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Case Report

# En Masse Retraction in Bimaxillary Protrusion and Molar Mesialization: A Case Report

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## KEYWORDS

En-masse rectraction, temporary anchorage device, molar mesialization

## ABSTRACT

**Introduction:** Successful orthodontic treatment of bimaxillary protrusion requires effective anchorage control to enable anterior retraction without unwanted posterior tooth movement. Loss of molars can compromise anchorage, leading to mesial drift, space reopening, and loss of vertical control. Temporary Anchorage Devices (TADs) provide a reliable solution for achieving maximum anchorage. This case report describes the use of TADs for en masse retraction and third molar mesialization.

**Case:** A 20-year-old female presented with a hyperdivergent profile and lip incompetence. Clinical examination revealed maxillary and mandibular incisor proclination. A gangrenous radix was present in the lower left region. Cephalometric analysis showed Class I skeletal malocclusion with a convex profile.

**Case Management:** Based on clinical and radiographic findings, extraction therapy was planned due to arch length discrepancy. Anchorage was compromised following extraction of the lower left molar. TADs were placed to provide maximum anchorage, allowing en masse retraction of anterior teeth and controlled mesialization of the third molar. This approach minimized unwanted tooth movement and maintained vertical control throughout treatment.

**Conclusion:** The use of TADs enabled effective anchorage control, facilitating precise en masse retraction and third molar mesialization, resulting in improved facial profile and occlusal outcomes.

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## INTRODUCTION

Bimaxillary protrusion is a condition characterized by protrusive and proclined upper and lower incisors and an increased procumbency of the lips. It is seen commonly in African-American and Asian types.[1] The aetiology of bimaxillary protrusion has been described as multifactorial.[2] The main features of patients presenting bimaxillary protrusion are malocclusion with dentoalveolar flaring of both the maxillary and mandibular anterior teeth that cause protrusion of the lips and produce a convex facial profile[3]. Treatment of class I bidental protrusion usually entails the extraction of all first premolars and retraction of the upper and lower anterior teeth. To achieve optimal aesthetic results, mesial movement of the posterior teeth must be prevented, and extraction spaces must be closed with complete retraction of the anterior teeth. Therefore, maximum or absolute anchorage may be required to achieve the best results.[4]

Anchorage can be defined as the resistance that a tooth or a group of teeth offers when they are subjected to a force. Orthodontic treatment aims to maintain sufficient anchorage control to create appropriate force systems that provide the desired treatment effects.[5] Some appliances that had been used, such as headgear, transpalatal arches, and Nance. Their efficiency is challenged by complicated designs, elaborate wire bending, and patient compliance, and thus is associated with loss of anchorage and variable treatment outcomes.[2] TADs are inserted into the bone and aim to enhance orthodontic anchorage either by supporting the anchoring teeth or by being an independent anchorage unit, eliminating the need for supporting teeth. Clinicians can better control anchorage by using TADs in orthodontic treatment, thereby achieving more satisfactory results than with conventional mechanics.[5.]

## CASE

A 20-year-old female came to Rumah Sakit Gigi dan Mulut Pendidikan (RSGM-P), Faculty of Dental Medicine, Universitas Airlangga, at the Orthodontics Department, wanting to move her teeth back. Facial aesthetic was her main complaint because she had a convex profile and protruding lips. The patient said that she never had any tooth procedures before and didn't have any systemic conditions.

Extral oral examination showed a convex profile with an incompetent lip (Figure 1). Intraoral indicated Angle class I on the left and right sides. She had gangrene on teeth 17 and 37 and needed to have them extracted. Patient had midline shifting 1 mm to the right on the maxilla and 1,5 mm to the left on the mandible. Arch length discrepancy on the maxilla was 10 mm, and on the lower jaw, 8 mm. There were no clinical signs of clicking or discomfort in the temporomandibular joints.

The lateral cephalometric analysis indicates that ∠ SNA 85º, ∠ SNB 78º, and ANB 5° refer to the skeletal pattern of Class II malocclusion. Dental measurements indicated that upper and lower incisors were proclined, with ∠ I-NA 28º, ∠ I-NB 47º, and ∠ Inter Incisal 113º. The patient has a convex skeletal profile (FH–NP 81.5º, NAP 18º), with mandible clockwise rotation with ∠ MP–FH 34°. Rickett's Lip Analysis and Steiner's Lip Analysis indicated the lips were far in front of the E and S line. The intraoral and extraoral photograph pretreatment was shown in Figure 1.

