
Interception of Skeletal Class 3 Malocclusion with Frankle 3 Appliance in Late Mixed Dentition A Case Report

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Abstract:

Class III malocclusion can be classified as dentoalveolar, skeletal or functional, which will determine the prognosis. The aim of this article was to describe and discuss a clinical case with skeletal Class III malocclusion treated with frankle 3 appliance and fixed mechanotherapy and followed up for two years.

Introduction:

Skeletal class III malocclusion is a growth related problem either could be due to retrognathic maxilla or prognathic mandible or a combination of both.¹ The optimal treatment time for skeletal class III due to retrognathic maxilla and normal mandible is early mixed dentition as anterior crossbite due to retrognathic maxilla will further restrict the maxillary growth.^{2,3} There are various appliances in paedodontic and orthodontic literature described for treating skeletal class III malocclusion.³⁻⁶ In our case we opted for frankle 3 in place of all other appliances because patient demanded a removable intraoral appliance.

Case Report:

A 11 years and 10 months old male patient in the mixed dentition stage (second transitional period) was referred for treatment with a chief complaint of an anterior crossbite. During the clinical interview, the presence of this malocclusion in other family members was reported. Facial evaluation showed lack of development of the middle third. Intraoral examination revealed a with a mesial molar relationship, and a crossbite of the four permanent incisors. Pre treatment photographs and radiographs are shown in figure 1.

A panoramic radiograph revealed the presence of all permanent teeth either erupted or in several developing stages. Careful evaluation of lateral cephalograms confirmed a Class III malocclusion, with an obtuse nasolabial angle, and a horizontal growth pattern.

Following the confirmation of a Class III malocclusion through the cephalometric analysis, clinical differential diagnosis was accomplished by verifying the occlusion pattern at either the intercuspal position (IP) or at the centric relation (CR). The patient showed no functional shifting of the mandible. This clinical and cephalometric findings confirmed a skeletal Class III malocclusion due to the maxillary retrognathism.

The patient was at a late mixed dentition stage, with almost 40 percent of growth left as confirmed from hand and wrist radiographs, so the main goal of the treatment was to correct the anterior crossbite, and allowing the maxilla to be in a forward position in relation to the mandible, thus affording a normal development.

The proposed treatment protocol comprised the interception of maxillary retrognathism with frankle 3 and settling the occlusion with fixed mechanotherapy and observe the patient for the relapse of the class III tendency.

The patient was on frankle 3 (figure 2) treatment for 8 months wearing the appliance part time (only in the evenings) for first 2 months and full time wear for 6 months, the anterior cross bite got corrected and immediately after the crossbite correction the fixed mechanotherapy with straight wire was started and debonded after 6 months after settling the occlusion. The patient was followed for 2 years period after debonding. Post treatment photographs figure 3.

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Discussion:

In this case, Class III was intercepted with frankle III, and a fixed appliance was installed only to correct small rotations, the anterior diastema, and to improve axial teeth relationships. After the cephalometric analysis (Table 1), it was verified that the SNA angle was increased, while the SNB angle and mandibular plane angle were unaltered during the interceptive phase. This suggests that the treatment using frankle III therapy was very effective. The measurements representing the vertical position of the mandible, FMA, and SN.GoGn were stable. The linear and angular measurements of the upper and lower incisors were maintained at pretreatment levels. The anterior crossbite corrected possibly due to the positive growth effect of the retrognathic maxilla.

Fixed orthodontic treatment was initiated immediately after the use of frankle 3 therapy. Table 1 shows the cephalometric values at the initial, and 2-year post-corrective follow-up. It was observed that the ANB angle improved and maintained till 2 year follow up due to the stability of both SNA and SNB angles, as well as those for FMA and SN.GoGn. The measurements were related to incisor inclinations remained stable at the 2-year follow-up, contributing for the maintenance of the positive overjet.

The cephalometric analysis of the case under study was demonstrated an increase of the ANB angle, and mandibular plane stability. The ANB was altered to a favorable value in the relationship of the jaws due to the treatment. The functional Regulator was developed by Rolf Frankel of Zwickau, Germany in 1966.⁷ The Frankel appliance is used to effect changes in sagittal, transverse, and vertical jaw relationships and remove the abnormal muscle forces in the labial and buccal areas that restrict skeletal growth,

thereby, providing an environment which maximizes skeletal growth. Four main types of functional regulators have been described by Frankel. They are the FR I, II, III and IV. One of these appliances, the FR-III is used in the treatment of skeletal Class III malocclusion. This appliance is used during early mixed dentition stage to correct skeletal Class III malocclusion, characterized by maxillary skeletal retrusion and no mandibular prognathism. The correct fabrication of FR-III is required. In order to do it, one must pay attention to the following points: mixing the alginate impression material in a thick consistency, optimum vestibular depth, oblique mounting of casts in the verticulator, minimum incisal vertical height of construction bite, sufficient working model trimming, rectangular wax relief of the occlusal margin area in the working cast and a palatal bow of 1.2 mm heavy wire.^{8,9} According to previous studies¹⁰⁻¹² they suggested the frankle 3 corrects the maxillary retrognathism by relative downward rotation of the mandible and by proclination of the upper and retroclination of lower incisors but in our given case the none of these changes can be demonstrated and the anterior crossbite is corrected due to the growth of the maxillary skeletal base. This variation in findings can be attributed variations in fabrication of frankle 3 appliance and proper selection of cases.

Conclusion:

This study demonstrated the achievement of optimal results, and the stability of the correction of a functional Class III malocclusion treated with a frankle 3 and followed by corrective orthodontics. In spite of the good outcomes achieved in this case, further long-term clinical investigations are necessary to assure the stability of Class III treatment.

TABLE 1:

	ANGLES	PRE TREATMENT	POST TREATMENT
1	SNA	74	79
2	SNB	80	81
3	ANB	-6	-2
4	Go Gn to SN	32	32
5	Occl. Pl to SN	14	14
6	U1 to N-A(mm)	10	7
7	U1 to N-A (Angle)	30	30
8	L1 to N-B (mm)	4mm	4
9	L1 to N-b (Angle)	22	22
10	Int. Inc. Angle	128	129



Fig. 1a frontal.



Fig. 1b left profile.



Fig. 1c right profile.



Fig. 1d right intra oral.



Fig. 1e left intra profile.



Fig. 1f opg.



Fig. 1g lateral cephalogram.



Fig. 1h hand and wrist radiograph.

Fig. 1. Pretreatment photos.



fig. 2a. front view.



fig. 2b. top view.

Fig. 2. Frankle 3 appliance.



3a



3b

fig. 3a and 3b. end of frankle treatment frontal and profile.



3c



3d



3e

fig. 3c, 3d, 3e post frankle intraoral.



fig. 3f. straight wire appliances for settling the occlusion.



fig. 3g. end of occlusal settlement.



3h



3i

fig. 3h and 3i. follow up frontal and profile,



fig. 3j. follow up lateral cephalogram.

Fig. 3. Post treatment photos.

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