

NON-SURGICAL TREATMENT OF SKELETAL CLASS II HIGH ANGLE MALOCCLUSION – A CASE REPORT

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ABSTRACT

This case report describes orthodontic management of a young girl with severe class II malocclusion combined with hyperdivergent mandible. Treatment involved extraction of upper and lower first premolars and use of vertical chin cup. The initial severe crowding was resolved and the vertical dimension was successfully maintained. The improved overall facial esthetics and avoidance of future surgical intervention were satisfactorily accepted by the patient and her parents.

Key Words: Class II malocclusion, hyperdivergent mandible, camouflage treatment.

INTRODUCTION

Clinical cases of growing skeletal class II malocclusion are considered challenging in the field of orthodontics. There are multiple reported approaches to manage such cases including maxillary headgear, mandibular functional appliances or a combination.¹⁻⁵ While some treatment modalities utilize two phases of treatment without extraction, other rely on extraction of permanent teeth with a single phase of treatment in the permanent dentition stage.⁶⁻⁷ Orthognathic surgery always remain an option for treating severe skeletal class II cases in adults with or without extraction of permanent teeth.⁸ When severe skeletal class II facial pattern is combined with class I dental malocclusion, extraction of permanent teeth and orthognathic surgery has been recommended.⁹

The effect of extraction treatment on the vertical facial pattern to overcome the extrusive nature of fixed orthodontic therapy has long been questioned in the orthodontic literature.¹⁰ This case report demonstrates the role of extraction of four first premolars in maintaining the vertical facial dimension, resolving severe crowding and improving overall facial esthetics in a severe skeletal class II high angle case.

CASE REPORT

An 11 year and 6 month old female patient presented in private orthodontic clinic with chief complaint of crowded upper and lower teeth. The clinical records (Fig 1) revealed that the patient had symmetrical

face, convex profile and incompetent lips at rest with hyperactive mentalis muscle. Intraoral photographs showed class I dental malocclusion with upper and lower right first molars in crossbite, upper lateral incisors in crossbite, increased overbite (50%) and increased overjet (3-4 mm). The upper and lower arches presented with severe crowding (8 and 7 mm, respectively). While the initial panoramic radiograph (Fig 2) revealed normal findings with full complement of permanent teeth, the initial cephalometric radiograph (Fig 3) showed convex profile with hyperdivergent and retrognathic mandible as confirmed by the cephalometric analysis (Table 1). Also, the cephalometric analysis indicated bimaxillary dentoalveolar protrusion with protruded upper and lower incisors.

Delaying orthodontic intervention and, planning surgical orthodontic treatment (possibly through surgical maxillary impaction and mandibular advancement procedure) in adulthood was presented to the patient and her parents as the first treatment option to correct her severe skeletal malocclusion, but this option was declined by the patient and parents. So, a 2nd option was presented with treatment objective at this stage to resolve upper and lower crowding, correct the dental malocclusion and maintain the vertical dimension of the patient. Treatment plan involved upper and lower fixed orthodontic appliance with the extraction of upper and lower first premolars and external vertical-pull chin cup.

The patient was fitted with full fixed upper and lower orthodontic appliance using 0.018" slot bracket system (3M Unitek, California, USA) except for upper and lower first premolars. The patient was then referred to an oral surgeon who performed extraction of upper and lower first premolars. After one week following the extraction, upper and lower 0.014" nitinol (NiTi) archwires were fitted for initial alignment of teeth except upper lateral incisors and lower left lateral in-

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TABLE 1: CEPHALOMETRIC ANALYSIS BEFORE AND AFTER ORTHODONTIC TREATMENT

