

SIMULTANEOUS INTRUSION AND RETRACTION USING MINISCREWS IN A CLASS I BI-MAXILLARY PROTRUSION: A CASE REPORT

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ABSTRACT

Class I bi-maxillary protrusion is one of the most common malocclusion encountered in day to day clinical practice. Traditional treatment protocol comprises of extraction of all first premolars followed by maximum retraction of incisors for significant dental and soft tissue changes. This case report represents a therapeutic protocol for the management of class I bi-maxillary protrusion in a late adolescent patient with slightly increased maxillary incisors visibility at rest and lip incompetency treated with all first premolar extractions and four mini-screws that were used for simultaneous intrusion and retraction. Noticeable amount of dental and soft tissue corrections resulted in significant improvement in facial and smile esthetics both static as well as dynamic.

KEY WORDS

Class I bi-maxillary protrusion, Mini-screws, Intrusion, Retraction.

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INTRODUCTION

Facial esthetics is a major concern of many orthodontic patients. The negative impacts on the facial profile with upper lip protrusion often lead patients to seek orthodontic treatment. Increased upper lip procumbency is commonly associated with protrusive maxillary dentition in Angle Class II Division 1 malocclusions and Class I malocclusions with bimaxillary dentoalveolar protrusion^{1,2}. In such circumstances, the major orthodontic treatment goal is to reduce the proclination of the maxillary incisors. Consequently the treatment plan often includes extraction of the bilateral maxillary premolars, followed by retraction of the anterior teeth with maximum anchorage³. Kocadereli⁴ found that when a decrease of lip procumbency is desirable, extracting premolars and retracting incisors is a viable option to achieve these objectives. When extracting premolars is desired to correct the malocclusion, the treatment plan must address space closure of the extraction sites.

Class I bi-maxillary protrusion is a common malocclusion in Asian population^{5,6}. Usually it is managed by extraction of four first premolars followed by retraction along with high anchorage control. But in case of adult bimaxillary protrusion with vertical excess, an efficient anchorage system with highest stability in sagittal as well in vertical plane is needed. Though there are devices like transpalatal arch, Nance palatal button but temporary anchorage devices provide an efficient absolute anchorage in such cases^{7,8}. Mini screws have various advantages as they are cost effective, can be placed and removed easily, are small in size and thus can be implanted comfortably in most sites and thus are the most popular absolute anchorage support today⁹.

CASE REPORT

DIAGNOSIS

A 16 years old female patient reported with the chief complaint of forward placement of upper front teeth with inability to close the lips properly. No history of serious illness or trauma was elicited.



Figure 1(a):Pretreatment extraoral and intraoral photographs

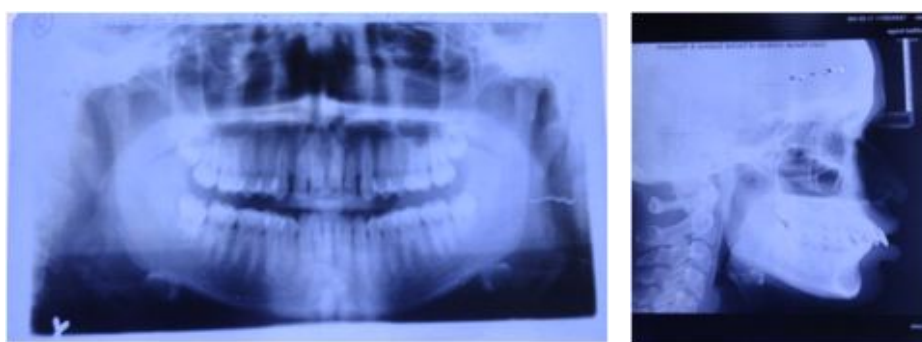


Figure 1: (b) Pretreatment OPG(c) Pretreatment lateral cephalogram

Extraoral examination revealed that she had mesocephalic head form & mesoprosopic facial form with convex facial profile. Lips were protrusive and incompetent with interlabial gap of 6 mm. Upper lip was short in length and everted, results in excessive incisor display at rest. On smile, left side of the upper lip shows hyper mobility and more elevation causing gingival display of 2 mm on left side. On intraoral examination, all permanent teeth were present except the third molars. Upper and lower incisors were proclined. Spaces were noted on both sides of the upper lateral incisors with 8 mm of overjet and overbite of 2.5 mm. Intra-oral examination revealed good buccal occlusion with bilateral class I canine and molar relation with mild spacing in the upper arch with flared incisors. Upper and lower dental midlines were coincident to each other. [Figure 1(a)]

