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Orthodontic Management of Impacted Premolars: A Case Report

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ABSTRACT

The lip bumper can lessen the need for extractions, by distal tipping the molars and expanding the width, depth, and circumference of the arch. This case report describes how a lip bumper appliance followed by fixed orthodontic treatment helped a patient with insufficient space for the eruption of permanent teeth due to mesial drift of the molars. This case report successfully showed that the lip bumper can be used for the effective uprighting of molars to regain the lost space.

Keywords: Distalization; Impacted premolars; Lip bumper.

INTRODUCTION

The methods of gaining space include extraction of teeth, proximal stripping, distalization of molars, incisors flaring, and arch expansion.[1] The lip bumper can reduce the need for extractions by distal tipping of the molars and increasing arch width, depth, and circumference.[1,2,3]

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This case report presents the treatment outcome of a patient with insufficient space for the eruption of permanent teeth due to the mesial drift of the molars. This case is unique as there are limited case reports in the literature using lip bumper as a space regainer in orthodontics.

CASE REPORT

Chief complaint: A 12-year-old patient complained of space in both the lower back tooth regions of his jaw.

Clinical finding: The patient had a history of early extraction of lower posterior deciduous teeth. The profile was convex, and competent lips (Figure 1). Intra-orally number of teeth present were 23 with the presence of crowding in the upper and lower arch. The unerupted teeth were 23, 35, 45, 38, 48, 18, 28, 17, 27. Upper dental midline was shifted to left by 1mm with respect to facial midline and coincided with lower dental midline. Molar relation was bilaterally super class I. Canine relation on the right side was class I. Overjet was 1mm and overbite was 2.5mm, 27.7% of the lower central incisor (Figure 1). When smiling, the lip line was average, non-consonant smile arc, and the smile style complex (Figure 1).

Radiographic finding: Orthopantomogram (OPG) showed impacted 35, 45, and 23 (Figure

1). The patient was in stage 4 of Cervical Vertebrae Maturation (CVM) indicated in a lateral cephalogram. (Figure 1).

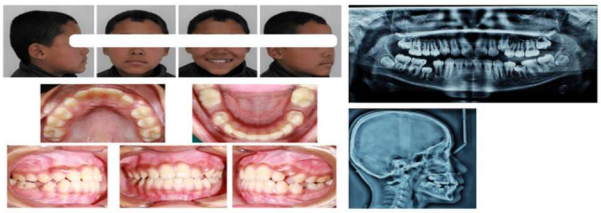

Figure 1: Pre-treatment photographs and x-rays

Diagnosis: Considering cephalometric analysis SNA was 83˚, SNB was 81˚, ANB 2˚, and FMA 27˚ suggestive of skeletal class I malocclusion with normal growth pattern. Upper incisor to NA was 24˚/5mm suggestive of slightly proclined and upper incisors positioned forward. Lower incisor to NB was 33˚/6mm suggestive of slightly proclined and lower incisors positioned forward. S line to upper lip was 1mm and lower lip was 2 mm suggestive of slightly protrusive upper and lower lips (Figure 1).

Treatment planning: Corrective orthodontics was planned but the patient refused extraction of premolars. Distalization in lower arch was planned as an alternative.

Treatment appliance: Initial bonding was done in upper arch with MBT (Meite Dental Orthodontic Manufacturing Company) 0.022" slot bracket.

Treatment sequence: 0.014" Nickel Titanium (NiTi) of Meite Dental Orthodontic Manufacturing Company, 0.016" NiTi, followed by 0.017" x 0.025" NiTi was used. Opencoil spring of dimension 0.012" x 0.030" and medium force from Foshan Vokodak Medical Company of china was used to open space for 23. Once enough space equal to the mesio-distal width of 23 was available with the help of push force through both slight anterior proclination and premolar distalization, piggyback archwire 0.012" NiTi was placed over base archwire of 0.019" x 0.025" Stainless Steel (SS).

Figure 2: (a) Lip bumper in lower arch for distalization (b) Eruption of 35 and 45 (c) Box elastics in 0.018" SS wire for bite settling

Lip bumper was used in lower arch for distalization (Figure 2a). Lip bumper was fabricated with SS wire of 0.045"with acrylic portion in the anterior portion of the wire and inserted into molar tubes cemented to the first molars on both sides. The acrylic portion was placed in the cervical region of the anerior teeth. The activation was accomplished with the Adam's plier by opening a U-loop put in front of the molar tubes in 3 weeks to remain roughly 2 to 3 mm in front of the lower incisors at the gingival level.[2] Lip bumper was used in the lower arch instead of opencoil spring in the

upper arch, as space regaining was required on both sides unlike in the upper arch. Lip bumper was used for 8 months, discontinued after the eruption of 35 and 45 (Figure 2b). The retention for the distalized space was not required as it was utilized for the eruption of second premolar on both sides. Lower arch was bonded in the 9th month of treatment.Settling of posterior teeth was done on 0.018" SS wire through the posterior box elastics of size 3/16" and 4.5 oz force (Figure 2c). OPG was done before the debonding of the appliance at 30 months which showed paralleling of the roots (Figure 3a). Lateral cephalogram was done before the debonding of the appliance (Figure 3a). In both the upper and lower arch, a lingual bonded retainer was placed. It was possible to attain class I molar and class I canine relationships with normal overjet and overbite (Figure 3b).

