



Class II DIV 1 Correction during Adolescence: Non-Extraction with Acrylic Herbst or Upper First Premolars Extraction

Rukh Baiz*, Anshul Singal and Sheetal Jha

Department of Orthodontics and Dentofacial Orthopedics, CCS University, India

*Corresponding Author: Rukh Baiz, Department of Orthodontics and Dentofacial Orthopedics, CCS University, India.

DOI: 10.31080/ASDS.2023.07.1656

Received: May 15, 2023

Published: June 17, 2023

© All rights are reserved by Rukh Baiz., et al.

Abstract

Background: No two cases are alike. Different cases, different treatment approach. Class II div 1 malocclusion possesses a variety of conflicting treatment modalities. What is important to know is “ what suits a case best.”

Materials and Methods: In this study a comparative analysis is presented for 2 cases of class II malocclusion. For one, upper first pre molars are extracted. The second case was treated with fixed functional Herbst appliance. The decision to extract or not to extract depends on proper examination of the case and visualizing the outcome beforehand.

Purpose: The purpose of this article was to compare the outcome of treatment with modified Herbst and bilateral upper first premolar extractions in post pubertal patients with Class II malocclusion.

Keywords: Class II; Adolescence; Acrylic Herbst; Premolars Extraction

Introduction

Class II malocclusion has different representations (div 1, div 2, maxillary excess, mandibular deficiency) and different treatment considerations (e.g., patient's socio-economical needs, growth, dental and soft tissue compensation).

Proper diagnosis of such a malocclusion with careful analysis of face, dentition and skeletal pattern is necessary to yield long term stability, function and esthetic.

With the shift from Angle to soft tissue paradigm, facial esthetics of the patient has become our primary consideration. Correcting the antero-posterior and vertical discrepancy in class II malocclusion is advocated in late mixed dentition or early adolescence with the help of myofunctional or orthopedic appliances respectively. This could simplify the overall treatment by taking advantage of patient's growth potential and soft tissue adaptation [1].

However, in non-compliant patients or when the growth has ceased, we can still attain acceptable results by either fixed functional appliance or camouflage by doing extractions.

Various intermaxillary appliances have been introduced for class II correction. One of which is the Herbst appliance. It is a fixed intermaxillary appliance given by Emil Herbst in early 1900s, [2] and popularized by Panchers in 1975 [3].

The concept was based on the idea of jumping the bite as introduced by Kingsley in 1880 [4]. The second approach to treat non-growing class II malocclusion is camouflaging by extraction. Whether to extract only maxillary premolars or maxillary and mandibular premolar depends on various factors maxillary premolar extraction is indicated in cases where there is no crowding or cephalometric discrepancy in mandibular arch [5].

Recent studies have shown that the treatment with only two maxillary premolars extraction gives a better occlusal result than the treatment with maxillary and mandibular premolar extractions [6].

Aim

In the present study, two different treatment modalities for class II malocclusion are presented.

Material and Method

Case 1

15-year-old female patient came with the chief complaint of forwardly placed teeth. Patient was post pubertal and had no medical or dental history.

Pre-treatment extraoral photographic examination shows no gross facial asymmetry, convex profile with horizontal growth pat-

tern, potentially competent lips with 2mm tooth display at rest and decreased nasolabial angle, complete upper incisor exposure with 2 mm of gingival display on smiling, non- consonant smile and buccal corridor space of 1 mm.

Pre-treatment intraoral photographic examination depicts normal soft tissue, pale pink gingiva, normal labial and buccal frenal attachments in upper and lower arches, good oral hygiene, overjet of 8 mm, overbite of 6 mm, proclined upper incisors and Angles Class II molar and canine relationship bilaterally.

Pre-treatment panoramic radiograph shows healthy dentition and surrounding structures.

