Correction of occlusal plane asymmetry and crowding with fixed orthodontic mechanotherapy: A case report**Bhushan Jawale¹, Lishoy Rodrigues^{2*}, Amit Chaudhari³, Manoj Patel⁴, Neetal Patel⁵**

¹Professor, ²Post Graduation Student, ³Associate Professor, ^{4,5}Private Practice, ^{1,2}Dept. of Orthodontics and Dentofacial Orthopedics, ¹³Sinhgad Dental College and Hospital, Pune, Maharashtra, ³BVP Dental College and Hospital, Pune, Maharashtra, ^{4,5}Shahada, District Nandurbar, Maharashtra, India

Corresponding Author: Lishoy Rodrigues

Email: lishoy95@gmail.com

Abstract

This case report presents the treatment of a 21 year old female patient who presented with the chief complaint of irregular upper and lower front teeth and a tilted plane of dentition. The patient was treated with fixed orthodontic mechano-therapy with orthodontic mini-implants for correction of occlusal cant, thus improving the patient's canted and asymmetric smile. The treatment also corrected her crowded dentition, thus providing the patient with a pleasant smile, a consonant smile arc, increasing her self-confidence and boosting her self-esteem.

Keywords: Correction of occlusal plane, Asymmetry, Orthodontic treatment, Orthodontic Mini-implants, Correction of crowding, Fixed orthodontic treatment, Case report.

Introduction

Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. Over the last few decades, there are increased number of adults who have become aware of orthodontic treatment and are demanding high quality treatment, in the shortest possible time with increased efficiency and reduced costs. The number of patients seeking orthodontic treatment has increased significantly.^[1,2] Treatment alternatives of correction of a Crowded dentition are either Orthodontic camouflage by extraction of premolars or a Combined orthodontic-orthognathic surgical therapy. It eventually depends mainly upon the severity of the malocclusion^[3,4] and the amount of needed tooth movements.^[3,5] If the skeletal discrepancy⁶ cannot be corrected by camouflage, any dental compensation may produce a reasonably good occlusion⁷ but at the expense of compromised esthetics.⁸ Over the last few decades, there are increased number of patients who have become aware of orthodontic treatment and are demanding high quality treatment, in the shortest possible time with increased efficiency and reduced costs. This case presents the correction of a Class I malocclusion in an adult female patient with crowded upper and lower front teeth and a tilted occlusal plane. The Non Extraction protocol shown in this case is indicative of how the smile arc and occlusal plane of the patient can be improved by routine Fixed Orthodontic treatment with the help of orthodontic mini-implants for correction of occlusal cant. Following fixed orthodontic treatment, marked improvement in patient's smile and facial profile were achieved and there was a remarkable increase in the patient's confidence and quality of life. The profile

changes and treatment results were demonstrated with proper case selection and good patient cooperation with Fixed appliance therapy. The patient was extremely satisfied with the results at the end of treatment.

Case Report**Extra-oral examination**

A 21 year old female patient presented with the chief complaint of irregularly placed upper front teeth and a tilted plane of dentition. On Extraoral examination, the patient had a straight profile, grossly symmetrical face on both sides with a normally positioned chin, competent lips, average mentolabial sulcus and an average Nasolabial Angle, a Leptoprosopic facial form, Mesocephalic head form and average width of nose and mouth. On Smiling, the patient showed crowded upper and lower anterior teeth, increased buccal corridor space and a non-consonant smile arc. The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history. There was excessive show of maxillary anterior teeth. The patient had a toothy smile. On smiling the patient also presented with a cant in the occlusal plane, with the maxillary right dentition canted more occlusally, thus showing presence of a gummy smile on the patient's right side on smiling. The patient had an unaesthetic smile arc and was very dissatisfied with her smile.

Fig. 1: Pre treatment extra-oral photographs

Intra-oral examination

Intraoral examination on frontal view shows presence of crowded upper and lower anterior teeth and a cant in the occlusal plane with the occlusal plane tilted upwards on the left of the patient. On lateral view, the patient shows the presence of a Class I incisor relationship, an End-on canine relationship on both sides and a Class I molar relationship on both sides. Patient has an average overjet and overbite. There is crowding in upper and lower anterior region. The upper arch shows the presence of a “U” shaped arch form and lower arch shows the presence of a “V” shaped arch form.

