Case Report

Class II malocclusion with mutilated anterior segment: Treated with a rare approach-creating an apparent midline

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Abstract

Mutilated cases pose a challenge to orthodontists by limiting the treatment options.

The following case report shows a 15-year-old male patient with Class II malocclusion who had missing central incisor and canine in the upper right quadrant, which were extracted around 4 years back. The case was treated by space closure involving movement of left central incisor into right central incisor position and conversion of the left lateral incisor into left central incisor. Overall an esthetic result was achieved saving the patient from the need for a prosthesis.

Key words: Class II malocclusion, crossing the midline, mutilated dentition, tooth movement

INTRODUCTION

Orthodontics has most often been associated with extractions of teeth, in most of the cases the choice is premolar extractions. However many times mutilated cases present in our practices where some teeth have been extracted previously due to various reasons. Such cases often have limited treatment options.[1] Compromise neither on esthetics nor on function is acceptable. Such cases require a unique treatment approach,[1] which should satisfy both the patient and the practitioner and keep the cost benefit ratio low. Here one such case is reported, of a 15-year-old male who presented with a previous history of surgical extraction of two upper anterior teeth that were impacted and associated with pain and swelling.

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DIAGNOSIS

The patient was a 15-year-old boy and his chief complaint was crowding in the lower arch and tooth malposition in the upper arch. The clinical and radiographic examinations revealed missing upper right central incisor and upper right canine. He had a Class II buccal occlusion on the right side, the molars on the left side were 2 mm short of Class I and the left canines were in super Class I relation (3 mm). There was transposition of the lower left lateral incisor and canine and both the left premolars were in scissors bite [Figure 1].

In addition, he had over-retained upper right primary canine, upper right primary central incisor and upper left primary first molar that was palatal to the first premolar and there was a palatally impacted conical supernumerary tooth in the upper right quadrant. In the lower arch, he had over-retained lower left primary canine that was distal to the permanent canine and lower left primary second molar that was buccal to second premolar [Figure 2].

The lower arch showed an arch length deficiency. There was a complete deep bite and increased overjet. Oral hygiene was fair, there was fibrotic gingival enlargement in the upper and lower left quadrants, without any bone loss.

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Right quadrants had healthy periodontium, with adequate attached gingiva.

Cephalometric examination revealed Class II skeletal pattern and a low Mandibular plane angle of 20° with both the upper and lower incisors forwardly placed [Figures 3-5].

The patient's facial profile was mild convex with upper lip strain upon closure [Table 1].

Figure 1: Pre-treatment extraoral photographs

Figure 2: Pre-treatment intraoral photographs

Figure 3: Pre-treatment lateral cephalogram

Figure 4: Pre-treatment panorex

Figure 5: Pre-treatment intraoral radiographs

Table 1: Pre-treatment cephalometric measurements

Variable	Pre-treatment	Normal
SNA	87°	82°±3
SNB	82°	79°±3
ANB	5°	3°±1
Wits appraisal	+3 mm	0 mm
SN to mandibular planes angle	20°	30°±5
Upper incisor to SN plane angle	102°	102°±2
Lower incisor to mandibular plane angle	106°	92°±5
Interincisal angle	134°	133°±10
Upper incisor to APo line	+7	2±2
Lower incisor to APo line	+3 mm	0-2 mm
Lower lip to Ricketts E plane	−0.5 mm	−2 mm
Upper lip to Ricketts E plane	2.5 mm	−4 mm

SNA: Sella nasion to A point; SNB: Sella nasion to B point; ANB: A point nasion B point; Apo: A point to Pogonion; SN: Sella nasion

Treatment objectives

Maxilla

- Maintain vertical control as the anterior teeth are aligned and leveled.

Mandible

- Maintain vertical control. Accept normal growth changes.

Maxillary dentition

- Align the teeth, level the occlusal plane.
- Close/restore space available due to missing upper right central incisor.
- Retract the anterior teeth.
- Establish a bilateral simulated Class I canine relationship, a right Class II molar relationship, a left Class I molar relationship and align midline with midsagittal plane.
- Substitute right first premolar for right canine.

Mandibular dentition

- Correct the tooth material arch length discrepancy.
- Level the curve of spee.
- Maintain the sagittal position of lower incisors as the skeletal base is Class II with low mandibular plane angle.
- Coordinate the mandibular arch with the maxillary arch.

Occlusion

- Treat to Class I incisor relationship with an optimal overbite, overjet and anterior guidance.
- Right side Class II molar relationship and left side Class I molar relationship,

Facial esthetics

- Retract the upper anteriors to relieve the upper lip strain and harmonize the profile.

Treatment alternatives

Option one

Utilize the missing central incisor and canine space present in the upper arch to achieve orthodontic goals.

Space will be utilized to retract the upper anterior teeth to reduce the overjet and to move upper left central incisor into right central incisor's position. Convert left lateral incisor into left central incisor. Both the upper first premolars will be in place of canines.

Extraction of blocked out lower left lateral incisor to gain space for decrowding and leveling the curve of spee.

