Asymmetric extractions for correction of severe crowding and narrow buccal corridor space- A case report**Bhushan Jawale¹, Lishoy Rodrigues^{2*}, Sameer Patil³, KM Keluskar⁴, Veerendra Kerudi⁵**

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Abstract

This case report is of a 19 year old female patient who presented with forwardly placed and crowded upper and lower front teeth with an unaesthetic facial profile and a non-consonant smile arc. This case was corrected non surgically merely by employing simple mechanics with the help of Fixed Orthodontic Mechanotherapy by extracting the maxillary 1st premolars and mandibular right 1st premolar followed by retraction and closure of spaces with the help of "Omega loops" bilaterally in the maxillary arch and on the right side in the mandibular arch. 3 premolar extractions were sufficient for proper finishing of this case. The case ended in a Class II Molar and Class I canine relationship. The case report emphasizes on the efficient space closure with the help of loops, thus minimizing friction which is a common problem during routine fixed orthodontic treatment and retraction with the help of Elastomeric chain that increases friction between the wire and bracket slot. Following fixed orthodontic treatment, marked improvement in patient's smile, facial profile and lip competence 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 and there was significant improvement in the unaesthetic narrow appearing buccal corridor space at the end of the treatment.

Keywords: Asymmetric Extractions, Narrow Buccal corridor space, Omega Loop, Space closure, Orthodontic treatment, Extraction of 3 premolars, Fixed Orthodontic Mechanotherapy, Case report.

Introduction

Facial Esthetics has been in increasing demand in today's century. Nowadays, patients with the slightest misalignment of teeth demand Orthodontic treatment to get it corrected and improve their smile and facial profile. Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. The number of patients seeking orthodontic treatment has increased significantly.^[1,2] Treatment alternatives of correction of crowded anterior teeth with proclination 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 discrepancy^[6] cannot be corrected by camouflage, any dental compensation may produce a reasonably good occlusion⁷ but at the expense of compromised esthetics. ⁸Over 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. Class II malocclusion patients frequently show a combination of skeletal and dento-alveolar components. Many cephalometric peculiarities have been reported in class II malocclusion patients with an increased overjet and overbite, such as a prognathic maxilla

and mandible, proclined maxillary and mandibular incisors. This case presents the correction of a Class II malocclusion with crowded dentition, asymmetry and proclination in a 19 year old female patient merely simply by executing extraction of 3 premolars followed by retraction with the help of Omega Loops. The Extraction protocol shown in this case is indicative of how an unaesthetic smile can be converted into a pleasant smile by routine Fixed Orthodontic treatment with extraction of 3 premolars followed by retraction and closure of spaces.

Case Report**Extra-oral examination**

A 19 year old female patient presented with the chief complaint of irregularly and forwardly placed upper front teeth and excessive show of front teeth. On Extra-oral examination, the patient had an orthognathic facial profile, grossly symmetrical face on both sides with potentially incompetent lips, moderately deep mentolabial sulcus and an acute Nasolabial Angle, a Leptoprosopic facial form, Dolicocephalic head form, Average width of nose and increased width of mouth, increased buccal corridor space, a non-consonant smile arc and orthognathic divergence of face. The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history. On Smiling, there was crowding, excessive show of maxillary anterior

teeth and the patient had a toothy smile. 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 showed presence of crowded upper and lower anterior teeth. On lateral view the patient showed the presence of Class II Division 1 incisor relationship with an increased overjet, an End-on Canine relationship on both sides and a Class II molar relationship on the left side and End on molar relationship on the right side. Patient had an overjet of 4 mm and an overbite of 3 mm. The patient also showed the presence of highly placed maxillary canines bilaterally and maxillary in standing lateral incisors bilaterally. Occlusal view shows the presence of a "U" shaped upper arch form and a "V" shaped lower arch form.