Fig. 2: Pre treatment intra-oral photographs

Pre treatment cephalometric readings

Parameters	Pre- treatment
SNA	81°
SNB	80°
ANB	1°
WITS	1mm
Max. Length	82mm
Man. Length	100mm
IMPA	93°
Nasolabial Angle	106°
U1 TO NA degrees	26°

U1 TO NA mm	2mm
L1 TO NB degrees	25°
L1 TO NB mm	3mm
U1/L1 Angle	129°
Saddle angle	138°
Articular angle	151°
Gonial angle	142°
FMA	28°
Y AXIS	74°

Model Analysis

Bolton ratio:-

Mandibular anterior excess:- 0.48 mm
Mandibular overall excess:- 0.17 mm

Arch Perimeter Analysis:

Need to extract 1st premolars

Careys Analysis:

Need to extract 1st premolars

Ashley Howe's index:-

Need for extraction

Chadda's Index:

Expansion not needed

Pont's Index:

Expansion not needed

Diagnosis

This 21 year old female patient was diagnosed with Angle's Class I malocclusion with an average maxilla and mandible and an average to vertical growth pattern, average overjet and overbite, slightly proclined upper and lower incisors, crowded upper and lower front teeth and a cant in the occlusal plane.

Treatment objectives

1. To correct crowding in upper and lower anterior region
2. To correct the cant of occlusal plane
3. To correct the non-consonant smile arc
4. To achieve a pleasing smile and a pleasing profile

Fixed appliance therapy with mbt0.022 inch slot

Treatment Rationale of Phase I of the treatment involved the use of upper and lower fixed appliances (0.022" slot brackets) to correct the crowding, alignment and leveling, detailing, and finishing of the case. Orthodontic mini-implants were placed on the maxillary right side, both buccally and palatally in the region between the maxillary second premolar and molar. Arch consolidation was done on the maxillary right side from canine to the last erupted molar and was securely made as one unit with the help of figure of 8 ligature ties. Thereafter Elastomeric chains were run at regular intervals from the buccal implant, running over the right 1st molar and ending on the palatal implant. Bite turbos were given in the mandibular arch bilaterally on the 2nd molars. This was done to intrude the entire right maxillary component and correct the existing gummy smile and cant of occlusal plane. The overall treatment time was 14 months of fixed appliance treatment. After unraveling of crowding and initial leveling and alignment, this occlusal cant was corrected when the treatment reached the 0.19" x

0.25" Stainless steel wire both in upper and lower arch. Yellow settling elastics were given in the premolar region for proper intercuspal settling of the posterior dentition. This treatment greatly improved the smile of the patient and completely corrected the patients tilted occlusal plane. Retention by means of both removable Hawley's retainer was given for 2 years and permanent Lingual Bonded retainers in upper and lower arch were given.

Fig. 3: Mid treatment extra-oral photographs

Fig. 4: Mid treatment intra-oral photographs

Discussion

The patient's chief complaint was irregularly placed upper and lower front teeth and tilted plane of occlusion. Class I malocclusion might have any number of a combination of the skeletal and dental component. Hence, identifying and understanding the etiology and expression of Class I malocclusion and identifying differential diagnosis is helpful for its correction. The selection of a fixed orthodontic appliance is dependent upon several factors which can be categorized into patient factors, such as age and compliance, and clinical factors, such as preference, familiarity and laboratory facilities. The fixed orthodontic therapy resulted in an improvement in the patient's smile, which is largely attributed to the fixed Orthodontic treatment and partly to the orthodontic mini-implants used in this treatment for correction of the patients occlusal cant. Successful results were obtained after the orthodontic therapy within 14 months of overall treatment time. After this active fixed orthodontic treatment phase, the smile of this 21 year old female patient improved significantly as seen in the post treatment Extra oral photographs. In this

case, providing orthodontic treatment with the use of mini-implants was mandatory to the patient as the case required correction of both crowding of upper and lower front teeth along with correction of the occlusal cant, both of which required immediate addressal as the patient was worried about her esthetics as she was a young college going girl. Successful results were obtained after the orthodontic treatment and this significantly improved the patient's self-confidence. Removable Hawley's retainers followed by fixed lingual bonded retainers were then delivered to the patient. The crowding in the upper arch was unraveled and the smile arc of the patient improved drastically to being more consonant and pleasant. After the orthodontic fixed appliance therapy the profile of the patient drastically changed at the end of the treatment and she was very happy and satisfied with the results.

