

# Bi-maxillary Protrusion: An Orthodontic Management

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## ABSTRACT

Bi-maxillary protrusion is a condition with protrusive and proclined upper and lower incisors and the patient is not able to close lips without strain. The presented case reported with the chief complaint of forwardly placed teeth, with skeletal class II malocclusion, and Angle's class I malocclusion with protrusive and forwardly placed upper and lower incisors. The treatment was performed with the extraction of all first premolars and retraction under absolute anchorage. The retraction of upper and lower lips of about 3 mm and 3.5 mm was achieved respectively and the patient was able to close lips without strain. With proper anchorage preparation, bi-maxillary protrusion can be successfully managed orthodontically.

## KEY WORDS

*Bi-maxillary protrusion, Skeletal class II malocclusion, Temporary anchorage device*

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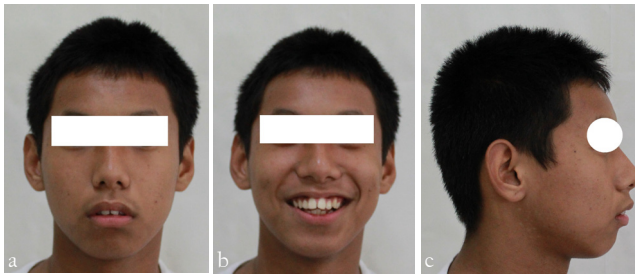
## INTRODUCTION

Bi-maxillary protrusion is defined as "a condition characterized by protrusive and proclined upper and lower incisors with procumbent lips".<sup>1</sup> Prevalence of bi-maxillary protrusion ranges from 3.7% to 68.8% and is a common dentofacial deformity seen in the Asian population.<sup>2,3</sup> Etiology is complex involving environmental factors, soft-tissue function, volume, and habit.<sup>4</sup> Patients with bi-maxillary protrusion seek orthodontic treatment with improvement of facial esthetics and dental appearance.<sup>5</sup> The patient reported forwardly placed upper teeth and was treated with extraction of first premolars and retraction of anterior teeth under absolute anchorage. This improved the facial balance, confidence of the patient, and hence the quality of life.

## CASE REPORT

A 15-year male patient presented with forwardly placed teeth in upper front region of jaw. The patient had history of root canal treatment done 3 months back. The profile of patient was convex, anteriorly divergent, acute nasolabial

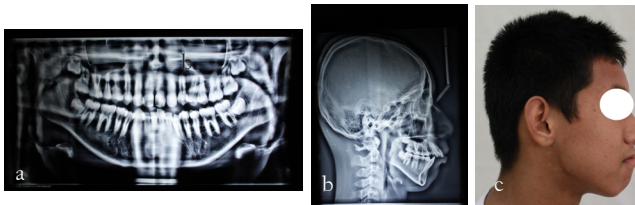
angle, and potentially competent lip with interlabial gap of 7 mm (Fig. 1a,b,c). The number of teeth present clinically was 28, unerupted third molars, and endodontically treated 16. Maxillary arch was tapered, asymmetrical, with crowding. Mandibular arch was ovoid, asymmetrical, with crowding. Molar relation was class I bilaterally with overjet of 8 mm and overbite of 0.5 mm/ 5.5% (Fig. 2a,b,c). On smile analysis, lip line was suggestive of average lip line, and non-consonant smile arc. On radiographic examination, orthopantomogram (OPG) showed unerupted third molars (Fig. 3a), intraoral periapical radiographs showed no any pathologies associated with upper and lower incisors, and lateral cephalogram showed cervical vertebrae maturation (CVM) CS stage 5 (Fig. 3b). Visual treatment objective (VTO) of the patient was not positive (Fig. 3c). ANB was 11° with prognathic maxilla (SNA= 86°), retrognathic mandible (SNA= 75°) and vertical growth pattern (FMA= 36°). Upper incisor to NA showed proclined and forwardly placed upper incisors with 32° and placed at the distance of 6 mm. Lower incisor to NB showed proclined and forwardly placed lower incisors with 34° and placed at a distance of 10 mm. S line showed protrusive upper and lower lips placed at the distance of 5 mm and 7 mm respectively.



