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Management of a non-growing skeletal class II patient: A case report

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Abstract

Treatment of skeletal Class II malocclusion demands a very calculative approach from an orthodontist's perspective. Depending on the individual patient needs we have various treatment options available, however these options can be judged based on the growth status and the severity of malocclusion. The possible treatment plan in an adult includes camouflage or surgery but in cases where neither of the two are feasible we have to look for an alternative such as fixed functional appliance, which has shown to bring about decent treatment outcomes by causing dentoalveolar changes in the past literature and thus reducing the skeletal as well as dental discrepancy. Therefore in the present case report we emphasize on the use of Powerscope which is a type of fixed functional appliance and its results showed a major improvement of skeletal, dental as well as the soft tissue relationships.

Keywords: Skeletal class II malocclusion, fixed functional appliance, powerscope, mandibular deficiency

Introduction

Class II malocclusion is one of the most common antero-posterior malocclusion in orthodontics and poses a major challenge in terms of its treatment planning and management. Skeletal Class II malocclusion represents discrepancy in the position of maxilla and mandible i.e. either retrusive and orthognathic maxilla or protrusive maxilla and orthognathic mandible or because of a combination of both. However amongst the three conditions retrognathic mandible is most common which can be because of multitudinous reasons such as small sized mandible, posterior placement of condyle in glenoid fossa or due to functional mandibular shift. The treatment planning of Skeletal Class II malocclusion depends on the growth status of the patient, amount of discrepancy present and patient compliance as in growing subjects, mandibular growth modulation can be done using various functional appliances [1-3]. Functional appliances restrict the maxillary growth and simultaneously stimulates the mandibular growth. Removable functional appliances such as activator, bionator and twin block are advised for compliant patients whose active growth is still remaining, where as in non-compliant patients or those who have crossed the adolescent growth spurt, Fixed functional appliances such as Herbst, Jasper jumper, Forsus and Advan Sync are advocated [4, 5]. The mandibular advancement induced by these functional appliances can bring about a change in molar relation, along with increase in the length of mandible and also helps in increased overjet correction [6-8].

Another fixed functional appliance which can be used for the correction of such Class II malocclusion is PowerScope which was the choice of appliance in this case report as it applies continuous force for producing favourable dentoalveolar effects in adult patients and is equally effective in enhancing patient comfort because it is relatively simple to install. It is delivered as a one-size-fits-all appliance pre-assembled with attachment nuts for quick and easy chair side application. As this 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 and so it can be used together with the brackets [9].

Thus the present case report describes a non-extraction approach for correction of Class II division 1 malocclusion with retrognathic mandible in an adult patient.

Case Report

A 23-year-old adult female reported to the department of Orthodontics and Dentofacial Orthopaedics with the chief complaint of forwardly placed upper front teeth since 7-8 years. Clinical examination revealed convex profile with posterior divergence, mesomorphic facial form, recessive chin, incompetent lips, and protrusive upper lip. On intraoral examination, the patient presented with Angle's Class II molar relation and End-on canine relation bilaterally along with an overjet of 6 mm and an overbite of 6.5 mm (Figure 1). Cephalometric analysis (Table 1) revealed a convex skeletal profile with ANB angle of 6°, a severely retruded mandible, a well-positioned maxilla, normal mandibular plane angle suggestive of average growth pattern. Dentoalveolar readings suggested almost upright upper and lower anterior teeth (Figure 2).



Fig 1: Pre-treatment photographs



Fig 2: Pre-treatment lateral cephalogram

Treatment Objectives

- Soft tissue
 - To achieve pleasing soft tissue profile.
 - To reduce lip incompetency.
- Dental
 - To achieve class I molar relationship bilaterally

- To achieve class I canine relationship bilaterally
- To correct increased overjet and overbite
- To relieve mild anterior crowding

• Skeletal

- To achieve skeletal class I relationship (ideal)

Treatment Plan

Three treatment plans were devised which included surgical advancement of mandible for correction of Skeletal Class II malocclusion but since the patient was apprehensive for surgery this treatment plan was ruled out. Secondly a camouflage therapy was considered by extracting upper first premolars but since this plan would have worsened the facial profile and anticipated soft tissue changes this plan was also discarded. Thirdly the use of fixed functional appliance was discussed with the patient as it has proven to give excellent results in dentoalveolar compensatory treatment of jaw deficiency in adult patients. Thus considering the severity of discrepancy and the probable etiology, a non-extraction approach was planned using MBT 0.018" slot preadjusted appliance. After leveling and aligning, the Power Scope which is a type of Fixed Functional appliance was installed to advance the mandible into a Class I relationship followed by finishing and detailing.

Treatment Progress

Initially 0.014" NiTi wire was used in both arches which was followed by 0.016" NiTi and 0.016" × 0.022" NiTi for 1 month each. Leveling and alignment was completed in 3 month time period and 0.016" × 0.022" stainless steel wire was placed in both the arches for 1 month. In the next appointment lingual crown torque of 10° was added 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 back distal to the molars and a unit was created from molar to molar in both the arches to avoid opening up of any spaces. This was followed by insertion of PowerScope appliance and positioning the mandible in Class I by adding 3mm shims bilaterally which were available with the appliance (Figure 3). Thereafter, the patient was recalled once every month for follow up visits.

