

Management of Class II Malocclusion using Cantilever Herbst Appliance : A Case Report

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ABSTRACT

Background: Class II malocclusion correction during the early mixed dentition is a challenge. To correct the skeletal base, appliance should be less dependent on the dentition. Since the child is non-compliant, using a fixed appliance in the existing dentition would be a better choice for treatment. In this case report Class II skeletal base was corrected using cantilever herbst appliance. There is a marked improvement in the mandible, where in the mandible is grown sagittally forward. Thus this case report shows the changes brought during by using cantilever herbst appliance during early mixed dentition period.

Keywords: Class II malocclusion, Cantilever herbst, Herbst appliance, fixed functional appliance.

INTRODUCTION

Class II malocclusion is more prevalent in general population. It is always better to correct the skeletal discrepancy during growth phase as it has more stability^{1,2}. The correction of skeletal base during growth phase is achieved using bite jumping. Removable appliances are more prevalently used during mixed dentition phase as it allows the eruption of the permanent teeth.³

Achieving patient compliance for the wear of functional appliance during mixed dentition period is a challenge. The use of Herbst appliance during late pubertal stage after the eruption of the permanent tooth became popular^{3,4}. The mandibular advancement induced and sustained by the appliance contributes to the successful Class II molar relationship and overjet correction, which can be attributed to about equal skeletal and dental changes⁵. Still use of the Herbst appliance during mixed dentition was not possible as the appliance

need prior alignment of the arches. Thus a modification of the Herbst appliance by Panchez known as Cantilever herbst appliance was introduced⁶. Here a cantilever was soldered in the canine and molar and the appliance was delivered. Thus, the aim of this paper is to present the use of a Cantilever herbst appliance for the correction of Class II malocclusion during the mixed dentition period.

CASE REPORT

A female patient of age 13years came to the department of orthodontics with a complaint of forwardly placed upper front tooth. No relevant medical or dental history was reported. On clinical examination patient had a mesomorphic body type, over mesocephalic head form and mesoprosopic facial form (Figure I). She had a convex profile with posterior divergence, her nose was upturned, with an obtuse nasolabial angle and incompetents lips (FigureII). The clinical VTO showed positive change

Received: Dec. 15, 2017; Accepted: Feb. 8, 2018

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Fig 1: Pretreatment Extraoral Frontal View



Fig 2: Pretreatment Extraoral Profile View



Fig 3: Positive visual treatment objective



Fig 4: Pretreatment Intraoral frontal View



Fig 5: Pretreatment Intraoral Right and Left side view.



Fig 6: Pretreatment Intraoral Upper and lower occlusal view



Fig 7: Placement of Cantilever herbst appliance Frontal view.



Fig 8: Placement of Cantilever herbst appliance side view



Fig 9: Post treatment extra oral frontal view



Fig 10: Post treatment extra oral profile view.



Fig 11: Post treatment intraoral frontal view.



