillary arch and –4 mm in the mandibular arch. She had 1 mm of overjet and 10% of overbite. These above findings showed class III malocclusion with crowding and pseudo transposition of the maxillary left canine and first premolar. Torsiversion of upper left canine was 180°and right canine was rotated 90° (Fig 3).

Treatment Objectives

The treatment objectives were to correct the transposition and torsiversion of teeth, establish a Class I molar and canine relationship, achieve ideal overbite and overjet, and correct proclination of the upper incisor, relieve crowding in both the arches.

Treatment Alternatives

The following alternatives were considered for the transposed teeth: (1) extraction of all first premolars (2) extraction of the maxillary right first premolar and left second premolar and lower both first premolars (3) non-extraction treatment and alignment of the teeth in the transposed order, and (4) non-extraction treatment and correction of the transposition.

Non- extraction plan was not considered as the crowding was severe especially in the maxillary arch. Between options 1 and 2, second option was taken into the account as upper left second premolar was compromised. It was decided to extract the carious second premolar instead of healthy first premolar, although it was transposed. As the type of transposition was pseudo, it was decided to correct it.

Treatment Progress

After restorative treatment of all first permanent molars and upper left central incisors, banding of all first and second permanent molars was done. Standard edgewise appliance (0.022x0.028) with MBT prescription brackets were bonded on the teeth and alignment and leveling was done by using superelastic NiTi wires in the following sequence .012, .016, .018. After alignment and leveling, .018 S/S wire was placed in the maxillary arch and extractions of upper right first and left second premolar was done. Couple was applied on upper left first premolar. Once upper left first premolar is in the position of second premolar, couple forces

were applied on torsiverion canines (Fig 4). The anchorage was obtained from first and second molars in both the arches. In addition, Transpalatal arch was also used in maxilla for anchorage reinforcement. In the lower arch, after extraction of both lower first premolars, canine retraction was done on 17x25S/S, followed by anterior retraction. Crossbite of posterior teeth was relieved by using expanded arch-wires.

Figure 1: Pretreatment intra and extra-oral clinical photographs

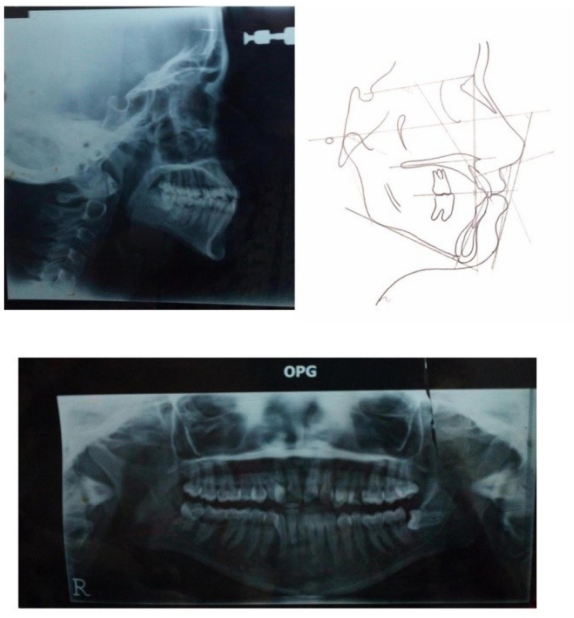

Figure 2: Pretreatment cephalometric radiograph and its tracing and orthopantomogram

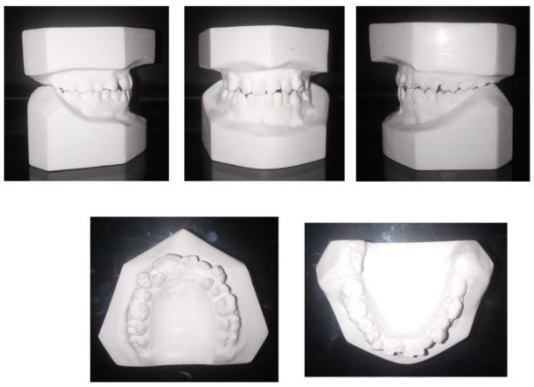

Figure 3: Dental casts before orthodontic treatment

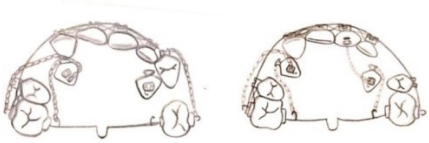

Figure 4: De-rotation of canines

After alignment and leveling, extraction of upper right first premolar and upper left second premolar was done De-rotation of teeth was started on 16x22 S/S wire. Anchorage was obtained from TPA and so ligation of anterior and posterior teeth via stainless steel ligature wire Couple forces were applied to both canines which were in torsiversion. Two posts were soldered to TPA serving as a hook for the attachment of couple force

Figure 5: Post-treatment intra and extra-oral clinical photographs

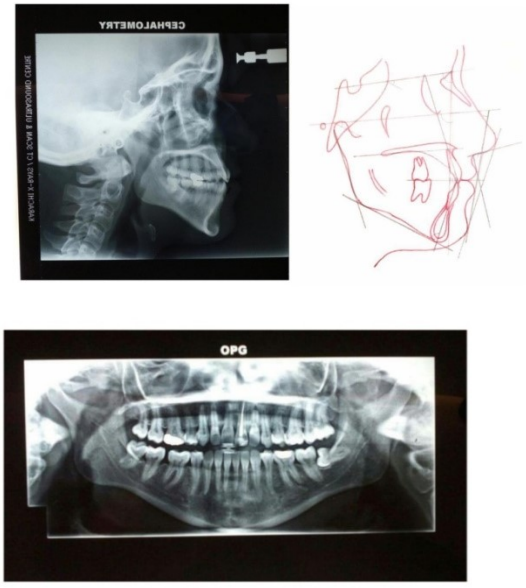

Figure 6: Post-treatment cephalometric radiograph and its tracing and orthopantomogram