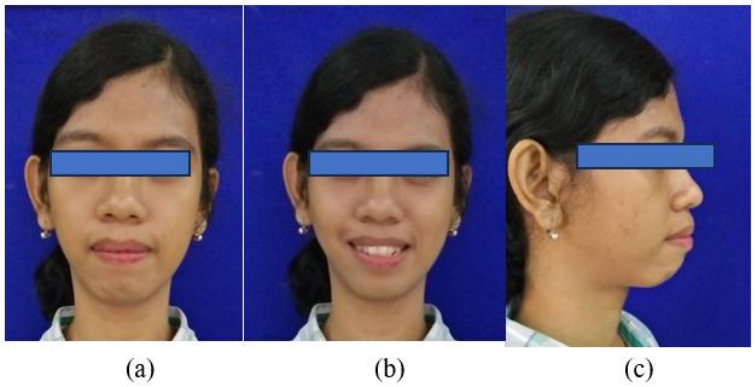


Figure 1. Pretreatment Extra Oral Photographs: (a) Frontal view relaxed lips Photograph, (b) Smile Frontal View Photograph, (c) Side Profile Photograph

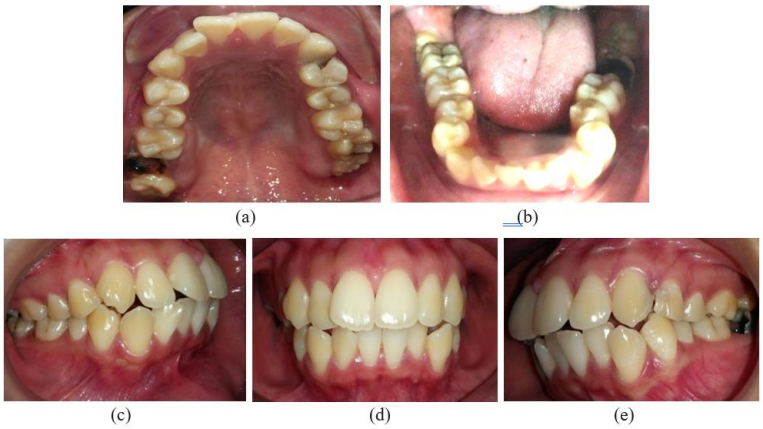


Figure 2. Pretreatment Intra Oral Photographs: (a) Maxilla occlusal view, (b) Mandibula occlusal view, (c) Right molar relationship, (d) Frontal view, (e) Left molar relationship

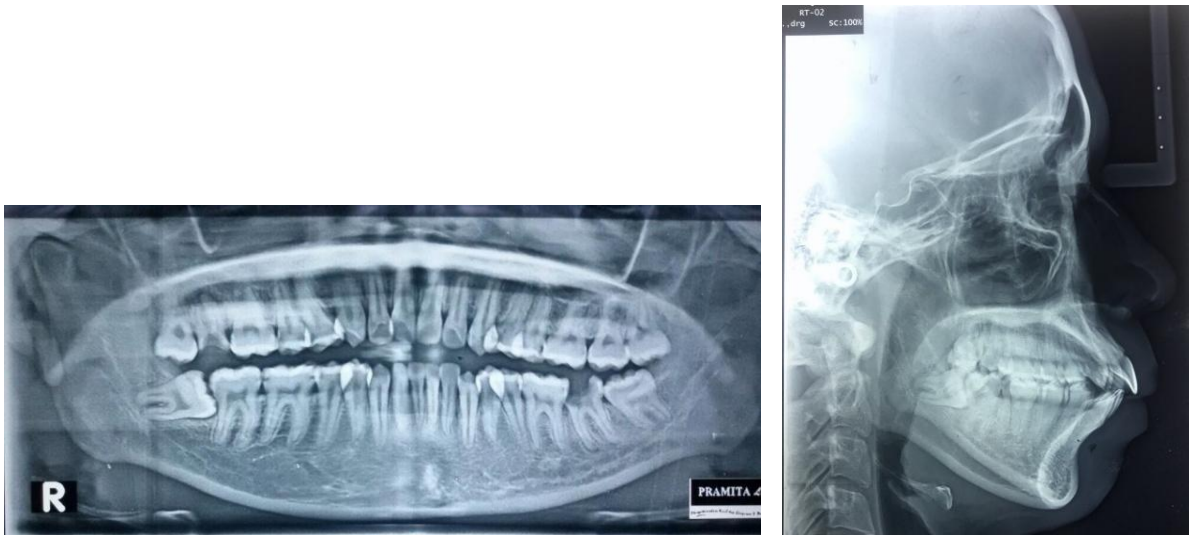


Figure 3. Pretreatment radiograph examination. (a) Panoramic radiograph, (b) Lateral cephalogram.

