Modified Tandem Appliance to Control developing Class III

Case Report

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ABSTRACT

Most developing Class III patients have a retruded maxilla. Early management in mixed dentition is linked to improved patient compliance and perhaps even an improved orthopaedic response, which can lead to positive outcomes. The purpose of this report is to describe a new modified tandem appliance design and its role in treatment of a growing Class III malocclusion. An 11-year-old male patient with an anterior cross bite and a retrognathic maxilla is presented. The therapeutic outcomes of a new, modified tandem appliance at the mixed dentition stage be appreciated. The anterior cross bite was fixed in 4 months, and a 3 mm positive overjet was established after using the appliance consistently for 9 months. The patient's profile underwent a remarkable improvement utilizing this.

Key Words : Anterior cross bite, Class III malocclusion, New modified tandem appliance

INTRODUCTION

A skeletal Class III malocclusion, which affects 8% to 22% of orthodontic patients, is a common orthodontic issue. One of the abnormalities that is the most challenging to comprehend is class III malocclusion. Studies done to determine the etiological characteristics of a Class III malocclusion revealed that the deformity affects the entire craniofacial complex and is not just limited to the jaws. The majority of individuals with Class III malocclusions displayed skeletal and dentoalveolar components together[1]. Complex[2,3] factors interact to cause the phenomenon. They may work in concert or alone, or they may neutralise one another. In the development of Class III malocclusion, hereditary along with environmental factors plays a significant role. The prevalence of Class III malocclusion is variable and depends upon the different ethnic groups and different methods of classification used[4]. The early management of Class III malocclusion with midface deficiency is necessary because maxilla is the template for the mandible in the early stage of development. The current clinical protocol for midface deficiency was orthopaedic maxillary protraction by means of elastics to an extraoral facemask. In the present case report a new modified tandem appliance for the management of developing Class III malocclusion, which is more patient friendly and simpler than the earlier one has been presented.[5]

APPLIANCE DESIGN

The appliance has three components, two fixed and one removable. The upper fixed appliance consist of bands on permanent 1st molars, transpalatal arch and palatal expansion arms. Soldered buccal arms are used for elastic traction. The lower appliance comprises bands on permanent 1st molars, lingual holding arch, fixed bite plane for posterior occlusal coverage[6] and buccal facebow tubes. A 0.045" headgear facebow with the outer bows, modified for elastic attachment is inserted into the lower tubes. Circumferential clasps on first deciduous molars and are used for mechanical retention, which augment the stability of lower appliance and prevent rocking of it in the upward direction at anterior segment during elastic traction.

CASE REPORT

A male patient of age 11 years with chief complaint of backward positioning of upper front teeth was diagnosed with skeletal class III with maxillary retrognathism and a normal mandible. On extraoral examination, he has mild concave facial profile with midface deficiency, competent lips and no temporomandibular joint disorder or facial asymmetry [Figure 1]. Intra oral examination revealed class III subdivision molar relationship on right side and deciduous canines on upper right and upper & lower left sides, class II div 2 incisal relationship with an anterior crossbite in relation to central incisors & left

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primary canines and a negative overjet of 2 mm. [Figure 2]. No forward functional shift of mandible was noted on closing movement of mandible. The family history was non-contributory.

Fig. 1. Pre-treatment extra oral photos showing mild concave profile with maxillary deficiency.

Fig. 2. Pre-treatment intra oral pictures showing reverse overjet and class III subdivision molar relationship.

On analysis of lateral head cephalogram patient had Class III maxillomandibular relation (ANB = −6°, Wits appraisal = BO 6mm ahead of AO). There was vertical growth tendency with FMA 30°, facial axis angle 3°, and Jarabak ratio of

Fig. 3. (A) Pre-treatment lateral cephalometric radiograph. B) Pre-treatment orthopantomograph radiograph.