Treatment outcome: The impacted teeth were erupted during the process of orthodontic treatment (Figure 3).

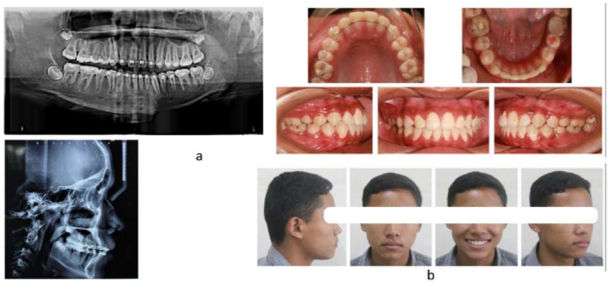

Figure 3: (a) X-rays before debond of appliance (b) Post treatment photographs

The molar and canine relation at the end of orthodontic treatment was bilaterally class I, with normal overjet and overbite and upper dental midline slightly to the right with respect to facial midline. The protrusiveness of lips was only slightly increased (Figure 3b, 4, and Table 1). From a non-consonant to a consonant smile, the patient's smile improved (Figure 4).

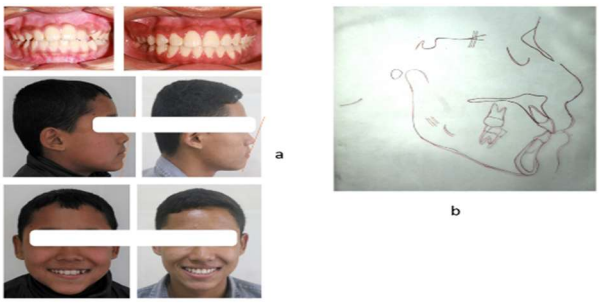

Fig 4: (a) Comparison of photographs before and after treatment and (b) Cranial base superimposition

The superimposition (American Board of Orthodontics ABO method) of lateral cephalograms showed the uprighting of lower first mandibular molars of around 2 mm with only slight increase in proclination of incisors (Figure 5).

DISCUSSION

Due to the limited case reports in the literature using lip bumper as a space regainer in orthodontics, comparison of our study with the previous studies is limited. Due to the early loss of deciduous posterior teeth and mesial migration of the first permanent molars, the patient's teeth 35 and 45 did not fully emerge. The non-extraction mode of treatment was chosen for this case as the incisors were only slightly proclined (Table 1) and also because of the patient's choice of treatment. Lip bumper was used as a method of space regainer in this

Table 1: Comparison of pre and post-treatment cephalometric values

Parameters	Normal value	Pre-treatment	Post-treatment	Difference
SNA	82˚±2˚	83˚	84˚	+1˚
SNB	80˚±2˚	81˚	82˚	+1˚
ANB	2˚±2˚	2˚	2˚	0˚
FMA	25˚	27˚	26˚	-1˚
Upper incisor to NA	22˚/4mm	24˚/5mm	26˚/7mm	+2˚/+2mm
Lower incisor to NB	25˚/4mm	33˚/6mm	34˚/7.5 mm	+1˚/+1.5 mm
S line to Upper lip Lower lip	-4mm -2mm	1 mm 2 mm	2mm 2.5mm	+1mm +0.5mm

presented case due to ease in its fabrication, and also as lip bumper has been proven to be successful for the increase of arch perimeter and distalization of molars.[1,4] The amount of activation was done in such a way that acrylic was placed 3 mm preceding the lower incisors.[4] The distalization and uprighting was about 2mm which can be appreciated in superimposition. Mandibular first molars had a distalization of 3.5 mm at the crown level and 1.8 mm at the root level in the study by Sugawara et al.[5] Because Sugawara et al. used the skeletal anchorage method more en-mass distalization was possible whereas slightly less distalization was accomplished in the presented case.s[5]

For mandibular molar distalization, a number of intraoral appliances have been developed, including the Temporary Anchorage Device (TAD), Franzulum appliance, Jones jig, and distal extension lingual arch.[6] In order to distalize the mandibular dentition and make room for en-mass retraction of the mandibular anterior teeth, Chung et al. placed mini-implants in the interdental gaps between the mandibular second premolars and first molars.[7] Chung et al. used mini-implants, which was distinct from our case because their procedure called for asymmetrical distalization of the mandibular dentition as well as en-mass retraction of the mandibular teeth.[7] In contrast to our work, Chen et al. corrected the dentoalveolar protrusion by distalizing the entire arch, using miniscrews as anchorage for the maxillary and mandibular dentitions.[8] In class III patients who are unwilling to have orthognathic surgery, Yu et al. demonstrated that a ramal plate might be a practical device for mandibular complete arch distalization.[6] Our case was different from this case as the premolars were unable to erupt due to mesial migration of molars. Wu et al showed clear aligner can effectively move mandibular molars farther though costly.[9] Byloff demonstrated that franzulum appliances, despite their complicated fabrication, were effective at causing the mandibular first molars to distalize.[10]

SUMMARY

This case report successfully showed that the lip bumper can be used for the effective uprighting of molars to regain the lost space.

Conflicts of interest: None.

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