Maxillary Growth Control with High Pull Headgear

Nadeer. T[1,*], Rosaline Tina Paul[2], Althaf T Rasheed[3], Midhun Vinod[4], Saveen N. S[5], Lakshmi Lakshmanan[6]

[1,2,3,4,5]Post Graduate Student, [6]Senior lecturer, Department of Orthodontics, Royal Dental College, Palakkad, Kerala.

***Corresponding Author:**
Email: nadeert1987@gmail.com

Abstract:

The use of headgear has several clinical applications like distalization, restricting maxillary growth and anchorage control. The main being control of the vertical maxillary excess. In this article a 10 yr old patient with a high pull headgear for a period of 8 months is detailed. Cephalometrically the result indicates the use of high pull headgear causes both skeletal and dentoalveolar changes.

Key words: *High pull headgear, Maxillary splint, Intrusion*

Introduction:

Class II malocclusion can be dental and/or skeletal, involving, maxillary excess, mandibular deficiency, or a combination of both. The characteristic finding of increased maxillary growth resulting in vertical maxillary excess can be observed as a gummy smile, an increased lower anterior facial height or increased display of incisors. Excessive growth of the maxilla in children with class II malocclusion has more of vertical than anteroposterior component, and if the maxilla moves downward, the mandible rotates downward and backward[1]. The treatment modality to correct vertical maxillary excess is by using a high pull headgear in growing patient and orthognathic surgery in non growing patients. Usage of mini implants is also another alternative in such patients. The use of headgear dates very long back and has found a variety of clinical application in contemporary orthodontics like distalization, restricting maxillary growth and anchorage control .Animal studies reveal that absolute distalization of maxilla and maxillary dentition is possible by heavy headgear forces for prolonged period.

The force vector should travel through the centre of resistance of the maxilla [2]when we want a bodily movement of the maxilla .The centre of resistance of maxilla exists at the posterior-superior aspect of the zygomatico-maxillary suture (fig 1).

In this paper, we present a case demonstrating the maxillary growth control with high pull headgear. The high pull headgear with maxillary splint allows vertical forces to be directed against all the maxillary teeth-not just the molars-and appears to have a substantial maxillary dental and skeletal effect with good vertical control.

Case Report:

A 10 year old female patient, in her pre-pubertal growth status exhibited a prognathic maxilla, retrognathic mandible with a vertical growth pattern and class II skeletal base. There was an increased incisor exposure at rest and smile with proclined incisors.

The treatment objective was to restrain the forward and downward descent of the maxilla due to growth. It was decided to treat the patient with a removable high pull headgear splint (fig 2). The length of the outer bow was kept short so that forces passed through the centre of resistance of the maxilla with a force magnitude of 600 gm per side (fig 3) .The patient was instructed to wear the headgear full time except while eating brushing and bathing. As the patient had potentially incompetent lips, she was also instructed to perform lip exercise by forcefully closing her lips on to the bows.

Recall visits were scheduled at 3 weeks interval and force levels were checked and maintained. The force values of the headgear module were measured during each visit and the patient was advised to step up the attachment to the next hole accordingly.

Results:

After 8 months of full time wear of the appliance (as recommended by Marcotte) [3] the bite was opened, with a reduction in incisor visibility (fig 4&5).The overjet was reduced from 5mm to 3mm (fig 6 & 7). Pre and Post treatment cephalometric tracing (fig 8& 9) showed that growth of the maxilla was restrained. (Table 1)

The cephalometric changes showed that the mid face height was reduced by 2 mm (N-ANS). The lower anterior facial height reduced by 5 mm. There was dento-alveolar intrusion as the distance of incisal tip to the palatal plane reduced by 6 mm. The SNA angle improved indicating a reduction in maxillary growth. The SNB angle mildly improved due to forward and upward rotation of mandible, which is

also indicated by mild reduction in mandibular plane angle.

Table 1

Measurements	**Normal**	**Pre Rx**	**Post Rx**
Nasion -ANS	50 ± 2.4 mm	51 mm	49 mm
ANS-Gnathion	61.3 ± 3 mm	68 mm	63 mm
Perpendicular distance from palatal plane to incisal tip	27.5±1.7 mm	31 mm	25 mm
SNA	82 ± 2^0	85.3^0	81.9^0
SNB	80 ± 2^0	74.6^0	75.9^0
ANB	2 ± 2^0	10.7^0	6^0
Inter incisal angle	131^0	109.8^0	102.7^0
Go-Gn to SN	32^0	36.8^0	35.5^0