VARIABLES	PRE-TREATMENT	POST-FUNCTIONAL	NORMAL
ANB	-5°	-3°	2°
Wits	BO 6 mm ahead of AO	BO 2 mm ahead of AO	BO 1 mm ahead of AO
SN-GoGn	38°	38°	32°
A-Na perp	- 6 mm	- 4mm	0 ± 2 mm
Midfacial length	65 mm	71 mm	81.7 ± 3.4
Mandibular length	98 mm	100 mm	99.3 ± 3.6
Jarabak ratio%	56.56%	58.58%	62-65%
U1-NA	27°/7 mm	30°/9mm	22°/4 mm
L1-NB	21°/5 mm	4°/22mm	25°/4 mm
S line-Upper lip	1 mm	1mm±	2 mm
S line-Lower lip	4 mm	2mm	± 2 mm

Table 1. Pre and post functional lateral cephalogram.

56.56%. Maxilla was deficient and retrognathic with normal mandible. Upper and lower incisors were normally placed in their basal bone [Figure 3 and Table 1].

TREATMENT ALTERNATIVES

The patient was provided with treatment options such as Face mask and chin cup, but the patient did not opt for it.

TREATMENT PLAN AND PROGRESS

For early management of the case, we planned to use the new modified tandem appliance with the objectives of relieving anterior cross bite as early as possible to provide harmonious jaw growth. Bite registration was done after fabrication of the band on upper and lower first molars. The upper and lower models were mounted on the articulator with wax bite and then appliance was fabricated in laboratory. After fabrication of appliance; it was properly finished, polished and bands were cemented by glass ionomer luting cement. Modified face bow was adjusted so that the junction of outer and inner bow should fall at the commissure of lips for easy elastic traction application. An 8 oz elastic was used for 4 weeks, followed by 14 oz. Initially, patient was instructed to wear the appliance minimum of 10-12 h/day, including while sleeping. The wear time was

Fig. 4. Extra oral picture of modified tandem appliance in place

Fig. 5. Intra oral picture of modified tandem appliance in place.

gradually increased up to 14-16 h/day. Patient was advised to visit after 1 week to monitor the compliance and check proper adjustment of appliance, and then scheduled to recall every 4 weeks to monitor progress.

RESULT

After 4 months of appliance wear anterior cross bite was fully corrected, so at this stage we removed posterior bite blocks and continued with the protraction of maxilla. After another 6 months of appliance wear, there was positive overjet of 3 mm. The oral hygiene maintenance with the appliance was excellent. After 9 months of total appliance wear, there was positive overjet, convalesced molar occlusion and pleasing facial profile. Cephalometric evaluation revealed a skeletal improvement, an increased vertical dimension, and improvement in facial balance.

Fig. 6. Post functional extra-oral pictures showing normal overjet and improvement in facial profile.

Fig. 7. Post functional intra-oral pictures showing normal overjet and class III molar and class I cuspid relationship.