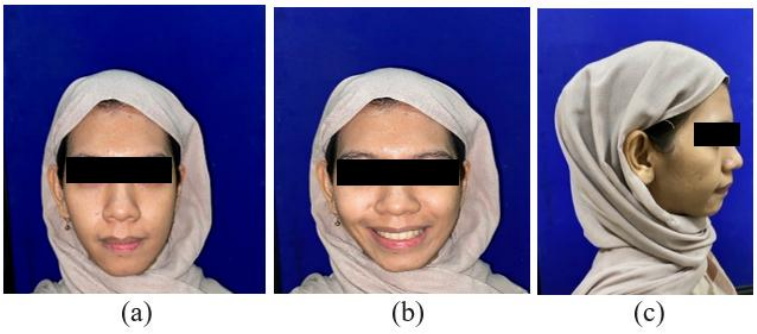


Figure 4. Posttreatment Extra Oral Photographs: (a) Frontal view relaxed lips photograph, (b) Smile frontal view photograph, (c) Side profile photograph

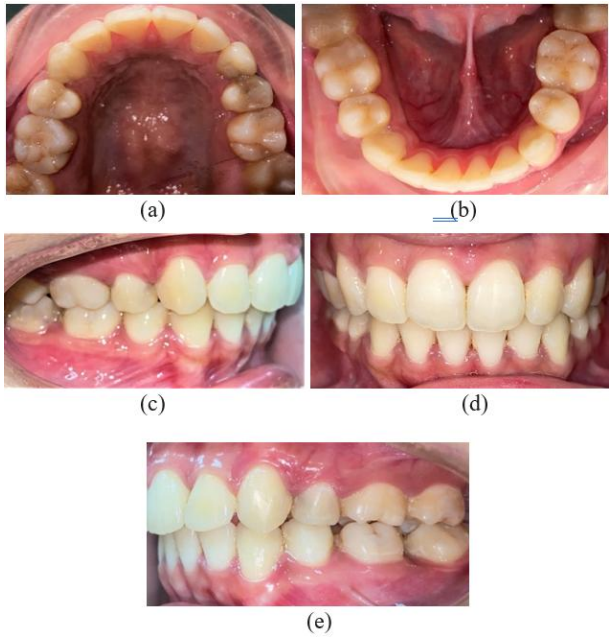


Figure 5. Posttreatment Intra Oral Photographs: (a) Maxilla occlusal view, (b) Mandibula occlusal view, (c) Right molar relationship, (d) Frontal view, (e) Left molar relationship