Fig 11: Post treatment intraoral right and left side view



Fig 12: Post treatment intraoral occlusal view



Fig 13: Comparison of changes of Pre and post cephalogram maxilla

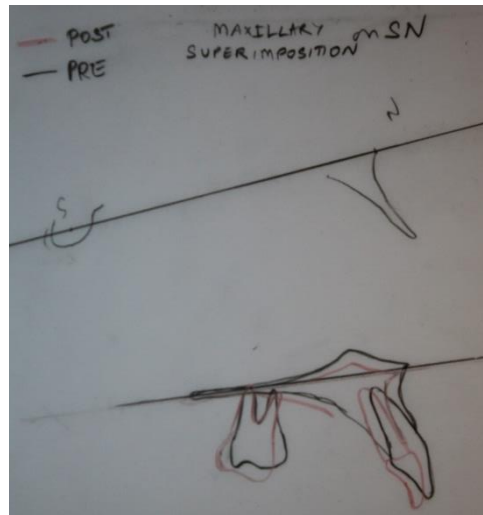
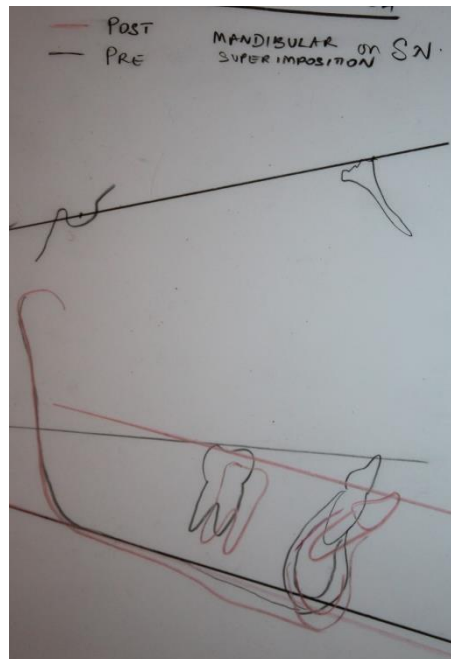


Fig 14: Comparison of changes of Pre and post cephalogram mandible.



in the facial profile (Figure III). Intraoral examination revealed early mixed dentition, a complete Class II molar relationship and Class II canine relationship with 9 mm of overjet, with 6mm of deep overbite (Figure IV, Figure V). The upper and lower arches were well aligned and U shaped (Figure VI).

Cephalometric analysis showed SNA angle of 81° , SNB angle of 72° with saddle angle of 123° (Table : I). Indicating maxilla is of average length and positioned normally, reduced mandibular length with average positioning of the mandible. Cervical vertebra maturity index showed stage 3⁷. The case

Table 1: Comparative cephalometric analysis of Pre and post lateral cephalogram.

SKELETAL	PRE TREATMENT	POST TREATMENT
SNA	81°	80°
SNB	72°	76°
SND	70°	75°
ANB	9°	4°
SN- PALATAL PLANE	6°	8°
SN- OCCLUSAL PLANE	19°	30°
SN GO-GN	29°	28°
DENTAL		
UPPER 1 TO NA ANGLE	24	24
UPPER 1 TO NA LINEAR	6mm	6mm
LOWER 1 TO NB LINEAR	13mm	9mm
LOWER 1 TO NB ANGLE	26	28
N.L A L	2mm	1mm
N.LB	15mm	5mm
SADDLE ANGLE	123°	126°
ARTICULAR ANGLE	149°	148°
GONIAL ANGLE	116°	118°
SN TO MANDIBULAR ANGLE	25°	29°
FH TO MANDIBULAR PLANE	22°	25°

was diagnosed as Angles Class II Division 1 malocclusion on an orthognathic maxilla and retrognathic mandible over a Class II skeletal base.

Treatment plan:

The treatment was planned to be in two phases.

Phase I: growth modification stage for the correction of retrognathic mandible.

Phase II Fixed orthodontic appliance for aligning and leveling.

Treatment progress:

Twin block appliance was the choice for the growth modification procedure. However, the patient lacked cooperation. Fixed orthopedic jumping device (Herbst appliance, HA) was presented to patient and parents as an alternative.

The patient was in the early mixed dentition period hence we opted for cantilever design. the first permanent molars were crowned and transpalatal arch and lingual arch was fabricated in the upper and lower arches respectively for anchorage. The cantilever arm of the Herbst was soldered to the buccal side lower stainless steel crown, and the ball end was attached to the buccal side of the upper

Herbst cantilever appliance therapy was given for 6 months of time. During second month the appliance was dislodged from maxillary right molar. Recementation of the appliance was done and the treatment was continued. There was marked improvement of the facial profile seen after 6 months. Fixed appliance treatment was preceded after the removal of the Herbst appliance.

RESULTS

In an aesthetical and myofunctional perspective, the treatment achieved good results, improving the initial profile, decreasing the incisors exposure during rest, and forming a passive lip seal.