**Figure 1a.** Extra-oral frontal photograph at rest before treatment, **b.** Extra-oral frontal photograph on smiling before treatment, **c.** Extra-oral profile photograph before treatment



**Figure 2a.** Intra-oral photograph (Right side) before treatment, **b.** Intra-oral photograph (Frontal) before treatment, **c.** Intra-oral photograph (Left side) before treatment

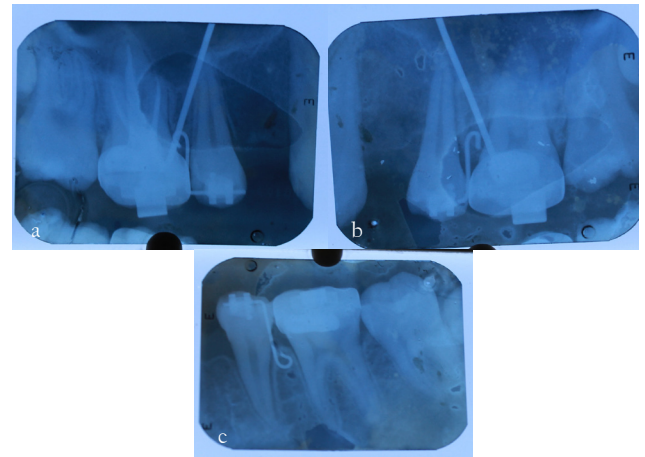


**Figure 3a.** Orthopantomogram (OPG) before treatment, **b.** Lateral cephalogram before treatment, **c.** Visual Treatment Objective (VTO)

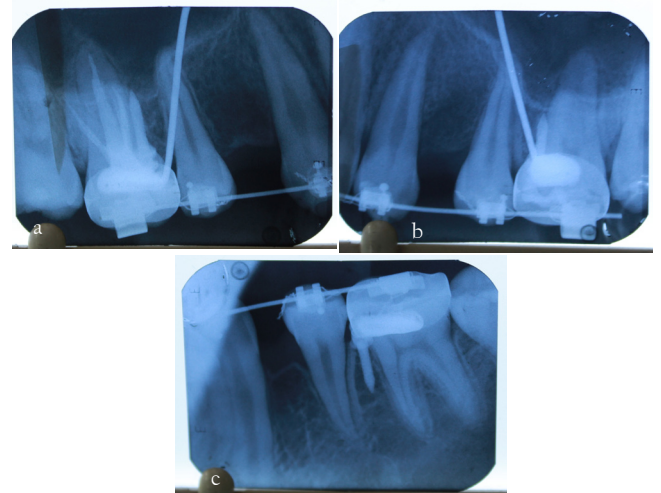


**Figure 4.** Bonding of upper and lower arch

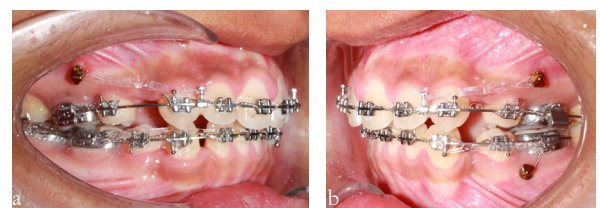
Skeletal diagnosis was skeletal class II with vertical growth pattern, dental diagnosis was Angle's class I malocclusion and soft tissue diagnosis was protrusive upper and lower lips. Since the patient was skeletal class II, patient was in late growth phase (CVM CS stage 5), VTO was not positive, orthodontic camouflage was planned. Extraction of 14, 24, 34, and 44 were done. MBT bracket with 0.022" x 0.028" slot was used. Absolute anchorage was planned on all quadrants. Lingual holding arch (LHA) and transpalatal arch (TPA) were placed in mandible and maxilla respectively. 0.014" NiTi then 0.016" NiTi (Fig. 4) and finally 0.017"x0.025" NiTi were used in both upper and lower arch. For the placement of TAD surgical stent was prepared and X-ray was taken for the accuracy of TAD placement (Fig. 5a,b,c). TAD was placed in between first molar and second premolar except on mandibular right side as space itself closed in right mandibular side and thus anchorage support was not required for the anterior retraction (Fig. 6a,b,c). End mass retraction was done in 0.019"x0.025" SS after 2 weeks of placement of TAD (Fig. 7a,b). Settling of buccal segments were achieved through the use of elastics



**Figure 5a.** Surgical stent for placement of Temporary Anchorage Device (TAD) between 16 and 15, **b.** Surgical stent for placement of TAD between 26 and 25, **c.** Surgical stent for placement of TAD between 36 and 35



**Figure 6a.** TAD placed in between 16 and 15, **b.** TAD placed in between 26 and 25, **c.** TAD placed in between 36 and 35



**Figure 7a.** Application of force from TAD through E-chain (Right side), **b.** Application of force from TAD through E-chain (Left side)

