Orthopaedic Combination Pull Headgear with an Expanded Inner Bow for Class II Correction

Tanmay Sharma, Santosh Kumar, Zuber Ahamed Naqvi, Ridam Jain, Bhaskar Gupta, Manoj Sharma

ABSTRACT

A successful orthodontic treatment depends upon proper diagnosis and treatment plan, as in this case combination pull headgear was used for correction of skeletal class II discrepancy. At the end of treatment an improvement in the facial profile was observed and skeletal as well as occlusal correction was achieved.

Keywords: Orthopedic, Profile, Skeletal class II, Dental.


Source of support: Nil

Conflict of interest: None declared

INTRODUCTION

The principle of orthopedic headgear treatment is to restrict forward growth of the maxilla by applying orthopedic forces on the maxilla. Cervical headgear therapy has been extensively studied for the last 50 years; however, treatment results have varied greatly.1 This may be explained by the use of different modifications of the headgear treatment.2-9 The direction and the force of traction has varied greatly, and high-pull, straight-pull, cervical-pull headgears, or combinations with different forces have been used.2,3,5,10 Forces from 150 to 200 gm may be used to move teeth2,3,11 while forces over 450 gm are assumed to surpass the tooth-moving threshold and been used to control dental anchorage.2,3,11,12 Strong forces are needed to produce orthopedic skeletal effects on the maxilla, which are essential in the treatment of class II malocclusion.12-20

The structure of the inner and outer bow has varied. The inner bow may be used with or without expansion,21,22 and it may or may not bear on the upper incisors. Bayonets have been used along the vertical or horizontal plane. The length of outer bow and its angle against inner bow has also varied.2,3 Furthermore, in many studies headgear therapy has not been used alone, but with fixed or functional appliances23,24 with or without tooth extractions.4,5,25 The age at the onset of treatment has also been suggested to be a critical factor.26 The headgear has been used either intermittently or continuously.20,27 Therefore, it is difficult to compare different results of the headgear therapy, and it is important to recognize what kind of headgear therapy is studied. In addition, the malocclusion itself may result from various maxillary and mandibular skeletal and dental relationships.28-32 This heterogeneity of class II malocclusion probably adds some variability to the results. Recent findings suggest that class II malocclusion is related to a narrow maxilla. This narrow maxilla was observed even in children younger than 6 years of age.33 To achieve a permanent skeletal correction of the malocclusion and prevention of the protrusive growth, the widening of this narrow maxilla seems to be essential.19 In a previous study,34 this widening was achieved by using headgear alone without any other appliances, when the headgear was used with a widened inner bow as suggested by Ricketts et al.22 The claimed side-effects of the treatment were distal tipping and extrusion of the first molars in excess of normal eruption, may be avoided by using a face bow with a long and rigid outer bow that has been bent upward.21,35,36,38

CASE REPORT

A 10-year-old boy present with the chief complains of forwardly placed teeth. On clinical examination it was found that he had convex profile (Fig. 1) having potentially competent lip with Angle’s class II division I malocclusion with proclined and protracted upper and lower incisors (Figs 2 to 5). Having skeletal class II pattern due to prognathic and macrognthic maxilla with average growth pattern (Fig. 6). It was decided to treat the patient by two phase therapy in the first phase it was decided to restrict the maxillary growth this would help in correction of class II skeletal pattern, class II molar relation, class II canine
Because the patient was in growing stage and approximately 65 to 85% of the growth was remaining (CVMI-2) with class II skeletal pattern and average grower it was decided to use orthopedic force by the use of face bow and combination headgear (Fig. 7). For this purpose upper molar were banded and molar tubes were welded to it. A Kloehn-type cervical headgear with a large inner bow and long outer bow was used to treat the class II division 1 malocclusions. The 4 mm horizontal bayonets were bent to the inner bow to keep teeth out of contact with cheeks or lips. The inner bow was engaged so, that the distance between the bow and the anterior teeth was 3 mm. The ends of the inner bow were bent inward to prevent the rotation of the first molars mesiopalatally or to rotate the first molars into their correct position. To prevent distal tipping of the first molar crowns and extrusion of the first molars over the amount of the normal eruption, the long rigid outer bow was bent 30 degrees upward. To prevent buccal and distal tipping of the first molar crowns, the molar tubes were placed as close to the gingival margin and the rotation center of
the first molars as possible.\textsuperscript{37} In the attachment of the headgear to teeth, double tubes were used, and the upper and outermost tube was used for the attachment. A force of 500 gm per side was used for cervical traction. The force was measured with a force gauge (dontrics).