Orthopantomogram (OPG) showed full complement of teeth with developing third molars with no missing or supernumerary teeth, all the teeth

had good periodontal support [Figure 1(b)]. Cephalometric evaluation revealed class I skeletal base, low to average growth pattern with proclined upper and lower incisors, acute nasolabial angle. [Figure 1(c)]

So, the patient was diagnosed as skeletal class I with bi maxillary protrusion with incompetent lips and excessive incisor display at rest and smile.

TREATMENT OBJECTIVES

1. Retraction of anterior teeth (both arches) to improve facial profile.
2. To attain proper tooth/lip relationship.
3. To achieve a balanced smile.
4. To achieve normal overjet and overbite.

TREATMENT PLAN

Extraction of all first premolars was carried out for gaining of space in both the arches. To maximize anterior retraction for achieving lip competency and maxillary incisor intrusion, miniscrews/micro-implants were used in upper arch. For sagittal anchorage preparation banding of 1st and 2nd molars was considered. M.B.T 0.022" prescription was used with standard tip and torque values. Post Treatment Retention was planned with Fixed Spiral retainers in both the arches using 0.030" triple stranded S.S wire and Hawley's Retainers were also planned for both the arches.

TREATMENT ALTERNATIVES

Another treatment approach could be surgical i.e. Le fort 1 maxillary impaction with extraction of all first premolars.

TREATMENT PROGRESS

All upper & lower first premolars were extracted. Pre adjusted gewise appliance 0.022×0.028 slot (MBT prescription) was bonded to the maxillary and mandibular arches. Initial leveling and alignment was carried out by 0.016inch HANT wire, then 0.018 AJ Will cock wire, followed by rectangular 0.019×0.025 Niti. Both the arches were prepared for retraction with posted 0.019×0.025 stainless steel wire. Four miniscrews (1.5mm×8mm) were placed in the upper

arch i.e. two in the anterior region distal to lateral incisors (approx. 8mm above the gingival margin), and two in the posterior region in between second premolars and molars. In lower arch anchorage preparation was done by involving second molars in the setup and enmass retraction was carried out by using continuous arch mechanics. After the space closure was achieved, final settling was done by using 0.014 inch SS wire for both upper and lower arch with settling elastics. [Figure 2 and 3]

TREATMENT RESULTS

At the end of treatment, proper class I molar and canine relation & optimum Overjet and overbite both were established in this case. Straighter profile, competent lips, consonant smile arc with pleasing smile was achieved. Incisor exposure at rest and during smile also significantly improved with optimum exposure of gum during smile noted. Overall, post treatment results showed significant improvement in facial and smile esthetics. [Figure 4]

Post treatment OPG showed proper root alignment with minimum root resorption and lateral cephalogram showed marked changes in values (minimum skeletal & maximum dento-alveolar). [Figure 5 & Table 1]. Overall superimposition of cephalometric tracing showed posterosuperior movement of upper incisors with little skeletal changes and upper & lower molars showed minimal anteroposterior changes. [Figure 6]



