



Treatment of Adult Class III Malocclusion with Orthodontic Camouflage: A 2 Case Report

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Abstract

Class III malocclusion with multifactorial etiology manifests with dental or skeletal discrepancies, if severe could lead to compromised facial esthetics and function. thereby decreasing the self-esteem in an individual especially during growing period. Treatment of Class III malocclusion with negative overjet becomes very daunting especially in patients with cessation of growth. Two such cases treated by orthodontic camouflage to produce optimal skeletal and dentoalveolar relationship with the help of unilateral extraction of lower 1st premolar, are illustrated in this case report.

Keywords: Class III malocclusion; Extraction; Torque

Introduction

Class III malocclusion is best described by discrepancies of dental or skeletal components in antero-posterior or vertical directions. Retrognathic and narrow maxilla, prognathic and wider mandible, and or a combination of both are the common clinical presentations of skeletal class III malocclusion. The magnitude of the discrepancy may compromise facial esthetics variably and motivates individuals to seek orthodontic correction [1-4].

The Class III malocclusion may be hereditary in occurrence further affected by environmental factors such as mouth breathing habit. Its prevalence varies among different ethnic groups ranging between 1% and 4% in Caucasians, 4% and 5% among the Japanese" and 4% and 14% among the Chinese [5]. However, its frequency is higher among Asians as large percentage of patients exhibit maxillary deficiency. In European royal families, the mandibular prognathism is commonly inherited. The heritability of mandibular prognathism among Brazilian families was estimated to be 0.316. Since it is an autosomal dominant inheritance with incomplete penetration, the expression of mandibular prognathism is influenced by a major gene [6].

The success or failure of early treatment could depend on inclination of the condylar head, the maxilla-mandibular vertical relationship together with the width of the mandibular arch. Successful outcomes with 95% degree of accuracy were predicted using ramal and corpus length, mandibular position, and gonial angle.

Treatment strategies in class III: The class III malocclusion can be treated at various stages during the dental and skeletal development or after the cessation of jaw growth.

Growth modification

Antero-posterior and vertical maxillary deficiency: Both of these contribute to Class III malocclusion. The effect is direct in cases where maxilla is small or in posterior position. If the maxilla does not grow vertically, the effect on the mandible is indirect, which then rotates upward and forward during normal growth, thereby leading to mandibular prognathism. This appearance is more related to position rather than size of the mandible.

Since maxillary deficiency is commonly a component of skeletal Class III malocclusion, the recent treatment strategy is aimed at promoting maxillary growth, for which the data from randomized clinical trials are not available. However, in children, inhibiting mandibular growth or stimulating maxillary growth tends to modify the growth in skeletal Class III malocclusion.

There are three approaches to manage maxillary deficiency: Frankel's functional appliance is the most effective method followed by reverse-pull headgear (facemask) and Class III elastics to skeletal anchors is the least effective.

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Received Date: 16 Aug 2023

Accepted Date: 05 Sep 2023

Published Date: 09 Sep 2023

Citation:

Saloni P, Sanjay M, Isha A, Merry, Parveen A. Treatment of Adult Class III Malocclusion with Orthodontic Camouflage: A 2 Case Report. *J Dent Oral Biol.* 2023; 8(3): 1217.

ISSN: 2475-5680

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Class III camouflage

Dental compensation or camouflage of simple class III malocclusions can be done in adult patients whereas severe cases require Orthodontics and/or Orthognathic Surgery. Moderately severe Class III malocclusions can be corrected by retracting the mandibular incisors into the available extraction space and proclining the maxillary incisors. Skeletal anchorage can be additionally used to distalize the entire mandibular dentition.

These types of cases can be managed by various approaches including extraction usually premolars in the lower or both arches, horizontal or vertical extra-oral tractions and distalization of lower molars. For non-growing class III patients, midline maxillary osteotomy followed by expansion device is recommended for treatment of crossbite.

Orthognathic surgery

When the facial esthetics is compromised by skeletal problem, the surgical orthodontic treatment is the preferred choice for patient's severe facial asymmetry and do not present any potential for facial growth. The class III dental and skeletal relationships are treated by orthodontic surgical treatment which promotes advancement

of maxilla and retrusion of mandible. The success of orthognathic surgery relies on the pre-surgical orthodontic preparation which dictates the skeletal movements at the time of surgery. The complete correction of skeletal discrepancies can be achieved by recognizing and correcting the prevailing dental compensations.

Orthognathic patients respond well to the combination of Le Fort I. The nasomaxillary soft tissue profile can be improved by Lefort I advancement. Rotating the maxilla-mandibular complex can modify occlusal plane and incisal axis. Maxillary retrusion is often noticed in prognathic mandible patients, and rotation of the maxillo-mandibular complex clockwise allows for more mandibular setback and may improve the depressed paranasal contour.

