Case Report

Class III Malocclusion Orthopaedic Correction: Case Report

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ABSTRACT

Class III malocclusion is one of the most difficult problems to treat in the mixed dentition. It has a multifactorial etiology involving both genetic and environmental causes. The dental and skeletal effects of maxillary protraction with a facemask therapy are well documented in several studies. Although treatment in the late mixed or early permanent dentition can be successful, results are generally better in the deciduous or early mixed dentition. The following case shows early treatment of a young patient with maxillary deficiency using a facemask.

Key words: Class III malocclusion, facemask therapy, maxillary deficiency.

INTRODUCTION

According to the British Standard Institute (BSI), the class III incisor relationship is defined as one in which the lower incisor edge lies anterior to the cingulum plateau of the upper incisors, with reduced or reversed overjet .[1] In terms of angle classification, a class III malocclusion is one in which the lower molar is mesially positioned relative to the upper molar, with no specifications with regard to the line of occlusion .[2] Class III malocclusion may occur as a result of skeletal or dental discrepancies and is a source of esthetic and functional impairment to the individual.[3] Prevalence of Class III is greater in Asian population compared to Caucasians, ranging between 4% and 13% in Japanese, 7.8–15.2% in Iranians, and between 4% and 14% among Chinese.[4,5,6] The prevalence of this malocclusion in Indian population is reported to be about 3.4%.[7] Ellis and McNamara found the most common type of Class III malocclusion to be maxillary skeletal retrusion combined with mandibular skeletal protrusion (30.1%), followed by pure maxillary retrusion (19.5%) and pure mandibular protrusion (19.2%).[8] Since Class III malocclusions are the most prevalent type which require orthognathic surgery, early treatment of this discrepancy is of paramount importance as it can minimize or even avoid surgeries at a later stage.[9] Early intervention is mandatory for many reasons, including the prevention of the traumatic occlusion of the lower incisors, which may lead to the development of periodontal problems; the prevention of true class III malocclusion and also providing enough space for the erupting permanent maxillary canines by proclining the upper incisors.[10] However, Class III skeletal malocclusion is notorious for relapsing after the completion of early stage of treatment. Patients with a significant mandibular prognathism require constant monitoring and may need further facemask therapy.[11] Hence, proper case selection, a prolonged duration of treatment, and long-term follow-up is necessary for orthopedic growth modification to be deemed successful. In the last two decades, a combination of rapid maxillary expansion (RME) along with a facemask to protract the maxilla has become a standard protocol in the early management of cases with maxillary deficiency.[12] This case report presents the use of the above procedure for the successful management of Class III malocclusion with maxillary deficiency in a 10-year-old patient.

CASE REPORT

A 10-year-old male patient reported to the Department of Orthodontics and Dentofacial Orthopaedics in Regional dental college and hospital, Guwahati, Assam ,with the chief complaint of irregularly placed upper front teeth and forwardly placed lower teeth. No relevant pre- and post-natal history or family history was reported. On extraoral examination, the patient showed a concave profile with deficiency in maxillary projection (figure 1). His lower lip was positioned ahead of the upper. He had an average clinical FMA and an acute nasolabial angle. His smile was unesthetic, revealing 1 mm of upper incisors, and 8 mm of lower incisors indicating a vertical

maxillary deficiency.

Fig: 1 Extraoral and Intraoral records

Records such as study casts, OPG, cephalogram (figure 2) and photographs were taken for the evaluation and confirmation of the diagnosis. Intraoral examination revealed gingiva was normal and dental crossbite in anterior with a reverse overjet of -4 mm and overbite 6mm. Temperomandibular joint function was normal with no pain on palpation, no clicking, popping, or crepitus noise, and a normal range of motion. Cephalometric analysis indicated a skeletal Class III pattern due to a retrusive maxilla and prognathic mandible with horizontal growth pattern and Skeletal maturity indicated CVMI Stage 3rd which shows growth potential 25-65%.

TREATMENT OBJECTIVES

The purpose of treatment was to correct the sagittal and transverse arch discrepancies through stimulation of maxillary growth and redirection of mandibular growth; correct the anterior crossbite; and obtain Class I molar and canine relationships with correct overbite and overjet along with coincident midlines. Early protraction facemask therapy could effectively reduce the skeletal discrepancy, simplifying

orthodontic treatment and reducing the tendency to relapse. The patient was young enough that good cooperation could be expected.