Figure 2: Mid treatment intraoral photographs



Figure 3 : Mid treatment lateral cephalogram & OPG



Figure 4: Post treatment extraoral & intraoral photographs

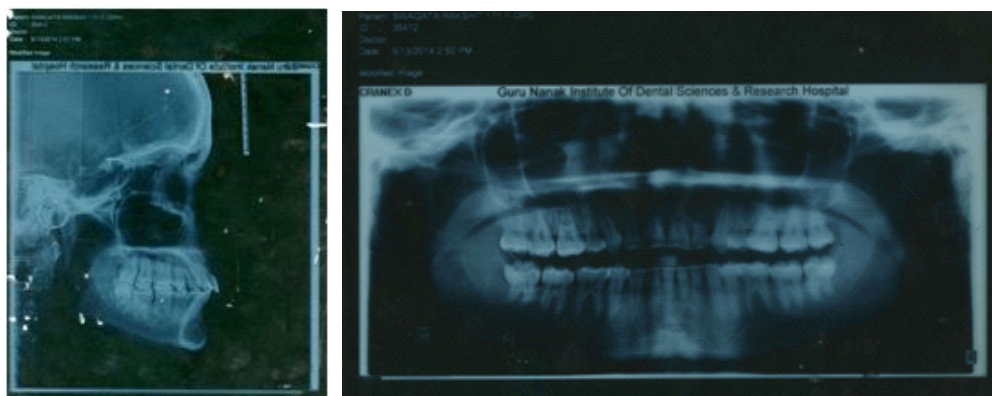


Figure 5: Post treatment lateral cephalogram & OPG

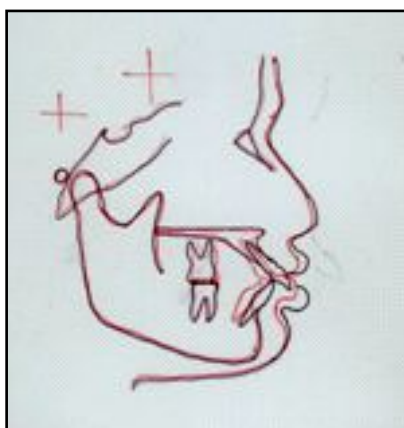


Figure 6: Pre (Black) and post-treatment (Red) Cephalometric superimposition

Measurement	Pre treatment	Mid treatment	Post treatment
SNA	90 [°]	90 [°]	89 [°]
SNB	89 [°]	89 [°]	87.5 [°]
ANB	1 [°]	1 [°]	1.5 [°]
Wit's appraisal	2mm	2mm	2mm
FMA (?)	20 [°]	20 [°]	20 [°]
Jarabak's ratio (%)	74	75	75.6
Upper 1 to SN	136 [°]	127 [°]	122 [°]
Upper 1 to NA (angular/ linear)	44 [°] /14 mm	3 [°] /12mm	27 [°] /5mm
Lower 1 NB (angular/ linear)	42 [°] /8 mm	40 [°] /5 mm	30 [°] /3.5mm
Inter-incisal angle	90 [°]	97 [°]	105 [°]
Palatal plane to Upper 6	25mm	23mm	24mm
Mandibular plane to lower 6	33mm	32mm	32mm
Nasal floor to Upper 1	28mm	28mm	26.5mm
IMPA	111 [°]	100 [°]	98 [°]
Nasolabial angle	70 [°]	72 [°]	78 [°]

Table 1: Pre, mid and post treatment cephalometric values

DISCUSSION

Miniscrew anchorage represents a paradigm shift in orthodontic biomechanics, enabling more predictable, effective, and efficient tooth movement¹⁰. The use of screw mechanics for achieving the effect of a Le fort I impaction of the maxilla was proposed by Lin et al. using multiple screws.¹¹ The use of mini-implants as a part of extraction treatment for Class II and Class I malocclusions enables anterior tooth retraction against bony anchorage without undesirable impacts on the posterior teeth.¹²⁻¹⁵

In this case report, patient was diagnosed with bidental protrusion along with mild vertical excess and lip incompetency. Upper incisors need retraction and some intrusion also after premolar extractions for significant facial changes. Four miniscrews were used in the upper arch for simultaneous retraction and intrusion¹⁶. The overall treatment outcome was very satisfactory as significant positive changes in dental and soft tissue parameters were noted (ANB changed from 1 degree to 1.5 degrees as SNA and SNB reduced by 1 and 1.5 degrees each respectively). Final IMPA was accepted at 98 degrees as it was within the normal range for Bengali population (95.01±/6.83)¹⁷.

CONCLUSION

Maximum retraction with intrusion can be carried out by using skeletal anchorage system which often replaces the requirement of surgical approach.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the

patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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