Aim of this paper is to discuss two class III malocclusion cases treated by unilateral premolar extraction.

Case Series

Case 1

A male patient of age 18 years visited the Department of Orthodontics and dentofacial orthopedics at Bhojia Dental College, Budh Baddi with the chief complaint of forwardly placed lower front



Figure 1: Pre-treatment extraoral photographs.



Figure 2: Pretreatment intraoral photographs.

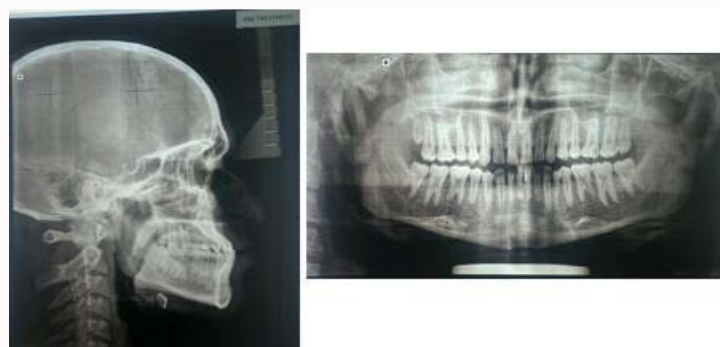


Figure 3: Pre-treatment radiographs.

Table 1: Pre-treatment cephalometric values.

| Measurements | Pretreatment |
|---------------------|--------------|
| SNA | 83° |
| SNB | 86° |
| ANB | -3° |
| Beta Angle | 39° |
| SN-GoGn | 23° |
| FMA | 24° |
| Jarabak ratio | 72.30% |
| 1 to NA | -6 mm |
| 1 to SN | 127° |
| IMPA | 95° |
| Nasolabial Angle | 81° |
| Upper lip to E-Line | -4 mm |
| Lower lip to E-Line | +1 mm |

teeth. Extra oral examination showed that he had a leptoprosopic facial form with good facial symmetry, concave profile with anterior divergence, competent lips, acute nasolabial angle, shallow mentolabial sulcus, low mandibular plane angle, and a non-consonant smile arc. No signs/symptoms of temporomandibular joint dysfunction. Intraoral examination revealed Class III molar relation bilaterally. There was presence of reverse overjet of 1 mm. Lateral cephalograms

showed he had orthognathic maxilla (83) and prognathic mandible (86) with ANB (-3), Wits (-6 mm) depicting a skeletal Class III jaw bases. Patient had a hypodivergent growth pattern on account of Sn-Go-Gn (23), FMA (24) and Jaraback ratio of 72.7%.

Treatment objective: To obtain optimum overjet and overbite, establish stable occlusal relationship, obtain skeletal balance, improve the facial features by a pleasing smile arc and soft tissue esthetics.

Treatment: After analyzing all diagnostic records, the patient was in the stage 6 of CVMI with 0% growth remaining. The patient refused surgical procedures and opted for orthodontic treatment and camouflage. He was treated with extraction of 1st premolar in lower right quadrant (44) (Table 1 and Figures 1-3).

Treatment progress:

a) **Alignment and leveling:** Treatment began with bonding of MBT .022” slot brackets and banding of first and second molars. Arches were initially aligned. The Archwire sequence progressed from 0.014” NiTi to 0.017” × 0.025” SS for 9 months.

After leveling and alignment extraction of 44 was done.

b) **Retraction and space closure:** Individual canine retraction of 43 was done with an active tieback and midlines were matched. Labial crown torque in anteriors and palatal crown torque in posteriors in upper arch and Labial crown torque in lower arch was given on 0.019 × 0.025” SS wire for attaining ideal overjet and overbite. This



Figure 4: Mid treatment photographs.

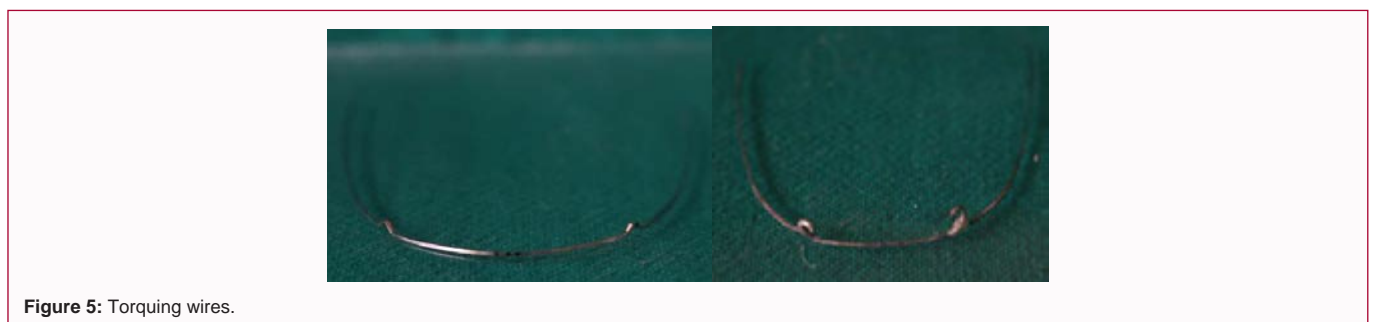


Figure 5: Torquing wires.