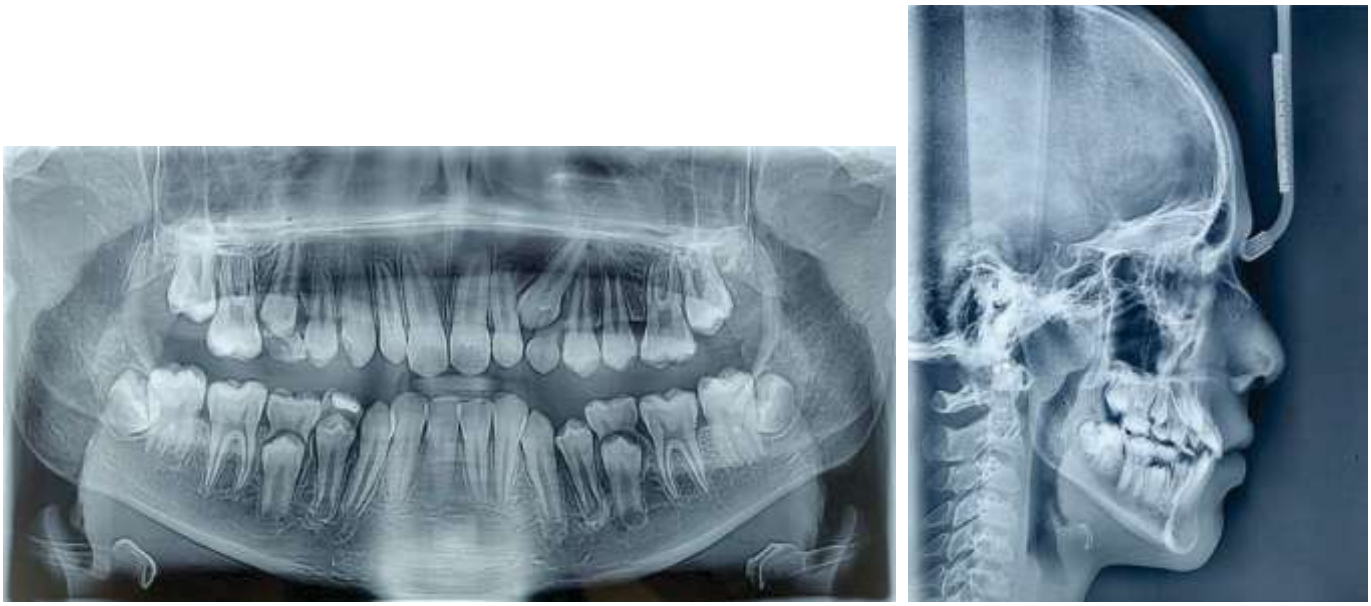

Fig. 8. (8.1) Post-treatment lateral cephalometric radiograph. 8.2) Post-treatment orthopantomograph radiograph.

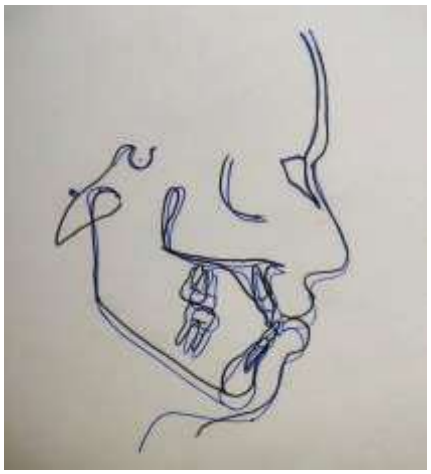

Fig. 9. Superimposition of pre and post functional lateral cephalogram.

DISCUSSION

A developing Class III malocclusion is one of the most challenging problems in orthodontics. It requires the early diagnosis and management. The objective of early orthodontic treatment of developing Class III malocclusion is to create an environment in which a more favourable dentofacial development can occur. The optimal time to intervene a developing Class III malocclusion is at the time of the initial eruption of the maxillary incisors. The therapeutic use of a Balters' Bionator[7] appliance is suggested in three subjects with anterior cross bite in mixed dentition by Giancotti et al. Turley presented the therapeutic results of orthopaedic treatment with palatal expansion and custom protraction headgear[8]. Tsai suggests the use of rapid palatal expansion and standard edgewise appliance to resolve an anterior cross bite. Rabie and Gu have used a simple method for the early management of pseudo-Class III malocclusion in the mixed dentition with fixed appliance. The therapeutic use of a new modified tandem appliance is suggested in developing Class III malocclusion. A positive overjet and overbite at the end of the treatment appears to maintain the anterior occlusion[9]. The overcorrection is required for long term stability in growing Class III malocclusion; because skeletal patterns generally continue to grow in the original direction after initial treatment. The increased level of patient cooperation with this appliance, combined with the ability to protract the maxilla, makes this appliance extremely valuable in early treatment of developing Class III malocclusion. In the present case there has been forward and lower rotation of the mandible which could have been prevented by giving chin cup along with the appliance but as the patient did not wish to wear it desirable results could not be achieved[10]. The new modified tandem appliance provides a tooth born anchorage system that combines skeletal and dentoalveolar movement[11]

CONCLUSION

The new modified tandem appliance has more fixed components and is an alternative to non-compliant patients who refuse to wear heavy extra oral orthopaedic appliances. It can also be used with upper arch expansion. It will be a valuable tool in the armamentarium of orthodontics to cope up with the developing Class III malocclusions.

Advantages of modified tandem appliance :

•Less bulky than a face mask and fixed components increase patient acceptance.

•Less expensive compared to conventional Tandem appliance.

•Upper incisors are not bonded and engaged so there's minimal force on teeth to procline them.

•Since the force vector is closer to the centre of resistance of maxilla, protraction can be expected rather than mesial tipping of upper molars.

Disadvantages of modified tandem appliance:

•Clockwise rotation of mandible and increase in lower facial height maybe undesirable in typical class III cases.

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