

TREATMENT OF CLASS III MALOCCLUSION WITH FACEMASK THERAPY IN LATE MIXED DENTITION

Dr Amal Kumar Chakrabarti¹, Dr Bides Bhaumik²,
Dr Kesang Drolma³, Dr Anusree Paul⁴

ABSTRACT

Class III malocclusion is one of the most challenging problems to be treated in orthodontics. Several treatment protocols have been advocated for the correction of class III malocclusion. The effects of facemask therapy have been well documented in literature. Although treatment in early mixed dentition period gives better results, treatment results can also be successful when used during late mixed or early permanent dentition. Following is a case report of a 12 year old female patient who was treated for class III malocclusion using facemask therapy.

KEY WORDS

Class III malocclusion, RME-Facemask, late mixed dentition, growing patient, case report

ABOUT THE AUTHORS

1. Associate Professor 2. Professor and HOD
3. Final year Post Graduate Student
Department of Orthodontics and Dentofacial Orthopaedics
Dr. R. Ahmed Dental College and Hospital, Kolkata
4. Consultant Orthodontist, Kolkata, West Bengal

INTRODUCTION

Until the 1970s, class III malocclusion was generally viewed as a problem of the mandible. The terms mandibular prognathism and class III malocclusion were considered synonymous.¹ However, now it is obviously clear that class III malocclusion has a multifactorial etiology. It can be due to dimensional disharmonies of various craniofacial skeleton involving the cranial base, maxilla or the mandible. In a cephalometric study, Ellis and McNamara found out that 45.5% of class III malocclusion was due to maxillary retrusion.² The treatment plan in such condition should aim towards correction of the maxillary retrusion rather than the mandible. Another important factor in decision of the treatment plan besides the type of malocclusion is the timing of the treatment. It is best to treat class III malocclusion when growth allows protraction of the maxilla. Patients, in whom growth has ceased, treatment includes orthodontic camouflage treatment in mild to moderate cases and orthognathic surgery in moderate to severe cases. In this case report, a 12 year old female patient was treated for class III malocclusion with reverse pull headgear or facemask.

DIAGNOSIS AND ETIOLOGY

A 12 year old female reported with complaint that the lower jaw was forwardly placed. She presented in mixed dentition stage with deciduous canines in upper arch and deciduous canines and molars in lower arch. She had skeletal and dental class III malocclusion. The facial profile was concave with retrusive upper lips and no gross asymmetry was noted. Intraorally, maxillary arch was in crossbite except premolars and molars on the left side. A negative overjet of 2mm was present in the anterior region. A mild asymmetry was noted in both the arches with right side of the arch slightly constricted lingually. Midlines of upper and lower arches coincided. Centric relation and centric occlusion were coincident as well indicating a true class III malocclusion (Figure 1; Table 1). There was no report of any kind of temporomandibular joint disorder.



Figure 1: Pretreatment photographs

Cephalometric analysis indicated a class III sagittal relationship ($ANB = -5^\circ$, $AO-BO = -9\text{mm}$) with a retrognathic maxilla ($SNA = 80^\circ$, $NaPerp$ to $A = -1.5\text{mm}$) and a prognathic mandibular position ($SNB = 86^\circ$, $NaPerp$ to $Pog = +5\text{mm}$). (Figure 2)

