

CASE REPORT

Skeletal Class II correction using the AdvanSync 2 Appliance (A class II corrector): A Case Report

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ABSTRACT

Angle's class II division malocclusion, being the most commonly occurring type of malocclusion, is challenging to treat especially when there is an underlying skeletal discrepancy. Various fixed functional appliances have been developed over the years by different authors for correction of skeletal class II malocclusion due to retrognathic mandible. Among them a fixed functional molar to molar appliance also known as, Advansync2(Ormco Co, Glendora, Calif) has been used effectively in the recent past. It is a fixed tooth-borne functional appliance with an advantage of allowing concurrent use of fixed orthodontic therapy. This facilitates reduction of the overall treatment duration. A case report of patient treated using this Advansync2 class II corrector has been presented along with the skeletal and dentoalveolar changes observed during the treatment. The effects observed were similar to most fixed functional appliances however the treatment duration was considerably reduced in all the cases.

Keywords: Class II malocclusion, Advansync2, fixed functional appliance, cephalometrics

INTRODUCTION

Angle's class II malocclusion is one of the most common problems affecting one third of the population¹ and it has been a challenge for all the orthodontists owing to its difficulty in predicting its aetiology and its variable nature of representation². In Indian population, orthodontists face a lot of class II div 1 cases mostly characterized by anteroposterior dental discrepancy which becomes severe when combined with an underlying skeletal disharmony. In growing population, Class II elastics or removable functional appliance are usually advocated for class II malocclusion. However, patient compliance becomes a major concern to employ these treatment modalities.

Fixed functional appliances were developed to bring the mandible forward regardless of patient compliance. AdvanSync2 is a fixed tooth borne functional appliance developed by Dr. Terry Dischinger in 2008. It facilitates functional therapy along with fixed mechanotherapy to reduce the treatment duration and also to improve compliance of the patient. In the early 1980s, Dr. Terry Dischinger was fascinated by the research being published by Dr. James McNamara, showing condylar growth in rhesus monkeys.

In 2008, Dr. Dischinger and Dr. Bill M. Dischinger set out to design a new Herbst appliance. Their main goal was to improve the comfort of orthopedic Class II treatment for class II patients. The result was the development with Ormco of the AdvanSync appliance, followed by a couple of years later with the AdvanSync 2 appliance with a few modifications from the original design.³⁻⁵

This new appliance is almost half of the size of the MiniScope Herbst appliance that had been used. Because of the smaller size, it is more comfortable in the posterior section of the mouth. Most of the sores seen in patients with previous Herbst appliances were in the lower premolar area from the screw housings. That was eliminated in this design.

So, patients are more comfortable to have it. Additional benefit that came out of the smaller design was the ability to bracket every tooth forward of the appliance. With this new design, bond all the teeth, including the mandibular second molars as well. When cases are finished with the Class II correction and the appliance is removed, most of the orthodontics has been accomplished as well and we can quickly move to the end of the treatment, making orthopedic Class II correction much more efficient and reducing treatment times by over 6 months.

Two papers, especially from the American Journal of Orthodontics and Dentofacial Orthopedics and the Hong Kong Dental Journal, proved that Herbst therapy combined with the use of edgewise brackets produces skeletal changes, glenoid fossa remodeling, and long-term stability of these achieved changes.^{6,7} It was stated in the research findings that the protocols used are important to achieve these results.

CASE REPORT

Orthodontic treatment is based on appropriate diagnosis and treatment planning. Therefore, it is necessary to understand all diagnostic aids for planning orthodontic treatment. Diagnosis involves a number of steps such as interview of patient, clinical examination and diagnostic records.⁸

Female patient aged 18 years reported to the department of Orthodontics with a chief complaint of forwardly placed upper front teeth.

On extra-oral examination, she had a mesocephalic head type, mesoprosopic facial form, convex facial profile, and posterior divergence. Nasolabial angle and FMA when examined clinically, found to be average (fig. 1a and b). Patient had an aesthetic body built, and normal gait. Examination also revealed positive VTO for patient.

Intra oral examination revealed Class II molar relation on right and end on molar relation on left side, class II canine relationship on both sides, overbite 4mm, 10 mm overjet, right sided mandibular midline shift, labially inclined maxillary incisors, and crowding in mandibular anterior region. Patient had tapered maxillary arch and ovoid mandibular arch. (fig. 2a, b, c, d and e)

Cephalometric parameters revealed skeletal class II malocclusion with orthognathic maxilla and retrognathic mandible. Hence, mandibular advancement using Advansync2 appliance was planned for the case.

