

Camouflage Treatment of Skeletal Class III Malocclusion with Anterior Crossbite in Adults: A Case Series

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Abstract

In the current scenario, different treatment modalities exist when orthodontic camouflage needs to be done in patients with mild or moderate skeletal Class III malocclusions. Recent advances such as temporary anchorage devices increased the scope of camouflage treatment. This series of cases describes the non-surgical management of skeletal Class III malocclusion using treatment mechanics, which efficiently improve the functional occlusion and esthetic requirements of the patient.

Key words: Anterior crossbite, Camouflage, Skeletal Class III

INTRODUCTION

The correction of skeletal and dental Class III malocclusion is a challenge to the orthodontist in relation to the diagnosis, treatment planning, and treatment mechanics. The amount and direction of growth in Class III patients decides the need for orthodontic and surgical approaches.^[1] Class III relationship may result from a normal maxilla with mandibular skeletal protrusion or a maxillary retrusion with normal mandible or a combination of both.^[2] An anterior crossbite can worsen with age which significantly affects facial esthetics and the function of the stomatognathic system. The etiology of Class III malocclusion is multifactorial due to the involvement of genetics, ethnicity, environmental factors, and habitual postures. The age preference for the treatment of an anterior crossbite is between 8 and 9 years.

Class III malocclusion patient can have a concave facial profile and the lower lip protrusive to the upper lip. Pseudo

Class III malocclusion is a condition developed by premature contact during the normal path of closure of the mandible and this can lead to the anterior displacement of the mandible.^[3] The etiologic factors of Class III malocclusion are genetic, environmental factors, and oral function.^[4] The treatment of choice for an adult patient with a severe skeletal Class III malocclusion and a midline deviation is usually combined surgical and orthodontic treatment. Orthodontic camouflage is the masking of skeletal discrepancies through extractions and orthodontic treatment, instead of correcting them. Therefore, dentoalveolar compensation is made without correcting the basal dysplasia.^[5]

Patients with borderline malocclusions are usually treated with camouflage treatment with selective extractions. However, we sometimes treat patients with severe problems who do not want surgery as a part of their treatment plans.^[6] In cases treated by orthodontic camouflage, the dental movements are often the opposite of those necessary before surgery, where dentoalveolar decompensating is the objective. Orthodontic camouflage treatment should be prescribed for young adults only if, before treatment begins, there are cephalometric indications that residual growth will not provoke a worsening of the deformity after treatment, causing dentofacial asymmetry. Camouflage treatment also implies that the tooth repositioning will have a favorable effect or at least be less damaging to the facial esthetics.^[7]

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Here, we report a non-surgical treatment approach with simplified treatment mechanics and its outcome for two adult patients with skeletal Class III malocclusion.

CASE REPORT-1

Diagnosis

A female patient of age 20 years reported with a complaint of irregularly arranged lower front teeth. On extraoral examination, the patient had mesocephalic head form, leptoprosopic facial form, straight profile, anterior divergence, and protruded lower lips. On intraoral examination, the patient had an anterior crossbite in relation to 11, 21, and 22, lower crowding and Class I molar and canine relationship, proclined maxillary anterior teeth, forwardly placed upright mandibular teeth, and upper and lower anterior crowding with reverse overjet of 2 mm.

On cephalometric evaluation [Table 1], the patient had a skeletal Class III base with normal maxilla and prognathic mandible on average growth pattern. On soft tissue analysis, the lower lip was protrusive and obtuse nasolabial angle. The model analysis showed that the Bolton's excess was 2.8 mm and increased tooth size-arch length discrepancy of 1 mm in lower arch [Figures 1-5].

Treatment Objectives

1. Correction of anterior crossbite.
2. Correction of crowding.
3. To obtain ideal overjet and overbite.
4. To obtain ideal esthetics.

Treatment Alternatives

The first treatment option was surgical orthodontics: Pre-surgical leveling and alignment, Lefort I osteotomy in maxillary arch and bilateral sagittal split osteotomy (BSSO) in the mandibular arch, and post-surgical orthodontics.

The second treatment option was camouflage treatment with mandibular incisor extraction.

Treatment Plan

Since the patient was not willing for surgery and procedures which involved the use of temporary anchorage devices (TADs), orthodontic camouflage treatment was decided to be performed with mandibular single incisor extraction and contemporary McLaughlin, Bennett, and Trevisi (MBT) mechanics. Following correction of anterior crossbite using posterior bite plane, mandibular anteriors would be retracted just enough to achieve ideal overjet and overbite.

