Correction of Class II using Powerscope Appliance – A Case Report

Khumanthem Savana¹, Mukesh Kumar ², Akram Ansari³, Abhay Jain³
¹Senior Lecturer, Department of Orthodontics & Dentofacial Orthopedics, HIDS, Paonta Sahib, Himachal Pradesh; ²Professor, Department of Orthodontics & Dentofacial Orthopedics, Teerthanka Mahaveer Dental College and Research Centre, Moradabad, Uttar Pradesh; ³Reader, Department of Orthodontics & Dentofacial Orthopedics, Teerthanka Mahaveer Dental College and Research Centre, Moradabad, Uttar Pradesh.

Address for Correspondence:
Dr. Khumanthem Savana, Senior Lecturer, Department of Orthodontics & Dentofacial Orthopedics, Himachal Institute of Dental Sciences, Paonta Sahib, Himachal Pradesh, India.

ABSTRACT:
Fixed functional appliance therapy has recently been gaining immense popularity as a means to noncompliant correction of skeletal class II malocclusion at the deceleration stage of growth. The Powerscope appliance (©2014 American Orthodontics Corporation) is one of the newest fixed functional appliances introduced. It offers the advantages of ease in appliance installation, robust in clinical aspect, giving predictable results, used in noncompliant patients, less prone to appliance breakages and failure, shortens the duration of treatment and utilizes the residual growth even beyond the pubertal growth spurt. Above all, it is patient friendly such that it does not restrict jaw movements and there is no associated tissue impingement. This article reports on a 13 year old female patient with a skeletal class II malocclusion treated using the Powerscope appliance. The appliance was worn for 8 months after the initial alignment with fixed mechanotherapy (MBT 0.022”). The end result of appliance therapy was that of correction of the skeletal class II malocclusion a class I skeletal and dental relationship.

Keywords: Class II malocclusion, Fixed functional appliance, Powerscope appliance, Pubertal growth spurt, Residual growth.

INTRODUCTION
Patient presenting with Class II malocclusion is most frequently encountered in our day-to-day practice as an orthodontist.¹ It may be a dental class II or a skeletal class II.² Management of class II malocclusion depends entirely upon the severity of the problem and the age at which it presents for treatment.³ Numerous orthodontic techniques and appliances have been introduced to treat the same. Popular treatment approach for the correction of skeletal class II malocclusion with retruded mandible is that of growth modulation through the use of various functional appliances, provided the patient is in the pubertal growth phase. Numerous functional appliances aimed to redirect mandibular growth by forward posturing of the mandible is currently available to correct this type of skeletal and occlusal disharmony.⁴ During the period of active growth, various myofunctional appliances like the Activator, Bionator, Frankel’s regulator and the twin block are being used.⁵,⁶ While during the deceleration stages of growth, the use of fixed functional appliances like fixed twin block, Jasper Jumper, Herbst, universal bite jumper, Ritto appliance, Eureka spring, Churro jumper, Forsus FRD, etc. are commonly being prescribed to the patient.⁷ The latter has recently been gaining immense popularity as fixed functional appliances, commonly known as “non-compliance Class II correctors”, are highly useful in those group of patients who fail to commit themselves to faithful wearing of functional appliances and patient cooperation is of paramount importance for achieving excellent results in orthodontics. Impossible for the patient to remove them – permits better control of appliance by the orthodontist. These appliances are tightened to the upper and lower archwires. However,
special anchorage measures need to be taken care of during treatment planning and implementation since unwanted dental treatment may be encountered due to the fact that the teeth serve to medium of force transmission.

This article describes the correction of Class II division 1 malocclusion subdivision with Retruded mandible and midline correction with the use of a Powerscope appliance.

Table 1: Pre-treatment and post-treatment cephalometric readings of the patient’s lateral cephalograms tracing.

<table>
<thead>
<tr>
<th></th>
<th>PRE-TREATMENT</th>
<th>POST-TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNA</td>
<td>80°</td>
<td>79°</td>
</tr>
<tr>
<td>SNB</td>
<td>73°</td>
<td>76°</td>
</tr>
<tr>
<td>ANB</td>
<td>6°</td>
<td>3°</td>
</tr>
<tr>
<td>FMA</td>
<td>20°</td>
<td>22°</td>
</tr>
<tr>
<td>U1/NA</td>
<td>30°</td>
<td>26°</td>
</tr>
<tr>
<td>U1-NA</td>
<td>6mm</td>
<td>4.5mm</td>
</tr>
<tr>
<td>L1/NB</td>
<td>23°</td>
<td>26°</td>
</tr>
<tr>
<td>L1-NB</td>
<td>4mm</td>
<td>5mm</td>
</tr>
<tr>
<td>U1/L1</td>
<td>118°</td>
<td>126°</td>
</tr>
<tr>
<td>IMPA</td>
<td>93°</td>
<td>98°</td>
</tr>
</tbody>
</table>

**DIAGNOSIS AND TREATMENT PLAN**

A 13-year-old female presented with the chief complaint of forwardly placed upper front teeth. Clinical examination revealed acute nasolabial angle, lip incompetence, everted lower lip, slightly convex profile with mandibular retrusion, posterior facial divergence and positive visual treatment objective (Figure 1). The patient had a Class II division 1 subdivision on right malocclusion, spacing in upper arch, crowding in lower arch, an overjet of 9mm, a deep overbite, crossbite in relation to 25, 35 and a lower midline deviation of 1mm to the right.

The lateral cephalometric tracing showed a skeletal relationship slightly towards Class II relation with horizontal growth pattern. The upper incisors were proclined while the lower incisors were properly inclined. The panoramic radiograph revealed proportional condylar structures and the presence of all permanent teeth. The hand wrist radiograph revealed stage 8 of Fishman’s Skeletal Maturity Indicator. The patient was due for menstrual cycle.