Option two

To extract upper left first premolar and open space for placement of prosthesis in missing right central incisor place. Close the remaining spaces by retraction of anteriors. Extraction of lower left lateral incisor to gain space for decrowding and leveling the curve of spee.

Extraction of lower left first premolar was not considered because the lower left canine was distally tipped and there was fibrotic gingival enlargement in the left posterior segment, which could hamper the tooth movement.

Treatment approach

Considering the young age of the patient and to avoid any prosthesis it was finally decided to go ahead with the first option (space closure option). In case of any problem during treatment (root resorption, or resistance to translation of left central incisor), it was decided to switch to the second treatment option and extract the upper left first premolar.

Treatment progress

Treatment was started with 0.022 inch slot pre-adjusted edgewise (Roth prescription) appliance after extracting all the retained deciduous teeth and lower left lateral incisor.

First of all scissors bite of left premolars was corrected and simultaneously upper and lower arch alignment was achieved. After switching to 0.018 inch stainless steel Australian arch wire, space closure was started by moving the upper left central incisor individually by use of elastomeric thread.

The impacted supernumerary tooth was surgically extracted.

The upper left central incisor was moved across the midline to substitute the missing upper right central incisor. The absence of labial frenum, probably due to prior surgery for removal of central incisor and canine, made this movement easier. The upper left lateral incisor was moved to the place of the upper left central incisor [Figures 6 and 7].

When spaces were closed partially, composite buildup of left lateral incisor was done making it of the exact mesiodistal dimension as the left central incisor [Figure 6].

Then the remaining spaces were closed on 0.019 × 0.025 inch steel wire using friction mechanics and an additional auxiliary 0.020 inch stainless steel expanded wire extending from left first molar to right first premolar was used to prevent skewing of the arch.

Finishing and detailing was performed using. 016 inch Australian AJ Wilcock premium wire.

After debonding, composite build up was done on the distoincisal edge of the upper left central incisor to make it appear like the upper right central incisor. Upper fixed and upper and lower removable retainers were given.

Figure 6: Progress intraoral photograph before composite buildup

Figure 7: Progress intraoral photograph showing absence of labial frenum

Recontouring of the upper left canine was postponed since the patient was still less than 18 years of age, to allow more time for secondary dentin formation.

Both the upper first premolars did not show any mediotrusive interference so the lingual cusps were not reduced.

Gingival recontouring to further improve the esthetics was advised, but the patient was happy with the result and refused this procedure.

Extraction of lower right third molar was advised and remaining third molars to be periodically reviewed.

RESULTS

The total treatment time was 29 months and results of the treatment were as follows:

1. Maxilla: Vertical control maintained.
2. Mandible: Vertical control maintained no clockwise rotation.
3. Maxillary dentition: Arch aligned, arch form coordinated with the lower arch, incisors retracted by 3 mm with proper torque control, vertical position improved, right molar moved slightly forward during space closure.
   - Right first premolar substituted for right canine.
   - Missing right central incisor space closed by translating left central incisor to the right side.
   - Left lateral incisor substituted for left central incisor
   - The apparent midline (distal surface of left central incisor) was shifted to left by 2 mm
   - Skewing of the arch due to unilateral extraction successfully avoided [Figure 8].
4. Mandibular dentition: Arch well aligned, arch form coordinated with maxillary arch. Incisors intruded and maintained in sagittal position. Left canine substituted the left lateral incisor. Midline coincident with facial midline.
5. Occlusion: Bilateral simulated Class I canine, right Class II molar relationship, coordinated arches, good anterior guidance and left molar relationship was 1 mm short of Class I. Occlusion plane rotated anticlockwise. Right side group function occlusion and left side canine guided occlusion was achieved.
6. Facial esthetics: Pleasing smile, lip strain relieved and profile improved. Upper lip retracted by 2.5 mm and lower by 0.5 mm [Figure 9].

Overall a good final result was achieved both esthetically as well as functionally and the need of prosthesis was eliminated. The apparent upper dental midline was not fully corrected; it was shifted to the left by 2 mm, which was in the acceptable range. A normal and uniform overjet (1.5 mm) was achieved and skewing of the arch was successfully avoided [Figure 10-12 and Table 2].

DISCUSSION

The important features of this case are:

First: Movement of central incisor across the midline

Second: In the upper arch, two teeth extraction space from the same quadrant was utilized for correction of malocclusion.

Third: A pseudo or apparent maxillary dental midline was created between left central incisors and left lateral incisor.