Pre-treatment cephalogram shows maxilla is orthognathic in relation to cranial base with an SNA of 81°, retrognathic mandible with SNB of 76° and ANB of 6° suggestive of skeletal class II pattern. Average towards horizontal growth pattern with Mandibular plane angle of 32°, FMA of 18° and Jarabak ratio of 73.2. Dentally, the patient had proclined upper incisors with upper incisor to NA angular measurement as 35° and average inclination of lower incisors i.e., 25°. The patient had an obtuse nasolabial angle of 98°.

Based on the pre-treatment records, the final diagnosis was that the patient had a skeletal class II relationship characterized by orthognathic maxilla and retrognathic mandible. Dentally, the patient had Angle’s class II malocclusion bilaterally with proclined upper incisors with an increased overjet and overbite.

Treatment objective were to correct skeletal class II relationship, to achieve class I molar and canine relationship bilaterally, to achieve ideal overjet and overbite, to achieve pleasing facial profile, to achieve lip competency and to achieve proper inclination of upper incisors.

Treatment was done in two phases:

Phase I

- Acrylic splint Herbst Fixed functional Appliance [7]

Phase II

- Fixed mechanotherapy with .022” slot
- MBT prescription
- Levelling and alignment
- Finishing and detailing

Treatment progress

- Figure 1: Pretreatment Records of Case 1
- Figure 2: Virtual Treatment Objective
- Figure 3: Appliance Delivery

