SAR Journal of Dentistry, Oral Surgery and Medicine

Abbreviated Key Title: *SAR J Dent Oral Surg Med*
Home page: https://sarmedjournals.com

ISSN 2707-7772 (P)

Case Report

"Temporary Anchorage Devices (TADs) for Management of Class I Malocclusion" – A Case Report

Dr. Rachana Mhetre[1], Dr. Lishoy Rodrigues[2*], Dr. Bhushan Jawale[3], Dr. Shilpa Chawla Jamenis[4], Dr. Vanessa Varghese[5]

[1]Dr. Rachana Mhetre | Private Practice, Pune, Maharashtra, India
[2]Dr. Lishoy Rodrigues | Post Graduate Resident, Dept of Orthodontics and Dentofacial Orthopedics, Sinhgad Dental College and Hospital, Vadgaon Bk, Pune, Maharashtra, India
[3]Dr. Bhushan Jawale | Professor, Dept of Orthodontics and Dentofacial Orthopedics, Sinhgad Dental College and Hospital, Vadgaon Bk, Pune, Maharashtra, India
[4]Dr. Shilpa Chawla Jamenis | Reader, Dept of Orthodontics and Dentofacial Orthopedics, Sinhgad Dental College and Hospital, Vadgaon Bk, Pune, Maharashtra, India
[5]Dr. Vanessa Varghese | Post Graduate Resident, Dept of Orthodontics and Dentofacial Orthopedics, VPDC Dental College and Hospital, Sangli, Maharashtra, India

***Corresponding Author**
Dr. Lishoy Rodrigues

Article History: | Received: 25.03.2021 | Accepted: 11.05.2021 | Published: 16.05.2021 |

Abstract: In young patients, tooth movement is affected by growth while in adults we deal strictly with tooth movement alone. In addition, orthodontic treatment in the adults is often based on symptoms detected by the patient while in children; it is based more often on signs detected by practitioners or parents. Of equal significance is the fact that the adults seeks treatment more often for esthetic reasons and hence is likely to have unreasonable expectations about the outcome of the treatment, is less adaptable to the appliance and is uncompromising in his/her appraisal of the treatment results. This case report evaluates the management of crowding in a female patient with a Class II malocclusion with conventional fixed appliance mechano-therapy by using Temporary anchorage devices for the purpose of absolute anchorage. The case required extraction of 1st premolars for correction of the proclined, forwardly placed and crowded upper and lower anterior teeth. Clinical and cephalometric evaluation revealed skeletal Class I pattern and clinical examination revealed presence of an orthognathic facial profile, an average to horizontal growth pattern, increased overjet and overbite, crowding in maxillary and mandibular anterior region, incompetent lips, increased lip fullness and lip strain, a gummy smile with an unaesthetic reverse smile arc and a decreased nasolabial angle. Following fixed orthodontic treatment by removal of all 1st premolars and with retraction of anterior segment, a marked improvement in patient's smile, facial profile and occlusion was 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.

Keywords: TADs, Temporary anchorage devices, gummy smile, Fixed Orthodontic Mechanotherapy, Class II malocclusion, Crowding, reverse smile arc, Mesoprosopic facial form, Aesthetic Improvement, 1st Premolar Extractions, Orthodontic Camouflage, Unaesthetic smile, Therapeutic Extractions.

INTRODUCTION

Adult, unlike the child, is a relentless patient who will not cover up deficiencies in the skill of diagnosis or errors in the overall treatment. He/she presents with no growth and meager accommodation to mechanics. Some adult presentations necessitate changes in treatment strategy from what would otherwise be employed in adolescent patients to achieve similar goals [1, 2]. In other cases, objectives themselves may need to be modified because of lack of growth potential, constraints of treatment mandated by the patient or the presence of multiple missing or compromised teeth. By planning treatment and mechano-therapy taking into account the individual