Fig. 2: Pre treatment intra-oral photographs

Pre treatment cephalometric summary

Parameters	Pre- treatment
SNA	83°
SNB	81°
ANB	2°
WITS	2mm(AO ahead of BO)
Max. Length	78mm
Man. Length	107mm
IMPA	99°
Nasolabial Angle	93°
U1 TO NA Degrees	36°
U1 TO NA mm	7mm
L1 TO NB DEGREES	30°
L1 TO NB mm	6mm
U1/L1 ANGLE	118°
Saddle angle	134°
Articular angle	146°
Gonial angle	125°
FMA	26°
Y AXIS	64°

Diagnosis

This 19 year old female patient is diagnosed with a Class II skeletal pattern, Angle's Class II malocclusion with a horizontal to average growth pattern, highly placed maxillary canines, in-standing maxillary lateral incisors with proclined upper and lower incisors, crowding in upper and lower anterior region, increased overjet and overbite, increased lip strain, protrusive upper and lower lips with a reduced Nasolabial angle and a Non consonant smile arc.

Model analysis

Bolton ratio:- Mandibular anterior excess:- 0.48 mm Mandibular overall excess:- 0.17 mm	Arch Perimeter Analysis: Need to extract 1 st premolars
Ashley Howe's index:- Need for extraction	Careys Analysis: Need to extract 1 st premolars
Pont's Index: Expansion not needed	Chadda's Index: Expansion not needed

Treatment progress

The maxillary 1st premolars and mandibular right premolar were first extracted. Complete banding of all molars followed by bonding in both maxillary and mandibular arch was done, using MBT-0.022X0.028" slot. Initially a 0.012" NiTi wire was used which was followed by 0.014", 0.016", 0.018", 0.020" NiTi archwires following sequence A of MBT. 0.016" x 0.022" NiTi wire was then used with an underlying Piggy back NiTi wire for correction of the in-standing maxillary lateral incisors. After 6 months of alignment and leveling NiTi round wires were discontinued. Use of 0.019" x 0.025" rectangular NiTi with accentuated

Anchor sweeps in the upper and lower stiff arch wires were given to prevent the bite deepening during retraction in the upper arch followed by 0.019" x 0.025" rectangular stainless steel wires for retraction and closure of spaces. 2 bilateral Omega loops were given in the maxillary arch and mandibular right side to promote frictionless and efficient retraction. Loops not only promote frictionless retraction but also improve the efficiency of the treatment by completing the treatment at a faster pace. Finally light settling elastics were given with rectangular steel wires in lower arch and 0.012" light NiTi wire in upper arch for settling, finishing, detailing and proper intercuspation. The upper and lower incisor crowding was unraveled, irregularity of upper anterior region was aligned and the incisor relationship changed from Class II division 1 to Class I. Canine relationship also changed from Class II to Class I. Molars were ended in a full cusp Class II molar relationship on the left side and a Class I molar relationship on the right side at the end of the treatment. Hawley's removable retainers were given to the patient followed by fixed lingual bonded retainers in the upper and lower arch. After completion of orthodontic treatment, the smile of the patient changed from being unaesthetic and non-consonant to a more pleasing and consonant smile arc. The treatment changed the patients overall profile, improved the unaesthetic looking narrow buccal corridor space by widening the arches and helped her feel more confident. She was very happy and satisfied with the treatment. A pleasing smile and a pleasing profile were achieved.

Fig. 3: Post treatment extra-oral photographs

Fig. 4: Post treatment intra-oral photographs

Post treatment cephalometric summary

Parameters	Pre- treatment
SNA	82°
SNB	81°
ANB	1°
WITS	2mm(AO ahead of BO)
Max. Length	79mm
Man. Length	108mm
IMPA	92°
Nasolabial Angle	103°
U1 TO NA Degrees	26°
U1 TO NA mm	3mm
L1 TO NB Degrees	24°
L1 TO NB mm	2mm
U1/L1 ANGLE	131°
Saddle angle	132°
Articular angle	143°
Gonial angle	124°
FMA	25°
Y AXIS	63°