- Figure 4: Mid Treatment Photographs
- Figure 5: Post Treatment Status

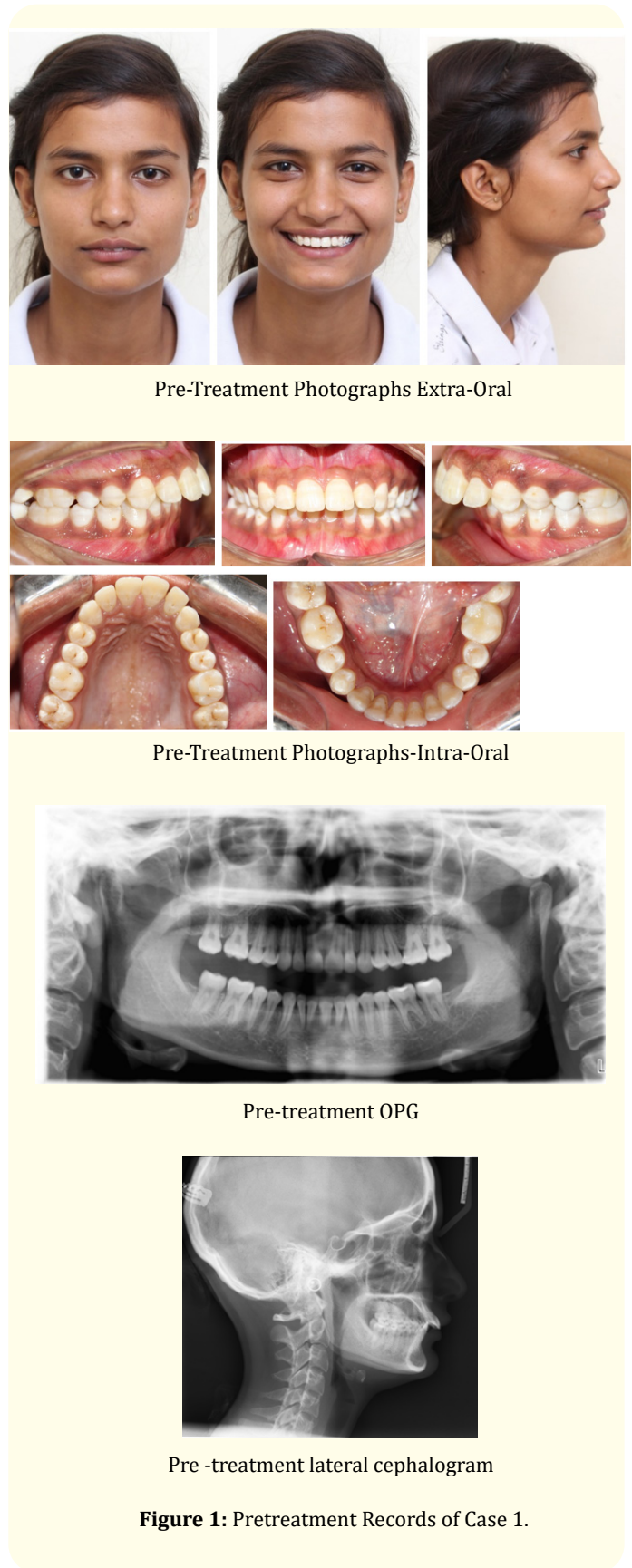




Figure 2: Virtual Treatment Objective.



Figure 3: Appliance Delivery.



Intra-Oral

Figure 4: Mid Treatment Photographs.



Extra-Oral



Intra-Oral



Post treatment OPG



Post treatment lateral cephalogram

Figure 5: Post treatment status.

Case 2

18-year-old female patient came with the chief complaint of forwardly placed upper front teeth. Patient was post pubertal and had no medical history. Patient had composite filling in lower right And left back tooth region (36,46).

Pre-treatment extra-oral examination shows no gross facial asymmetry present, convex profile with horizontal growth pattern, potentially competent lips and decreased nasolabial angle, complete upper incisor show with 3 mm of gingival display on smiling, non- consonant smile and buccal corridor space of 1 mm present.

Pre-treatment intra-oral photographic examination depicts normal soft tissue, pale pink gingiva, normal labial and buccal frenal attachments in upper and lower arches, good oral hygiene, overjet of 7mm, overbite of 8mm, proclined upper incisors and Angles Class II molar and canine relationship bilaterally.

Pre-treatment cephalogram shows maxilla is orthognathic in relation to cranial base with an SNA of 81°, retrognathic mandible with SNB of 75° and ANB of 5° suggestive of skeletal class II pattern. Average towards horizontal growth pattern with Mandibular plane angle of 23°, FMA of 24° and Jarabak ratio of 72. Dentally, the

patient had proclined upper and lower incisors with upper incisor to NA angular measurement as 37° and lower incisor to NB angular measurement as 33°. The patient had an average nasolabial angle of 97°.

Based on the pre-treatment records, the final diagnosis was that the patient had a skeletal class II relationship characterized by orthognathic maxilla and retrognathic mandible. Dentally, the patient had Angle’s class II malocclusion bilaterally with proclined upper and lower incisors with an increased overjet and overbite.

Treatment objective were to achieve class I molar and canine relationship bilaterally, to achieve ideal overjet and overbite, to achieve pleasing facial profile, to achieve lip competency and to achieve proper inclination of upper and lower incisors.

Treatment plan was as follows

- Type of appliance and prescription: Fixed mechanotherapy with .022” slot
- MBT prescription
- Upper premolar extraction
- Levelling and alignment
- Space closure via sliding mechanics
- Finishing and detailing

Treatment progress

- Figure 6: Pre-Treatment Photographs of Case 2
- Figure7: Mid Treatment Status Photographs-Intra-Oral
- Figure 8: Post Treatment Photographs

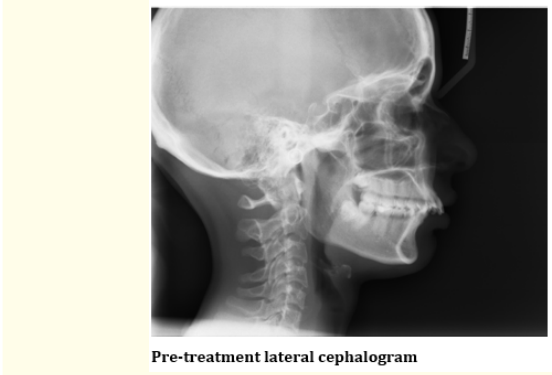


Figure 6: Pre-treatment photographs of case 2.