circumstances that may affect the patient's biological response to treatment, realistic goals of orthodontics can be mutually recognized and agreed on by both the provider and the patient before therapy is initiated, resulting in an immensely rewarding experience [3, 4]. Orthodontic treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth [5, 6]. Over the last few decades, there has been an increase in the awareness about orthodontic treatment which has led to more and more adults demanding high quality treatment in the shortest possible time with increased efficiency and reduced costs [7-10]. The indications for extractions in orthodontic practice have historically been controversial [11-13]. On the other hand, correction of Class II malocclusions in growing patients, with subsequent dental camouflage to mask the skeletal discrepancy, can involve retraction by non-extraction means simply by utilizing the available spaces or by extractions of premolars [14, 15]. This case presents the correction of crowding with a Class I malocclusion in an adult female patient with proclined maxillary and mandibular anterior teeth, merely simply by executing extraction of maxillary and mandibular 1st premolars followed by fixed appliance therapy using conventional MBT fixed appliance mechanotherapy. Temporary anchorage devices were used in this case for the purpose of retraction and also to maintain an absolute anchorage. The Extraction protocol shown in this case is indicative of how an unesthetic smile can be converted into a pleasant one by routine fixed Orthodontic treatment with extraction of 4 premolars followed by retraction and closure of spaces.

CASE REPORT

Extra-Oral Examination

A 26 year old female patient presented with the chief complaint of irregularly placed upper and lower front teeth and excessive show of upper gums. On Extra-oral examination, the patient had an orthognathic facial profile, grossly symmetrical face on both sides, a Mesoprosopic facial form, Dolicocephalic head form and average width of nose and mouth, incompetent lips with increased lip strain , an acute Nasolabial Angle with increased upper and lower labial fullness. The patient had no relevant prenatal, natal, postnatal history, history of habits, medical or a family history. On Smiling, there was presence of crowding in the maxillary anterior region and a gummy smile with an unaesthetic reverse smile arc. The patient was very dissatisfied with her smile.

Fig-1: Pre treatment extra-oral photographs

Intra-Oral Examination

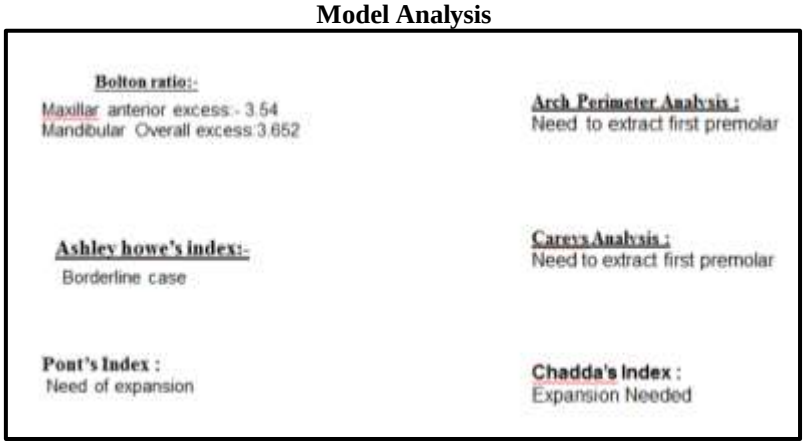
Intraoral examination on frontal view showed presence of non-congruent upper and lower dental midlines with lower dental midline shifted to the left by 2.5mm. There was presence of crowding in the maxillary and mandibular anterior region with an increased overbite of 4mm. On lateral view the patient showed presence of Class II Division 1 incisor relationship, an End-on canine relationship and a Class I molar relationship bilaterally with an increased overjet of 6mm and proclined and forwardly placed upper and lower anterior teeth. The upper and lower arch showed presence of a "U" shaped arch form.

