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Management of skeletal Class III malocclusion with face mask therapy in a 10 year old male patient- A 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. Orthopedic correction of skeletal Class III malocclusion in a growing patient is crucial as it can circumvent future surgical procedures. The dental and skeletal effects of maxillary protraction with a facemask 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 severe anterioposterior maxillary deficiency, using a facemask .

Keywords: Class III malocclusion, facemask therapy, growth modification, maxillary deficiency.

Introduction

Class III malocclusions are usually growth-related discrepancies which often become more severe until growth is complete. These factors tend to complicate the treatment, and the use of somewhat unusual appliance systems is often required so that surgery should not be part of the plan[1].

The prevalence of this malocclusion in Indian population is reported to be about 3.4%. Ellis and McNamara concluded that the most common combination of variables in an adult Class III malocclusion were a retrusive maxilla, protrusive maxillary incisors, retrusive mandibular incisors, a protrusive mandible, and a long lower facial height Further, on an average, 60% of Class III malocclusions are characterized by maxillary deficiency. 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. Proper case selection, a prolonged duration of treatment, and long-term follow-up is necessary for orthopedic growth modification to be deemed successful[2]. Among the approaches for treating Class III malocclusion is the use of orthopedic appliances, such as chincups, facial masks, functional orthopedic appliances of the jaws, preventive orthodontic appliances (e.g : Eschler arch and Porter appliance or "W" arch), multibracket fixed appliances and a combined orthodontic and orthognatic surgery protocol[3].

This case report presents the use of the above procedure for the successful management of Class III malocclusion in a 10-year-old patient using a reverse pull headgear (facemask) therapy resulting in successful correction of the malocclusion.

Case report

A 10 years old male patient accompanied by his father reported to the Department of Pedodontics and Preventive Dentistry, Himachal Dental College Sundernagar, Himachal Pradesh with a chief complaint of an over grown lower jaw. The patient did not give any relevant pre- and post-natal history or family history.

On extraoral examination, the patient showed a concave profile and anterior divergence with deficiency in maxillary projection. His lower lip was positioned ahead of the upper. The patient's smile was unaesthetic.

Intraoral examination showed the patient to be in a mixed dentition stage. The first molars were in a Class III relation on both sides. Evaluation of lateral cephalograms was done, according to which SNA was 70^0, SNB was 72^0 and hence the ANB was -2^0. This confirmed that the discrepancy was skeletal Class III malocclusion. A comprehensive and detailed treatment plan was made based on the extraoral/intraoral findings and the radiographic investigations carried out. A facemask therapy was planned to achieve the ideal orthopedic effect required for the correction of skeletal discrepancy. As the patient was at a mixed dentition stage, with great potential of growth, so the main goal of the treatment was to correct the forward deviation of the mandible by allowing the maxilla to be in forward position than mandible thus improving the facial esthetic of the patient as per the chief complaint of the patient.

Figure 1: Preoperative picture, lateral cephalogram and panoramic radiograpgh

Treatment plan

To correct the vertical and anteroposterior maxillary deficiency, it was decided to protract the maxilla using a Petit Facemask.

Treatment procedure

The face mask was adjusted to rest on the forehead and the chin of the patient. Elastics (5/16 inch by 14 ounces) were worn from hooks located 2-3 cm in front of the lips to the intraoral attachments located on the expansion appliance, approximately at the gingival level of the canine.

Figure 2

The force generated by the elastics was 600-800g bilaterally. The reverse pull headgear was attached to two hooks incorporated in the anterior region of the maxillary dentition. The approximate duration of wear for the reverse pull gear was 14–15 hours (mostly during night hours) as reported by the patient.

Follow up after two month

After a period of two months, the patient was evaluated.

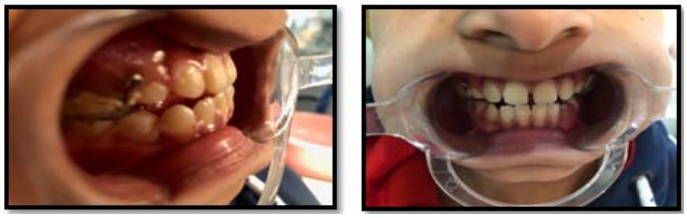

Figure 3

The evaluation showed an edge to edge incisal and molar relationship. Thereafter the patient was again called for follow-up.

