CASE REPORT

Maxillary molar distalization with first class appliance

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SUMMARY

Non-extraction treatment has gained popularity for corrections of mild-to-moderate class II malocclusion over the past few decades. The distalization of maxillary molars is of significant value for treatment of cases with minimal arch discrepancy and mild class II molar relation associated with a normal mandibular arch and acceptable profile. This paper describes our experience with a 16-year-old female patient who reported with irregularly placed upper front teeth and unpleasant smile. The patient was diagnosed to have angles class II malocclusion with moderate maxillary anterior crowding, deep bite of 4 mm on a skeletal class II base with an orthognathic maxilla and retrognathic mandible and normal growth pattern. She presented an ideal profile and so molar distalization was planned with the first-class appliance. Molars were distalised by 8 mm on the right and left quadrants and class I molar relation achieved within 4 months. The space gained was utilised effectively to align the arch and establish a class I molar and canine relation.

BACKGROUND

Class II malocclusion is one of the most common problems in orthodontics with an estimated one-third of all orthodontic patients treated for this condition.¹ Over the past few decades, non-extraction and non-compliance therapies have become more popular in the correction of mild-to-moderate class II malocclusions. A common treatment modality is distalization of the maxillary molars to create a class I relationship. This is particularly indicated in cases with arch length discrepancies of not more than 8 mm with limited dental protrusion, unerupted maxillary second molars, average or low mandibular plane angle and

in cases where the maxillary permanent molars have moved mesially due to early loss of deciduous molars.

In the past, the primary means of distalization have been headgear and sliding jigs with class II elastics from the mandibular arch. Gould² was the first person to discuss about unilateral distalization of the molars with the help of extra oral, cervical and occipital pull head caps. Since these methods require a significant amount of patient cooperation, newer non-compliance appliances have been developed such as the K-loop,³ the Jones Jig,⁴ the Keles slider,⁵ the Pendulum Appliance,⁶ the fixed piston appliance,⁷ and the Distal Jet⁸.

Although the need for minimum patient's cooperation and ease in use are among the advantages of these appliances, the distal molar movement occurs mainly by tipping and rotation of the crowns, and an anchorage loss does occur in the premolars and incisors.

Keeping these shortcomings in mind, Fortini *et al*⁹ introduced the first class appliance for unilateral or bilateral distalization of maxillary first molars which they claimed could produce bodily distal movement of maxillary molars with minimal anchor loss.

CASE PRESENTATION

A 16-year-old postpubertal female patient reported to the clinic, with irregularly placed upper front teeth. Further inspection revealed a mesocephalic head form, mesoprosopic facial form, convex profile, straight divergence and competent lips (figure 1). Intraorally, she had class II molar relation on the right side and end on relation on the left side, labially placed 13, palatally placed 12,

Figure 1 Pretreatment facial photographs.

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Figure 2 Pretreatment intraoral photographs.

maxillary dental midline shift of 1 mm to the right side, overjet 2 mm and overbite 5 mm. Maxillary anteriors were retroclined with a space discrepancy of 5 mm in the maxillary arch and 2 mm in the mandibular arch (figure 2).

The patient had a class II skeletal pattern with orthognathic maxilla and retrognathic mandible and normal growth pattern.

INVESTIGATIONS

Cephalometrically, the patient had an SNA angle of 78°, SNB angle 73° and ANB 5°, indicating a class II skeletal pattern. The mandibular plane angle was 30°, indicating a normal growth pattern. Upper incisor to NA was 8° and lower incisor to NB was 23°. Orthopantomogram revealed missing 18, favourably positioned 28, unerupted 38 and 48 and normal condylar anatomy (figure 3).

TREATMENT

- The treatment plan was to extract 27, since 28 was in a favourable position to erupt.
- Distalization of maxillary first molars using first class appliance to create space for labially blocked out canine and to correct class II molar relation.
- Postdistalization phase with preadjusted edgewise appliance for levelling and alignment of maxillary and mandibular arches.

Initially, bands were fitted on the maxillary first molars and second bicuspid, and impressions were made with the four

bands. The first class appliance was fabricated in the laboratory and inserted into the patient's mouth (figure 4).

The appliance consists of a vestibular side with formative screws soldered on the buccal sides of the first molar bands. Split rings welded to the second premolar bands controls the vestibular screws. Stop screws are used to maintain the distal positions of the molars after active movement has been completed. Palatal side consists of a modified Nance button, which is butterfly shaped for added stability and support during retention. Sections of 0.045" tube are soldered to the palatal sides of the first molar bands for insertion of the butterfly component of the appliance. These tubes allow the molars to be distalised without undesirable tipping. The butterfly section is soldered to the second bicuspid molar bands. Nickel titanium 0.010"×0.045" coil springs, approximately 10 mm each in length, are fully compressed between the bicuspid solder joints and the tubes on the second bicuspid bands. These springs are designed to balance the action of the vestibular screws, preventing molar rotations and development of posterior crossbites.