Treatment goals were to correct the patient’s skeletal and dental relationships and improve the soft-tissue balance. Three treatment options were discussed. First, all first premolar extraction or secondly, upper first premolar and lower second premolar extraction followed by finishing the case in ideal Class I molar and canine relation with midline correction. Thirdly, the use of fixed functional appliance with unequal activation to address the problem. This way the remaining growth potential of the patient can be best utilized for the patient own benefit.

**Treatment Progress**

Full fixed .022” appliances were placed to level and align both arches. After eight month, the leveling and alignment was achieved (Figure 2). To reinforce anchorage, .019” × .025” stainless steel archwires were inserted. TPA was given in upper arch. Figure –eight ligation was done from first molar to first molar in both arches. 10° of lingual root torque was given in lower anteriors. A fixed functional appliance, the Powerscope, was placed with more activation on right side to correct the lower dental midline deviation and improve the mandibular retrognathism and achieve Class I relation (Figure 3). Because it is worn full-time, it does not depend on patient cooperation.1

After eight months, the Powerscope appliance was removed, and lighter .016” stainless steel
archwires were inserted, along with vertical elastics. After 20 months of active treatment, skeletal and dental Class I relationships had been attained, and the fixed appliances were removed (Figure 4A).

Figure 1: Pre-treatment extra-oral and intra-oral photographs, lateral cephalograms, OPG and hand wrist radiograph

Figure 2: After levelling and alignment intra-oral photographs

Figure 3: Intra-oral photographs with the Powerscope appliance
DISCUSSION
On completion of treatment, the patient’s facial profile was orthognathic because of the soft-tissue modifications and the mandibular advancement. The lower incisors were slightly proclined, while the upper incisors were upright.
Cephalometric superimpositions showed that mandibular and maxillary growth had occurred during orthodontic treatment (Figure 4B, Table 1). Significant improvement was observed in the patient’s dental esthetics, including correction of the midline deviation, achievement of ideal overbite and overjet.
Fixed functional systems offer absolute advantages over removable systems. Fixed functional appliance system being designed for 24 hours daily wear, there is a continuous stimulus for mandibular growth. Also, their compact, concise and small size design permitting better adaptation to functions such as a mastication, swallowing, speech and breathing. Hence, better patient tolerance. Fixed functional appliances are therefore usually known as non-compliance Class II devices.
The Powerscope appliance is marketed by the American Orthodontics. It is also known as the Class II corrector simplified. User friendly to the orthodontist and the patient, it allows greater range of jaw movement, simple, efficient and much more. Unlike other Class II correctors available, there is no need for assembly, measuring, or appliance manipulation. It bear the following features:
1. Patient-Friendly Design
It has a low profile, smooth, rounded design and no piston extending distally from the upper molars. Therefore, reduce ulceration.
2. Ready to Use
One-piece, no assembly required, and no need for lab setup.
3. Wire Attachment Nuts
Simple wire-to-wire installation reduces inventory of special band attachments and headgear tubes.
4. Ball And Socket Joint
Improve lateral movement of jaw.
5. Nickel Titanium Internal Spring Mechanism
260gm. spring activated mechanism means reduced treatment time compared to traditional Class II Herbst appliances.
6. 18mm Telescoping Mechanism
No incidence of disengaging during treatment. No unnecessary emergency visits.
Hex Head Screws
Reverse screw thread assembly minimizes screw loosening during treatment, while hex head design allows safe and easy appliance delivery.

Figure 4B: Post-treatment lateral cephalograms and OPG

Contraindications
- It is not to be used inpatients who have a history of severe allergic reactions to nickel.

Adverse Reactions
- Increase in axial inclination of lower incisors
- Due to pushing mechanism, intrusive forces may be placed on teeth
- Buccal rotation of maxillary molars and mandibular canines

Anchorage control
Commonly encountered unwanted tooth movement with the appliance are increase in the axial inclination of lower anterior teeth or the opening of spaces distal to the canines. This can be taken care of by:
- Full slot rectangular stainless steel archwires (0.017” × .025” in 0.018” slot and .019” × .025” in 0.022” slot)
- Cinching of the lower arch wire
- Full lower arch figure of eight ligation
- Arch locks/stops posteriorly
- Significant negatively torque lower anterior brackets (-6 to -10 degrees)
- Use of upper 1st non-convertible molar tubes
- Inclusion of second permanent molar

Sterilization protocol
The sterilization of the appliance is as per the “Guidelines for Disinfection and Sterilization in Healthcare Facilities, 2008”, published by the US Centers for Disease Control and Prevention: steam sterilization of wrapped appliance in an autoclave i.e. 30 minutes at 121°C (250°F) in a gravity displacement sterilizer or 4 minutes at 132°C (270°F) in a prevacuum sterilizer”.

CONCLUSION
To conclude, Powerscope proved to be a good cost-effective appliance in treating Class II skeletal malocclusion. The overall treatment time is seen to be short. It is also possible to treat this type of malocclusion with minimal effort.

It offers the following advantages:
- Quick wire-to-wire installation and installs in minutes and in just one appointment
- Internal NiTi spring delivers 260gms of force for continuous activation during treatment
- Patient-friendly design maximizes comfort
- Less visible
• Allows full freedom of jaw movement i.e. opening or side to side movement.
• Minimal intra-oral injury as the appliance assembly has no sharp edges or external springs
• Smooth, low profile design. Less bulky, hence more esthetic.
• Treatment time is typically faster than traditional headgear or other similar Class II correctors
• One-piece, telescoping design won’t come apart during treatment, avoiding emergency visits
• Only care to be taken by patient—soft diet intake, to keep Powerscope clean and not to miss scheduled appointments

REFERENCES