

Treatment of class II division 1 using powerscope in growing patient: A case report

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Abstract

Class II Division 1 malocclusion is a common orthodontic issue characterized by upper front teeth protrusion over lower teeth, impacting dental aesthetics, speech, and psychological well-being. Timely intervention is crucial to guide skeletal development and prevent long-term complications. PowerScope, a dynamic orthodontic appliance, addresses this malocclusion by stimulating mandibular growth and correcting dental discrepancies simultaneously. This case report highlights of a 14-year-old patient treated with PowerScope, resulting in significant improvement in dental alignment and facial aesthetics. The efficacy of PowerScope in addressing Class II malocclusions in growing patients is underscored, emphasizing its potential to achieve favorable outcomes while promoting natural mandibular growth³. Timely intervention with orthodontic devices like PowerScope enhances functional and aesthetic outcomes, contributing to the overall well-being and confidence of growing patients facing Class II Division 1 malocclusion.

Keywords: Power scope, class II div 1 malocclusion, fixed functional appliances

Introduction

Class II Division 1 malocclusion, commonly seen in growing individuals, is characterized by an excessive protrusion of the upper front teeth (maxillary incisors) relative to the lower front teeth (mandibular incisors), often accompanied by a retruded lower jaw. This dental malalignment can lead to various functional and aesthetic concerns, such as difficulty chewing, speech impairment, and self-esteem issues¹. Early detection and intervention, typically through orthodontic treatment, are crucial in managing Class II Division 1 malocclusion, as it allows for guiding proper jaw growth and dental alignment, thereby improving both oral function and appearance for optimal long-term dental health. Fixed functional appliances are orthodontic devices used to correct malocclusions, particularly those involving discrepancies in the positioning of the upper and lower jaws. Unlike traditional braces, which primarily focus on tooth alignment, fixed functional appliances target the underlying skeletal structures by encouraging proper jaw growth and alignment. These appliances typically consist of telescoping systems, NiTi internal spring, brackets and wires that are attached to the teeth and work in conjunction with the natural movements of the jaw to reposition it into a more harmonious relationship⁶. By promoting favorable changes in jaw

position and function, fixed functional appliances can effectively address issues such as Class II malocclusions and improve both the aesthetic appearance and functional efficiency⁵. They are often a valuable component of comprehensive orthodontic treatment plans, particularly for growing individuals, where early intervention can yield optimal results

Diagnosis and etiology

A 14 year-old female patient reported to the department with the chief complain of forwardly placed teeth in upper front region of the jaw. Patient has no associated medical and dental history. No history of trauma associated with same.

On extraoral examination patient showed bilaterally symmetrical face with straight profile and acute nasolabial angle with incompetent lips, acute mentolabial sulcus. Patient has protrusive maxilla and retrusive mandible.

On intraoral examination patient revealed class II molar and canine relation, proclination and spacing with upper and lower anteriors. Molars and canine were in end on relationship. Upper and lower lip were protrusive. Anterior deep bite was present along with overjet of 12mm.





Fig 1: Pre treatment radiographs

OPG examination reveals presence of all teeth with erupting third molar in all four quadrants i.e 18, 28, 38, 48 and good bone support. Pre treatment lateral cephalogram revealed skeletal class II relation, Protrusive maxilla & retrusive mandible, Normodivergent jaw bases, Proclined upper and lower incisor, Protrusive upper lip and lower lip.

Treatment Objectives

The treatment objectives for this patient were to (1) to correct proclination in upper and lower anterior teeth, (2) achieve class I molar and canine relation bilaterally, (3) achieving adequate overjet and overbite, (4) to derotate 25, 33, (5) and achieving balanced soft tissue profile.

Treatment Plan

Treatment plan decided was to be progressed in two phases i.e phase I alignment and leveling with fixed orthodontic therapy followed by phase II therapy i.e fixed functional appliance.

Treatment progress

Treatment started with bonding of 0.022"x0.028" pre-adjusted edgewise bracket in the maxillary arch. Initial leveling and alignment started with 0.012" NiTi wire with transpalatal arch followed by 0.014", 0.016", 0.018" NiTi

wires respectively. Anterior bite plane was placed for deepbite. After initial alignment and leveling, 0.016" x0.022" NiTi followed by 0.019x0.025"SS was placed. A labial root torque of 10 degrees was placed in 0.019x0.025"SS in lower arch. Around 11 months into the fixed orthodontic treatment, fixed functional appliance-Powerscope was placed. After 4 months of placement, 3mm of activation was done bilaterally. For finishing and detailing green class II elastics of 5/16" 2.0 oz elastics were placed, followed by red elastics of 3/16", 3.5 oz were placed. After total of 2 years into the treatment debonding was done with upper and lower arch. A fixed lingual retainer from canine to canine was placed in upper and lower arch. Along with Beggs wrap around retainer was inserted in upper and lower arch.