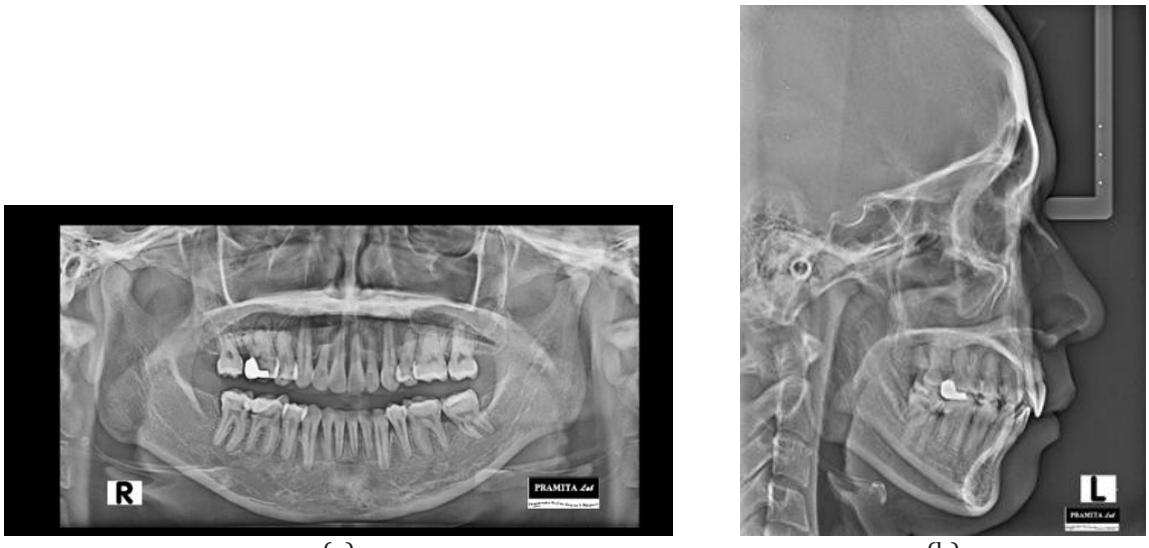


Figure 6. Posttreatment radiograph examination. (a) Panoramic radiograph, (b) Lateral cephalogram.

Table 1. Cephalometry's Analysis Pre and Post Treatment

| Measurement | Surabaya mean[6] | Patient Measurement | |
|---|---|---|---|
| | | Pre | Post |
| ∠ SNA | 84.3 | 85° | 84° |
| ∠SNB | 81.4 | 78° | 79° |
| ∠ ANB | 3 | 7° | 5° |
| ∠OP–SN | 5 – 3 | 20° | 18° |
| ∠MP-SN | 20 – 40 | 25° | 24° |
| ∠1-NA | | 28° | 22° |
| 1–NA (mm) | | 8 | 5 |
| ∠1 - NB | | 47° | 27° |
| 1–NB (mm) | | 12 | 10 |
| Nasolabial Angle | | 109° | 120° |
| Upper lips – E line | | + 3 mm | +2 mm |
| Lower lips -E line | | +3 mm | + 2 mm |
| Upper lips-S line | | +5 mm | + 3 mm |
| Lower Lips- S line | | +7 mm | + 5 mm |

## CASE MANAGEMENT

Based on extraoral, intraoral, and radiographic examination. The treatment's goal was to correct the inclination to achieve a better profile using a fixed appliance. The treatment plan also included relieving the maxillary and mandibular crowding. Because of arch discrepancy, the upper and lower first premolars were extracted. Odontectomy for #28 and #48 was performed, but teeth #18 and #38 were not extracted because they will be replacing the second molar that was extracted, as they can no longer be treated with endodontic treatment.

The first step of the treatment was the utilization of bonding brackets using 0.022 slots of MBT, a pre-adjusted edgewise appliance, after the extraction of the first premolar. At the beginning of the treatment, the patient refused to do the extraction of #28, so on the upper left side, the first molar slightly moved mesially. Levelling and aligning begin with 0.012 nickel-titanium (NiTi), followed by 0.014, 0.016, 0.016 x 0.016, and 0.016 x 0.022 NiTi for the upper and lower arches. Before retraction began, a TADs was inserted on proximal regio #16, #26, #36, and #46. TAD using a Jeil mini screw, diameter 1.6 x 8 mm for both maxilla and mandibula intra radicular. The finishing stage was done by settling up and down elastic by SS 0.017 x 0.025. In the finishing stage, #16 was diagnosed with reversible pulpitis, and therefore, on tooth 16, a filling process was carried out with a direct inlay on the same day as the debonding process.

## DISCUSSION

Since improvement of facial aesthetics is often the main demand of patients presenting with bimaxillary protrusion, a severe case with a skeletal background might favored, in terms of profile changes, a surgical approach. Twenty years ago, orthodontic microscrews and miniplates were introduced as means to enhance anchorage. With the introduction of such devices in treatment planning, the need for patient cooperation that was mandatory regarding conventional devices was reduced. Total distalization of the whole upper and lower dentition became feasible as a treatment alternative in moderate dentoalveolar protrusion cases.[7] If a miniscrew is used as a direct anchor, it is advantageous to place the miniscrew along the line of the desired tooth movement. If the force applied between the tooth and the miniscrew causes undesirable moments, then the miniscrew should be used as indirect anchorage to support the anchorage teeth, rather than acting as a direct anchor.[5,8]

