

Esthetic management of severe skeletal Class II malocclusion – A case report

Manish Goyal¹, Mukesh Kumar², Sumit kumar³, Shikha Rani⁴, Shalini Mishra⁵

Principal and head¹, Professor², Senior Lecturer^{3,5}, Post graduate student⁴

Department of Orthodontics and Dentofacial Orthopaedics Teerthanker Mahaveer Dental College, Moradabad, Uttar Pradesh

Abstract

Background: In recent times, there have been enormously increasing number of young adults who desire the shortest, cost effective and a non-surgical correction of malocclusion (skeletal Class II), there are various treatment modalities have been presented for the treatment of Class II div 1 malocclusion and dental camouflage is generally a preferred treatment option. According to Bell WH, a positive overjet greater than 8 mm, a negative overjet of -4 mm or greater, and a transverse discrepancy greater than 3 mm were not orthodontically treatable. At the present time there are no widely accepted guidelines, nor there is a "gold standard," for determining which cases of Class II malocclusion would best be treated with surgery versus orthodontic camouflage, merely ANB angle cannot be a gold standard for deciding surgery versus orthodontic camouflage treatment. This case report presents one such case of an 18-year-old non-growing female who had a skeletal Class II division 1 malocclusion with a prognathic maxilla, a retrognathic mandible, a negative VTO with an overjet of 8 mm, and did not wanted surgical correction for same. In this scenario camouflage treatment by extracting the upper first premolars were opted. Following treatment, a satisfactory facial esthetic was achieved with static and functional occlusion.

Results: Post treatment facial photographs showed a satisfactory facial esthetic, with Class II molar relation and Class I canine bilaterally. This resulted in an enhanced self-esteem of the patient.

Conclusions Adult orthodontics is a rapidly growing field and over the past two decades there has been a noticeably increased demand for orthodontic treatment from adults. This may be attributed to improved dental services and a greater dental awareness among adult patients. This is due to more aesthetically acceptable appliances are developed and less social stigma is attached to adults Wearing visible orthodontic appliances¹¹

Key words: Orthodontic camouflage; Skeletal Class II div 1 malocclusion; Temporary anchorage devices, Power arm.

Introduction

Malocclusion can compromise the health of the oral tissues and also lead to psychological and social problems. Well aligned teeth not only contribute to the health of the oral cavity and the stomatognathic system, but they also influence the personality of the individual. A Class II div I malocclusion is the most prevalent type of malocclusion which is being encountered in India. The classical features of the Class II div 1 malocclusion include, mild to severe Class II skeletal base with an Angle Class II molar relation and Class II canine relation, proclined maxillary incisors and an increased overjet and a convex profile with incompetent lips¹. Proffit and Akerman described three primary treatment approaches for correction of Class II malocclusion. These approaches include: 1) growth modification so that the jaw discrepancy is eliminated 2) compensation of the dentition with retraction of the upper incisors and proclination of the lower incisors, or both, in an effort to camouflage rather than correct the skeletal problem; or 3) surgical correction of the jaw abnormality. The envelope of discrepancy in all three planes of space determines the diagnosis and treatment planning for treating skeletal Class II malocclusion, either by orthodontic or orthognathic correction or by a combination of both.

In non-growing patient treatment of skeletal Class II malocclusion is even more challenging and controversial. In adults with skeletal malocclusion involving either deficient or prognathic mandible, bilateral sagittal split