Treatment Progress

0.022" slot MBT brackets were bonded on the upper and lower arches with bilateral fixed posterior acrylic bite plane on the lower molar region. Leveling and alignment was

started with 0.016 nickel-titanium (NiTi) followed by the sequence of rectangular NiTi archwires in the upper and lower arches. After leveling and alignment, space closure was done with 0.019×0.025 SS. Settling of occlusion was done with 0.019×0.025 " stainless steel wire in upper and lower anterior tooth and vertical settling elastics in posterior. Retention was given with a removable Hawley's retainer in the upper arch and canine-to-canine bonded fixed retainer in the lower arch.

Treatment Results

Post-treatment records showed good alignment of the upper and lower arches. An esthetically acceptable smile arc was achieved due to the correction of the upper anterior crossbite. There was a good occlusion between the upper and lower arches with ideal intercuspation of the posterior teeth.

CASE REPORT-2

Diagnosis

A 21-year-old male patient came with complaint of irregularly arranged upper front teeth region. On



Figure 1: Pre-treatment intraoral – case 1

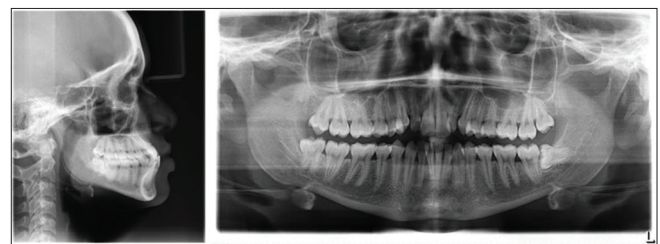


Figure 2: Pre-treatment lateral cephalogram and orthopantomogram – case 1



Figure 3: Posterior bite plane – case 1

extraoral examination, the patient had brachycephalic head form, euryprosopic facial form, concave profile, anterior divergence, and protruded lower lips. On intraoral examination, the patient had anterior crossbite in relation to 12 and 22, mild upper anterior crowding, spacing of upper and lower anteriors, Class III molar and canine relationships, and forwardly placed upright mandibular teeth with overjet of 1 mm. On cephalometric evaluation [Table 2], the patient had a skeletal Class III base due to prognathic mandible on a horizontal growth pattern. Regarding soft tissue profile, the upper and lower lips were protrusive with acute nasolabial angle [Figures 6-12].

The model analysis showed that the Bolton's excess was 5.2 mm and increased tooth size-arch length discrepancy of 3 mm spacing in lower arch.

Treatment Objectives

1. Correction of anterior crossbite.
2. Correction of crowding.
3. Correction of spacing.
4. Correction of proclination.
5. To achieve Class I molar and canine relationship.
6. To obtain ideal overjet and overbite.
7. To obtain ideal esthetics.

Treatment Alternatives

The first treatment option was surgical orthodontics: Pre-surgical leveling and alignment, reduction of proclination

in maxillary arch with extraction of premolars, and decompensation followed by BSSO and post-surgical orthodontics.

The second option was the use of miniplate-assisted camouflage treatment of Class III malocclusion by en-masse distalization of mandibular dentition.

The third treatment option was camouflage treatment with extraction of maxillary second and mandibular first premolars and mini-implant supported retraction of anterior teeth.

The fourth treatment option was camouflage treatment with mandibular incisor extraction.

Treatment Plan

Since the patient was not willing for surgery and procedures which involved the use of TADs, orthodontic camouflage