Pre-Treatment Photographs Extra-Oral

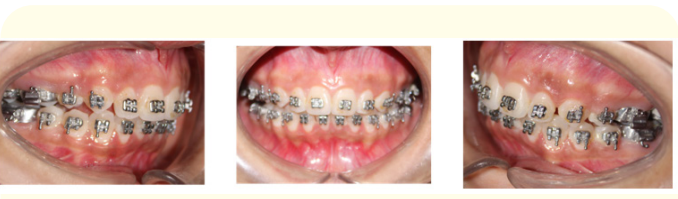


Figure 7: Mid treatment status photographs-intra-oral.



Post treatment Photographs Extra-Oral



Post treatment Photographs-Intra-Oral



Post treatment OPG



Post treatment lateral cephalogram

Figure 8: Post treatment photographs.

Results

Case 1

Post-treatment extraoral photographic examination shows improvement in the profile, competent lips with no tooth display at rest and an average nasolabial angle, complete upper incisor exposure with 1 mm of gingival display on smiling, consonant smile and buccal corridor space of 1 mm.

Post-treatment intraoral photographic examination depicts normal soft tissue, pale pink gingiva, normal labial and buccal frenal attachments in upper and lower arches, good oral hygiene, overjet of 2 mm, overbite of 2 mm, normal inclination of upper and lower incisors and Angles Class I molar and canine relationship bilaterally.

Post-treatment panoramic radiograph shows healthy dentition and surrounding structures. Maxilla is orthognathic in relation to cranial base with an SNA of 80°, orthognathic mandible with SNB of 78° and ANB of 2° suggestive of skeletal class I pattern. Average towards horizontal growth pattern with Mandibular plane angle of 33°, FMA of 18° and Jarabak ratio of 73.8. Dentally, the patient had average inclination of upper and lower incisors with upper incisor to NA angular measurement as 25° and lower incisor to NA angular measurement as 25°. The patient had an average nasolabial angle of 109°.

Based on the post-treatment records, the patient had a skeletal class I relationship characterized by orthognathic maxilla and mandible. Dentally, the patient had Angle’s class I malocclusion bilaterally with average inclination of upper and lower incisors and an average overjet and overbite. Patient also had a pleasing profile and lip competency.

Case 2

Post-treatment extra-oral examination improvement in the profile, competent lips with no tooth display and an average nasolabial angle, complete upper incisor show with 0.5 mm of gingival display on smiling, consonant smile and buccal corridor space of 1 mm present.

Post-treatment intra-oral photographic examination depicts normal soft tissue, pale pink gingiva, normal labial and buccal frenal attachments in upper and lower arches, good oral hygiene, overjet of 2mm, overbite of 2mm, normal inclination of upper and lower incisors, Angles Class II molar relationship bilaterally and class I canine relationship bilaterally.

Post-treatment cephalogram shows maxilla is orthognathic in relation to cranial base with an SNA of 80°, retrognathic mandible with SNB of 75° and ANB of 5° suggestive of skeletal class II pattern. Average towards horizontal growth pattern with Mandibular plane angle of 23°, FMA of 24° and Jarabak ratio of 69. Dentally, the patient had normal inclination of upper incisors with upper incisor to NA angular measurement as 25° and lower incisor to NB angular measurement as 30° suggesting proclination of lower incisors. The patient had an average nasolabial angle of 104°.

Based on the post-treatment records, the patient had a skeletal class II relationship characterized by orthognathic maxilla and retrognathic mandible. Dentally, the patient had Angle's class II molar relationship bilaterally and class I canine relationship bilaterally with average inclination of upper incisor and proclined lower incisors with an average overjet and overbite. Patient also had a pleasing facial profile and lip competency.

Discussion

Class II malocclusion reflects disharmony in either of the jaws or both, leading to compromised facial and dental esthetics, most common cause being the retrognathic mandible.