Figure 6: Tear drop loop for space closure.

was followed by space closure with T loop (0.018” × 0.025” TMA) in upper arch and E-chain retraction force in lower arch and Class III elastics for 3 months (Figures 4-6).

c) **Finishing:** 0.018 × 0.025” SS wire wrt U/L arch. W-elastics were given for 3 months.

Treatment results: The overall treatment result was 3 years. The ABO Discrepancy index was 27-pre-treatment and 8 post-treatments. The ABO Objective grading (post-treatment) was 7. A Class I dental relation was achieved and overbite improved. The overjet is good. Facial Balance & smile esthetics improved. TMJ were asymptomatic after treatment. The OPG shows no evidence of significant root resorption (Table 2 and Figures 7-9).

Case 2

A male patient of age 21 years visited the department of Orthodontics and dentofacial orthopedics at Bhojia Dental College, Budh Baddi with the chief complaint of forwardly placed lower front teeth. Extra oral examination showed that he had a mesoprosopic facial form with good facial symmetry, concave profile with anterior divergence, competent lips, acute nasolabial angle, shallow mentolabial

sulcus, low mandibular plane angle, and a non-consonant smile arc. No signs/symptoms of temporomandibular joint dysfunction. Intraoral examination revealed as Class III molar relation. There was presence of reverse overjet of 3 mm. Lateral cephalograms showed he had prognathic maxilla (86) and prognathic mandible (92) with ANB (-6), Wits (-7 mm) depicting skeletal Class III jaw bases. Patient had a hypodivergent growth pattern on account of Sn-Go-Gn (24), FMA (23) and Jarabak ratio of 69.5%.

Treatment objective: To obtain optimum overjet and overbite, establish stable occlusal relationship, obtain skeletal balance, improve the facial features by a pleasing smile arc and soft tissue esthetics.

Treatment: After analyzing all diagnostic records, the patient was in the stage 6 of CVMI with 0% growth remaining. Orthosurgical correction of skeletal discrepancy was proposed, however, patient refused to undergo any surgical treatment, hence one phase therapy with unilateral extraction of lower left first premolar was done (Figures 10-12).

Treatment progress:

a) **Alignment and leveling:** Treatment began with bonding of



Figure 7: Post-treatment extraoral photographs.



Figure 8: Post-treatment intraoral photographs.

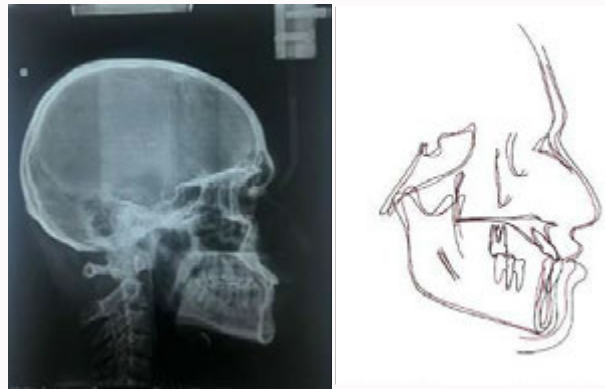


Figure 9: Treatment Changes Cephalometrically.

Table 2: Pre vs. post-treatment cephalometric values.

| Measurements | Pretreatment | Post-treatment |
|---------------------|--------------|----------------|
| SNA | 83° | 84° |
| SNB | 86° | 85° |
| ANB | -3° | -1° |
| Beta Angle | 39° | 38° |
| SN-GoGn | 23° | 24° |
| FMA | 24° | 21° |
| Jarabak ratio | 72.30% | 70.50% |
| 1 to NA | -6 mm | 39/5 mm |
| 1 to SN | 127° | 126° |
| IMPA | 95° | 78° |
| Nasolabial Angle | 81° | 89° |
| Upper lip to E-Line | -4 mm | 0 mm |
| Lower lip to E-Line | +1 mm | 0.5 mm |

Table 3: Pre vs. post-treatment cephalometric values.

| Measurements | Pretreatment | Post-treatment |
|---------------------|--------------|----------------|
| SNA | 86° | 85° |
| SNB | 92° | 89° |
| ANB | -6° | -4° |
| Beta Angle | 36° | 36° |
| SN-GoGn | 24° | 27° |
| FMA | 23° | 25° |
| Jarabak ratio | 69.50% | 67.50% |
| 1 to NA | 6 mm | 6 mm |
| 1 to SN | 125° | 125° |
| IMPA | 88° | 75° |
| Nasolabial Angle | 104° | 82° |
| Upper lip to E-Line | -3 mm | -4 mm |
| Lower lip to E-Line | -0.5 mm | -2 mm |



Figure 10: Pre-treatment extra oral photographs.