Follow up after six months

Follow up after four months was done by assessing the patient by taking the lateral cephalogram and the study model casts.

Figure 4: Posttreatment extraoral and intraoral pictures posttreatment lateral cephalogram.

Post-operative follow up

	Normal	Pre-operative	Post-operative
SNA	82^0	70	78
SNB	80	72	77
ANB	2	-2	1
FMPA	25	30	30
IMPA	90	98	93
FMIA	65	69	65
I-I	135	122	125
Y -axis	59	66	64

Discussion

From time to time, controversies have arisen over the effect of orthopedic force upon the maxillofacial complex. Graber and Sassouni did a study to determine the effect of orthopedic forces. Both conclude that it is possible to alter the vertical and anteroposterior proportions of the face by orthopedic means, that is, by influencing the position and size of the maxilla and the mandible.The purpose of the present report is to describe severe Class III malocclusion cases treated in the mixed dentition by using Face mask[7].Forward growth of the maxilla at an early stage is more desirable when considering various treatment options to treat skeletal class III malocclusion .

While considering maxillary protracting appliance combined with chincup for the therapy the entire maxillary base is moved anteriorly with elastics running horizontally from the buccal hooks on the upper first molars to the horns extending from the chin cap. Mandibular prognathism is reduced by the chincup. The force for maxillary protraction is about 400gm. The chincup is pulled up by 800 gm. Therefore, the total retraction force for mandible is about 1.2 kg. The upper first molars are reinforced for anchorage purposes by a smifixed palatal plate with vertical tubes and lingual aspect of maxillary molars[7].

Alcan et al. (2000), reported SNA changes of 2.29 degrees with marked dental effects with 17 hours of facemask use for 3 months. Vaughn et al. (2005) reported facemask use 24 hours a day for 6 months and observed

SNA increments of 3 degrees with few dental effects. These results are similar to those reported by Tortop et al. (2007) and Keles et al. (2002), who had patients use the facemask for 16 hours a day. After analysing the results of the articles regarding the time of facemask use, it is observed that the studies requiring 16 hours of use obtain greater maxillary protraction with minimal dental effects, which is similar to what is obtained when using the apparatus for 24 hours. Therefore, face mask should be used for 14-16 hours a day for obtaining desirable results[8]. In this case, patient used facemask for 12-14 hours, mostly during the night time for a period of six months.

In the present case report, there was no need for maxillary expansion as patient already had a wide maxillary arch. The change was required in the anterioposterior position of the mandible followed by correction of severe sagittal discrepancy of maxilla and mandible.

The case reported shows that early management of class III malocclusion with a facemask is an effective and successful modality when deciding the treatment part and also is a successful alternative to surgeries. Multiple stages of orthopaedic intervention may be required, and thus these patients must be monitored until all major facial growth is complete . The ideal timing of facemask therapy as summarized by various authors[9] :

- Early mixed dentition : Bacetti, Mc Gill, Franchi, McNamara
- Before the patient is 10 years of age : Kim, Viana, Graber
- Pre and mid pubertal group showed significant increase in SNA and maxillary length, while late pubertal group showed only a less significant increase in SNA :Takada
- The optimal time to intervene a class III malocclusion is when incisors erupt : William Proffit.

Pearson, Heckman, and Hirose et al. reported that the chincap could control dentoalveolar growth and reduce lower facial height. Wendel and Nanda also reported that the mandible exhibited less downward displacement relative to the cranial base as a result of chincap therapy. These findings may indicate that the mandibular position is more alterable vertically than anteroposteriorly, and such effects could exist for a longer period in the face[10] . Miniscrew anchorage could also be used in patients older than 10 years whose permanent lateral incisors and canines have erupted. Bone quality in the mandibular anterior region needs to be sufficient, or a bi-cortical approach for miniscrew insertion considered. As always, the risk of inflammation or infection should be monitored [11] . Camouflaging for Class III cases would be successful if malocclusion was corrected without affecting the facial appearance and involves a combination of lower incisor retraction and forward movement of maxillary incisors. When the lower incisors are retracted, the chin generally appears prominent [12] .

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