The appliance was activated by turning the formative screw one-quarter of a turn in a counter clockwise direction once per day for a prescribed period of time. The patient was seen in 2 weeks interval and the activation was continued until a class I molar relation was achieved.

OUTCOME AND FOLLOW-UP

Within 4 months the molars had distalised on both sides achieving a class I relationship. Spaces of 8 mm were produced in the

Figure 3 Pretreatment lateral cephalogram and orthopantomogram.

Figure 4 Occlusal photograph with first class appliance.

right and left quadrants between the maxillary first molar and second bicuspid almost entirely by translation with some amount of anchor loss (figure 5). The maxillary incisors had slightly proclined (2.8°) and overjet increased by 0.8 mm. Once distalization was achieved, the appliance was transformed to a Nance holding arch by removing the bands on the second premolars together with the male screws and the palatal coil springs (figure 6). The tube on the palatal side was crimped to stabilise the molar in distal position. A bodily movement of the distalised molar was observed as evidenced from the pretreatment and post-treatment radiographs (figure 7). The second and first premolars were allowed to drift distally which occurred due to the pull of the transeptal fibres for a period of 3–4 months. Extraction of 27 not only allowed easier distalization on that side but also allowed the eruption of 28 into good position and occlusion.

In the second phase, maxillary and mandibular arches were bonded (Roth 0.022 preadjusted edgewise system) and levelled

through sequential changes of archwire sizes (figures 8 and 9). The total treatment time was 21 months. The cephalometric values showed no skeletal changes but only dental movements (table 1). The case was debonded and maxillary and mandibular wrap around retainers was placed.

DISCUSSION

Molar distalization procedures have been very useful in non-extraction borderline case management. Over the years the procedures have undergone much refinement to achieve treatment objective more precisely. This has led to the development of several intraoral appliances such as K-loop,³ Jones Jig,⁴ Pendulum,⁶ distal jet,⁸ first class appliance⁹ and microimplants,^{10–12} etc.

First class appliance is a hybrid appliance which uses a formative screw on the vestibular side and 0.010"×0.045" Niti coil spring on the palatal aspect. As the forces act from palatal and buccal aspects, the molars are bodily distalised rapidly, thus

Figure 5 Postdistalization occlusal photograph.

Figure 6 Converted to retention appliance.

preventing any molar rotations or posterior crossbites. It produces distalization of maxillary first molars even when the second molars are completely erupted, thus reducing the treatment time.⁹ Alternatively, second molar extraction is considered to facilitate distalization of the maxillary molars in selected class II division I malocclusion cases. Distalization movement is rendered easier after second molar extraction as it provides the space required for alignment of the teeth and for attaining correct occlusal relationships.¹³

In the present case findings, class II molar relation changed to class I due to distal molar movement. There was mild proclination of the anteriors which was favourable in this case to obtain an ideal overjet and overbite.

Fortini *et al*¹⁴ evaluated the treatment effects of first class appliance on 17 patients. The maxillary molar distalization contributed to 70% of the space created anterior to the first molars. Thirty per cent was due to reciprocal anchorage loss of the maxillary second premolars. The maxillary first molars were moved distally an average of 4 mm per side with a mean distal tipping of 4.6°. Rate of distalization was 1.7 mm per month. Anchorage loss measured at the second premolars was 1.7 mm with 2.2° of mesial tipping. The maxillary central incisors proclined slightly during treatment (2.6°) with minimal increase in overjet (1.2 mm). No significant changes in sagittal or vertical skeletal relationships were observed.

Papadopoulos *et al*¹⁵ conducted a study to evaluate the effects of first class appliance on 32 patients and found that

Figure 7 Predistalization and postdistalization radiographs.

Figure 8 Intraoral photographs after levelling and alignment.

Figure 9 Extraoral photographs after levelling and alignment.

significant distalization of first molars (mean 4 mm) was produced within a period of 17.2 weeks. The rate of molar movement was 1 mm/month; however, it was associated with distal tipping of first molars (8.56°) and anchor loss with an overjet increase of 0.68 mm. No significant distal rotation occurred.

Table 1 Cephalometric summary

Measurement	Pretreatment	Post-treatment
SNA	78°	78°
SNB	73°	75°
ANB	5°	3°
GoGn-SN	30°	30°
Facial axis	-4°	-4°
U1-NA	8° , 2.5 mm	11° , 0 mm
L1-NB	23° , 5 mm	33° , 5 mm
Interincisal angle	144°	130°
Nasolabial angle	116°	118°

Learning points

- ▶ First class appliance is an efficient non-compliance appliance to distalise maxillary molars for treatment of class II malocclusion on a non-extraction basis.
- ▶ Produces rapid distalization of the maxillary first and second molars, even when the second molars are completely erupted, thus reducing the treatment time.
- ▶ Distalises molars without causing significant distal rotation.
- ▶ Causes minimal anterior anchorage loss or changes in the vertical dimension.
- ▶ After distalization, it can be transformed into a retention appliance, so no additional wire bendings are required.

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Competing interests None.

Patient consent Obtained.

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