Case Report

Nonextraction Management of Class II Malocclusion Using Powerscope: A Case Report

Paul R[1], Mattu N[2], Golchha V[3], Yadav D[4], Gupta M[5]

[1]Professor and Head, Department of Orthodontics and Dentofacial Orthopedics, Inderprastha Dental College and Hospital, Sahibabad, Ghaziabad, U.P.
[2]Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, Inderprastha Dental College and Hospital, Sahibabad, Ghaziabad, U.P.
[3]Professor, Department of Orthodontics and Dentofacial Orthopedics, Inderprastha Dental College and Hospital, Sahibabad, Ghaziabad, U.P.
[4]Reader, Department of Orthodontics and Dentofacial Orthopedics, Inderprastha Dental College and Hospital, Sahibabad, Ghaziabad, U.P.
[5]Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, Inderprastha Dental College and Hospital, Sahibabad, Ghaziabad, U.P.

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ABSTRACT

Class II malocclusion is one of the common deformities which one comes across in the clinical scenario. Clinical and radiographic assessment helps us in diagnosing the skeletal and dental components of class II as correct diagnosis and age of patient are the keys to successful management of such cases. Among the various treatment modalities available for managing the skeletal and dental Class II, fixed functional appliances are the recently introduced non-compliance dependent alternatives for management of such cases. These appliances work best during post pubertal stages and allow for the correction of skeletal and dental class II I varying proportions. The present case report describes a case of Class II malocclusion with horizontal growth pattern treated with Powerscope appliance. This hybrid fixed functional appliance allowed for the successful achievement of the treatment objectives.

Keywords: Fixed functional appliance.

INTRODUCTION

Class II malocclusion presents a major and common challenge to present day orthodontics.[1] It may be a dental class II or a skeletal class II.[2] Among different dental and skeletal combinations that can create a Class II malocclusion, mandibular retrusion is one of the most common characteristics.[3] Treatment of Class II malocclusion continues to be a great challenge that orthodontists face daily in clinical practice and depends entirely upon the severity of the problem and the age at which it presents for treatment.[4] Various 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. 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.[5] In case of patients presenting at an age beyond pubertal growth spurt, 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.[6] These appliances have recently been gaining immense popularity as "non-compliance Class II correctors", and are highly useful in those group of patients who fail to commit themselves to faithful wearing of functional appliances.

Powerscope is the latest innovation in Class II correction which is a direct derivative of the Herbst Type II appliance. Dr Andy Hayes worked in conjunction with American Orthodontics to develop Powerscope which is an intermaxillary Class II corrector appliance designed to address the critical needs of the orthodontist, including patient comfort and acceptance, extensive range of motion, and simple installation.

It is delivered as a one-size-fits-all appliance preassembled with attachment nuts for quick and easy chair side application. The appliance has a wire-to-wire installation with attachments placed mesial to the first molar in the maxillary arch and distal to the canine of the mandibular arch.[7] Internal NiTi

spring mechanism delivers 260 gms of force for continuous activation during treatment. Appliance is low profile and less bulky for more esthetic facial appearance, smooth, rounded patient-friendly design for better patient comfort, telescopic device that does not displace or disengage during treatment; these advantages make it more patient friendly.

This article describes the correction of Class II division 1 malocclusion in an adult patient with retruded mandible and midline correction with the use of a Powerscope appliance.