Discussion

The patient's chief complaint was irregularly and forwardly placed upper front teeth and also excessive show of upper front teeth. The selection of orthodontic fixed appliances 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 execution of fixed appliance therapy with extraction of 3 premolars appropriately resulted in an improvement in the patient's profile in this case and met. Alongside fixed orthodontic treatment, the maxillary 1st premolars and mandibular right premolar were removed and retraction was done with the help of Omega loops to correct

the already existing malocclusion. This patient had a very unique malocclusion. She had a full cusp Class II molar relationship on the left side and an end on molar relationship on the right side with canines in End-on relationship bilaterally. The patient presented crowding in the upper and lower anterior region with a Class II division 1 incisor relationship due to which it was decided to extract 3 premolars and rectify the malocclusion. The U1 to NA values both in degrees and in millimeters decreased significantly and the upper and lower incisor proclination was corrected. The Nasolabial angle also improved drastically from being acute to slightly obtuse. Successful results were obtained after the fixed MBT appliance therapy within a stipulated period of time. The overall treatment time was 13 months. After this active treatment phase, the profile of this 19 year old female patient improved significantly as seen in the post treatment Extra-oral photographs and buccal corridor spaces were decreased significantly. Removable Hawley's retainers followed by fixed lingual bonded retainers were then delivered to the patient. The crowding in the upper and lower arch was corrected and the smile arc of the patient improved drastically to being more consonant and pleasant. The patient was very happy and satisfied with the results.

Comparison of pre and post treatment cephalometric readings

Parameters	Pre-treatment	Post-treatment
SNA	83°	82°
SNB	81°	81°
ANB	2°	1°
WITS	2mm(AO ahead of BO)	2mm(AO ahead of BO)
Max. Length	78mm	79mm
Man. Length	107mm	108mm
IMPA	99°	92°
Nasolabial Angle	93°	103°
U1 TO NA Degrees	36°	26°
U1 TO NA mm	7mm	3mm
L1 TO NB DEGREES	30°	24°
L1 TO NB mm	6mm	2mm
U1/L1 ANGLE	118°	131°
Saddle angle	134°	132°
Articular angle	146°	143°
Gonial angle	125°	124°
FMA	26°	25°
Y AXIS	64°	63°

Conclusion

This case report shows how the correction of severely crowded dentition can be managed alongside fixed orthodontic treatment with extractions of 3 premolars and frictionless retraction with the help of Loops, thus lowering the treatment time and enhancing the profile of the patient.

The planned goals set in the pretreatment plan were successfully attained. Good intercuspation of the teeth was obtained and the unaesthetic appearing Class II division 1 incisor relationship was changed to Class I relationship. The molars were settled in a full cusp Class II relationship on left side and Class I on right side and canines were settled in a Class I relationship bilaterally. The maxillary and mandibular teeth were found to be aesthetically satisfactory in the line of occlusion with a pleasing consonant smile arc and competent lips at the end of treatment. Normal overjet and overbite was achieved. The correction of 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 results of the treatment.

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Conflict of Interest

None.

References

- 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.
- Gottlieb 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.
- Bailey LJ, White R Jr. Assessment of patient for orthognathic surgery. *Semin Orthod.* 1999;5:209-22.
- 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.
- Graber TM, Vanarsdall RL, Vig KWL. Orthodontics. Current principles and techniques edn 3. St Louis: Mosby, 2000.
- Proffit WR, White RP Jr. Who needs surgical-orthodontic treatment?. *Int J Adult Orthodon Orthognath Surg.* 1990;5:81-9
- Turvey Ta Orthognathic surgery: A significant contribution to facial and dental esthetics. *J Am Dent Assoc.* 1998;117:49e-55e.
- 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.
- Kharbanda OP, Sidhu SS, Sundaram KR, Shukla DK. Prevalence of malocclusion and its traits in Delhi children. *J Indian Orthod Soc.* 1995;26:98-103.
- Ishii N, Deguchi T, Hunt NP. Craniofacial differences between Japanese and British Caucasian females with a skeletal Class III malocclusion. *Eur J Orthod.* 2002;24:493-9.