Studies have shown that condylar growth stimulation and the remodeling of glenoid fossa can help in bringing the mandible forward [8-10].

Many animal studies suggest that the remodeling of condyle and glenoid fossa is similar in growing and non-growing animals, while some studies suggest the adaptive changes are negligible or non-existent in non-growing animals [11,12].

Ideally the skeletal disproportion should be corrected using functional appliance during growth period or orthognathic surgery in adults [13].

However, orthognathic surgery entails high risk and greater cost. Hence, we opt for camouflage treatment with or without extraction. Such treatment modality only alters the dento-alveolar component and has no effect on facial esthetics [14].

However, various studies have shown that fixed Herbst appliance used during adolescence and in young adults has shown condylar adaptation and glenoid fossa remodeling [15,16].

Therefore, Herbst appliance treatment in young adults has proven to be an effective treatment modality to correct class II malocclusion by achieving mandibular skeletal changes and hence overcome the disadvantage of conventional adult orthognathic treatment.

In the present study, two cases of young adults with class II malocclusion have been discussed. Early adolescence, as defined by lateral cephalogram CVMI staging implies that the subjects were in accelerated phase of pubertal growth spurt [17].

Both the cases might look alike i.e., having class II molar relationship and a large overjet, but are not similar in nature, hence had different treatment approach. First case is treated without extraction using fixed acrylic Herbst appliance and the other case is treated with upper first premolars extraction to achieve dental and soft tissue harmony. First patient had a class II skeletal relationship with orthognathic maxilla and retrognathic mandible. Visual treatment objective was check which showed a significant improvement and hence mandibular advancement was our treatment choice. The pre-treatment records were in favor of Herbst appliance and to get most of it, a fixed acrylic Herbst appliance was selected. The post treatment records exhibit correction of the malocclusion due to both dental and skeletal change, and hence a remarkable correction in the profile, which is in accordance with the studies done before on Herbst appliance [18,19].

The skeletal changes i.e., the lengthening of the mandible and the advancement of the mandible contributed to a greater amount in correcting the overjet and molar relationship. In this patient, a significant amount of improvement was observed in the soft tissue profile following the first phase of 8 months with Herbst appliance and minor adjustments were done later with fixed mechanotherapy for 6 months. Although the promising results still confine the Herbst appliance for its age limitation. The second case of class II malocclusion was treated with only maxillary first premolar extraction such that the post treatment molar relationship was same as pre-treatment molar relationship. Hence no gross changes were made in the posterior segment.

Class II molar relationship is believed to be stable. Finishing a class II malocclusion with molars in class II relationship has a similar occlusal stability as finishing the same malocclusion in class I molar relationship [20].

Furthermore, the extraction in the mandibular arch was avoided as the patient had an no intra-arch mandibular discrepancy and an average inclination of incisors. A remarkable improvement with respect to the soft tissue profile was noted following the treatment.

Therefore, if the case favors, class II malocclusion can be successfully treated with only maxillary first premolar extractions.

Conclusion

- A class II skeletal malocclusion represents itself by an antero-posterior discrepancy between the maxilla and the mandible, with maxilla being prognathic, most often mandible being retrognathic or can be both.
- Treatment of class II malocclusion varies from growth modification, camouflage treatment to surgical correction, depending on the growth, severity and patient compliance.
- Fixed functional appliances, such as Herbst appliance demonstrates the dentoskeletal adaptation in young adults to successfully correct class II malocclusion and hence can prevent orthognathic surgery in skeletal borderline class II cases.
- Another treatment approach for class II cases is to camouflage the skeletal discrepancy by extractions. Only extracting two maxillary first premolars and leaving the molar relationship as it is can also help in attaining stable occlusion and correcting the facial profile.
- Proper diagnosis is the key to successful orthodontic treatment. It is better to diagnose twice and treat once than diagnosing once and treating twice.