Post treatment cephalometric readings

Parameters	Post- treatment
SNA	82°
SNB	80°
ANB	2°
WITS	1mm
MAX. LENGTH	81mm
MAN. LENGTH	99mm
IMPA	94°
Nasolabial Angle	102°
U1 TO NA degrees	28°
U1 TO NA mm	2mm
L1 TO NB degrees	26°
L1 TO NB mm	2mm
U1/L1 ANGLE	127°
SADDLE ANGLE	137°
Articular angle	152°
Gonial angle	142°
FMA	27°
Y AXIS	72°

Fig. 5: Post treatment extra-oral photographs

Fig. 6: Post treatment intra-oral photographs

Comparison of pre and post treatment cephalometric readings

Parameters	Pre- treatment	Post- treatment
SNA	81°	82°
SNB	80°	80°
ANB	1°	2°
WITS	1mm	1mm
Max. Length	82mm	81mm
Man. Length	100mm	99mm
IMPA	93°	94°
Nasolabial Angle	106°	102°
U1 TO NA Degrees	26°	28°
U1 TO NA mm	2mm	2mm
L1 TO NB degrees	25°	26°
L1 TO NB mm	3mm	2mm
U1/L1 ANGLE	129°	127°
Saddle angle	138°	137°
Articular angle	151°	152°
Gonial angle	142°	142°
FMA	28°	27°
Y AXIS	74°	72°

Conclusion

This case report shows how the correction of crowded dentition and canted occlusion can be managed alongside fixed orthodontic treatment with simplified mechanics using conventional MBT mechanotherapy and orthodontic mini-

implants for en-masse intrusion of a group of teeth. The planned goals set in the pretreatment plan were successfully attained. Good intercuspation of the teeth was obtained. The maxillary and mandibular teeth were found to be esthetically satisfactory in the line of occlusion with a pleasing smile and a consonant smile arc and competent lips at the end of treatment. The correction of the malocclusion was achieved and crowding was unraveled with a significant improvement in the patient aesthetics and self-esteem. The patient was very satisfied with the result of the treatment.

Funding

None.

Conflict of Interest

None.

References

1. Boyd RL, Leggott PJ, Quinn RS, Eakle WS, Chambers D. periodontal implications of orthodontic treatment in adults with reduced or normal periodontal tissues versus those of adolescents. *Am J Orthod Dentofacial Orthop.* 1989;96:191-8.
2. Gottleib EL, Nelson AH, Vogels DS. 1990 JCO study of orthodontic diagnosis and treatment procedures. Part 1: Results and trends. *J Clin Orthod.* 1991;25:145-56.
3. Bailey LJ, White R Jr. Assessment of patient for orthognathic surgery. *Semin Orthod.* 1999;5:209-22.
4. Tulloch Jf, Lenz BE, Phillips C. Surgical Versus orthodontic correction for class II patients: age and severity in treatment planning and treatment outcome. *Semin Orthod.* 1977;72:1-22.
5. Graber TM, Vanarsdall RL, Vig KWL. Orthodontics. Current principles and techniques ed 3. St Louis: Mosby, 2000.
6. Proffit WR, White RP Jr. Who needs surgical-orthodontic treatment?. *Int J Adult Orthodon Orthognath Surg.* 1990;5:81-9
7. Turvey Ta Orthognathic surgery: A significant contribution to facial and dental esthetics. *J Am Dent Assoc* 1998;117:49e-55e.
8. Trivedi B, Mahadevia S, Shah R, Thakker D. Combined Orthodontic and Surgical Approach in an Adult Patient with Skeletal Class III Malocclusion. *J Adv Oral Res.* 2014 ;5(3):24-7.