Figure 6: Pre-treatment extraoral – case 2

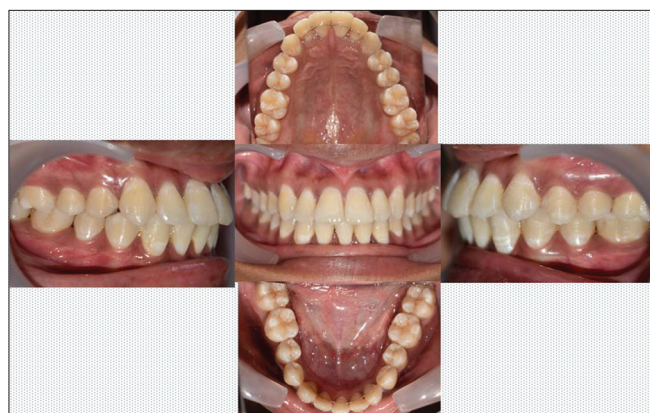


Figure 4: Post-treatment intraoral – case 1



Figure 7: Pre-treatment intraoral – case 2



Figure 5: Post-treatment lateral cephalogram and orthopantomogram – case 1

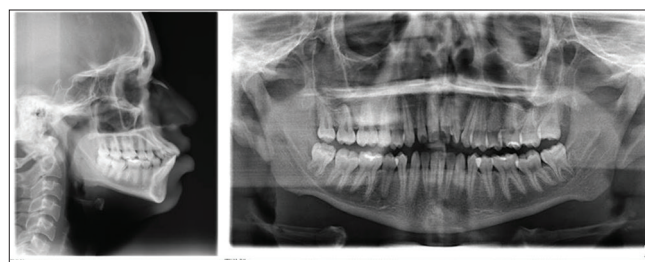


Figure 8: Pre-treatment lateral cephalogram and orthopantomogram – case 2



Figure 9: Posterior bite plane – case 2

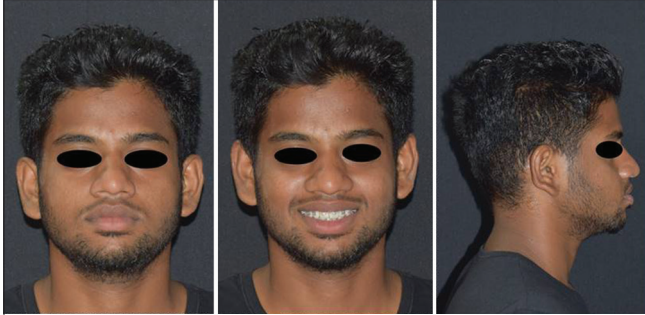


Figure 10: Post-treatment extraoral – case 2

treatment was decided to be performed with mandibular single incisor extraction and contemporary MBT mechanics (treatment option IV). Following correction of anterior crossbite using posterior bite plane, mandibular anteriors would be retracted just enough to achieve ideal overjet and overbite.

Treatment Progress

0.022" slot MBT brackets were bonded on the upper and lower arches with bilateral fixed posterior acrylic bite plane on the lower molar region. Leveling and alignment was started with 0.016 NiTi followed by the sequence of rectangular NiTi archwires in the upper and lower arches. After leveling and alignment, space closure was done with 0.019×0.025 SS. Settling of occlusion was done with 0.019×0.025 " stainless steel wire in upper and lower anterior tooth and vertical settling elastics in posterior.

Treatment Results

Post-treatment records showed good alignment of the upper and lower arches. An esthetically acceptable smile arc was achieved after the correction of the upper anterior crossbite. There was a good occlusion between the upper and lower arches and good intercuspation of the posterior teeth.

DISCUSSION

The etiological factors in the development of Class III malocclusion include both anteroposterior and vertical maxillary deficiency. If the length of the maxillary base is small or if the maxilla is positioned posteriorly, the effect is direct. If it has not proportionately grown vertically, there is an indirect effect on the mandible, which then

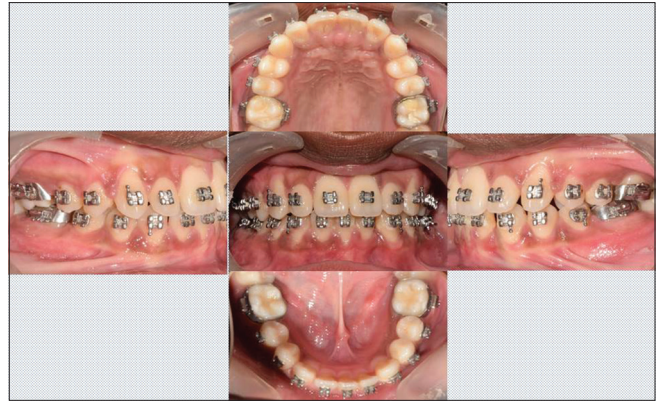


Figure 11: Post-treatment intra oral – case 2



Figure 12: Post-treatment lateral cephalogram and orthopantomogram – case 2

rotates upward and forwards producing an appearance of mandibular prognathism.

For Class III correction in adults, if camouflage was planned, typical extractions might be lower first premolars alone, lower first and upper second premolars, or one lower incisor. Combined surgical and orthodontic treatment is the other option of Class III correction in adult patients.

In this case series, simplified treatment modalities were designed based on patient's treatment preference and extent of malocclusion.

Functional or orthopedic appliances can be used in growing cases but have not been the ideal choice.^[1] Intraoral appliance includes the use of Class III elastics in conjunction with four miniplates inserted in the left and right infrazygomatic crest of the maxillary buttress and between the lower left and right lateral incisors and canines.^[8] Uribe *et al.*^[4] used the reverse bionator in the treatment of Class III malocclusion cases. Gencer *et al.*^[9] reported about the double-plate appliance in treating Class III malocclusions. This appliance is used in conjunction with a face mask. Sukh *et al.*^[10] used a modified tandem appliance for the management of developing Class III malocclusion.