CLINICAL EXAMINATION AND DIAGNOSIS

A 23-year-old female reported with the chief complaint of forwardly placed upper front teeth and inability to close the lips. Extraorally, the patient had no apparent facial asymmetry, mesoprosopic facial form, convex facial profile and a hypotonic lower lip. The patient had a deep mentolabial sulcus, hyperactive mentalis, low clinical FMA and positive visual treatment objective on the advancement of the mandible. Intraorally, the patient presented in permanent dentition with Class II division 1 incisor relationship and increased overjet of 8 mm. The deep bite was increased (6 mm). Maxillary dental midline was coincident with facial midline but the lower midline was shifted to the left by 2 mm. The canine relationships were full unit Class II on both sides. The maxillary incisors were proclined and maxillary arch was mildly constricted in the anterior region (Fig. 1). The patient

Figure 1 Pretreatment photographs

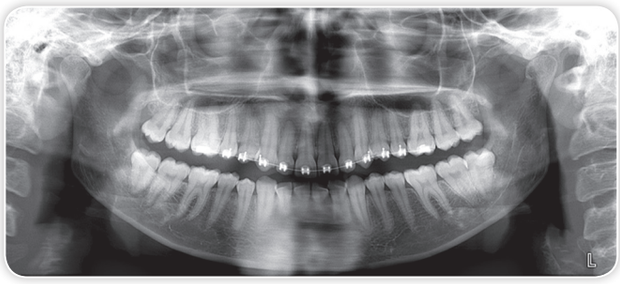

Figure 2 Pretreatment OPG

Figure 3 Pretreatment lateral cephalogram

had brackets bonded on the upper arch one week before reporting.

Orthopantomogram confirmed the presence of all permanent including third molars (Fig. 2). The cephalometric assessment (Fig. 3) confirmed that the patient had a Class II skeletal relation with horizontal growth pattern, orthognathic maxilla and retrognathic mandible with decreased nasolabial and mentolabial angle. The upper incisors were slightly proclined, whereas the lower incisors were normally inclined.

DIAGNOSIS

Class II skeletal relation with horizontal growth pattern, mesofacial form and Angle's Class II Division 1 malocclusion complicated by

- Increased overjet and overbite
- Midline shift
- Mild lower anterior crowding
- Rotated 24
- Incompetent lips.

TREATMENT OBJECTIVES

- Skeletal
  - To achieve skeletal class I relation (ideal)
- Dental
  - To achieve class 1 molar relation
  - To correct overjet and overbite
  - To correct Midline shift
  - To relieve Mild lower anterior crowding
  - To derotate 24
- Soft tissue
  - To achieve pleasing soft tissue profile.

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. These two options were discarded as they would not bring about the necessary profile changes. Third option was 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 and the dentoalveolar effects of the appliance can help in achieving the treatment objectives.

TREATMENT PROGRESS

Orthodontic treatment was started with 0.022" × 0.028" Preadjusted Edgewise appliance with a nonextraction approach. Bands were placed with a transpalatal arch in the upper jaw to minimize the anticipated side effects at the upper posterior segment. An initial 0.014 inch round nickel titanium archwire was used for leveling and alignment of both arches for 4 weeks followed by 0.016'' NiTi wire for one month. Two months later, upper and lower wires were replaced with 0.017" × 0.025" and 0.019" × 0.025" NiTi wires. Upper and lower 0.019" × 0.025" stainless steel wires were placed, with lingual crown torque of 5–10° in the lower anterior segment to counteract the labial inclination of mandibular incisors due to Class II corrective forces. The mandibular archwire was consistently cinched distal to the molars.

After 8 months of alignment and leveling, pre fixed-functional records were made and the case was prepared for insertion of powerscope appliance. The mandible was positioned to a Class I molar relationship and Powerscope was inserted bilaterally for a period of 6 months. The appliance was inserted from the distal part of the head gear tube on the maxillary molar to the arch wire distal to mandibular canine (Fig. 4). Four months after insertion, the appliance was activated on the left side

Figure 4 Powerscope insertion

using 3 mm shims available with the appliance to aid in midline correction. After eight months, the Powerscope appliance was removed, and lighter .016" stainless steel archwires were inserted, along with vertical elastics.

Finishing and detailing followed for 4 months after the molar correction. The active treatment was 17 months.