The maneuver of moving the central incisor across the midline has been reported by several authors[2-6] in younger age groups and animal experiments. Cookson,[2] Follin[4], Melnik,[5] and McCollum[6] showed that a central incisor tooth could be translated across the midpalatine suture

Figures 8: Post-treatment intraoral photographs

Figure 9: Post-treatment extraoral photographs

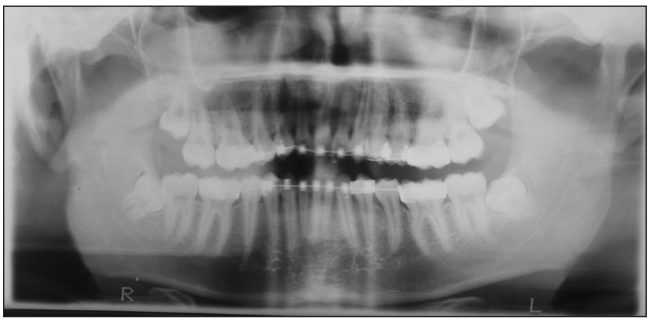

Figure 11: Post-treatment panorex

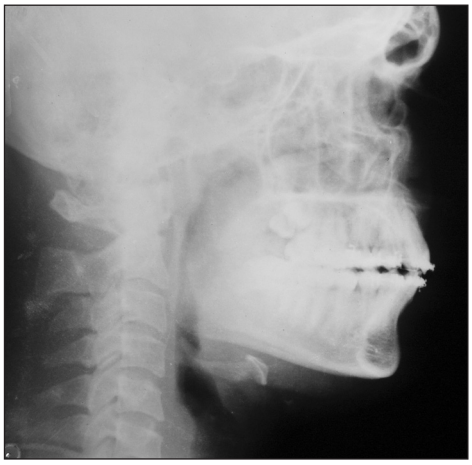

Figure 10: Post-treatment lateral cephalogram

Figure 12: Post-treatment intraoral radiograph

Table 2: Post-treatment cephalometric measurements

Variable	Post-treatment	Change
SNA	87°	0
SNB	82°	0
ANB	5°	0
Wits appraisal	+4.5 mm	+1.5 mm
SN to mandibular planes angle	19°	−1°
Upper incisor to SN plane angle	103°	+1°
Lower incisor to mandibular plane angle	105°	−1°
Interincisal angle	135°	+1°
Upper incisor to APo line	+4 mm	−3 mm
Lower incisor to APo line	+2.5 mm	−0.5 mm
Lower lip to Ricketts E plane	0 mm	−0.5 mm
Upper lip to Ricketts E plane	−5 mm	−2.5 mm

SNA: Sella nasion to A point; SNB: Sella nasion to B point; ANB: A point nasion B point; Apo: A point to Pogonion; SN: Sella nasion

in young patients (8-9 years of age) with the use of fixed appliances. Melnik[5] and McCollum[6] moved the normal central incisor to the contralateral side and on the ipsilateral side a supernumerary tooth present medial to lateral incisor was moved. Cookson[2] Follin[3,4] and Melnik[5] showed radiographically that the midpalatine suture deviated in the direction of the translation. McCollum[6] showed that the tooth traversed the suture. First adolescent case report has been shown by Bosio *et al*.[7] and first adult case report has been shown by Garib *et al*.[8] and they also reported deviation of the midpalatal suture and deviation of the labial frenum. In this case also the midpalatine suture deviated with the tooth movement and there was

a deviation of the incisive papilla and rotation around the incisive foramen.[7]

Frenal tissue stretch has been held responsible for opening up of extraction spaces in earlier studies.[9,10] In this case, the absence of labial frenum (probably due to prior surgery for removal of central incisor and canine) [Figure 7] made the movement easier and helped the treatment by reducing the chances of relapse due to frenal pull. There was a minimal amount of apical blunting of the left central incisor. Periodic intraoral radiographs were taken to check for any abnormal root resorption, as it has been observed in some studies.[3]

As two teeth from the same quadrant were missing, attempting space closure would shift the midline to a great extent, this was considered desirable. However the other side effect of unilateral retraction is skewing of the arch[11] and canting of the occlusal plane[11,12] towards the extraction side. To avoid the skewing of the arch an auxiliary 0.020 inch stainless steel expanded wire extending from left first molar to right first premolar was used. Canting was avoided by slow tooth movement. A uniform overjet and overbite was achieved at the end of treatment.

In asymmetric crowding and unilateral single tooth extraction cases midline shift can be nearly 3-4 mm.[1,13,14] Here, with two teeth unilateral extraction, the midline shift was 7 mm. The mesio distal diameter of the central incisor was 9 mm so a shift of the midline by 7 mm made the distal surface of this tooth just 2 mm away from the facial midline and this was optimal[15,16] to serve as an apparent midline. Many of the studies[15-18] have suggested that a 2 mm deviation of the maxillary dental midline, on either side of the facial midline is esthetically acceptable and goes unnoticed.

Everything went well as was planned and a satisfactory overall result was achieved. If in between treatment, root resorption or inadequate tooth movement would have been observed we would have switched to second treatment option. We used fixed retention for upper arch and the same has been used and advised in prior case reports.[7,8]

SUMMARY AND CONCLUSION

This case shows that central incisor can be moved to contralateral side without any adverse effects. However, such treatment should be started with caution keeping in mind a sound second treatment option.

At the starting point itself this should be explained to the patient and parents, to avoid any conflict later.

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