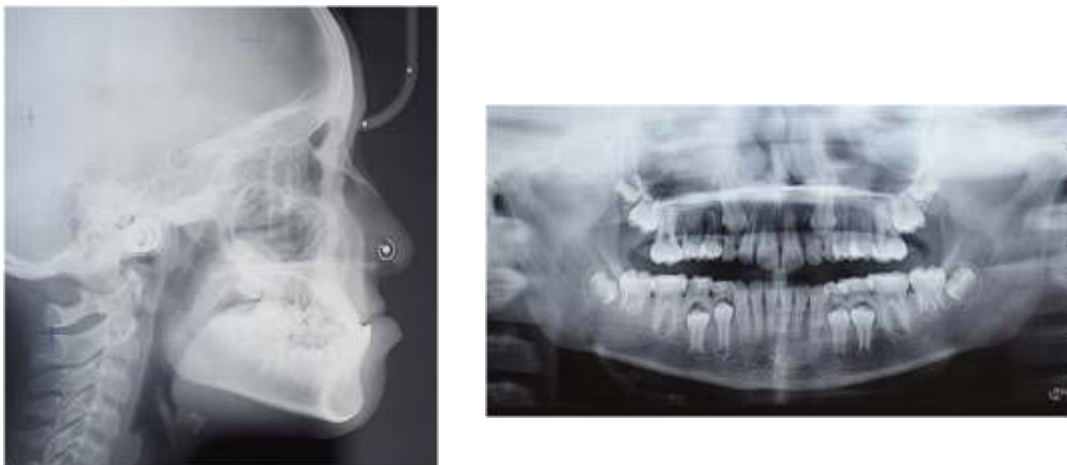


Figure 2 : Pretreatment cephalogram and orthopantomogram



Figure 3A



Figure 3B



Figure 4 : Introral photographs post facemask therapy

TREATMENT OBJECTIVES

The objectives of phase I included

- Correction of transverse and sagittal arch discrepancies
- Correction of posterior and anterior crossbites

Objectives of phase II included

- Leveling and alignment of both the arches
- Achieving positive overjet
- Achieving class I canine and molar relationship

TREATMENT PLAN

Treatment decided for this case was growth modification which was to be done by maxillary expansion first to correct the posterior crossbite as well as loosening the circum-maxillary sutures to facilitate maxillary protraction with reverse headgear or face mask therapy for correction of sagittal skeletal discrepancy followed by finishing and detailing with fixed orthodontic appliance.

TREATMENT ALTERNATIVE

- Posterior bite block appliance in maxillary arch

with chin cup therapy. Chin cup therapy may bring about some amount of downward and backward rotation of the mandible and retroclination of the lower incisors which will help in improving the overjet. But since the maxillary sagittal position cannot be influenced with this treatment alternative, proper overjet cannot be established and profile cannot be improved.

- Another option given to the patient was to wait till eruption of all permanent teeth and then treat with combined orthodontic and surgical procedure but patient refused to undergo surgery and instead continue with facemask therapy.

TREATMENT PROGRESS

A bonded rapid maxillary expansion appliance with Hyrax screw was delivered. Patient had been wearing the appliance for a week before any activation of the screw was done. After a week when the patient had been accustomed to the appliance, activation of the screw was initiated once daily by ½ turn for 10 days. Facemask therapy was initiated 10 days after initiation of activation of the RME screw (Figure 3A & B). A force of 8 oz/side was delivered for four weeks with 3/8" extraoral elastic. The force was subsequently increased by using 3/8" 14 oz for four weeks followed by 5/16" 14 oz for four weeks and finally the force was increased and maintained using ¼" of 14 oz/ side. Patient was advised to wear the appliance atleast 14 hours per day. This phase of the treatment continued for 10 months (Figure 4).



Figure 5 : Pre debonding photographs

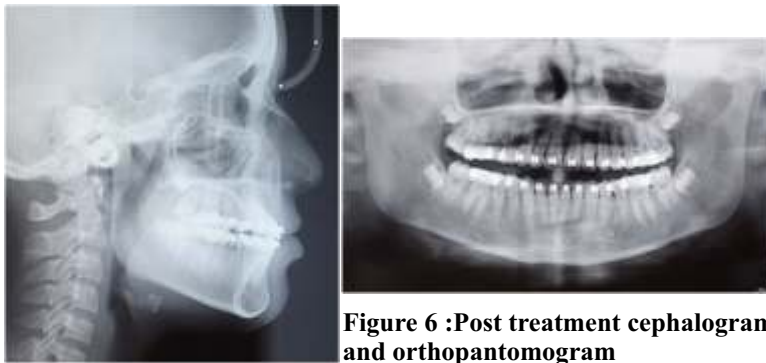


Figure 6 :Post treatment cephalogram and orthopantomogram



Figure 7 :Overall cephalometric superimposition(black-pretreatment; red-post treatment)

Following this phase, a maxillary removable plate was given to retain the effects achieved with RME and facemask therapy. The fixed treatment was not started until the occlusion had settled. After a period of 2 months, 022 slot fixed appliance with MBT prescription was placed. Aligning and leveling of the arches were done and class III intermaxillary elastics were given to achieve class I molar and canine relation. The total treatment time was 22 months.