After 8 months, the Powerscope appliance was removed, and 0.016" TMA archwires were inserted, along with vertical elastics for Finishing, detailing and settling of occlusion, which took another 4 months. Thus the total active treatment duration was 16 months following which the patient was given Begg's retainer for both the arches.



Fig 3: Powerscope insertion

Treatment Results

At the end of treatment a major improvement was seen in the facial balance and esthetics along with a straight profile. A Class I molar and canine relationship was also achieved bilaterally with a good buccal inter-digitation and a reduction

in the increased overjet and overbite to 2mm and 2.5mm respectively. Post treatment cephalometric readings suggested decrease in ANB angle and increased mandibular length along with forward position of mandible.

Discussion

Being the most common malocclusion in orthodontic practice Class II malocclusion is a great challenge for clinicians. The most favourable treatment for such malocclusion can be done if patients reports well in time during their active growth phase. However once the growth ceases the most sought after treatment plans are either extraction or surgery. The situation worsens when treatment is planned for a patient in whom the skeletal discrepancy is not so severe that surgery is viable or when the soft tissue compensations do not allow for an orthodontic camouflage treatment using extraction therapy. Therefore in such cases when the patient is an adult and the treatment objective is to achieve mild skeletal as well as dental corrections fixed functional appliances are advocated.¹⁰ PowerScope itself does not cause forward repositioning of the mandible in anterior direction instead when patient functions in a maximum intercuspation position, its internal spring comes into action by delivering 260 gms of force for continuous activation during treatment and hence it is suitable for Class II patients.¹¹⁻¹⁴

During treatment, SNA value was reduced by 1°, while the SNB value increased by 1°. As a result, the ANB value decreased from 6° to 4° toward Class I skeletal pattern. The upper incisor proclination was reduced, and lower incisor proclination was increased. The vertical mandibular proportions also increased during treatment (Table 1).

On comparing the cephalometric pre- and post-treatment findings, a notable improvement was seen in both the soft tissue and facial profile. An increase in the length of mandible from 94mm to 96mm was also one of the reasons for mandibular advancement. A considerable improvement in the soft tissue was also appreciated with a shift towards an orthognathic profile. The upper lip relation to E line improved greatly by reducing from 5 mm to only 3 mm. Lower lip to E line along with nasolabial angle were also maintained. The treatment could thus accomplish a well-balanced face with a

pleasant smile (Figure 4 & 5). The results were stable and extremely satisfying for both the clinician as well as the patient.

Table 1: Comparison of cephalometric parameters

Parameters	Pre Treatment	Post Treatment
SNA	82	81
SNB	76	77
ANB	6	4
N Pt A	2 mm	1 mm
N Pog	-5 mm	-4 mm
LAFH	58 mm	60 mm
GO-GN to SN	27	29
Max Length	86 mm	85 mm
Mand Length	94 mm	96 mm
UI to NA (Angle)	20	18
LI to NB (Angle)	31	32
LI to APog	1 mm	2 mm
S Line (Upper)	5 mm	3 mm
S Line (Lower)	2 mm	3 mm
Nasolabial angle	101	102



Fig 4: Post-treatment photographs

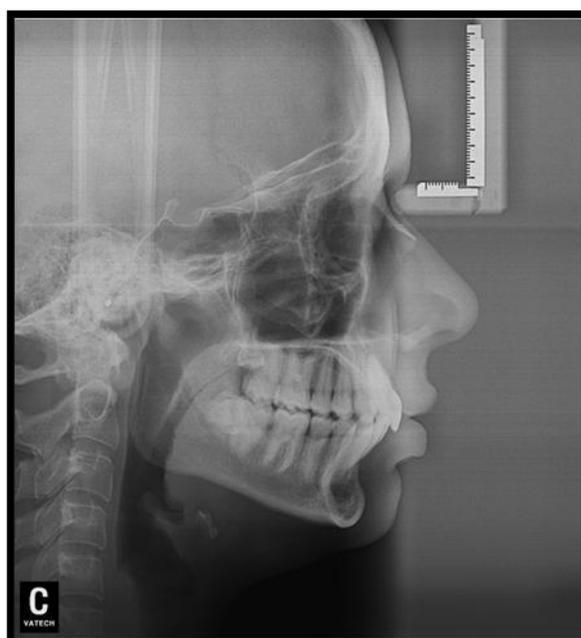


Fig 5: Post-treatment lateral cephalogram

Conclusion

Power Scope proved to be a very handy fixed functional appliance for treating adult patient with Class II malocclusion. With limited side effects, minimal patient compliance need, easy installation and uni-size nature of this device, this appliance proved to be completely cost effective both for the patients as well as for the clinician. Power Scope could be one of the best treatment options for improving the soft tissue profile and esthetic appearance of the patient by advancing mandible and ensuring excellent long-term stable results.

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