Loss of anchorage, if any, may compromise the aesthetic outcomes. Since the patient showed protruded lips and proclined anterior teeth, the case was treated by en masse retraction of the anterior teeth in the extraction spaces. Absolute anchorage was required, and therefore, mini-implants were chosen to be placed in all four quadrants to support the retraction mechanics. Mini implants also provide biomechanical advantages. The placement of the mini-implant posteriorly and the length of the power arm positioned anteriorly can be

customized to meet specific requirements and needs. Strategic placement of implants, high in the alveolar bone, provides the biomechanical advantage of preventing bite deepening during retraction. This allows the retraction force to be accompanied by an intrusion force vector, preventing the extrusion of the anterior teeth during space closure.[4]

The use of orthodontic mini-implants as anchorage constructions during the mesialization of the mandibular molars contributes to a reduction in the general terms of treatment and supports more prognostic movement that does not provoke significant pathological changes in the level of the alveolar crest, and minimizes the risk of concomitant periodontal complications occurring.[9] The use of mini-implants provided a better system for controlling anchorage and facilitating our mechanics. It avoided the use of conventional anchorage mechanics in the posterior segment and its side effects, such as molar slippage or extrusion.[10,11] Biomechanical systems are designed to apply forces that produce controlled tooth movement. In bimaxillary protrusion cases, retraction forces are typically directed in a posterior and downward direction to retract the protruded teeth into the dental arch. The use of TADs allows for the application of these forces without relying on anchorage from neighboring teeth[11] Stepovich published a clinical study of edentulous space closure in the mandible and found that spaces of 10 mm or more (ie, molar extraction spaces) could be closed, and that large mandibular spaces could be closed without tipping the teeth.[12] The use of orthodontic mini-implants as anchorage constructions during the mesialization of the mandibular molars contributes to a reduction in the general terms of treatment and supports more prognostic movement that does not provoke significant pathological changes in the level of the alveolar crest, and minimizes the risk of concomitant periodontal complications.[9] The case of posterior edentulism can be resolved after careful prognostic evaluation in a relatively short time via orthodontic repositioning of an upper third molar, with appropriate crown and root shape, into the extraction space of an upper second molar.[13] Since posterior teeth are stabilized, rotational effect on the occlusal plane is reduced and thus helps in eliminating the chance of developing an anterior deep bite.[14] TADs have revolutionized orthodontic treatment by providing reliable and stable anchorage. In Class I bimaxillary protrusion cases, where controlling anchorage is crucial, TADs play a pivotal role in preventing undesired tooth movement during retraction. The case report highlights the strategic placement of TADs to enhance biomechanics and ensure efficient retraction without compromising the stability of the results.[12] In this case report, an 8 mm mini screw was chosen because the length of the mini-screw and the density of bone affect the stability of the miniscrew. In bone with optimal density, 10 mm and 8 mm miniscrews exhibited good anchorage resistance.[15] In the mandible, the most convenient sites for miniscrew insertion were in the spaces comprised between second molars and first premolars; in the maxilla, between first molars and second premolars, as well as between canines and lateral incisors, and between the two central incisors. The interradicular spaces between the maxillary canines and lateral incisors, and between mandibular first and second premolars, were found to be influenced by the presence of dental crowding. The site to inserted mini screw in maxilla and mandibula for intra radicular TAD where an amount of 3 mm of bone and in a place covered by attached gingiva are to be most likely

found between second and first molars, between first molar and second premolar, and between second and first premolars; in the maxilla, they could be found between first molar and second premolar, between canine and lateral incisor and between the two central incisors.[16,17]

Using TAD in this case result was bodily mesial translation of the UR8, without obvious signs of root resorption or gingival recession, which are possible side effects of this biomechanics. A case of posterior edentulism can be resolved after careful prognostic evaluation in a relatively short time via orthodontic repositioning of an upper third molar, with appropriate crown and root shape, into the extraction space of an upper second molar.[13]

## CONCLUSION

The use of Temporary Anchorage Devices (TADs) in this case effectively provided maximum anchorage control, enabling successful en masse retraction of anterior teeth despite compromised posterior support due to molar loss. This approach facilitated controlled tooth movement, including molar mesialization, without undesirable side effects such as anchorage loss or vertical discrepancies. Consequently, significant improvements were achieved in both facial aesthetics and occlusal outcomes, demonstrating that TADs are a reliable and efficient solution in managing bimaxillary protrusion cases with anchorage limitations.

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