TREATMENT RESULTS

The post-treatment facial profile of the patient demonstrated noticeable improvement with improved facial esthetics and straight facial profile. The intraoral occlusion revealed satisfactory result with bilateral Class I canine and molar relationship with good buccal interdigitation. Overjet and overbite were reduced to 2 mm and 2 mm, respectively (Fig. 5).

DISCUSSION

Among all malocclusion, Class II malocclusion presents a constant challenge to the orthodontists.[8] Various treatment approaches and appliances have been endeavored for correcting the Class II malocclusion which can be as a result of skeletal abnormalities. Class II malocclusions due to mandibular retrusion are most commonly treated with functional orthodontic appliances which create orthopedic force directed at the mandibular condyle. These appliances produce skeletal correction by initiating remodeling changes at the mandibular condyle and glenoid fossa as well as, by bringing about favorable dento-alveolar changes.[9] They can be of two types–removable or fixed appliances.

Among fixed functional appliance, Powerscope has been added to the inventory recently by American Orthodontics. There is abundant literature is abundant on many fixed functional appliances such as Jasper jumper, Herbst, Universal bite jumper, Eureka Spring, and Forsus FRD, but not many reports are currently available with regard to Powerscope.[10-13] The case discussed here was treated with Powerscope considering its advantage over the conventional ones. The Powerscope was a fixed one-piece appliance available in one size suiting all Class II patients when compared to the ones used until now. One piece concept prevents the dislodgment of the appliance on various jaw movements. Moreover, the size selection, ordering the appliance, and delay in receiving the appliance could be all avoided as the appliance is unisized. Customization of the appliance could be done with the help of crimpable shims supplied along with Powerscope armamentarium. The appliance allows the quick and easy wire-to-wire installation preventing bond failures of bracket and buccal tube. The ball and socket joint at the two ends of the appliance allows excellent jaw movements reducing much of patient discomfort. This paper illustrates the skeletal, dental, and soft tissue changes after treatment with Powerscope fixed functional appliance. Moreover, we have attempted to enumerate the advantages of this appliance over the conventional ones based on our clinical experience.

During treatment, SNA value was reduced by 1°, whereas the SNB value increased by 3°. As a consequence, the ANB value decreased by 4° toward Class I skeletal pattern. The upper incisor proclination was reduced, and lower incisor

Table 1

Comparison of cephalometric parameters

Parameters	*Pretreatment*	*Post-treatment*
ANB (°)	6	2
Wits appraisal (mm)	4 mm	1 mm
SNA (°)	81	80
SNB (°)	76	79
1-NB (mm)	5	3
1-1 (°)	122	130
1-SN (°)	113	102
GoGn-SN (°)	29	32
FMA (°)	23	25
IMPA (°)	96	101
Y-axis	61	62
Jaraback's ratio	67.5	66.1
Lower gonial angle	75	76

Figure 5 Post-treatment photographs

proclination was increased (Fig. 5). The vertical mandibular proportions also increased during treatment (Table 1).

On comparing the cephalometric pre- and post-treatment findings, considerable improvement has been seen in the soft tissue and skeletal profile. A near to normal interincisal angle was established. A substantial improvement in soft tissue was appreciated with a tendency toward an orthognathic profile. The lower lip relation to E line improved greatly from −2 mm to −1 mm. Upper lip to E line along with nasolabial angle also showed substantial improvement. The treatment could thus accomplish a well-balanced face with a pleasant smile which could be well ascertained from the superimposition of soft tissue and hard tissue (Fig. 5). The results were stable and extremely satisfying for both the clinician as well as the patients.

CONCLUSION

To conclude, Powerscope proved to be a good cost-effective appliance in treating Class II skeletal malocclusion. 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 260 gms of force for continuous activation during treatment
- Patient-friendly design maximizes comfort
- Less visible.

Address for Correspondence
Paul R
Professor
Department of Orthodontics and Dentofacial Orthopedics
Inderprastha Dental College and Hospital
Sahibabad, Ghaziabad, UP
e-mail: drrahulpaul@gmail.com

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