TREATMENT PLAN

The patient was concerned about his dental and facial esthetics. The use of facemask to correct the anterior crossbite and improve facial aesthetics. The patient choose to proceed with treatment plan because of a desire to improve his dento-facial appearance.

TREATMENT PROGRESS

Treatment was started with RME device which consisted of a HYRAX screw (Leone, Italy) with an expansion range of 13 mm. It had hooks incorporated on the buccal aspect at the position of the deciduous canines to engage the elastics for a facemask. This appliance was cemented in place in the patient's mouth. The screw was daily activated for a ½ turn for a period of 10 days. It has been stated that even in patients who do not require any increase in transverse dimension; the appliance should be activated for 8–10 days prior to facemask placement. After the disjunction, the screw was sealed, and PETIT type face mask therapy was started (figure 3). Patient was instructed to wear facemask for a duration of 14 hours per day. The approximate duration of wear as reported by the patient's parents 2 weeks later was 14–15 hours. The direction of pull was forward and downward, directed approximately 30° to the maxillary occlusal plane. Starting with a force level of 150 g on each side, it was increased to 300 g on each side from the 2nd week. After 1 month of wear, the force imparted was increased to and was maintained at 450 g bilaterally. Positive overjet and Class I molar relation was achieved after 5 months, but the device was maintained for further 4 months to achieve overcorrection. The evaluation was conducted every month. Once overcorrection achieved Frankle regulator appliance was given to wear at night as a retainer till all permanent teeth erupt (figure 5)

Figure 3: Bonded Hyra and petit type facemask

TREATMENT RESULT

After active treatment, nearly all skeletal and dental objectives had been achieved. The anterior crossbite had been corrected; the sagittal discrepancy was improved significantly. The maxilla had moved forward, SNA angle had increased from 83º to 84º, SNB decrease from 85º to 83º and ANB from -2 to 1(fig 4) Table 1.

Fig 4 post treatment records.

Fig 5: Frankel Regulater Retainer

DICUSSION

Some 65% of patients present with Class III malocclusions due to maxillary hypoplasia.[8] Most of these malocclusions are severe, making it even more important to consider early orthopaedic treatment.[13] Several methods have been proposed to enhance perioral muscle function, breathing, swallowing, and chewing.[14,15]A major reason for instituting early anterior crossbite correction was to avoid the complications often associated with it, such as gingival recession labial to lower incisors,[16,17] excessive incisal wear, increased chances of temperomandibular joint dysfunction,[18] a growth pattern that worsens with age,[19] compromised dental and facial aesthetics and associated negative psychosocial effects. Rapid maxillary expansion was used along with facemask therapy in this case. Several circummaxillary sutures play an important role in the development of the nasomaxillary complex including the frontomaxillary, nasomaxillary, zygomaticotemporal, zygomaticomaxillary, pterygopalatine, intermaxillary, ethmoidomaxillary and lacrimomaxillary suture which are patent till eight years of age.[20] Patients in the primary and early mixed dentition do not require maxillary expansion for protraction. However, by the late mixed dentition period, maxillary sutures become tortuous and fuse. The use of an expansion appliance helps in “disarticulating” the maxilla and initiate cellular response in the circumaxillary sutures thus allowing for a more positive reaction to protraction forces. We used a bonded RPE appliance which offered several advantages including reducing the number of appointments, serving as posterior bite blocks to facilitate correction of anterior crossbite and reducing buccal crown tipping during expansion due to the rigidity of the appliance framework. Prospective clinical trials have shown that maxilla remained stable for 2 years and long term successful in 67%-75%.[21]

	NORMAL VALUES	PRE TREATMENT	POST TREATMENT
SNA	82 ± 2	83°	84°
SNB	80 ± 2	85°	83°
ANB	2 ± 2	-2°	1°
OP	14.5°	7°	14°
MPA	32°	19°	21°
UI-NA	22°/4mm	22°/3mm	34°/5mm
LI-NB	25°/4mm	23°/4mm	20°/3mm
UI-LI	131°	137°	128°
Upper lip to E-line	-4mm	-3.5mm	0mm
Lower lip to E-line	-2mm	5mm	0mm

CONCLUSION

Early intervention is mandatory for developing class III malocclussion. Facemask therapy is an effective method to treat Class III malocclusion in the mixed dentition. The use of palatal expansion in conjunction with maxillary protraction helps to "disarticulate" the maxilla and initiates cellular response in the sutures, allowing a more positive reaction to protraction forces enhancing the overall function and aesthetics.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests regarding the publication of this paper.

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