osteotomy (BSSO) with or without genioplasty is often recommended and in case of maxillary prognathism LeFort I osteotomy with maxillary setback is recommended. Over the last decade, increasing numbers of adults have become aware of the orthodontic treatment and are demanding a high-quality treatment with an increased efficiency, non-surgical management and reduced cost in the shortest possible time². Camouflaging skeletal Class II malocclusions in non-growing patient involve extraction of either 2 maxillary premolars or 2 maxillary and 2 mandibular premolars or asymmetric extraction of 2 maxillary premolar and one mandibular premolar³. The extraction of 2 maxillary premolar is generally indicated, when there is no crowding or cephalometric discrepancy in the mandibular arch^{4,5}. The extraction of 4 premolars are primarily indicated for crowding in the mandibular arch, a cephalometric discrepancy, or a combination of both,⁵⁻⁷. Recent studies have shown that the patient satisfaction with a camouflage treatment is quite similar to that which could have been achieved with a surgical intervention⁸. Also, to state that the treatment with two maxillary premolar extractions gives a better occlusal result than the treatment done with four premolar extractions⁹.

The science behind the use of Temporary Anchorage Devices (TADs) and their effect on the dentition has undergone a paradigm shift since the introduction of these appliances into clinical orthodontics almost two decades ago. While using conventional mechanics, force application is usually parallel to the occlusal plane and

hence, the orthodontist is only required to analyze force in one plane. However, as Temporary Anchorage Devices (TADs) are usually placed apical to the occlusal plane into the bone between the roots of teeth (between the roots of the second premolars and first molars, close to the mucogingival junction), so the force applied is at an angle. This angulated force lends itself to be broken into two components by the law of vector resolution: a horizontal retraction force and a vertical intrusive force. The force applied with Temporary Anchorage Devices in such a setup is closer to the Centre of Resistance of the anterior unit. Therefore, the M/F ratio is significantly less, compared to that generated in conventional mechanics.¹⁰ Clinically it decreases the tendency of teeth to tip, by applying a force that does not pass through the center of resistance of the unit to be moved, produces a moment which cause tipping. Power arms are simple, economical, and effective means for force application, close to Centre of Rotation of active unit. So the length of power arm is kept high in vestibule, close to Centre of Rotation¹¹.

Case Report

This case report is about an 18-yearold female patient who came to the Department of Orthodontics with a chief complaint of irregularly and forwardly placed upper front teeth.(Figure 1)

Diagnosis

Extra oral examination revealed a mesocephalic head shape with a mesoprosopic facial form. The profile of the patient was convex, with a posterior facial divergence. The nasolabial angle was acute, with incompetent lips. The patient showed a retruded mandible with a vertical growth pattern and had a negative VTO (Figure 1).

An intraoral examination revealed that patient had an End-on molar relation on right, Class II molar relation on left and End-on canine relationship bilaterally. A “U shaped” arch form and excessively proclined maxillary incisors with an overjet of 8 mm and 3 mm of spacing in the upper anteriors, 4 mm of spacing in relation to lower anteriors. Rotation was observed with respect to 11,12,21,22,14,24,25. A midline shift of 2 mm towards right was observed. Smile assessment revealed 7 mm of incisor display with 3 mm of gingival exposure. Oral hygiene status of patient was average. TMJ examination gives no history of pain or clicking while various jaw movements. The right and left excursive movements were normal with a maximum mouth opening of 40 mm.

OPG and Cephalometric Analysis

Panoramic radiograph shows that the maxillary and the mandibular third molars were present. There were no evidence of restorations, caries or any other pathology. Optimum alveolar bone level was present for orthodontic mechanotherapy.

Cephalometric examination revealed pretreatment ANB angle of 8° suggesting Skeletal Class II malocclusion (Table 1). Patient exhibited excessive lower anterior facial height and increased mandibular plane angle. Dentoalveolar analysis showed proclined upper and lower anteriors with increased interincisal angle (Table 1).

Table 1 Reading of patient’s lateral cephalograms tracing

Measurements	Norm	Pre-Treatment	Post – Treatment
SNA (angle)	82°	85°	82°
SNB (angle)	80°	76°	76°
ANB (angle)	2°	8°	6°
U I to N-A(mm)	4 mm	7 mm	3 mm
U I to N-A(angle)	22°	32°	22°
L I to N-B (mm)	4 mm	7 mm	5 mm
L I to N-B (angle)	25°	31°	30°
U I to LI (Interincisal-angle)	131°	125°	141°
MPA	32°	34°	34°
IMPA	90°	96°	95°

Model Analysis

Arch perimeter analysis concluded a 1.2 mm of maxillary tooth material excess and carey’s analysis showed 2 mm mandibular tooth material excess. Bolton’s analysis revealed a mandibular anterior tooth material excess of 0.89 mm while overall mandibular tooth material excess was 1.16 mm (figure 2).



