Non-Surgical Treatment of Angle's Class III Malocclusion- A Case Report

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Abstract

This is case report presents the treatment of a 20-year-and 4-month-old male with Angle's Class III and Anterior Proclination& Open bite with a concave profile. Extra radicular anchorage was taken with the help of an infra zygomatic screw (IZC) & buccal shelf screw was effective in correcting both skeletal and dental parameters. By the end of the treatment, the dentition was well aligned and Class I molar and canine relation was achieved. A non-surgical camouflage approach opted for this case for distalization of the dentition.

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Introduction

The reason behindClass III malocclusion could be multiple factors, which could be the expression of a moderate distortion of normal development as a result of interaction between hereditary genetic or innate factors with environmental factors.

Multiple skeletal topographies of underlying Class III malocclusion are due to discrepancies in the maxillary and mandibular growth along with vertical and/or transverse problems apart from sagittal malformations.[1]The anterior bite is often described as a condition where the maxillary incisors fail to overlap the mandibular incisors when the posteriors are in occlusion. The etiological factor for this malocclusion could be hereditary or non-hereditary factors. Non hereditary factor includes – digit/foreign body sucking, abnormal tongue function, trauma or pathology to condyle.[2]

This case report describes a nonsurgical intervention in a post-pubertal orthodontic patient with a skeletal Class III malocclusion with anterior proclination and open bite.

Diagnosis and Treatment Plan

A 20-year-old male patient presented complaining of a forwardly placed upper anterior teeth.
Clinical examination showed Concave Profile extra orally and intraorally it was observed that the molar relationship on both left and right side of the patient was Angle's ClassIII, there was also increased maxillary anterior segment proclination with anterior open bite with minimal crowding in mandibular anterior teeth and both the lips being incompetent with the presence of tongue thrusting habit.

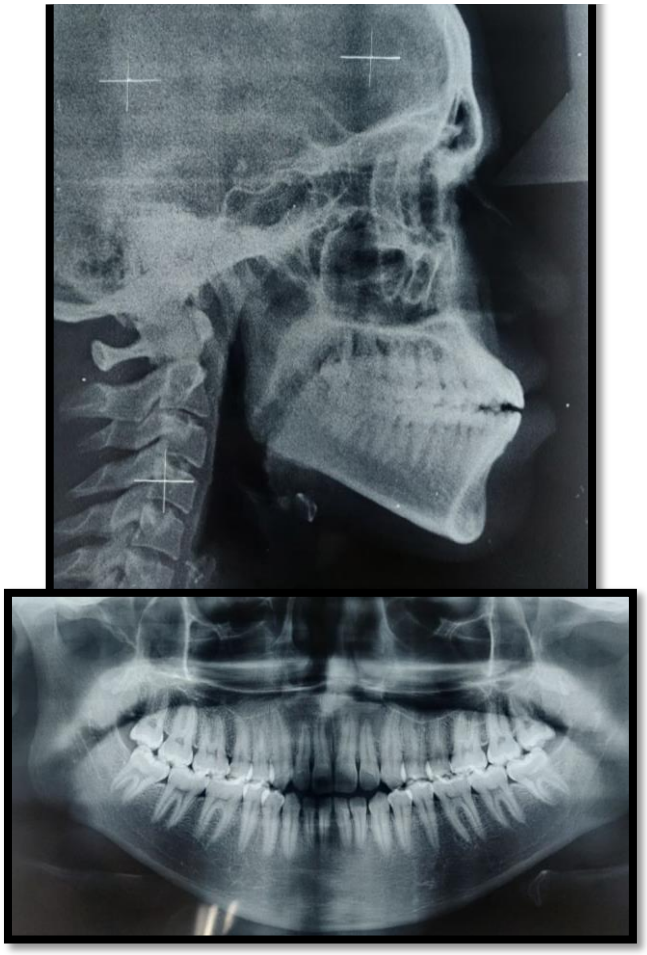


Fig1- pre-treatment records of the patients including extraoral pictures, intraoral pictures & radiographic records.