	Norms	Initial	Final	Difference
Skeletal				
Anterior Cranial Base (SN) (mm)	71.9	69.3	69.5	0.2
Saddle/Sella Angle (SN-Ar) (°)	124	123.5	124.2	0.7
SNA (°)	82	81.1	80.1	-1
SNB (°)	80.9	73.2	73.9	0.7
ANB (°)	1.6	8	6.2	-1.8
FMA (MP-FH) (°)	25.6	44.8	43.2	-1.6
MP - SN (°)	33	49.7	49.5	-0.2
Lower Face Height (ANS-Me) (mm)	65	76.5	74.5	-2
Upper Face Height (N-ANS) (mm)	50	51	53.9	2.9
N-Me (mm)	110	125.5	125.8	0.3
Maxillary Skeletal (A-Na Perp) (mm)	0	-4.1	-3.8	0.3
Midface Length (Co-A) (mm)	88	87.2	83.1	-4.1
Mandibular length (Co-Gn) (mm)	111.9	117.8	118.6	0.8
S-Go (mm)	67	67.3	68.6	1.3
LFH/TFH (ANS-Me:N-Me) (%)	55	57.9	55.7	-2.2
UFH/TFH (N-ANS:N-Me) (%)	45	42.1	44.3	2.2
P-A Face Height (S-Go/N-Me) (%)	65	54.5	55.4	0.9
Wits Appraisal (mm)	-1	6.1	5.8	-0.3
Y-Axis -- Downs (SGn-FH) (°)	60.8	70.7	69	-1.7
Ramus Height (Ar-Go) (mm)	40.8	36.8	39.6	2.8
Mandibular length (Go-Gn) (mm)	65.9	81	82	1
Gonial/Jaw Angle (Ar-Go-Me) (°)	126.5	140	139.7	-0.3
Dental				
Interincisal Angle (U1-L1) (°)	130	117.5	131.8	14.3
U1 - NA (mm)	4.3	4.9	4.8	-0.1
U-Incisor Protrusion (U1-APo) (mm)	6	11.6	9.3	-2.3
U1 - NA (°)	22	21.5	18.8	-2.7
U1 - SN (°)	102.3	102.6	98.9	-3.7
L1 - NB (mm)	4	11.6	8.6	-3
L1 - NB (°)	25.3	33.1	23.2	-9.9
L1 - Occ Plane (°)	72	59.5	68	8.5
IMPA (L1-MP) (°)	95	90.2	79.8	-10.4
Soft Tissue				
Lower Lip to E-Plane (mm)	-2	12.9	7.1	-5.8
Upper Lip to E-Plane (mm)	-2.6	7.3	3.5	-3.8
Nasolabial Angle (Col-Sn-UL) (°)	102.0	107.1	103.6	-3.5
Facial Convexity (G'-Sn-Po') (°)	12.0	16.2	15.4	-0.8