Figure 1- Pre-Treatment Records- Extra oral and intraoral images of patient along with OPG and cephalogram



Figure 2- Pre treatment models

Treatment Goals

1. To obtain a good facial balance.
2. To obtain an optimal static and a functional occlusion and stability of the treatment results.

Treatment Objectives

1. To level and align the teeth.
2. To achieve an ideal overjet and an ideal over bite.
3. To achieve an adequate functional occlusal intercuspation with a Class II molar and a Class I canine relationship.
4. To achieve lip competency.

Treatment alternatives

1. A surgical approach (BSSO with chin reduction genioplasty).
2. A non-surgical (extraction of 14, 24) treatment approach for orthodontic camouflage.

Treatment Plan

Both treatment alternatives were discussed with patient and her parents. Patient was not willing for surgical correction of jaw, although the antero-posterior jaw discrepancy was severe, so we decided upon selective extraction of two permanent maxillary first premolar teeth, for orthodontic camouflage, as a conservative treatment strategy. (Figure 3)

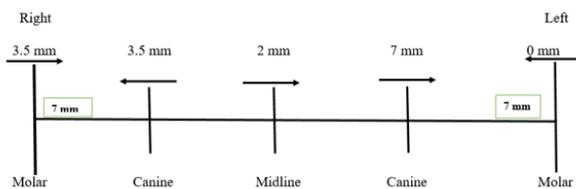


Figure 3- Dental VTO (Anticipated treatment changes in maxillary and mandibular arches)

Treatment Progress

Maxillary first premolars were extracted and the patient underwent a fixed orthodontic mechanotherapy with a pre-adjusted edgewise appliance of 0.022" slot (3M Unitek™ Gemini Metal Bracket prescription). An initial 0.014-inch round NiTi arch wire (3M Unitek™ Nitinol Super Elastic Wire) was used for the levelling and the alignment of both the arches, followed by 0.016 SS arch wire. Then upper and lower 0.016 x 0.022-inch SS wire were placed, which was later followed by the placement of 0.017 x 0.025-inch SS wire. At the end of 20 weeks, enough leveling and aligning had occurred to place the upper and lower 0.019 x 0.025-inch SS wire. At the 20th week, enmass retraction of the six upper anterior teeth were carried out using a mini- implant (1.5 x 8 mm, SK surgical) (Fig.4). Class III elastics of 4/5"oz, 5/16" (Panda, AO) were given for correcting End-on molar relation on right side to end up in Class II molar relation bilaterally. After the closure of extraction space, 0.014 round NiTi wire (3M Unitek™ Nitinol Super Elastic Wire) were used for 18 weeks for final occlusal settling, followed which case was debonded and a fixed upper and lower lingual bonded retainers were given.



Figure 4- Mid treatment records – Mini implants used for retraction through E chains

Treatment Result

Post treatment facial photographs showed a satisfactory facial esthetic, with Class II molar relation and Class I canine bilaterally. This resulted in an enhanced self-esteem of the patient (Figures- 5). Post treatment model shows satisfactory occlusion (figure-6).