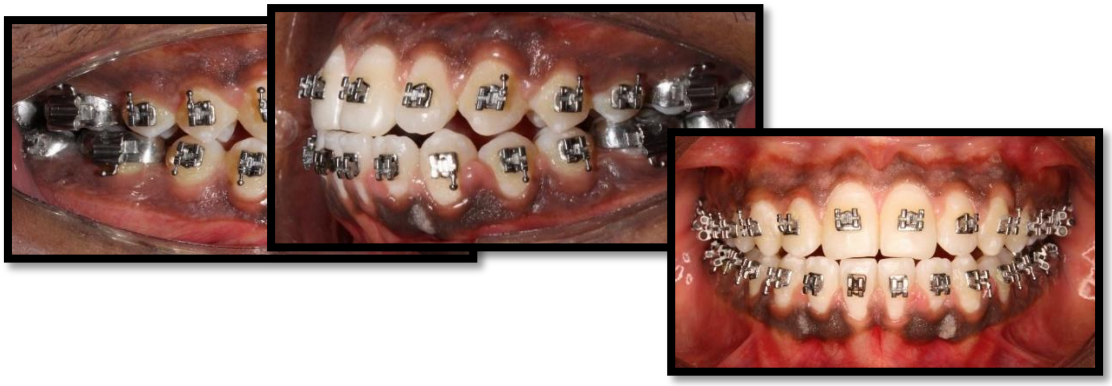
Treatment goals included correcting molar relationship to achieve Angles class I molar relationship, correcting the proclination of both maxillary and mandibular anterior teeth, breaking tongue thrusting habit, closing the anterior open bite, relieving the mandibular arch from crowding, and achieving optimum overjet and overbite.

Two treatment plans were proposed to the patient first being a surgical alternative that was orthognathic surgery with the setback of the mandible alongwith genioplasty; the other treatment plan was orthodontic therapy with placement of IZCs in the arch of the maxilla and Buccal shelf Screws in thearch of the mandible and then whole arch distillation.

The patient opted for a second treatment option.

Treatment Progress

The treatment was initiated with banding of the first and second molars in all the quadrants, in the maxillary arch a habit-breaking appliance was fabricated which was a tongue crib and was given to the patient for over a period of six months along with orthodontic bonding of all the teeth with MBT 0.022" Metal Pre Adjusted Edgewise Bracket System. The alignment of maxillary and mandibular arch started with a 0.014" Nickle Titanium archwire for a period of 4 weeksfollowed by the sequence of 0.016"for another 4 weeks and then shifted to rectangular Nickle Titanium arch wire with the sequence of 16x22" Nickle Titanium wire for 21 days and then upgraded to 17x25" Nickle Titanium and 19x25" Nickle Titanium in both maxillary and mandibular arches with an equal period of 4 weeks interval.(figure.2) Once the leveling and alignment of the maxillary and mandibular arches were completed the patient was referred to the department of oral surgery for extractions of the 3rd molar present in all 4 quadrants which was a month prior to the retraction process. After the extraction, the whole maxillary and mandibular arch were consolidated and the archwire was upgraded to 19x25" stainless steel rectangular wire as the full expression of bracket prescription was achieved.



(fig.2) extraoral and intraoral records after 6 months of leveling and alignment phase.

Once the arches were stabilized with 19x25 SS wire the extra-radicular IZC with a dimension of 2x12 stainless steel screws was inserted in the maxillary arch between the first and second molars on both the quadrants whereas for the mandibular arch buccal shelf screw with dimension 2x12 Stainless Steel implants were used between first and second molars. In order to place the extra radicular bone screws for IZC the initiatingarea of insertion is between the first 2 molars 2mm above the mucogingival junction in the alveolar mucosa. In order to create the initial notch the self-drilling screw is placed perpendicular to the occlusal plane and a few turns were given with the driverafter that the direction of the driver was changed to 55-70° directed towards the teeth which helped in bypassing the roots and directing the screw towards the infra-zygomatic region of the maxillary arch. While for placement of buccal shelf bone screw the initial notch was given interdentally between the first and second molars and 2mm away from the mucogingival junction, initially the screw is directed at perpendicularto the occlusal plane and few turns are given to create the initial notch before the direction of the driver is changed to 60-75°towards the tooth which helps to surpass the roots and direction of the implant towards the buccal shelf area of the mandible.[6]Then the retraction mechanics were performed using 250gms of force in all the quadrants. The bodily movement by distalization of the maxillary and mandibular arches were completed in 10 months.