Fig 2: Initial alignment and leveling



Fig 3: Insertion of power scope



Fig 4: Post treatment with beggs wrap around retainer



Cephalometric analysis

	PRE TREATMENT	PRE FUNCTIONAL	POST FUNCTIONAL
ANB	6°	8°	3°
A per- B per	10 mm	10 mm	2 mm
Wits	6 mm	7 mm	1 mm
NA Pog	12°	13°	6°
VERTICAL			
SN-GoGn	32°	31°	30°
FMA	23°	20°	21°
Basal Plane Angle	22°	21°	20°
Jabarak ratio	61%	62.5%	65%
Y-axis	70°	69°	67°
MAXILLARY			
SNA	86°	83°	83°
A per-N per	3 mm	2 mm	2 mm
S per-Ptm per	20 mm	19 mm	19 mm
MANDIBULAR			
SNB	78°	75°	80°
B per- N per	-8 mm	-8 mm	-3 mm
Go Pog	61 mm	65 mm	70 mm
Saddle Angle	131°	130°	128°
Posterior Cranial Base	29 mm	30 mm	30 mm
DENTAL			
UI-SN	119°	98°	105°
UI-NA	33°, 7 mm	23°, 4 mm	26°, 5 mm
UI-A-Pog	41°, 14 mm	20°, 3 mm	28°, 6 mm
LI-MP	104°	100°	105°
LI-NB	30°, 6 mm	24°, 3 mm	27°, 4 mm
LI-A-Pog	24°, 1 mm	22°, 2 mm	28°, 6 mm
Interincisal Angle	113°	135°	125°
SOFT TISSUE			
E Line	U- 1mm L- -3 mm	U- -3 mm L- -3 mm	U- -3 mm L- -2 mm
Nasolabial Angle	81°	118°	100°

Discussion

Class II Division 1 malocclusion presents a common challenge in orthodontics, particularly in growing patients where timely intervention is critical to guide skeletal development and prevent long-term complications. This malocclusion, characterized by the protrusion of upper front teeth over the lower ones, not only affects dental aesthetics but also influences speech, chewing efficiency, and psychological well-being. Addressing Class II Division 1 malocclusion in growing patients requires a strategic approach that accounts for the ongoing craniofacial growth. PowerScope is the latest innovation among fixed functional appliances developed by Dr. Andy Hayes. It applies continuous force and produces favourable dentoalveolar effects such as restraining maxillary growth, stimulation of

mandibular growth, distal maxillary movement and mesial positioning of mandibular arch1. PowerScope emerges as a promising solution in this regard, offering a dynamic orthodontic mechanism to stimulate mandibular growth and correct dental discrepancies simultaneously. By applying controlled force to the lower jaw, PowerScope encourages mandibular advancement, thereby reducing overjet and improving occlusal relationships. A case report by Dr Luv Agarwal1 illustrates the application of PowerScope in 16 years young adolescent male having skeletal Class II Div 2 with mandibular deficiency who was reported with forwardly and irregularly placed upper front teeth with closed bite. Case was treated initially with MBT 0.022” prescription followed by PowerScope. Successful results were obtained with a substantial improvement in facial profile, skeletal jaw relationship and overall aesthetic appearance. PowerScope produced a significant forward movement of mandible which obliterated the need of extractions. In our case report of a 14 year-old patient with Class II Division 1 malocclusion, the implementation of PowerScope yielded significant improvements in both dental alignment and facial aesthetics over the treatment period. This underscores the efficacy of PowerScope in addressing Class II malocclusions in growing patients, highlighting its potential to achieve favorable outcomes while promoting natural mandibular growth.

A study was conducted on 14 orthodontic patients to evaluate the efficacy of Powerscope appliance in the treatment of skeletal Class II patients by three-dimensional image. conducted on with a mean age of 15.39 ± 1.25 years old that included post-pubertal female patients with skeletal Class 2 of ANB angle greater than 4° due to the retruded mandible. Cone- beam computed tomography was made before (T1) and after (T2) installation of the Powerscope appliance. Conclusion: (1) Powerscope appliance provides an effective tool for the treatment of skeletal Class 2 adolescent patients. (2) Effects of Powerscope appliance were mainly dental with lesser skeletal effects. (3) The skeletal changes were seen in the mandibular base with minimal maxillary skeletal effects. Timely intervention with orthodontic devices like PowerScope not only enhances functional and aesthetic outcomes but also contributes to the overall well-being and confidence of growing patients facing Class II Division 1 malocclusion. The study concluded that avoiding extraction for Class II malocclusion due to mandibular retrusion is crucial to prevent adverse soft tissue changes2. In a study done by Middha et al4 PowerScope exhibited effects that were not considered statistically significant on the maxilla, instead primarily manifesting dento-alveolar changes that led to a considerable reduction in overbite. Class II correctors like PowerScope offer significant benefits, including minimized side effects and reduced need for patient compliance. The PowerScope is particularly effective for noncompliant patients, improving both the soft tissue profile and esthetic appearance through sagittal forward mandibular displacement. This method ensures excellent, long-term stable results.

References

1. Agarwal L, Singh K, Tandon R. Treatment of Class II Div 2 malocclusion using powerscope: A case report. Orthodontic Journal of Nepal, 2018;8(1):63-7.

2. El-Hossainy H, Al-khalefa HN, Abouelnour AM. Three-dimensional evaluation of the efficacy of Powerscope appliance in treatment of skeletal Class II malocclusion: A prospective clinical study. *Al-Azhar Journal of Dental Science*, 2022;25(2):223-31.
3. Savanna K, Kumar M, Ansari A, Jain A. Correction of Class II using Powerscope Appliance-A case report. *Arch of Dent and Med Res*, 2016;2(3):120-5.
4. Middha A, Shah YD, Gupta S, Syed FA, Hemanth RV, Nashiroddin M. A Comparative Analysis of Treatment Effects of PowerScope and AdvanSync2 in Class II Division 1 Malocclusion: A Retrospective Study. *Cureus*, 2023;15(11).
5. Kalra A, Swami V, Bhosale V. Treatment effects of "PowerScope" fixed functional appliance-a clinical study. *Folia Medica*, 2021;63(2):253-63.
6. Al Hamdany AK, Hasan LA, Alrawi MN, Alhajar EH. PowerScope 2 functional appliance: A 3D finite element simulation of its action on the mandible. *Journal of Oral Biology and Craniofacial Research*, 2023;13(2):299-305.