

Case Report

A custom made appliance for correction of anterior crossbite in Class III malocclusion

ABSTRACT

Anterior crossbite is the most important concern in a patient with a Class III malocclusion. The current report demonstrates the use of a custom made removable appliance in a patient unwilling for fixed orthodontic therapy.

Keywords: Class III, crossbite, removable appliance

DIAGNOSIS AND ETIOLOGY

A 13-year-old male reported to the Department of Orthodontics with the chief complaint of backwardly placed upper front teeth and lower teeth closing ahead of upper teeth. On extraoral examination, the patient had a concave profile, obtuse nasolabial angle, and prominent chin [Figure 1]. Intraoral examination revealed Angle's Class III malocclusion with reverse overjet of 2 mm, retained 53 and spacing present in upper and lower arches [Figure 1]. The Orthopantomogram revealed impacted 13. The cephalometric analysis revealed a mild Class III skeletal pattern (ANB-1°) with prognathic mandible (SNB 82°) and average growth pattern (FMA 25°). The lower incisors were proclined (IMPA 105°) whereas the Upper incisors were upright (upper 1 to SN 105°) [Table 1].

TREATMENT OBJECTIVES

To correct the anterior crossbite and achieve normal overjet and overbite.

Treatment plan

The patient had a mild skeletal Class III pattern, spacing and proclination of lower dentition and upright incisor with anterior crossbite. Hence, we aimed at camouflaging the skeletal pattern and achieving normal closure of the jaws. This could be achieved by proclination of the upper incisors, consolidation and retroclination of the lower incisors by fixed orthodontic

therapy. However, the patient was not willing for fixed orthodontic treatment. Thus, we devised a removable custom made appliance to accomplish our treatment objectives. In a prior report, we have successfully used a custom made skeletal Class II corrector for Class II malocclusion.^[1] This appliance was modified to achieve our objectives in the current case. Furthermore, before sagittal correction, the transverse relation was improved by use of hyrax expander for 7 days [Figure 2] to correct the lateral cross bite. This increased the spacing in the upper arch evident as a midline diastema.

FABRICATION OF APPLIANCE

The appliance components comprised of the following component.^[1]

1. Metallic component which included wire framework, tube, pin, and NiTi coil spring
 - a. Wire framework: A wire was adapted along the buccal and lingual surfaces of upper and lower posterior teeth for reinforcing the retention of the appliance.

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A ball end wire was soldered distal to lower first molar and distal to upper canine region for the purpose of attachment of tube and pin assembly, respectively

- b. A pin component with hook was made with a 20-gauge wire and stopper was made distal to this hook with blob of solder material to avoid slippage of coil spring
- c. A tube was made by cutting a 16-gauge needle to an appropriate length, and a hook was soldered on the one end
- d. Coil spring: NiTi open coil spring of dimension

0.010" × 0.036" was used between tube and pin assembly.

2. Acrylic splint covering entire dentition was fabricated for upper and lower arches. The wire framework was embedded in the acrylic splint.

APPLIANCE ASSEMBLY

1. The components of the appliance were assembled so that the soldered hook on the tube was engaged onto the ball end at the distal aspect of canines in the upper splint and the soldered hook on the pin engaged onto the ball end distal to lower first molars in the lower splint
2. The tube and pin components were cut accordingly to the bite registered for the patient
3. Open coil springs were then inserted between tube and pin to keep the appliance in active state so as to bring the mandible in desired retruded position [Figure 3].

TREATMENT PROGRESS

A custom made appliance was fabricated for the patient to correct the anterior crossbite. The patient was instructed to wear the appliance for 24 h except while eating. After 4 months of the appliance of wear, a positive overjet was achieved and the skeletal discrepancy was successfully camouflaged [Figure 4]. Furthermore, selective trimming of the upper appliance labially and lower appliance lingually was performed to allow dental compensation to take place. The patient was satisfied with the treatment results and the remaining space in the upper arch was to be closed by fixed prosthesis as the mesiodistal width of all the incisors was smaller than average. As the patient was unwilling for the immediate prosthetic closure of spaces, conventional retainers were given to maintain the treatment results till fixed

Table 1: Comparative cephalometric measurement

Parameters	Pretreatment	Postfunctional
SNA (°)	81	81
Maxillary length (Co-pt A) (mm)	77	77
SNB (°)	82	82
Mandibular length (Co-Gn) (mm)	101	102
ANB (°)	-1	-1
SN-GoGn (°)	32	32
Upper 1 to NA (°)	25	38
Lower 1 to NB (°)	38	25
IMPA (°)	105	96



Figure 1: Pretreatment photograph



Figure 2: Postexpansion photograph with hyrax expander



Figure 3: Intraoral photographs of appliance assembly



Figure 4: Posttreatment photographs

prosthesis could be given. Table 1 compares the cephalometric measurements of pre- and post-treatment results.

DISCUSSION

The management of any malocclusion should be patient oriented keeping in mind the treatment objectives. The current case highlights the fact that judicious use of the appliances can render satisfactory treatment results where

treatment option becomes limited due to patients choices. The nonsurgical treatment planning in a patient with Class III malocclusion involves restriction of mandibular growth by chin cup and/or protraction of maxilla by facemask or camouflage of the condition by fixed orthodontic therapy.^[2-4] In the current case, however, the patient was unwilling to wear any extraoral appliance and also reluctant to undergo fixed orthodontic therapy but was concerned about his reverse overjet. Therefore, it was decided to use custom made Class III corrector for crossbite correction. This appliance works on the principle of telescopic mechanism. The forward thrust exerted on the upper splint was transmitted to the maxilla whereas distalization effects were seen with the entire mandibular arch. On comparing the cephalometric outcomes, a considerable improvement was seen by proclination of upper incisors and retroclination of lower incisors at the end of treatment [Figure 5]. The patient was follow-up for 2 years with well-settled occlusion and stable result [Figure 6].

The custom appliance has several advantages which are as follows:

1. As the appliance was given in accordance to patients consent, good compliance was achieved
2. Low cost and minimal armamentarium
3. Fabrication was easy with ease of wear and hygiene maintenance

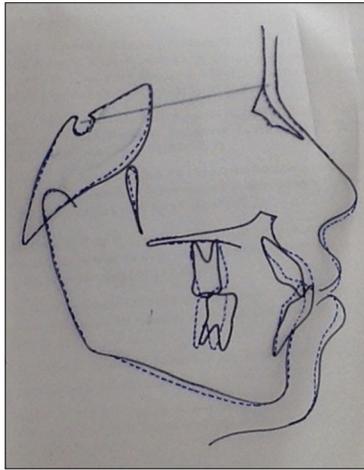


Figure 5: Superimposition of pre- and post-treatment cephalometric tracing (SN plane at Sella)



Figure 6: Postretention photographs after 2 years' follow-up with settled occlusion

4. Treatment objective was achieved in only 4 months.

CONCLUSION

A case of mild skeletal Class III malocclusion with prognathic mandible was successfully treated with this custom made a functional appliance. Since the appliance was fabricated with minimal cost, armamentarium and was well accepted by the patient.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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