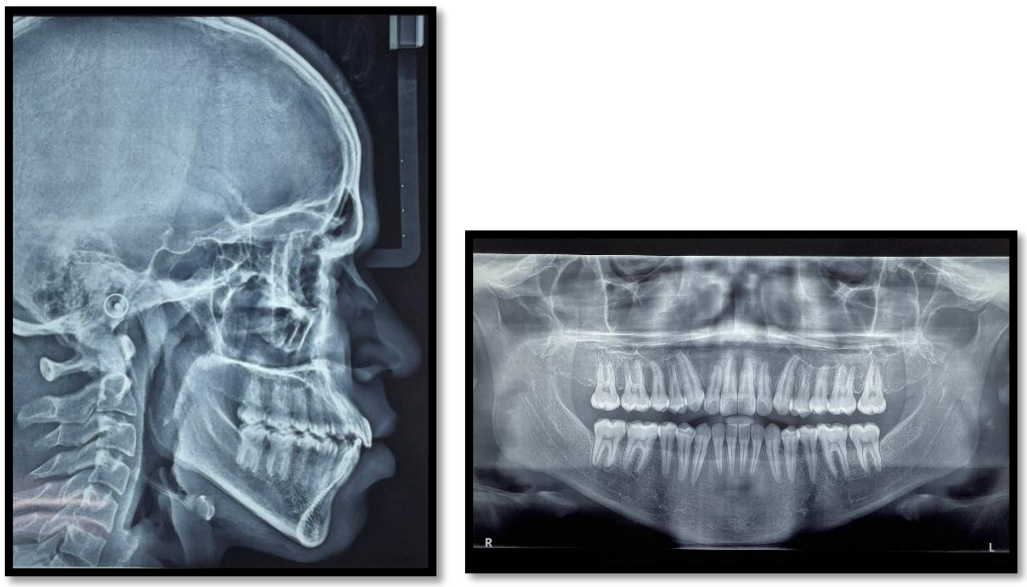
Treatment Results

It was observed that the maxillary arch was distalized by 1mm and the mandibular arch was distalized by 4 mm and achieved class I molar and canine relation on both sides. After distalization settling elastics were given to the patient.

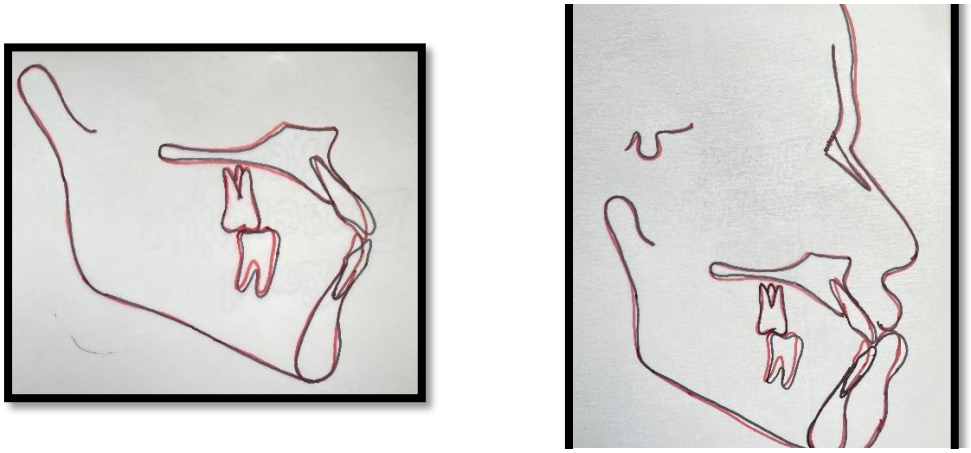
Post-treatment it was observed that the patient's profile showed improvement in lips competency and dentally the ideal Angle's Class I molar and canine relation were achieved with cephalometric readings it was confirmed that the patient showed

improvement in skeletal and dental parameters with readings such asimproved IMPA=89°, increased interincisal angle =126° and U1 to NA=8mm/29°;L1 to NB=8mm/29°,the incisal angulation was improved than what was present during pre-treatment phase, the open bite was also corrected and well established overjet and overbite were achieved at the end of the treatment the patient also showed improvement in nasolabial angle =81°. Further, the crowding that was seen earlier in mandibular anterior teeth was also corrected with distalization. After the completion of the treatment, the patient was delivered clear Essix retainers fabricated for both the maxillary and mandibular arch, covering the second molars of all four quadrants.

Even though the overall extraoral lateral profile of the patient showed a concave appearance, the treatment done on the patient was a non-surgical camouflage approach and ideally, a surgical mandibular setback surgery was suggested to the patient but the patient chose the nonsurgical approach.



(fig.3) post-operative extra oral &intraoral pictures with radiographic records.



(fig.4) superimposition of changes in patient pre and post-treatment, black outline denotes pre-operative location whereas red outline denotes changes post treatment.

Cephalometric values of the patient pre and post-orthodontic treatment.