The expansion of the inner bow and the amount of force used were controlled at 6 to 8 weeks intervals. The patients were asked to wear the headgear 12 to 14 hours a day, in the evenings and at nights, and to keep a daily diary of his headgear wear. The treatment was finished when correction of the class II molar relationship to the class I molar relationship was achieved regardless of the amount of possible horizontal overjet (Figs 8 to 13). These changes also corresponds to the change in cephalometric variables as shown by Table 1.

After the treatment of 1 and a half year molars are in class I relationship was achieved with reduction in convex profile and end on canine relationship. Now, the patient shall be treated in second phase therapy, i.e. orthodontic treatment.

<table>
<thead>
<tr>
<th>Table 1: Cephalometric analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>SNA</td>
</tr>
<tr>
<td>SNB</td>
</tr>
<tr>
<td>ANB</td>
</tr>
<tr>
<td>Wits appraisal</td>
</tr>
<tr>
<td>Ni Pt A</td>
</tr>
<tr>
<td>Ni Pog</td>
</tr>
<tr>
<td>Go Gn to SN</td>
</tr>
<tr>
<td>Y-axis</td>
</tr>
<tr>
<td>Facial axis</td>
</tr>
<tr>
<td>Face height ratio (Jaraback ratio)</td>
</tr>
<tr>
<td>Upper incisor to NA (mm)</td>
</tr>
<tr>
<td>Upper incisor to NA (degree)</td>
</tr>
<tr>
<td>Lower incisor to NB (mm)</td>
</tr>
<tr>
<td>Lower incisor to NB (degree)</td>
</tr>
<tr>
<td>Lower incisor to mandibular plane angle</td>
</tr>
<tr>
<td>Interincisal angle</td>
</tr>
<tr>
<td>Upper molar to Ptv</td>
</tr>
</tbody>
</table>

DISCUSSION

In the present case, it has been shown that class II malocclusions with a protrusive maxilla may be corrected to class I molar relationships by using orthopedic cervical
Orthopedic Combination Pull Headgear with an Expanded Inner Bow for Class II Correction

Fig. 11: Posttreatment extraoral photograph

Fig. 12: Posttreatment intraoral photograph (right lateral)

Fig. 13: Posttreatment intraoral photograph (left lateral)

headgear as the only appliance, provided that an expanded inner bow and upward-bent long outer bow are used. Concurrent to the correction of the malocclusion, both the maxillary and mandibular dental arches were significantly widened.34 The cephalometric analysis (Table 1) suggest that the observed improvement of the occlusion was achieved by inhibiting the forward growth of the maxilla, and by anterior and downward rotation of the palate. The forward growth of the mandible followed the normal growth pattern and was not significantly affected by the treatment. During treatment, the mandible rotated upward and forward following the normal growth pattern.39,40 This result is consistent with the observation by Cook et al.41 Hence, it can be suggested that the expansion of the maxillary dental arch enabled normal mandibular growth. Therefore, the expansion of the inner bow of the headgear is an essential part of the method.

CONCLUSION

Class II division 1 malocclusions with a protrusive maxilla were corrected to class I molar relationships using orthopedic cervical headgear as the only treatment appliance. The headgear was used with an expanded inner bow and an long outer bow bent upward. During the treatment period, the mandible grew forward according to the normal growth pattern. This normal mandible growth is likely to be achieved by widening the maxilla with the expanded inner bow.42 This suggests that orthopedic cervical headgear used with an long upward bent outer bow and a widened inner bow is a suitable method to treat the class II division 1 malocclusions.

REFERENCES


18. Sandusky WC. Cephalometric evaluation of the effects of the Klenoh type of cervical traction used as an auxiliary with the edgewise mechanism following Tweed’s principles for correction of class II, division 1 malocclusion. Am J Orthond 1965;51:262-87.


ABOUT THE AUTHORS

Tanmay Sharma (Corresponding Author)
Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, Mahatma Gandhi Dental College and Hospital, Sitapur, Jaipur, Rajasthan, India, e-mail: drmranmaysha@gmail.com

Santosh Kumar
Professor and Head, Department of Orthodontics and Dentofacial Orthopedics, Kothiwal Dental College and Research Center Moradabad, Uttar Pradesh, India

Zuber Ahamed Naqvi
Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, Mahatma Gandhi Dental College and Hospital, Jaipur, Rajasthan, India

Ridam Jain
Consultant Orthodontist, Private Practice, Jaipur, Rajasthan, India

Bhaskar Gupta
Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, Saraswati Dental College and Hospital, Lucknow, Uttar Pradesh, India

Manoj Sharma
Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, Saraswati Dental College and Hospital, Lucknow, Uttar Pradesh, India