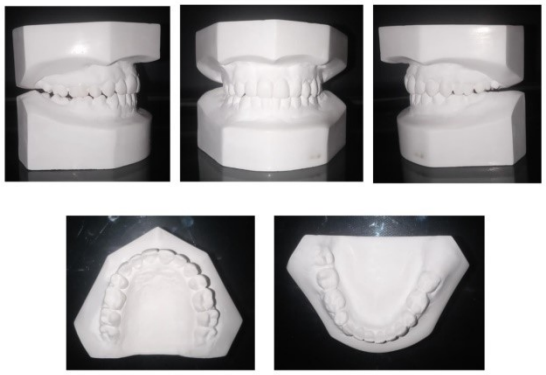

Figure 7: Dental casts after orthodontic treatment

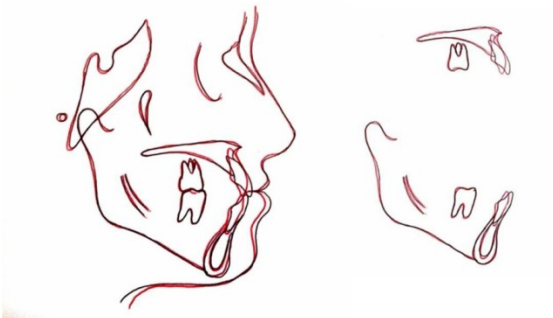

Figure 8: Superimposition of the lateral cephalogram tracings. Black, pre-treatment; red, post-treatment

Treatment Results

The proportion of face was adequately achieved after the treatment (Fig 5), and lower lips procumbency was improved. The clinical frontal picture showed a pleasing smile. The position of the crowns of the pseudo-transposed teeth had been aligned and torsiversions of maxillary canines were also resolved. Radiographically, root parallelism was acceptable. The problem of proclined maxillary incisors were addressed and slight retroclination of lower incisors were also corrected (Fig 6, Table I). A good occlusion was achieved with class I molars and incisor relationship (Fig 7). The superimposition of cephalometric radiograph showed a downward and backward mandibular rotation pattern (Fig 8).

Table I: Pre and Post Treatment Cephalometric Summary

PARAMETERS Sagittal Analysis	Norm	Pre Tx	Post Tx	Difference
<SNA	82° ± 2°	81°	84°	2
<SNB	80° ± 2°	82°	83°	1
<ANB	2 ° ± 2 °	-1°	01	1
Facial angle	87° ± 4°	85°	86°	1
Vertical Analysis				
<Go-Gn to SN	32°± 4°	33°	39°	6
FMA	25°± 4°	29°	34°	5
LAFH/AFH	54%± 4%	55%	55%	0
MMA	25°± 4°	29°	32°	3
Dental Analysis				
UI – SN	102°± 5°	113°	102°	11
IMPA	90°± 4°	87°	80°	7
Soft Tissue Analysis				
E-Line: UL LL	-3 ± 2 -2 ± 2	-5 -1	-5 -3	0 2
Z angle: Nasolabial angle:	78° ± 5° 90° - 110°	75° 72°	76° 80°	1 8

Discussion

When transposed teeth are corrected, following consequences can be resulted due to the complex mechanics that are involved in their correction; these are risk of damage to the surrounding structure, root resorption, gingival recession and lengthy treatment time.[10] The drawbacks of accepting the teeth in their exchanged position are compromised appearance and function.[11] If premolar is considered in canine position, in order to simulate canine, occlusal reshaping and palatal cusp reduction are inevitable procedures.[12]

The forces applied on the maxillary right first premolar were in a more palatal direction with a rotation in a mesial direction.[13] The contact of the root was prevented at the time of canine mesial movement, because of the narrower the mesiodistal root width of the premolar as compared to its buccolingual diameter. The torsiversion of both maxillary canines were corrected by application of couple. It was a lengthy procedure as the rotation was 180 degrees and 90 degrees respectively.

There were no inflammatory features noted in the gingiva of transposed teeth. The sulcular depth noted was about 2 mm. Young age of the patient might have contributed in the excellent healing of periodontium.

Regarding relapse of canines which were in torsiversion, literature suggests that the potential of some rotated teeth of getting back to their original position depends upon the severity of rotation and how much correction has been achieved. Greater the rotation, higher will be the relapse tendency. Boese[14] and Swanson et al[15] reported a direct link between relapse and pre-treatment degree of rotation. Eventually, teeth with higher degree of relapse should always be considered for surgical procedure like fiberotomy. In our case report, no such relapse was noticed. This could be attributed to the fact that pretreatment inter-canine width was not violated.

Conclusions

Correction of pseudo-transposition and torsiversion is an extensive procedure. As it is time consuming, patient's cooperation, esthetic, function and vulnerability to caries should be taken into the consideration when deciding to correct it orthodontically.

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