Variable	Normal	Pre	Post
SNA	82±2°	88°	87°
SNB	80±2°	88°	85°
ANB	2±2°	0°	2°
Wits Appraisal	-1mm	BO ahead by 5mm	AO=BO
FMPA	25°	30°	28°
GoGn-Sn	32°± 2°	32°	32°
Y-axis	59.4°	60	58°
Angle of Convexity	0°	1°	6°
Facial Angle	87.8°	90°	90°
U1 to Na (deg/mm)	22°/4mm	34°/11mm	29°/8mm
U1 to SN plane	102°± 2°	122°	115°
L1 to NB (deg/mm)	25°/4mm	33°/10mm	25°/8mm
IMPA	90°	96°	89°
IIA	131°	111°	126°

FMIA	65°	54°	63°
Nasolabial Angle	90°-110°	76°	81°
Jaraback's Ratio	62%-65%	66%	65.3%

On the basis of cephalometric values SNA=88°& SNB = 88° suggested bimaxproclination and in WITS appraisal BO being 5mm ahead of AO suggestive prognathic mandible, dentally decreased interincisal angle (111°) suggested a bimaxillary protrusion, in the reading of pretreatmentsection and post-treatment significant results were seen.

Discussion

The occurrence of class III malocclusion is lowest in the population when compared to Angle's class I & II. The classic feature of class III malocclusion is the patient having a concave profile. There are various treatment modalities for the correction of this malocclusion which include 1.modification of growth involving a chincup to restrict the growth of the mandible or a facemask for protraction of the maxillary. 2. Dentoalveolar compensation or extraction of teeth for camouflage approach. 3. Final approach is orthognathic surgery.[3]Generally the choice of treatment is bespoke for each patient especially when it comes to treating an adult patient with this malocclusion it is generally a surgical approach followed by orthodontic treatment or sometimes the camouflage method where teeth are being extracted for space compensation.[4] As an orthodontist, we should always provide the most suitable treatment plan for the patient but operatorsaren't the ones who are generally faced with the burden of cost, discomfort, and risk of the surgery.[3] In our case the adult patient opted for a nonsurgical approach. At the beginning of the treatment the first and second molars of all the quadrants were banded and a habit-breaking appliance was fabricated and delivered as the patient presented with an open bite and tongue thrusting was the etiological factor for the malocclusion. After that, the treatment started with leveling and alignment phase where both arches were bonded with MBT prescription metal brackets and 0.014" Nickel-Titanium round wires and were continued up to 19x25 NiTi later for the retraction stage the wires were upgraded to 19x25 stainless steel rectangular wire. A temporary anchorage device (TAD) is a device that is used to enhance the anchorage which can either be by supporting the teeth of reacting unit or by preventing the need for the reactive unit combined and is subsequently removed after the purpose is fulfilled.[5] The extraradicular which is also considered a temporary anchorage device IZC is placed far from the roots of the teeth in infra-zygomatic region of the maxillary arch and for the mandiblein the buccal shelf. Generally, these screws are larger than usual inter-radicular screws with dimensions of 10-14mm in length and at least a diameter of 2 mm.For the placement of IZC the preferable area, in this case, was in the infra-zygomatic crest between the first and second molar, and the buccal shelf bone screw was placed in the buccal shelf area which is located lower and lateral to the second molars. After the placement of the screws the stability was checked, though according to the literature immediate loading can be done on the bone screws with up to 350gms of force per screw,[6] the

patient was recalled after three weeks and then the force was loaded on each screw with the means of elastomeric chains and the force was measured with the help of dontrix gauge. The patient was recalled on the equal interval of 21 days for follow-ups with retraction and space closure and the elastomeric chain was changed with every appointment. The light force was used throughout the treatment and with this, we were able to achieve class I molar and canine relation on both the side with appropriate overjet and overbite, significant improvement in skeletal and dental parameters with readings such asimproved IMPA=89°, increased interincisal angle =126° and U1 to NA=8mm/29°; L1 to NB=8mm/29°, the incisal angulation was improved than what was present during pre-treatment phase, at the end of the treatment the patient also showed improvement in nasolabial angle =81°.Even though the dental parameters were satisfactory the overall extraoral appearance of the patient remained towards the concave profile but the patient was happy with treatment since his chief complaint of incompetent lips with proclined teeth and the open bite was rectified.

Conclusion

The treatment choice for any kind of malocclusion should be be spoke for each patient. All treatment possibilities, including those that are ideal and those that are a compromise, should be considered and explained to the patient so that they can opt for the most acceptable one. All problems observed by a clinician might not be problems for the patients. The treatment that this patient received satisfied his needs, despite its limitations. The results that were achieved were satisfactory for both the patient and the orthodontist. The patient's chief complaint was reported and treated to his satisfaction, an aesthetic smile was established, and the malocclusion was treated to a satisfactory and stable result.

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