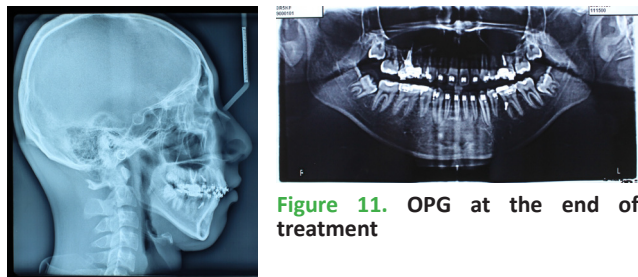
of diameter 3/16" and force of 4.5 oz. In the end, there was class I molar and class I canine relation on both sides (Fig. 8a,b,c). Lingual bonded retainer was used as a retainer in both upper and lower arch (Fig. 9a,b). Lateral cephalogram showed good inclination of upper and lower incisors with correct overbite and overbite (Fig. 10). OPG showed the paralleling of roots to each other (Fig. 11). Total duration of active orthodontic treatment was 26 months. Patient was able to close lips without strain (Fig. 12a). The smile of patient was improved (Fig. 12b) and convexity of profile reduced (Fig. 12c).



**Figure 8a.** Intra-oral photograph at the end of treatment (Right side), **b.** Intra-oral photograph at the end of treatment (Frontal) **c.** Intra-oral photograph at the end of treatment (Left side)



**Figure 9a.** Intra-oral maxillary occlusal photograph at the end of treatment, **b.** Intra-oral mandibular occlusal photograph at the end of treatment



**Figure 10.** Lateral cephalogram at the end of treatment

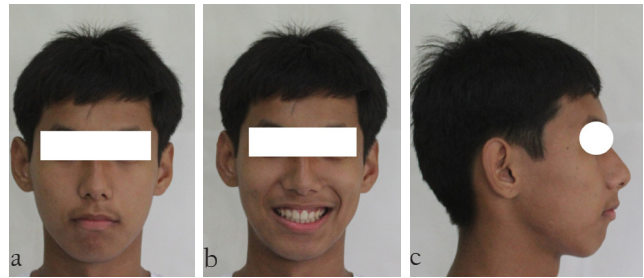
**Figure 11.** OPG at the end of treatment

## DISCUSSION

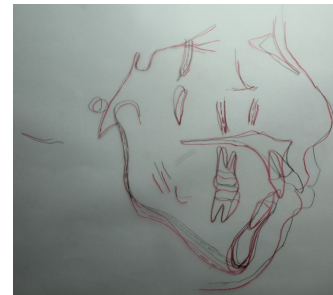
Orthodontic treatment is needed to provide treatment for any patient with functional and aesthetic problems. Bi-maxillary patients can have functional problems such as speech, adaptive tongue thrust, anterior open bite, and spacing. Aesthetically these patients can have psychological problems.<sup>2</sup> Also bi-maxillary protrusion is associated with gingival recession.<sup>6</sup> Ethnicity of patients should also be considered during orthodontic treatment planning of bi-maxillary protrusion. Mild to moderate bi-maxillary protrusion is a normal facial characteristic in blacks and does not routinely require treatment. However, treatment is required if patient is unable to close lips without strain, in severe incisor protrusion, and patients' desire for change.<sup>7</sup> Orthodontic retraction in bi-maxillary protrusion accounts for upper lip retraction in the range of 2 to 3.2 mm and lower lip in the range of 2 to 4.5 mm.<sup>8</sup>

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**Figure 12a.** Extra-oral photograph (Frontal) at rest at end of treatment, **b.** Extra-oral photograph (Smiling) at rest at end of treatment **c.** Extra-oral photograph (Profile) at rest at end of treatment



**Figure 13.** Cranial base superimposition of pre and post lateral cephalogram

The presented case was a case of Angle's class I bi-maxillary protrusion with procumbent lips. Based on the diagnosis and chief complaint, extraction of all first premolars was indicated. For bi-maxillary protrusion case, anchorage is demanding since mesialization of posterior segment may compromise retraction of anterior teeth. Temporary anchorage device (TAD) was used in our study as TADs provide better anchorage and shorter treatment duration in the orthodontic treatment of bi-maxillary protrusion.<sup>9</sup> Force for retraction was applied 2 weeks after placement of TAD because the clinical stability of TAD is the sum of primary and secondary stability which is maximum at 2 weeks onwards.<sup>10</sup> Retraction of upper and lower incisors brought about retraction of 3 mm and 3.5 mm of upper and lower lips respectively with respect to S line (Fig. 13). The improvement in smile and profile of patient was achieved and patient was able to close the lips comfortably without strain. The proper torque of upper central incisors was not achieved which is one of the shortcomings of the case. With proper diagnosis, treatment planning, and with proper anchorage system, orthodontic management of bi-maxillary protrusion can be successfully achieved.

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