Bibliography

1. Bishara SE. "Class II Malocclusions: Diagnostic and Clinical Considerations with and Without Treatment". *Seminars in Orthodontics* 12 (2006): 11-24.
2. Herbst E. "Dreissigj hrige Erfahrungen mit dem Retentions-Scharnier". *Zahn rztl Rundschau* 43 (1934): 1515-1524,1563-1568,1611-1616.
3. Pancherz H. "Treatment of Class II malocclusions by jumping the bite with the Herbst appliance. A cephalometric investigation". *American Journal of Orthodontics* 76 (1979): 423-442.
4. Kingsley NW. "A Treatise on Oral Deformities as a Branch of Mechanical Surgery". *American Journal of Dental Science* 13.12 (1880): 571.
5. Bishara SE., et al. "Dentofacial and soft tissue changes in Class II, Division 1 cases treated with and without extractions". *American Journal of Orthodontics and Dentofacial Orthopedics* 107 (1995): 28-37.
6. Janson G., et al. "Class II treatment success rate in 2- and 4-premolar extraction protocols". *American Journal of Orthodontics* 125.4 (2004): 472-479.
7. McNamara JA. "Fabrication of the acrylic splint Herbst appliance". *American Journal of Orthodontics and Dentofacial Orthopedics* 94.1 (1988): 10-18.
8. Charlier JP, et al. "Effect of mandibular hyperpropulsion on the paw chondroblastic zone of young rat condyle". *American Journal of Orthodontics* 55 (1969): 71-74.
9. McNamara JA Jr and Bryan FA. "Long term mandibular adaptations to protrusive function: An experimental study in Macaca mulatta". *American Journal of Orthodontics and Dentofacial Orthopedics* 92 (1987): 98-108.
10. Woodside DG., et al. "The influence of functional appliance therapy on glenoid fossa remodeling". *American Journal of Orthodontics and Dentofacial Orthopedics* 92 (1987): 181-198.
11. Adams CD., et al. "Dentofacial remodelling produced by intermaxillary forces in Macaca mulatta". *Archives of Oral Biology* 17 (1972): 1519-1535.
12. Ramfjord SP and Blankenship JR. "Increased occlusal vertical dimension in adult monkeys". *Journal of Prosthetic Dentistry* 45 (1981): 74-83.
13. Hugo De Clerck and Hilde Timmerman. "Distalization of the maxillary arch with miniplate anchorage: Moschos A. "Papa-dopoulos, Skeletal Anchorage in Orthodontic Treatment of Class II Malocclusion: Mosby 22 (2015): 118-123.
14. Herbst Ruf S and Pancherz H. "Dentoskeletal effects and facial profile changes in young adults treated with the Herbst appliance". *The Angle Orthodontist* 69.3 (1999): 239-246.
15. Ruf S and Pancherz H. "Temporomandibular joint growth adaptation in Herbst treatment. A prospective magnetic resonance graphic study". *European Journal of Orthodontics* 20 (1998): 375-388.
16. Ruf S and Pancherz H. "TMJ joint growth adaptation in young adults treated with Herbst appliance. A prospective MRI and cephalometric roentgenographic study". *European Journal of Orthodontics* 30 (1998): 735-750.
17. Brent Hassel and Allan G Farman. "Skeletal maturation evaluation using cervical vertebrae". *American Journal of Orthodontics and Dentofacial Orthopedics* 107 (1995): 58-66.
18. Pancherz H. "The mechanism of class II correction in Herbst appliance treatment. A cephalometric investigation". *American Journal of Orthodontics* 82 (1982): 104-113.
19. Pancherz H and Anehus-Pancherz M. "Facial profile changes during and after Herbst appliance treatment". *European Journal of Orthodontics* 16 (1994): 275-286.
20. Janson G., et al. "Treatment stability in patients with Class II malocclusion treated with 2 maxillary premolar extractions or without extractions". *American Journal of Orthodontics and Dentofacial Orthopedics* 138 (2010): 16-22.