Pre treatment orthopantomogram (OPG) revealed that the patient had full permanent dentition except third molars with no missing or supernumerary teeth. (fig. 3)



Fig.1: Extra oral photographs (a) Frontal facial view (b) Facial profile view



Figure 2: pre treatment Intra oral photographs(a) Frontal occlusal view (b) right side view (c) left side view. (d) Maxillary occlusal view (e) mandibular occlusal view



Fig.3: Pre treatment orthopantomogram (OPG)

TREATMENT OBJECTIVES

Treatment objectives included correction of class II molar and canine relationship, to achieve normal overjet and overbite, to relieve crowding in mandibular arch and correction of skeletal class II relationship to improve convex facial profile of patient.

Treatment Plan

Non extraction treatment was planned and fixed functional therapy was decided to correct skeletal class II relationship. We planned to give AdvanSync 2 appliance with MBT prescription.

TREATMENT PROGRESS

A full orthodontic appliance of 0.022 slot MBT system was bonded in the maxillary arch and the mandibular arch.

Aligning and levelling was done sequentially with, 0.014 NiTi, 0.016 NiTi and 16x22 NiTi and so on, followed the MBT system wire sequence. At the end of the fixed functional therapy, bilateral class I molar and class I canine was obtained.

Three months after treatment, the AdvanSync 2 was placed [Fig. 4] and activated for 3 mm thrice during the therapy. It was needed to level the lower arch and torque the upper incisors labially before placing the arms. If we had not done this, the patient would have been positioned in an end-on incisor relationship, creating a large posterior open bite. This leads to the arms orienting themselves into a more vertical position and not correcting the Class II.

Make sure to always evaluate this before attaching the arms. If the arms get oriented in a more vertical position rather than horizontal, then remove the arms and continue the leveling and aligning until the proper overbite has been established and there is an adequate overjet to advance the mandible.

The patient had the AdvanSync 2 appliance for 5 months at which time we removed the appliance while the mandible was in an overcorrected position [Fig. 5]. The patient was in treatment (total) for 16 months. As you can see from pre treatment and after treatment the photos in Figures 1, 2 and 6, the patient had a complete transformation facially from the skeletal correction we achieved using the AdvanSync 2 appliance.

Hawleys retainer in upper arch and Begg's wrap around retainer in lower arch was delivered for the upper arch and a bonded lingual retainer was fixed in the lower arch.

Mechanics Used



Figure 4: Hooked up advansync2 (a)intraoral frontal view (b) intraoral right side (c) Intraoral left side



(a)

(b)