Sugawara *et al.*^[11] studied the long-term effects of chin cup appliance in growing patients that exhibit mandibular prognathism and short lower facial height, whereas Rey

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

Parameters	Pre-treatment	Post-treatment
SNA angle	78°	78°
SNB angle	83°	82°
ANB angle	-5°	-4°
GoGn to SN	28°	31°
U1 to NA angle	33°	40°
U1 to NA (linear)	6 mm	6 mm
L1 to NB angle	27°	25°
L1 to NB (linear)	8 mm	7 mm
L1 to mandibular plane angle	97.2°	91°
Interincisal angle	123°	130°

SNA: Sella-nasion to A, SNB: Sella-nasion to B, ANB: A point to B, L1: Lower lip, U1: Upper lip, NB: Nippon bearing

Table 2: Comparison of pre- and post-treatment cephalometric values of case 2

Parameters	Pre-treatment	Post-treatment
SNA angle	81°	81°
SNB angle	83°	82°
ANB angle	-2°	-1°
GoGn to SN	18°	21°
U1 to NA angle	43°	27°
U1 to NA (linear)	12 mm	7 mm
L1 to NB angle	38°	28°
L1 to NB (linear)	9 mm	5 mm
Interincisal angle	97°	125°
L1 to mandibular plane angle	102°	92°
U1 to S line	7 mm	2 mm
L1 to S line	10 mm	6 mm

SNA: Sella-nasion to A, SNB: Sella-nasion to B, ANB: A point to B, L1: Lower lip, U1: Upper lip, NB: Nippon bearing

et al.^[12] used the mandibular cervical headgear in growing Class III patients exhibiting mandibular prognathism. Ramos^[13] studied about the efficiency of Class III treatment using facial mask. Canturk *et al.*^[14] described about the orthopedic correction of Class III malocclusion with palatal expansion and custom protraction headgear.

Surgical correction of Class III malocclusion includes, in most cases, mandibular setback, maxillary advancement, or a combination of both. The orthognathic surgical procedure due to its complexity, morbidity, and associated risk factors acts as a deterrent in patients opting for this treatment. Hence, in this patient population, the preference of Class III corrections has been camouflage orthodontic treatment. The camouflage treatment is the dental compensation for a maxillomandibular discrepancy. The traditional way of Class III camouflage treatment mainly includes Class III elastics. Class III elastics increase the proclination of upper incisors and extrude the upper molars, resulting in an unesthetic smile and clockwise rotation of the mandible. To avoid this, several studies have reported mini-implant-assisted distalization of lower dentition. Seo *et al.*^[15] studied camouflage treatment about rapid maxillary expansion and

mandibular distalization in a skeletal Class III malocclusion using the palatal mini-implants. Ning and Duan^[16] stated about the camouflage treatment in adult skeletal Class III cases by extraction of two lower premolars.

In this case series, simplified treatment mechanics were designed based on patient treatment preference and extent of malocclusion. The 1st case described here is a skeletal Class III patient with straight profile and crowding of the arches and anterior crossbite. The extraction of lower incisor, in this case, is favorable because it helps in maintaining the facial profile and also in the correction of lower anterior crowding. The correction of upper anterior crowding was achieved by mild proclination and proximal stripping of the upper anteriors. The farther the maxillary anteriors is proclined, the greater would be the risk of the development of black triangles. In this case, when the upper anteriors were flared minimally, black triangles were developed between incisors. This was corrected by proximal slicing of anteriors by 2 mm totally.^[17]

The 2nd case described here is a skeletal Class III patient with concave facial profile and spacing in the upper and lower anterior teeth and anterior crossbite. Therefore, alignment and leveling and the upper and lower incisor correction could be concurrently achieved. As a result, oral function and dentofacial esthetics rapidly improved while surgical risks were avoided. The occlusal bite was raised using posterior bite plane and eliminated upper anterior tooth interference was vital for retraction of the lower anterior teeth. During treatment, the labial and lingual inclinations of the incisors altered and the lower molars relation was changed to Class I. Insufficient overjet in results in edge-to-edge bite. Extraction of lower single incisors helped to achieve overjet and I canine relation.^[17]

CONCLUSION

Camouflage treatment has proved to be one of the most important and preferred treatment modalities for Class III malocclusion. The possibility of ideal camouflage treatment with simplified mechanics in Class III malocclusion will depend on the extent of Class III malocclusion. Recent advances such as the use of bone screws and miniplates have enhanced the prognosis of Class III camouflage treatment.

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