The comparative cephalometric evaluation showed that SNA angle was reduced by 1°, SNB angle was increased by 4°. ANB angle was reduced from 9° to 4° showing a change from class II skeletal base to class I skeletal base. Saddle angle remained the same in the pre and post treatment cephalogram. Lower gonial angle was increased by 2° and upper gonial angle remained the same. Mandibular plane angle was increased by 3° showing a downward and forward rotation of the mandible with increase in the lower facial height. Dental analysis revealed that maxillary incisors positioning remained the same (1.NA, 24°), while the mandibular incisors was proclined (1.NB, 28°) providing an adequate

overbite (3.0 mm) and overjet (2.0 mm). S line was improved from negative to positive (Table I).

Thus the cephalometric skeletal analysis showed that the maxilla was maintained in the normal position and in same length, mandibular length was increased and drifted forward and rotated downward. The treatment contributed to an increase in the mandibular prognathism (SNB, 76°), better maxillary positioning (SNA, 80°), and an improvement in sagittal relationship between maxilla and mandible (ANB, 4°).

After the Herbst treatment patient is continued with fixed appliance therapy for leveling and aligning. There was significant increase in the size of the mandible during the active treatment. After the active phase of treatment the results showed class I skeletal base.

DISCUSSION

The interceptive orthodontics has more stability than the corrective orthodontics, however patient compliance to wear the appliance depends on the age and gender of the patient⁸. Thus interceptive orthodontics with removable appliance depends on the child's self-esteem, patient/orthodontist relationship^{9,10}. Duration of the treatment has been increased due to non-compliance of the patient, thus removable appliance is not an apt choice⁸.

After the reappearance of Herbst appliance by Pancherz, it became widely used appliance for the correction of the skeletal class II cases. It does not need patient cooperation with the placement and removal of the appliance, it is worn full time in the mouth. It significantly reduces the treatment time and also fastens the growth modification since the forces are generated full time to induce the growth of the mandible⁴.

However Herbst appliance is placed in well aligned arches in the late mixed dentition period. This significantly reduces the inception time frame for the treatment of skeletal class II. In situations where premolars are unerupted i.e in early mixed dentition period a modification of the Herbst appliance known as cantilever Herbst can be used. The same was used in this case in order to correct the malocclusion during the early mixed dentition period itself.

The patient was in the skeletal age CVM staging 3 suggesting pre-pubertal growth spurts an ideal age for growth modification procedures⁷. The patient had a skeletal Class II with a retrognathic mandible and orthognathic maxilla, the treatment plan was to divide the phase into two. Phase one growth modification procedure, phase two was fixed orthodontic appliance to align and level the teeth. Phase one was decided to be done with twin block appliance to utilize the pubertal growth spurt. The patient compliance for the wear of the twin block appliance was very poor in spite of repeated patient education. Since the patient was non-compliant we decided to go for a fixed functional appliance, she was in the early mixed period.

Larry white⁶ in his article presented that the use of cantilever herbst is more as the treatment is started earlier when compared to the other modifications. It is more stable and also can be used in patients with any age group and particularly useful when mandibular bicuspid are absent or the primary molars cannot withstand functional forces.

Our active phase of treatment was completed by six months. Initial discomfort due to the appliance was reported by the patient for the first one week. Appliance dislodgement was present only once after the second month of treatment due to crown dislodgement in the upper right molar. At the end of active phase the molars were in super class I relationship, Incisors were with 1mm overjet. Pancherz in his article showed that there is active growth of mandible than the maxilla which in turn reduces the overjet of the dentition⁵. The comparative cephalometric evaluation of the pre and post radiographs showed a distalization effect on the maxilla and advancement of the mandible achieving a class I skeletal relationship (Figure XIII, Figure XIV). Distalisations of the maxillary molars are noted as it also aids in achieving class I molar relation of the dentition.

CONCLUSION

Herbst cantilever appliance can be considered as an alternative therapy for non-compliant patient and can also be used in early mixed dentition phase to correct the jaw relation. Our case is a clear example of how a non-compliant retrognathic mandible patient can still be treated in an early mixed dentition period.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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