Fig 1: Pre-treatment photographs

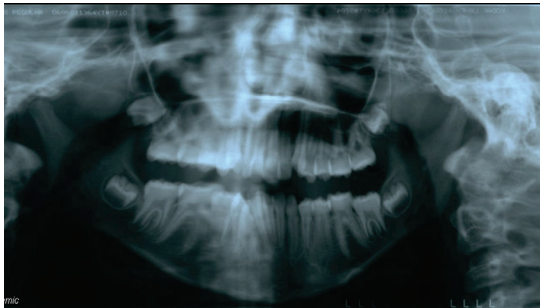


Fig 2: Pre-treatment panoramic radiograph



Fig 3: Pre-treatment cephalometric radiograph



Fig 4: Post-treatment photographs



Fig 5: Post-treatment panoramic radiograph

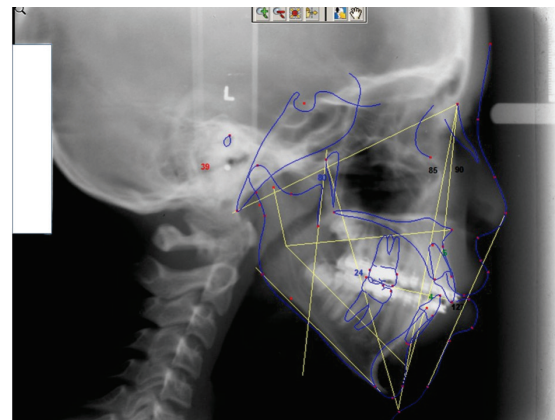


Fig 6: Post-treatment cephalometric radiograph

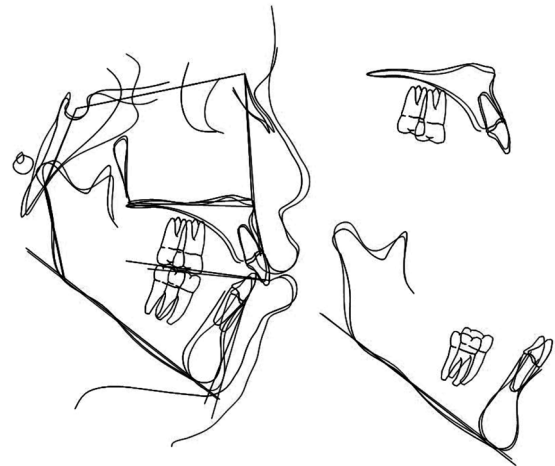


Fig 7: Cephalometric superimposition



Fig 8: Intraoral photographs after 6 months in retention. Once alignment of included teeth was achieved, upper and lower canine retraction was performed on 0.016" stainless steel (SS) archwires using sliding mechanics. When upper and lower canines were fully retracted, they were laced back to first molars, and

upper and lower incisors were aligned with 0.016" NiTi archwires. After alignment of upper and lower incisors, en-mass retraction of incisors was achieved using 0.016" X 0.022" titanium molybdenum alloy (TMA) with preformed T-loops archwires. Finally, the upper and lower archwires were developed to 0.017 X 0.025" SS archwires and vertical orthodontic elastics (6 oz, 3M Unitek, California, USA) were used for finishing.

A vertical-pull chin cup was utilized to help maintain the vertical dimension and the patient was advised to wear it 16 hours per day. Treatment continued for 22 months, then progress records were obtained and brackets were removed. Final clinical photographs (Fig 4) shows overall improvement in patient's smile, esthetics and dental occlusion. Upper and lower fixed retainers were placed and patient was given upper Hawley retainer for night time use. Pre-debonding panoramic radiograph (Fig 5) shows parallelism of teeth roots around the extractions sites, while cephalometric radiograph (Fig 6) shows improvement of the patient's profile mainly through retroclination of upper and lower incisors. Cephalometric tracing superimposition (Fig 7) shows improvement of lower incisor position, as well as forward movement of upper and lower molars. The skeletal discrepancy between maxilla and mandible improved as reflected by the improved ANB angle (Table 1). Some mandibular growth took place (Fig 7) but the mandibular plane angle was maintained (Table 1). Stable occlusion was noticed over 6 months in retention (Fig 8). The patient was kept in third molars monitoring program with her general dentist.

DISCUSSION

In growing patients with skeletal class II malocclusion combined with high mandibular plane angle, the traditional and most widely used treatment approach ranges from the use of high-pull headgear to the use of mandibular anterior jumping appliance, or combination of both, with or without extraction of permanent teeth.^{5,6} In late adolescence with severe skeletal class II high angle condition, surgical option is usually considered as redirecting the patient's growth may not be possible with traditional orthodontic treatment.⁸ However, the surgical intervention is commonly not appealing to the patients and their parents.¹¹ Camouflage treatment is considered an alternative option for treating such cases. However, control of the vertical dimension during treatment in high angle cases remains always a challenge in clinical orthodontics.¹⁰

Extraction of permanent teeth in combination with vertical chin cup can provide an alternative solution for camouflage treatment of severe skeletal class II high angle cases. The results of this case report supports previously reported effect of extraction therapy in maintaining the vertical dimension in high angle class II cases.^{10,12}

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