Figure 11: Pre-treatment intra oral photographs.



Figure 12: Pre-treatment radiographs.

MBT .022" slot brackets and banding of first molars. Lower posterior bite plane was given to relieve the anterior crossbite and attain the normal overjet. Arches were initially aligned. The Archwire sequence progressed from 0.016" NiTi to 0.017" \times 0.025" SS in upper arch and from 0.014" NiTi to 0.018" \times 0.025" SS in lower arch.

After leveling and alignment extraction of 34 was done.

b) **Retraction and space closure:** Individual canine retraction of 33 was done with an active tieback force. This was followed by space closure with Omega loop (α bend = 35° and β bend = 15°).

c) **Finishing:** 0.018 \times 0.025" SS wire wrt U/L arch. Class III elastics were given.

Treatment results: The case was completed in 1.5 years. The ABO Discrepancy index was 18-pre-treatment and 8 post-treatments. The ABO Objective grading (post-treatment) was 7. A stable occlusal relation was achieved and overbite improved. Anterior crossbite was relieved. Facial Balance & smile esthetics improved. TMJ were asymptomatic after treatment (Table 3 and Figures 13-16).

Discussion

Management of skeletal class III malocclusion usually involves surgical intervention. These adult patients had no clinically significant maxillomandibular growth potential left to establish treatment goals. Orthognathic surgery to protract the maxilla with the possibility of mandibular setback, combined with fixed orthodontic treatment, were discussed with them. However, patients refused surgical procedures and opted for orthodontic treatment and camouflage. Orthodontics alone helped to camouflage some skeletal and dental aspects of the malocclusion therefore, improving function, stability and esthetics [7]. Asymmetric extraction in mandibular arch was carried rather than symmetric extraction to correct the midline deviation of mandibular arch and obtain Class I canine relationship in short period of time. Case reported by Weisner (2009) in which he did unilateral extraction and used single Miniscrew implant to correct midline and anterior crossbite. Another case was reported by Guilherme et al. (2010), in which they used asymmetric intermaxillary class III elastics to correct the unilateral class III molar relationship. Bacetti et al. (2001)



Figure 13: Mid treatment photographs showing omega loop for space closure.



Figure 14: Post-treatment extra oral photographs.



Figure 15: Post-treatment intra oral photographs.

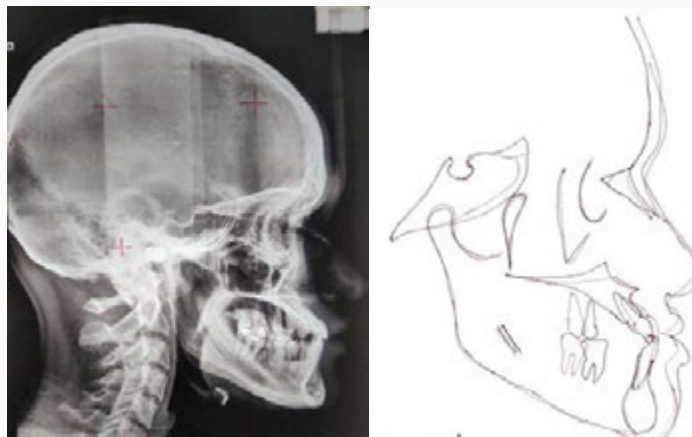


Figure 16: Post-treatment cephalogram & superimposition.

reported more favorable prognosis when intervention to correct anterior crossbite was implemented at an early age. Yamashiro and Takada (1995) reported a non-surgical management of adult class III case with extraction of lower first molar with lower midline deviation to the opposite side. Jiuxiang and Yan (2003) have reported treating 13 skeletal class III patients with lower second molar extractions. Farret et al. (2016) used miniplates as anchorage units for mandibular dentition distalization for camouflage of a class III malocclusion. The result of our cases as well as those of others shows that surgery with involved risk, cost and prolonged treatment duration can be avoided and camouflage treatment can be attempted to successfully treat mild to moderate skeletal class III cases [8-12].

Conclusion

Not all skeletal class III cases require surgical intervention. Moderate cases of skeletal class III can be successfully treated with camouflage. Proper application of biomechanics and using the right appliances can make the most difficult challenge an easy task.

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