Figure 5 - Post-Treatment Records- Extra oral and intraoral images of patient along with OPG and cephalogram



Figure 6- post treatment models

Discussions

The indications for the extractions in the orthodontic practice have historically been controversial. The premolars are probably the most commonly extracted teeth for orthodontic purposes, as they are conveniently located between the anterior and the posterior segments. The treatment of the Class II malocclusion by extracting only 2 maxillary premolars required an absolute anchorage to avoid a mesial movement of the posterior segment during the retraction of the anterior teeth, so mini-implants were used. The orthodontic treatment goal includes obtaining a good facial balance and an optimal static and functional occlusion and stability of the treatment results⁹. This present case is one of the good example for explaining the dental camouflage over orthognathic surgery, as patient compliance and patient's perception of their facial esthetics becomes integral part of decision making over cephalometric values for example ANB greater than 8° (generally considered for orthognathic surgery)(Table 1).

The demand for speedy and efficient orthodontic treatment has been increasing in recent years. To meet this demand, sliding mechanics in combination with implant anchorage has become more and more popular throughout the world.

Conclusions

- Adult orthodontics is a rapidly growing field and over the past two decades there has been a noticeably increased demand for orthodontic treatment from adults. This may be attributed to improved dental services and a greater dental awareness among adult patients. This is due to more aesthetically acceptable appliances are developed and less social stigma is attached to adults Wearing visible orthodontic appliances¹¹.
- In the literature, there is general agreement that one of the main reasons for adult Class II subjects seeking treatment are dental and facial esthetics. The more dissatisfied the patients are with their facial appearance, the more likely they will choose a surgical instead of an orthodontic approach. No much difference in the outcome of treatment was

found when comparing the orthognathic surgery and dental camouflage, in terms of esthetic perception of the subject. Extractions of the premolars, leads to remarkable profile changes and satisfactory facial aesthetics¹⁰.

References

- [1] Emrich RE, Brodie AG, Blayney JR. Prevalence of Class I, Class II, and Class III Malocclusions (Angle) in an Urban Population - An Epidemiological Study, *J Dent Res.* 1965;44: 947-53.
- [2] Khan RS, Horrocks EN. A study of adult orthodontic patients and their treatment. *Br J Orthod.* 1991;18(3):183-94.
- [3] Cleall JF, Begole EA. Diagnosis and treatment of Class II Division 2 malocclusion. *Angle Orthod.* 1982;52:38-60.
- [4] Bishara SE, Cummins DM, Jakobsen JR, Zaher AR. Dentofacial and soft tissue changes in Class II, Division 1 cases treated with and without extractions. *Am J Orthod Dentofacial Orthop.* 1995; 107:28-37.
- [5] Arvystas MG. Nonextraction treatment of Class II, Division 1 malocclusions. *Am J Orthod.* 1985; 88:380-95.
- [6] Mihalik CA, Proffit WR, Phillips C. Long-term follow up of Class II adults treated with orthodontic camouflage: A comparison with orthognathic surgery outcomes, *Am. J. Orthod.* 2003; 123:266-78.
- [7] G Janson, AC Brambilla, JFC Henriques, MR de. Class II treatment success rate in 2- and 4-premolar extraction protocols, *Am. J. Orthod.* 2004; 125(4):472 – 79.
- [8] Tweed C. Indications for the extraction of teeth in orthodontic procedure. *American Journal of Orthodontics.* 1944; 30: 405-28.
- [9] Tominagaa J, Tanakab M, Kogac Y, Gonzalesa C, Kobayashid M, Yoshidae N. Optimal Loading Conditions for Controlled Movement of Anterior Teeth in Sliding Mechanics. *Angle Orthod;* 2009; 79(6):1102-1107.
- [10] Upadhyay M, Yadav S, Nanda R. Biomechanics of incisor retraction with mini implant Anchorage. *Journal of Orthodontics,* 2014;41:S15-S23.
- [11] Staggers JA. A comparison of results of second molar and first premolar extraction treatment. *American Journal of Orthodontics and Dentofacial Orthopedics.* 1990;98: 430-36.

Corresponding Author

Dr. Mukesh Kumar
Professor

Department of Orthodontics and Dentofacial Orthopaedics TMDCRC, Moradabad
Email: drmukeshortho@yahoo.co.in