11. Lew KK, Foong WC. Horizontal skeletal typing in an ethnic Chinese population with true class 3 malocclusion. *Br Orthod*. 1993;20:19-23
12. Hullihen SP. Case of Elongation of the Under Jaw and Distortion of the Face and Neck, Caused by a Burn, Successfully Treated. *Am J D SC*. 1849;9:157.
13. Blair VP. Operations on the Jaw-bone and Face. *Surg Gynec Obst*. 1907;4:67.
14. Kazanjian, V. H.: Treatment of Mandibular Prognathism With Special Reference to Edentulous Patients. *Oral Surg Oral Med Oral Path*. 1951;4:680.
15. Dingman RO. Surgical Correction of Mandibular Prognathism, an Improved Method. *Am J Orthod Oral Surg*. 1944;30:683.
16. Edward R. Surgical Correction of Mandibular Prognathism. *Alpha Omegan*. 1951;45:104.
17. Caldwell, Jack B, Letterman GS. Vertical Osteotomy in the Mandibular Rami for Correction of Prognathism. *J Oral Surg*. 1954;12:185.
18. Smith JD, Thomas PM, Proffit WR, "A comparison of current prediction imaging programs,". *Am J Orthod Dentofac Orthop*. 2004;125(5):527-36.
19. Rivera SM, Hatch JP, Dolce C, Bays RA, Van Sickels JE, Rugh JD et al. Patients' own reasons and patient-perceived recommendations for orthognathic surgery. *Am J Orthod Dentofacial Orthop*. 2000;118:134-41.
20. Proffit WR, Philips C, Dann C, Turvey TA. Stability after surgical orthodontic correction of skeletal Class III malocclusion. I. Mandibular setback. *Int J Adult Orthodon Orthognath Surg*. 1991;6:7-18.
21. Proffit WR, Philips C, Turvey TA. Stability after surgical orthodontic correction of skeletal Class III malocclusion. III. Combined maxillary and mandibular procedures. *Int J Adult Orthodon Orthognath Surg*. 1991;4:211-225.
22. Bailey LJ, Cevdanes LH, Proffit WR. Stability and predictability of orthognathic surgery. *Am J Orthod Dentofacial Orthop*. 2004;126(3):273-7.
23. Kiran J, Isaac A, Shanthraj R, Madannagowda S. Surgical-orthodontic treatment of Class I malocclusion with maxillary vertical excess--a case report. *Int J Orthods (Milwaukee, Wis.)*. 2012;23(2):57-62.
24. Bjork A, Skieller V. Normal and abnormal growth of the mandible. A synthesis of longitudinal cephalometric implant studies over a period of 25 years. *Eur J Orthod*. 1983;5:41-3.
25. Eggensperger N, Raditsch T, Taghizadeh F, Iizuka T. Mandibular setback by sagittal ramus osteotomy: a 12-year follow-up. *Acta Odontol Scan*. 2005;63:183-8.
26. Cho HJ. Long-term stability of surgical mandibular setback. *Angle Orthod*. 2007;77(5):851-6.
27. Viswapurna PS, Al Hashmi A. Orthodontic surgical treatment of a skeletal class iii malocclusion.
28. Luther F, Morris DO, Karnezi K, "Orthodontic treatment following orthognathic surgery: How long does it take and why? A retrospective study,". *J Oral Maxillofac Surg*, 2007;65(10):1969-76.
29. Rodrigues EU, Maruo H, Guariza Filho O, Tanaka O, Camargo ES. Mechanical evaluation of space closure loops in Orthodontics. *Braz Oral Res*. 2011;25(1):63-8.
30. Kuhlberg AJ, Burstone CJ. T-loop position and anchorage control. *Am J Orthod Dentofac Orthop*. 1997;112(1):12-8.
31. Chakravarthy CH, Kumar PK. 'Loops in Orthodontics'- A Review. *Indian J Mednodent Allied Sci*. 2014;2(1):57-63.