TREATMENT RESULTS

Patient compliance was good with both facemask and elastics. The objectives of the treatment were achieved. The profile and upper and lower lip relationship improved. Correction of crossbite and positive overjet of 1mm was achieved (Figure 5).

Variables	Pre-treatment	Mid-treatment	Post-treatment
SNA	80°	83°	81°
SNB	86°	85°	83°
ANB	-5°	-1°	-3°
Wits appraisal	-9mm	-6mm	-7mm
Upper incisor to SN	113°	114°	117°
IMPA	92°	90°	90°
FMA	21°	24°	23°
Y-axis	57°	64°	63°
LAFH	53mm	61mm	60mm
Facial axis angle	+5.5°	0°	-3°
Facial angle	94°	92°	90°
H angle	6°	12°	14°
Ricketts lip analysis upper	-6mm	-4mm	-3mm
lower	+2mm	-0.5mm	0mm

Table 1 : Pre, mid and post treatment cephalometric values



Figure 8: Eight month post treatment photographs

DISCUSSION

Class III malocclusion can be considered as one of the most challenging problems in mixed dentition period.³ If the patient is presented at an early age, correct treatment can bring good results. And also it is important to identify the cause of the problem and address to it. A review of literature shows that the recommended age for starting maxillary protraction therapy to achieve good orthopaedic effect is prior to

fusion of intermaxillary sutures^{4,6}. Nevertheless, it is also possible to treat patients in late mixed dentition period and achieve good results as was in this case.

In this report, the patient presented with a class III malocclusion with retrusive maxilla that was treated with facemask therapy. Maxillary expansion with Hyrax screw was utilized to correct the posterior crossbite and causing disarticulation of the midpalatal and circum-maxillary sutures followed by facemask therapy. With good patient compliance, the

effect of maxillary protraction was evident as the facemask therapy began. The SNA angle increased from 80° to 83° and ANB angle reduced from -5° to -1°. The upper incisor to SN increased from 1130 to 1140 showing mild proclination due to facemask therapy. A small improvement was in the SNB angle from 86° to 85° and very little retroclination (2°) of lower incisor was seen (Figure 6 & 7)(Table 1).

Due to protraction of the maxilla, a downward and backward rotation of the mandible and increase in lower anterior facial height occurred (Table 1). This is a common effect and has been reported in past cases 5,7,8 as well. Both skeletal and dentoalveolar effects of facemask therapy resulted in correction of the malocclusion and an overall normalization of the unesthetic facial concavity. Figure 8 shows 8 months post treatment photographs.

CONCLUSION

Class III malocclusion can be treated if it is presented at an early age while there is still some active growth left. RME- facemask therapy can be successfully used to treat patients during late mixed dentition period as well.

REFERENCES

1. Jacobson, A. Evans, WB. Preston C. Mandibular prognathism. *Am J Orthod.* 1974;66:140–71.
2. Ellis, E. McNamara JJ. Components of adult class III malocclusion. *J oral Maxillofac Surg.* 1984;42:292–302.
3. Al-Mozany, S., Dalci O., Almuzian, M., Gonzalez, C., Tarraf, NE., and Ali M. A novel method for treatment of Class III malocclusion in growing patients. *Prog Orthod.* 2017;18:40–8.
4. Cha K. Skeletal changes of maxillary protraction in patients exhibiting skeletal Class III malocclusion: a comparison of three skeletal maturation groups. *Angle Orthod.* 73:26–35.
5. Merwin, D., Ngan, P., Hagg, U., Yiu, C., Shy W. Timing for effective application of anteriorly directed orthopedic force to the maxilla. *Am J Orthod Dentofac Orthop.* 1997;(112):292–9.
6. Baccetti T, Franchi L MJ. The cervical vertebral maturation (CVM) method for the assessment of optimal treatment timing in dentofacial orthopedics. *Semin Orthod.* 2005;(11):119–29.
7. Kapust AJ, Sinclair PM TP. Cephalometric effects of face mask/ expansion therapy in Class III children: a comparison of three age groups. *Am J Orthod Dentofac Orthop.* 1998;(113):204–12204–12.
8. Ngan P, Cheung E WS. Comparison of protraction facemask response using banded and bonded expansion appliances as anchorage. *Semin Orthod.* 2007;(13):175–85