Fig 1: Centre of resistance of maxilla

Fig 2: Intra oral splint

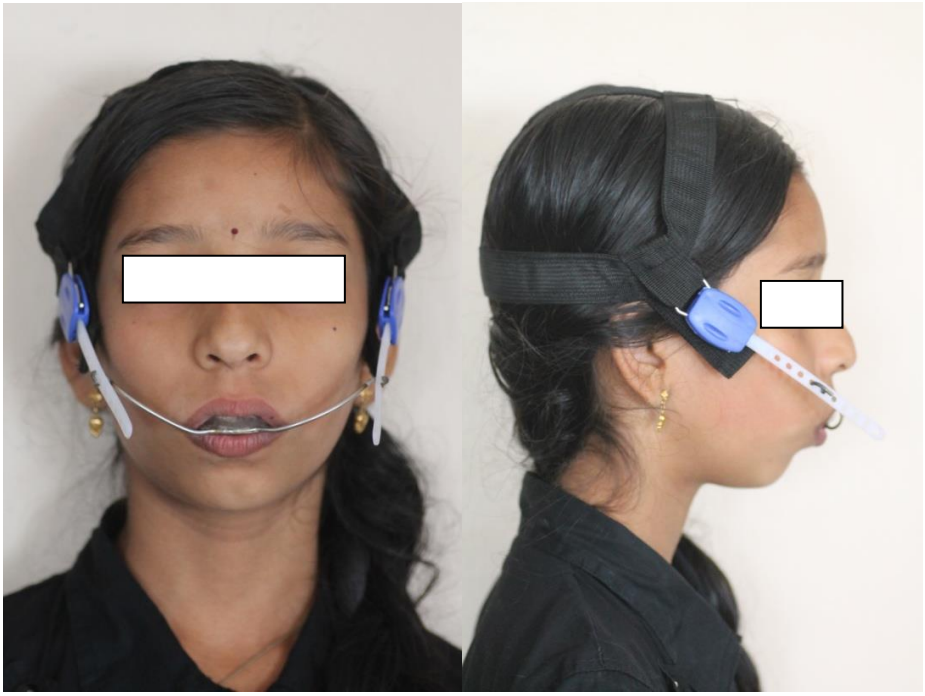

Fig 3: patient with high pull headgear

Fig 4: Pre-treatment intraoral view

Fig 5: Post treatment intraoral view

Fig 6: frontal view- pre and post treatment photographs

Fig 7: Lateral view – pre and post treatment photographs

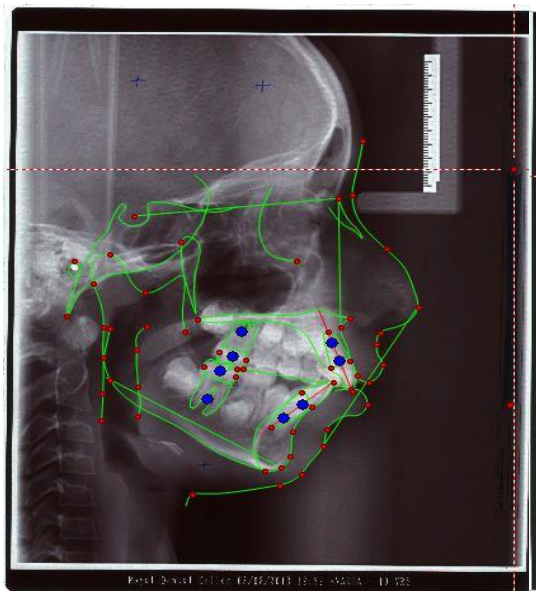

Fig 8: Pre treatment lateral ceph

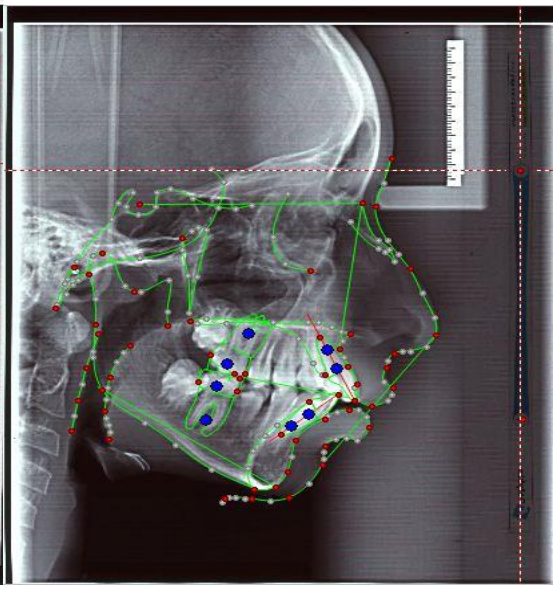

Fig 9: post treatment lateral ceph

Discussion:

Caldwell et al[4] used a maxillary splint appliance for a period of 4-20 months and noticed that the maxillary dentition was both tipped and displaced distally, and downward development was inhibited or even slightly reversed. Martins et al[5] also used similar appliance for a period of 1.7 yrs and noted that the headgear corrected the Class II primarily by dento-alveolar changes. Orton et al[6] used a high pull headgear with maxillary splint for a period of 1.1 yrs and noted slight maxillary restraint in both sagital and vertical planes was obtained showing that principal effect was in the maxillary teeth. Uner et al[7] used a similar appliance for 11 months and revealed that the splint had both orthopedic and orthodontic effects on the growth pattern of the dento-skeletal structures.

In our case a full time wear for a period of 8 months has led to both skeletal and dental changes which are evident in the improvement of SNA angle indicating the reduction in maxillary growth. The reduction of lower anterior facial height indicates the upward and forward auto rotation of the mandible which has subsequently improved SNB angle also. Inter incisal angle has reduced indicating proclination of incisors during the treatment. The growth of mandible is unhindered and the absence of an appliance in the lower arch could be the reason for such a proclination in the lower incisors. The reduction in the mandibular plane angle indicates auto rotation of the mandible.

Conclusion:

The high pull headgear brought about significant clinical and cephalometric changes in the patient. The advantage of this maxillary splint with high pull headgear were (1) Skeletal and dental changes were significant within a period of 8 months (2) Second phase of fixed appliance therapy was made faster (3) High pull headgear with proper biomechanics at correct period of time with patient cooperation has led to the success of the treatment .

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