

# Management of severe Class II malocclusion with sequential removable functional and orthodontic appliances: A case for MOrthRCSEd\*\* examination

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## Abstract

**Introduction:** Functional appliance is an effective way of treating skeletal Class II malocclusion in children and adolescents. A 12-month stepwise mandibular advancement protocol has been proved to enhance the condylar growth and improve the mandibular prognathism using Herbst appliance. **Objective:** The following case report documented a 11 year old Chinese girl with 11 mm overjet treated by a phase I 12-month growth modification therapy using Twin Block appliance with Hyrax palatal expander and high-pull headgear in a stepwise mandibular advancement protocol followed by a phase II preadjusted Edgewise appliance therapy. It is one of the cases submitted for the Membership of Orthodontics Examination of the Royal College of Surgeons of Edinburgh.

**Keywords:** Myofunctional therapy. Functional appliances. Angle Class II malocclusion.

## Editor's abstract

For the treatment of Class II skeletal malocclusion due to mandibular retrusion, the use of functional orthopedics appliances is indicated with the purpose of stimulating mandibular growth. The present study deals with the presentation of a clinical case of a skeletal Class II malocclusion dealt with the Twin Block orthopedic appliance used together with a high-pull headgear followed by fixed orthodontic treatment. A Chinese patient, 10 years and 10 months of age, with convex facial profile, Class II, Division 1 malocclusion due to

mandibular retrusion, molar relationship of complete Class II, 11 mm overjet and moderate deep overbite, looked for orthodontic treatment complaining of crowding and protrusion of upper incisors. Through the analysis of cervical vertebrae, it was found that the patient was in stage CVS3, that is, near the peak of pubertal growth. Initially, the Twin Block appliance with an expansion screw was installed, with full time use, with initial mandibular advancement of 5 mm and vertical opening of 7 mm. Together with the Twin Block, a high-pull headgear with average force of 450 g/side was used

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12 to 14 h/day. After six months, the Twin Block appliance was adjusted to provide additional 5 mm of mandibular advancement. After 12 months, these devices were removed and fixed orthodontic appliance were used for alignment and leveling of the teeth and finishing the case. The total treatment time consisted of 26 months. The initial malocclusion was corrected obtaining normal molar relationship on both sides, plus a normal overjet and overbite. The facial profile was also improved, reflecting the improvement of the maxillomandibular relationship, due to a redirection of maxillary

growth, with its restriction in the anterior direction and considerable mandibular growth during the first phase of treatment (orthopedic). The authors concluded that this protocol for orthopedic treatment, with gradual mandibular advancement in 12 months, showed to be effective for the Class II malocclusion treatment associated with mandibular retrusion. However, evaluations associated with long-term studies involving a larger number of subjects should be conducted in order to scientifically prove the effectiveness of the proposed orthodontic/orthopedic treatment.

### Questions for the authors

#### 1) Currently, there are several appliances for orthopedic treatment of Class II malocclusion due to mandibular retrusion. Why was the Twin Block associated with the high-pull headgear chosen to treat this patient?

Removable functional appliance was used in this patient because her premolars were not fully erupted yet when treatment started.

Favourable compliance was also a deciding factor. The use of a high-pull headgear during the functional appliance stage was to restrain the downward maxillary growth and to minimize the backward and downward rotation of the mandible which would increase the overjet and jeopardize the treatment effects.

#### 2) The 10-mm improvement in overjet occurred in 70% at the expense of skeletal structures and 30% due to dental changes, while improvement in the positioning of molars was 81% due to skeletal structures and 19% due to dental changes. In the authors' opinion, what was the reason for this significant skeletal correction with the treatment performed?

The skeletal correction is a combined result of maxillary growth restraint and enhanced mandibular growth.

A number of studies have shown that functional appliance (Herbst appliance) treatment with high-pull headgear in a stepwise advancement manner for 12 months produce greater skeletal improvement in Class II correction.

In this case, the lower incisor angulation increased very slightly during the Twin Block treatment and this contributed to the high percentage of skeletal changes (less dental changes) as well.

#### 3) What factors should be considered for the choice between treating orthopedic/orthodontic in two phases in relation to that performed in only one stage?

The factors which need to be considered are:

» Cause of the Class II malocclusion (Dental or Skeletal); Prognathic maxilla, retrognathic mandible or a combination of both.

» Patient's facial profile.

» Age and skeletal maturity of the patient.

» Preference of the patients such as extraction of teeth, expected length of treatment, acceptance with the functional appliances and so on.

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