Fig-2: Pre treatment intra-oral photographs

Table-1: Pre treatment cephalometric readings

PARAMETERS	PRE- TREATMENT
SNA	82°
SNB	80°
ANB	2°
WITS	1mm
MAX. LENGTH	92mm
MAN. LENGTH	109mm
IMPA	99°
NASOLABIAL ANGLE	92°
U1 TO NA DEGREES	34°
U1 TO NA mm	6mm
L1 TO NB DEGREES	29°
L1 TO NB mm	4mm
U1/L1 ANGLE	118°
FMA	24°
Y AXIS	66°
L1 TO A-POG	3mm
CONVEXITY AT PT. A	1mm
LOWER LIP- E PLANE	3mm
N-PERP TO PT A	1mm
N-PERP TO POG	-2mm
CHIN THICKNESS	11mm

Model Analysis



Diagnosis

This 26 year old female patient was diagnosed with a II malocclusion on a Class I Skeletal base with an average to horizontal growth pattern, proclined upper and lower incisors, crowding in upper and lower anterior region with non-coincident dental midlines, incompetant lips with increased lip fullness, gummy smile with a non-consonant reverse smile arc, reduced nasolabial angle with increased lip strain.

List of Problems

1. Proclined maxillary and mandibular dentition
2. Crowding in maxillary and mandibular anterior region
3. Non coincident dental midlines
4. Gummy smile
5. Decreased Nasolabial angle
6. Incompetant lips
7. Increased lip strain
8. Reverse smile arc

Treatment Objectives

1. To correct proclined maxillary and mandibular anterior dentition
2. To correct crowding in maxillary and mandibular anterior teeth
3. To correct the non-coincident dental midlines
4. To correct the existing gummy smile
5. To correct the decreased Nasolabial angle
6. To improve the lip competency
7. To decrease the lip strain
8. To correct the smile arc
9. To achieve a Class I incisor and canine relationship
10. To maintain a Class I molar relationship
11. To achieve a pleasing smile and a pleasing profile

Treatment Plan

- Extraction of 14, 24, 34 and 44 with banding, bonding and fabrication of trans-palatal arch in the maxilla
- Fixed appliance therapy with MBT 0.022 inch bracket slot.
- Initial leveling and alignment with 0.012", 0.014", 0.016", 0.018", 0.020" Niti archwires following sequence A of MBT.
- Inter-radicular implants between 15, 16 and 25,26.
- Retraction and closure of spaces by use of 0.019" x 0.025" rectangular NiTi followed by 0.019" x 0.025" rectangular stainless steel wires.
- Absolute anchorage with TADs in the upper and lower arch to maintain a Class I molar relationship bilaterally and for en-masse retraction of the proclined anterior teeth.
- Final finishing and detailing with 0.014" round stainless steel wires.
- Retention by means of Hawley's retainers along with lingual bonded retainers in the upper and lower arch.

Treatment Progress

Complete bonding & banding 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. After 6 months of alignment and leveling NiTi round wires were discontinued. Retraction and closure of existing spaces was then started by use of 0.019" x 0.025" rectangular NiTi followed by 0.019" x 0.025" rectangular stainless steel wires. Reverse curve of spee in the lower arch and exaggerated curve of spee in the upper arch was incorporated in the heavy archwires to prevent the excessive bite deepening during retraction process and also to correct the already existing gummy smile. Anchorage was conserved in the upper and lower arch with the help of temporary anchorage devices, thus constantly monitoring the already existing Class I molar relationship bilaterally. Retraction and closure of existing spaces was done with the help of Elastomeric chains delivering light continuous forces and replaced after every 4 weeks due to force decay and reduction in its activity. Retraction with the help of inter-radicular implants enabled getting the incisors and canines from Class II and an End on relationship respectively to a Class incisor and canine relationship. Thus an ideal overjet and overbite was achieved at the end of the treatment. 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 anterior

proclination was corrected with an ideal occlusion at the end of the fixed apppliance therapy. The Nasolabial angle improved significantly at the end of treatment, thus improving the profile even further. There was improvement in occlusion, smile arc and profile at the end of the treatment and the patients chief complaint of crowding and gummy smile was addressed.

Table-2: Mid treatment cephalometric readings

PARAMETERS	MID- TREATMENT
SNA	82°
SNB	80°
ANB	2°
WITS	1mm
MAX. LENGTH	93mm
MAN. LENGTH	111mm
IMPA	98°
NASOLABIAL ANGLE	96°
U1 TO NA DEGREES	29°
U1 TO NA mm	4mm
L1 TO NB DEGREES	27°
L1 TO NB mm	3mm
U1/L1 ANGLE	117°
FMA	24°
Y AXIS	65°
L1 TO A-POG	3mm
CONVEXITY AT PT. A	1mm
LOWER LIP- E PLANE	2mm
N-PERP TO PT A	1mm
N-PERP TO POG	-2mm
CHIN THICKNESS	12mm

Fig-3: Mid treatment extra-oral photographs

Fig-4: Mid treatment intra-oral photographs

DISCUSSION

Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. 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. Treatment of maxillary and mandibular crowding with extraction of premolars in an adult patient is challenging. A well-chosen individualized treatment plan, undertaken with sound biomechanical principles and appropriate control of orthodontic mechanics to execute the plan is the surest way to achieve predictable results with minimal side effects. Class II malocclusion might have any number of a combination of the skeletal and dental components. Hence, identifying and understanding the etiology and expression of Class II malocclusion and identifying differential diagnosis is helpful for its correction. The patient's chief complaint was irregularly placed upper and lower front teeth and excessive show of upper gums and seeked treatment for the same. 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 most important point to be highlighted here is the decision to extract the premolars. After analyzing the case thoroughly and reading all pretreatment cephalometric parameters along with evaluating the patients profile clinically, a decision was made of proceeding with the treatment by extracting all four 1st premolars as the patient presented with severe maxillary and mandibular proclination with crowding and gummy smile, hence the case could not be managed without extractions. The treatment after closure of extraction spaces improved the patients profile changing the Nasolabial angle from acute to average at the end of the treatment. There was a significant decrease in the lip strain and lip fullness with increased competency of lips. Crowding was unraveled, an ideal overjet and overbite was achieved, upper and lower dental midlines were coincident, smile arc was consonant and the pre-treatment gummy smile was corrected. Successful results were obtained after the fixed appliance therapy within a stipulated period of time. The overall treatment time was 19 months. After this active treatment phase, the profile of this 26 year old female patient improved significantly as seen in the post treatment Extra-oral photographs. Hawley's retainers were then delivered to the patient along with fixed lingual bonded retainers in upper and lower arch. Patient was very happy and satisfied with the results of the treatment

Table-3:Pre- finishing cephalometric readings

PARAMETERS	PRE - FINISHING
SNA	81°
SNB	80°
ANB	1°
WITS	0mm
MAX. LENGTH	91mm
MAN. LENGTH	107mm
IMPA	94°
NASOLABIAL ANGLE	102°
U1 TO NA DEGREES	26°
U1 TO NA mm	2mm
L1 TO NB DEGREES	27°
L1 TO NB mm	2mm
U1/L1 ANGLE	129°
FMA	25°
Y AXIS	67°
L1 TO A-POG	2mm
CONVEXITY AT PT. A	1mm
LOWER LIP- E PLANE	1mm
N-PERP TO PT A	1mm
N-PERP TO POG	-1mm
CHIN THICKNESS	12mm

Fig-5: Pre finishing intra-oral photographs

Table-4: Post-treatment cephalometric readings

PARAMETERS	POST - TREATMENT
SNA	82°
SNB	80°
ANB	2°
WITS	0mm
MAX. LENGTH	92mm
MAN. LENGTH	108mm
IMPA	93°
NASOLABIAL ANGLE	107°
U1 TO NA DEGREES	23°
U1 TO NA mm	1mm

L1 TO NB DEGREES	22°
L1 TO NB mm	1mm
U1/L1 ANGLE	132°
FMA	25°
Y AXIS	66°
L1 TO A-POG	1mm
CONVEXITY AT PT. A	0mm
LOWER LIP- E PLANE	0mm
N-PERP TO PT A	0mm
N-PERP TO POG	-1mm
CHIN THICKNESS	12mm

Fig-6: Post treatment extra-oral photographs

Fig-7: Post treatment intra-oral photographs

Table-5: Comparison of pre, mid, pre-finishing and post treatment cephalometric readings

PARAMETERS	PRE-TREATMENT	MID-TREATMENT	PRE- FINISHING	POST-TREATMENT
SNA	82°	82°	81°	82°
SNB	80°	80°	80°	80°
ANB	2°	2°	1°	2°
WITS	1mm	1mm	0mm	0mm
MAX. LENGTH	92mm	93mm	91mm	92mm
MAN. LENGTH	109mm	111mm	107mm	108mm
IMPA	99°	98°	94°	93°
NASOLABIAL ANGLE	92°	96°	102°	107°
U1 TO NA DEGREES	34°	29°	26°	23°
U1 TO NA mm	6mm	4mm	2mm	1mm
L1 TO NB DEGREES	29°	27°	27°	22°
L1 TO NB mm	4mm	3mm	2mm	1mm
U1/L1 ANGLE	118°	117°	129°	132°
FMA	24°	24°	25°	25°
Y AXIS	66°	65°	67°	66°
L1 TO A-POG	3mm	3mm	2mm	1mm
CONVEXITY AT PT. A	1mm	1mm	1mm	0mm
LOWER LIP- E PLANE	3mm	2mm	1mm	0mm
N-PERP TO PT A	1mm	1mm	1mm	0mm
N-PERP TO POG	-2mm	-2mm	-1mm	-1mm
CHIN THICKNESS	11mm	12mm	12mm	12mm

CONCLUSION

This case report illustrates how a case with crowding and gummy smile can be managed with Extraction of 4 premolars by means of appropriate use of conventional MBT prescription along with efficient conservation of anchorage at the same time. The planned goals set in the pre-treatment plan were successfully attained. Good intercuspation of the teeth was achieved with a Class I molar, incisor and canine relationship. Treatment of the proclined and forwardly placed upper and lower anterior teeth included the retraction of maxillary and mandibular incisors with a resultant decrease in soft tissue procumbency and facial convexity.The maxillary and mandibular teeth were found to be esthetically satisfactory in the line of occlusion. Patient had an improved smile and profile. The correction of the malocclusion was achieved, with a significant improvement in the patient aesthetics and self-esteem. The patient was very satisfied with the result of the treatment.

REFERENCES

1. D.L.R., D.S.C.J., D.B.J., D.P.D., D.A.K., D.P.P., D.A.R.F., D.A.K. (2021). “Conventional Straight Wire Appliance For Correction Of Midline Diastema And Spaced Dentition” – A Case Report, Advanced Research Journal of Medical and Clinical Sciences, 491-497.
2. Jawale D.B., Rodrigues D.L., D.B.K., D.A.N., D.N.K., D.R.K.S. (2021). “Conventional Mbt Mechanotherapy For Correction Of An Unaesthetic Smile With A Midline Diastema And Spaced Dentition” – A Case Report. Advance Research Journal of medical and clinical Science, 477-483.
3. D.B.J., D.L.R., D.S.P., D.A.K., D.N.K., D.V.M. (2021). “Premolar Extractions For Correction Of Severe Crowding, Gummy Smile And An Unaesthetic Non-Consonant Smile Arc In A Patient With Class Iii Skeletal Pattern” – A Case Report, Advanced Research Journal of Medical and Clinical Sciences, 484-490.
4. D.L.R., D.S.C.J., D.B.J., D.A.S., D.T.K., D.C.J., D.A.K., D.N.A. (2021 “Self Ligating Braces For Treatment Of A Borderline Extraction Case By Non Extraction Protocol” – A Case Report, Advanced Research Journal of Medical and Clinical Sciences, 498-505.
5. Dr. Bhushan Jawale, Dr. Lishoy Rodrigues, Dr. Sameer Patil, Dr. Anand Patil, Dr. Sandeep Jethe. (2021). “Burstone’s 3 Piece Intrusion Utility Arch In Combination With Absolute Anchorage Using Mini-Implants For Correction Of Bimaxillary Dentoalveolar Protrusion” - A Case Report On Segmental Arch Mechanics, International Journal Of Scientific Research, Volume - 10 | Issue – 05.
6. Lishoy R, