CLASS III MALOCCLUSION! DOES IT REALLY POSE A CHALLENGE? — A CASE REPORT

[1]ROZINA NAZIR, BDS, FCPS-II
[1]ERUM AMIN, BDS, FCPS-II
[2]HAMEED ULLAH JAN, BDS, MCPS, FCPS (Pak)

ABSTRACT

A case report of a young girl having mild skeletal class III malocclusion with negative overjet and overbite is exclusively managed on orthodontic grounds. Patient's mandibular first premolars were already extracted by some local dentist. Her major esthetic concern was pivoting around her obtuse nasolabial angle. All pertinent treatment options were presented so as to address and serve her primary purpose. She opted for dentoalveolar compensation and defying all other treatment options, although all pros and cons were thoroughly explained in the best interest of the patient, including the surgical orthodontic treatment. Treatment goal was attained by restoring normal overjet, overbite thus improving not only the function but also enhancing and augmenting her nasolabial profile which was the major concern at the outset of treatment.

Key words: *Class III, Dentoalveolar compensation, Nasolabial angle.*

INTRODUCTION

Normal occlusion is generally characterized by a balanced facial skeletal complex, enjoying harmony in facial growth, between mandible and maxillary size, form, and position of these constituting structures.[1] A class III malocclusion is defined as an abnormal relationship of the arches where all the teeth occlude mesial to normal, with the cusp of upper second premolar in the sulcus between the mesiobuccal and middle buccal cusps of the lower first molar.[2] Class III malocclusion with skeletal component is however an orthodontic challenge, especially when a conservative and camouflaging approach is requested.[3] Class III biomechanics are often used in fixed orthodontic treatment to correct the anteroposterior relations of the occlusion.[4] However an important factor for the successful treatment of this malocclusion is the facial growth pattern. A reduced lower anterior face height, deep overbite, passive lip seal, associated with a class III malocclusion, warrants a better prognosis, because treatment induced backward rotation of the mandible will assist in camouflaging the anteroposterior discrepancy.[3] When an increased lower anterior face height is associated with this malocclusion, surgical intervention is the treatment of choice, because any orthodontically induced mandibular clockwise rotation will increase the vertical facial dimensions and, consequently, add to lip incompetence.[5]

For patients reluctant to undergo orthognathic surgery or those with border line cases, an alternative optimal treatment is dentoalveolar compensation without correcting the underlying skeletal deformity, thus mitigating the fear and/or aftermath of surgical procedure particularly in the maxillofacial complex where it is hardly accepted.

CASE REPORT

Diagnosis and Clinical Findings

A young girl of 17 years reported to the department of orthodontics, Armed Forces Institute of Dentistry. She was concerned about her unaesthetic appearance

[1] Resident, Deptt of Orthodontics, AFID, Rawalpindi. Email: rozina11@hotmail.com

[1] Resident, Deptt of Orthodontics, AFID, Rawalpindi. Email: drerumamin@gmail.com

[2] Assoc Prof & Classified Specialist (Orthodontics), O/C Dental Centre, CMH, Lahore Cantt, Email: huj100@hotmail.com

Correspondence: Col Hameedullah Jan, Assoc Prof & Classified Specialist (Orthodontics), O/C Dental Centre, CMH, Lahore Cantt, Email: huj100@hotmail.com

due to her collapsed and flat upper lip, lower prominent anterior teeth overlapping the upper anterior teeth. She was a young cooperative girl very conscious of her dentofacial esthetics. No additional significant discrepancy between habitual occlusion was noted. She had initially visited a general dentist for treatment who got her lower first premolars extracted and tried to treat her but remained unsuccessful due to unknown reasons, leaving behind almost all residual spaces of the extracted teeth, thus further deteriorating her problems esthetics. The cause of class III malocclusion was unknown. Her mother reported that there was no evidence of hereditary traits of this type of problem in her parental or maternal family. Extra oral examination revealed that her face was flat and symmetrical (Fig 1). Competent but strained lips were observed in the rest posture. Her soft tissue profile was concave with flat upper and procumbent lower lip. No signs of TMJ dysfunction were found. Intraoral examination revealed good gingival health, Class III molar relationship with negative overjet and overbite.

To investigate the case, facial photographs, study models, OPG, lateral cephalogram were taken. Profile view showed obtuse nasolabial angle (Fig 1). Intraoral examination showed that her teeth # 34 and # 44 were already extracted. All third molars were unerupted. Both upper and lower incisors reflected compensatory inclination (Fig 2)

Fig 1: Pretreatment facial photographs with an obtuse nasolabial angle

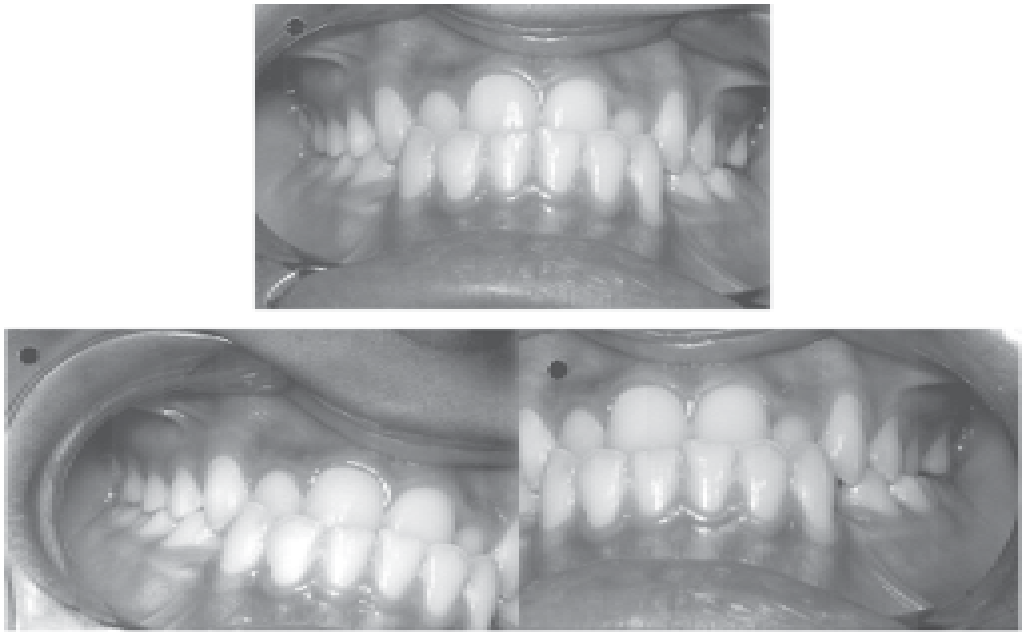

Fig 2: Pretreatment intraoral photographs showing anterior crossbite and residual spaces

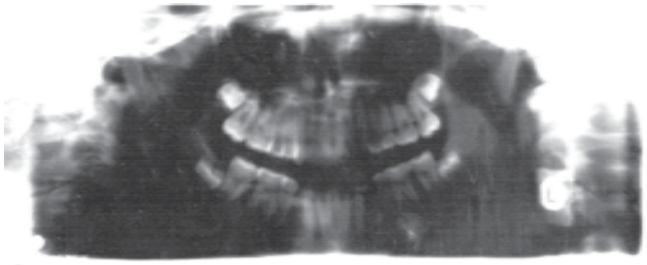

Fig 3: Pretreatment panoramic radiograph showing extracted mandibular premolars

OPG showed optimal periodontal status, favoring congenial environment for conventional orthodontic therapy to be optimally undertaken. Both lower permanent first premolars were found missing as it is evident from the history that they have been therapeutically extracted. All 3rd molars were passing through the eruptive phase of development (Fig 3).

In cephlometric tracing her sagittal analysis showed SNA almost within normal range (80), while her ANB angle was -3 which showed mildly prognathic mandible. Vertical analysis showed that MMA was below normal (24°) depicting decreased lower anterior facial height. As far as dental analysis is concerned, her IMPA was found to be 87°. Soft tissue analysis revealed flat upper lip, relatively protruding lower lip. Both the lips were however lagging behind the esthetic line (Fig 4a).

After detailed history, thorough clinical examination & in-depth investigations a diagnosis of class III malocclusion with anterior crossbite was made. Patient was technically counseled & strategized for comprehensive orthodontic treatment.

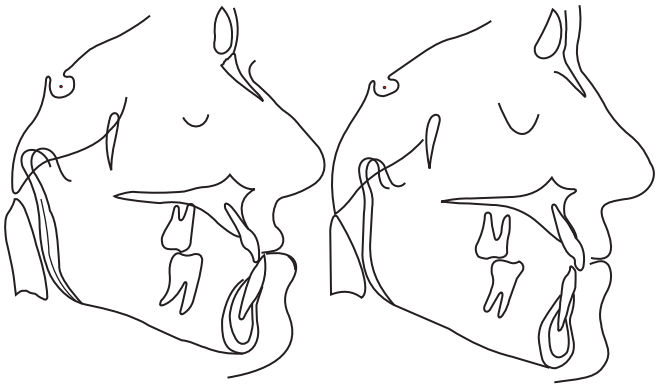

Fig 4a: Pretreatment cephalometric tracing
4b. Paratreatment cephalometric tracing

Treatment objectives

Overall treatment objectives consisted of bringing the maxillary teeth forward so as to normalize nasolabial angle and balance the labial profile of the patient. Additional focus was directed towards restoration of a class I molar & canine relationship, correction of anterior crossbite, decompensation, particularly of the lower incisors & restoring a positive overjet and normal overbite. So the sole and salient objectives were to correct the occlusal discrepancies by means of dentoalveolar compensation, which would produce attractive facial features.

Treatment was planned to be carried out with fixed mechanotherapy to protract the upper anteriors & bodily retract the lower anterior segment so as to achieve positive and optimal end results. Class III inter arch elastics were utilized to correct the class III malocclusion.

The patient and parents were made aware that class III malocclusion typically worsens with age especially if left untreated. In the event if orthodontic correction is made unsuccessful because of delay and continuity of mandibular growth or poor compliance on part of the patient, orthognathic surgery would be considered as an open option. Parents however had already expressed a negative interest for orthognathic surgery.

The malocclusion was treated with .022 inch preadjusted edge wise appliances. Leveling and alignment of maxillary and mandibular arches began with smaller dimensional flexible and a resilient archwire. It was then followed by sequential increase in dimension and form of wire. Arch coordination was mechanically monitored and class III mechanotherapy was continued till bite was jumped over and anterior crossbite was corrected and a good occlusal relationship was attained. Detailing and finishing were accomplished till perfection of a balanced and functional occlusion (Fig 5).

The residual extraction spaces were completely consolidated. The patient compliance in using the elastics was seen pretty well. Currently patient is undergoing though the finishing stage. After debonding, upper and lower canine to canine fixed retainers will be given.

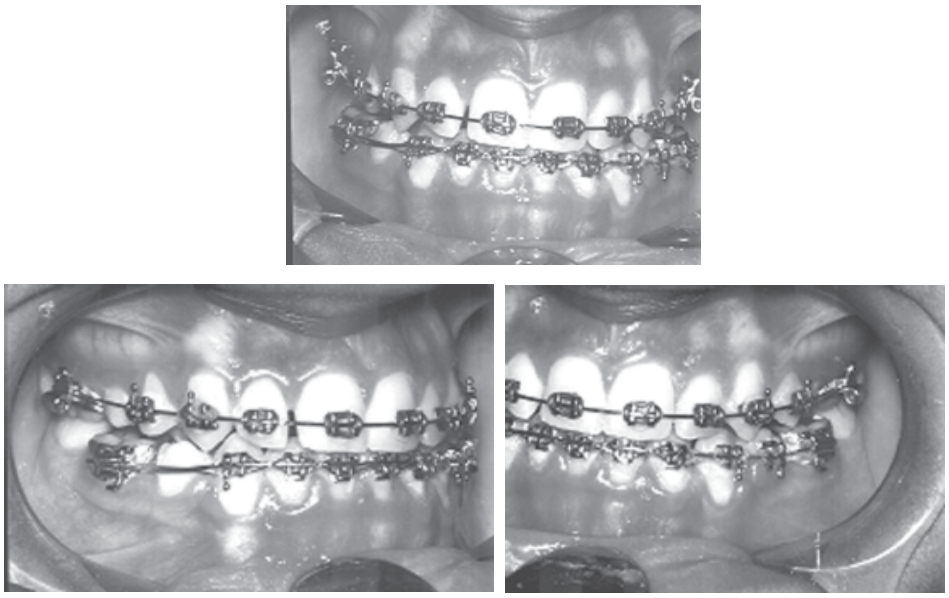

Fig 5: Intraoral paratreatment photographs showing correction of anterior crossbite and closure of residual spaces

PARATREATMENT RESULTS

The paratreatment extraoral photographs show an overall improvement in facial profile particularly in the nasolabial region. The upper flat lip was made prominent because maxillary incisor proclination, this also maximized the display of vermillion area of the upper lip. Intraoral photographs and dental casts depict satisfactory and an optimal dental outcome. The patient was rejoiced with her pleasing smile and juvenile labial profile Fig 4b.

TABLE. 1 PRETREATMENT AND PARATREATMENT CEPHALOMETRIC VALUES

Measurements	Pre-treatment	Para-treatment
SNA	80°	82°
SNB	83°	80°
ANB	-3°	0°
Wits	-3mm	0mm
UI.NA	27°	23°
UI.NA	5mm	3mm
LI.NB	27°	24°
LI.NB	-4mm	3mm
UI.LI	140°	135°
IMPA	87°	92°
MMA	23°	26°
SN-Mand	29°	32°
Jaraback ratio	71%	67%
UL to E line	-5mm	-1mm
LL to E line	-2mm	0mm

Table shows pre and paratreatment cephalometric findings.

DISCUSSION

In orthodontics optimal occlusal and esthetic results will only be obtained if compliant patients are treated in the hands of an astute and prudent orthodontist. Compliance is attained if we let the patient and parents to thoroughly understand the whole clinical scenario, the pros and cons of every step, its outcome including both short and long term fruitful goals and the looming aftermath if taken casually and ignorantly. This is common happening that we face in our society on daily basis. We got all the set goals in this patient by gaining an excellent patient compliance during the whole span of orthodontic treatment especially while using class III elastic mechanics.

With larger dental and skeletal discrepancy, it is imperative that one must cautiously go for dentoalveolar compensation.[7,8] The changes contributing most to the correction of the current clinical problem were maxillary incisor proclination, extrusion and bodily

retraction of the mandibular incisors with concurrent alveolar remodeling. These changes help produce counterclockwise rotation of the occlusal plan.[9] Although there are many nonsurgically treated class III case reports,[10-14] only few show such dental and skeletal discrepancies.[9]

Dentoalveolar changes improved the soft tissue profile, with protrusion of the upper lip and slight recession of the prominent lower lip. This is usually expected in camouflage treatment.[9,15]

When such dentoalveolar changes are executed, forces leading to periodontal pressure must be kept within physiological limits otherwise bone and soft tissue dehiscence, fenestration and at time gingival recession will become imminent. This in turn will lead to unstable occlusion with poor periodontal support.[16] Keeping in mind these hidden risk factors for maxillary incisors, the secondary effect after labialization of these teeth, could include thinning and resorption of the labial cortical plate with subsequent aftermath of gingival recession, dehiscence, or fenestration. With mandibular incisors, it could be lengthening of the clinical crown or resorption of lingual cortical plate.[16] Grafting procedures are sometimes anticipated and done before orthodontic treatment. However when lower premolars are extracted and the incisors are retracted, the amount of attached tissue is usually then not a big concern. Proclination of maxillary incisors may be dependent on gingival health, thickness and the osseous contour in that area. It must be considered essential before deciding & embarking upon the treatment choice. However none of these problems were either sensed or encountered, as periodontal evaluation showed a healthy condition. This favorable & productive response presumably occurred because the patient's periodontal status at the outset of treatment was good, the attached gingiva and plaque control were adequately sound adequate.[17] Periodontally compromised patients might not have such a satisfactory result due to the various risk factors and horrific challenges.

Extraction of the mandibular third molars can be undertaken if prognosis is poor. This may facilitate distal movement of the mandibular teeth to correct the AP relationship if required. Although citation of various studies[18] show that, extraction of the third molars helps control the vertical dimension in the patient who had clinically long face, but contrary to that some other latest references has discouraged the unjustifiable extractions of 3rd molars as this leads to temporomandibular joint and muscular disorders (TMJMD) .[19]

In this case all third molars were not yet erupted and the anterior face height of the patient was on the shorter side of scale. They were however kept under constant surveillance. An alternative and more common procedure would be to extract the mandibular first premolars which had already been undertaken before she landed at our institute based orthodontic clinic.

CONCLUSION

Before launching a final orthodontic decision and to address these difficult grey zone clinical situations of class III malocclusions through dentoalveolar compensation, the clinician must comprehensively discuss the whole treatment plan and s/he must weigh carefully all the benefits and potential risks/cost of this conceivable choice. If the benefits outweigh the cost, this approach can be chosen and is to be materialized and deemed as the final verdict in the best and overall interest of the patient. The biomechanics we applied were purely customized and tailored according to this strategy, for this technically difficult and challenging patient. This rendered a boost to our treatment flow, helped utilized maximum patient compliance and thus overwhelmingly gained momentum in the provision of a stable and esthetically balanced functional occlusion.

REFERENCES

1 Mitani H, Sato K, Sugawara J. Growth of mandibular prognathism after pubertal growth peak. Am J Orthod Dentofacial orthop 1993; 104: 330-6.

2 Bishara SE. Orthodontic diagnosis and treatment planning. In: Bishara SE, ed. Text book of orthodontics. Philadelphia, WB Saunders Co; 2001: 98-112.

3 Janson G, Prado de Souza JE, Alves FA, Andrade P, Nakamura A, Roberto de Freitas M, et al. Extreme dentoalveolar compensation in the treatment of class III malocclusion. Am J Orthod Dentofacial Orthop2005; 128: 787-94.

4 Proffit WR. Interach elastics: their place in modern orthodontics. In Hosl E, Baldauf A, eds. Mechanical and Biological Basics in Orthodontic Therapy. Germany : Huthig ; 1991 : 173-78

5 Woodside D. Do functional appliances have an orthopedic effect? Am J Orthod Dentofacial Orthop1998; 113: 11-4.

6 Bilodueau J. Vertical consideration in diagnosis & treatment: a surgical orthodontic case report. Am J Orthod Dentofacial Orthop 1995; 107: 91-100.

7 Stellzig-Eisenhauer A, Lux C, Schuster G. Treatment decision in adult patients with Class III malocclusion: Orthodontic therapy or orthognathic surgery? Am J Orthod Dentofacial Orthop 2002; 122: 27-38.

8 Bilodeau J. Correction of a severe Class III malocclusion that required orthognathic surgery: a case report. Semin Orthod 1996; 2:279-88.

9 Lin J, Gu Y. Preliminary investigation of nonsurgical treatment of severe skeletal Class III malocclusion in the permanent dentition. Angle Orthod 2003; 73:401-10.

10 Fukui T, Tsuruta M. Invisible treatment of class III female adult patient with severe crowding and cross-bite. J Orthod 2002; 29:267-75.

11 Kondo E, Ohno T, Aoba T. Nonsurgical and nonextraction treatment of a skeletal class III patient with severe prognathic mandible: long term stability. World J Orthod 2001; 2: 115-26.

12 Hong R, Ahn J, Soh B. Correction of anterior crossbite with combination technique. J Clin Orthod 1998; 32: 557-61

13 Frank C, The nonsurgical orthodontic correction of Class III malocclusion. Am J Orthod dentofacial Orthop 1993; 103: 107-14.

14 Suri S, Utreja A. Management of a hyperdivergent Class III malocclusion, maxillary midline diastema, and infected mandibular incisors in a young adult. Am J Orthod dentofacial Orthop 2003; 122: 15-26.

15 Lew K. Soft tissue profile changes following orthodontic treatment of Chinese adult with class III malocclusion. Int J Adult Orthod Orthognath Surg 1990; 5: 59-65.

16 Sarikaya S, Haydar B, Ciger S, Ariyurek M. Changes in in alveolar bone thickness due to retraction of anterior teeth. Am J Orthod dentofacial Orthop 2002; 122: 15-26.

17 Maynard J Jr, Ochsenbein C, Mucogingival problems, prevalence and therapy in children. J periodontal 1975; 46: 543-52.

18 Kim Y. Anterior open bite and its treatment with multiloop edgewise archwire. Angle Orthod 1987; 57: 290-321.

19 James R. Miller and Lioyd Mancl. Risk factors for the occurrence and prevention of temporomandibular joint and muscle disorders: Lessons learned from 2 recent studies. Am J orthodontics Dentofacial orthop 2008; 134: 537-42.