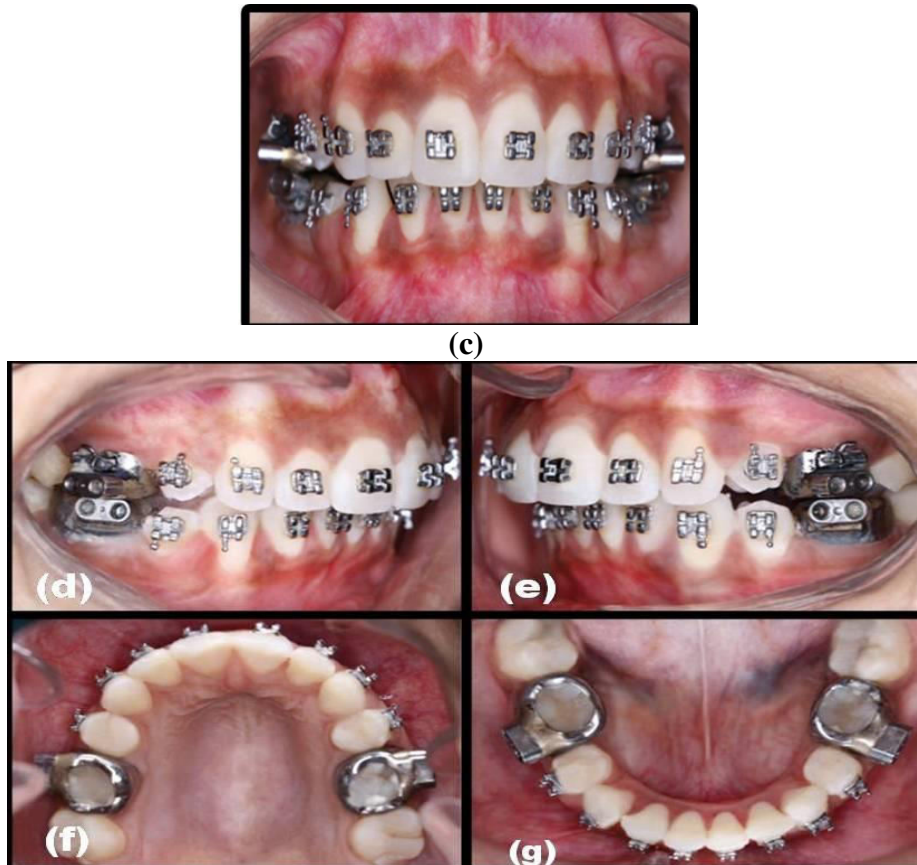


Figure 5: Progress.Photographs (a) Extra oral Facial Frontal view (b) Facial profile. (c) Intraoral front view (d) Intraoral right lateral view (e) Intraoral left side (f) Maxillary Occlusal view (g) Mandibular Occlusal view

Table No. 1: Hard tissue changes

| Variable | Pre-treatment | Post-treatment |
|----------------|---------------|----------------|
| SNA | 76° | 76° |
| SNB | 70° | 72° |
| ANB | 6° | 4° |
| SN-Go Gn | 36° | 37° |
| IMPA | 93° | 91° |
| Jaraback Ratio | 60% | 60% |

Table No. 2: Soft tissue changes

| Variable | Pre-treatment | Post-treatment |
|-------------------|---------------|----------------|
| S line to UL | 0mm | -1mm |
| S line to LL | 1 mm | 0mm |
| Naso labial angle | 104° | 106° |



Figure 6: Post treatment photographs after debonding. (a) Extraoral Facial frontal view. (b) Facial profile. (c) Intraoral frontal view (d) Intraoral right side (e) Intraoral left side

DISCUSSION

Skeletal class II malocclusion can have variants in different areas such as Maxillo-mandibular relationship that is mandibular retrognathism, maxillary protrusion or combination of both, increased length of anterior cranial base contribute to midface protrusion while increased length of posterior cranial base positioned temporomandibular articulation in more retrusive position.⁸⁻¹⁰

Different treatment modalities have been developed for the treatment of class II malocclusions such as selective extractions, orthopaedic treatment using headgear or functional appliances, removable and fixed – inter or intra arch appliances and orthognathic surgeries.^{11,12}

When the functional appliances are used during active growth periods (before or during puberty), they are intended to induce maximum skeletal growth. However, the amount of skeletal or dental change which will be obtained is difficult to quantify as it depends on various intrinsic and extrinsic factors.

According to Ruf and Pancherz¹⁰, Advan sync has produced significant mandibular growth changes in post pubertal patients, past their peak height velocities. This can be evidenced by the post treatment cephalometric findings in present patient reported in this article. (Table no.1 and 2)

Pangrazio et al¹¹ stated that removable or fixed functional appliances bring about sagittal and vertical skeletal changes in the jaw positions resulting in orthopaedic and orthodontic changes. Skeletal discrepancy correction during growth period can be achieved using removable as well as fixed functional appliance. The AdvanSync2 appliance (activated in increments until an edge to edge incisor relationship) is a fixed functional appliance wherein there is no necessity to align and level the arches prior to the placement of the advansync2 appliance, so capitalizing on residual growth is possible, with favourable decrease in the treatment duration.

The molar-to-molar attachment brings about intrusion of the molars and also mild proclination of the lower incisors. However, the amount of lower incisor proclination is lesser when compared to other fixed functional appliances where the attachment is fixed to the mandibular anterior segment thereby resulting in greater proclination of the lower anteriors.¹³⁻¹⁶

The direction of the forces generated by the advansync2 appliance includes sagittal, intrusive, and expansive vectors. The sagittal force vector has produced distal movement of the upper molars and also exerted an anterior force to the mandibular dentition and the mandible. Additionally, an intrusive force of the maxillary posterior region and mandibular anterior region was also evidenced. The push force generated by the appliance also leads to 2-3mm of expansion of the maxillary dental arch. This can be evidenced by the increase in the maxillary intercanine, inter-premolar and the inter-molar widths in our patient wherein there was an overall arch expansion of 3-4mm.

Dislodgement of the bands from the molars was routinely encountered. The bulkiness of the molar bands was a disadvantage which could not resist the occlusal forces resulting in dislodgement. Hence, re-cementation of the bands had to be employed. Maxillary and mandibular molars were intruded due to the occlusal forces and the molar-to-molar attachment. This can be evidenced in the post functional cephalogram wherein there was a decrease in the FMA and lower anterior facial height. This had to be counteracted by extruding the molars during the finishing and settling stages.¹⁶⁻¹⁹

“Since the advansync2 appliance is a miniaturised modification of the original Herbst appliance, the treatment stability can be expected to be the same.”

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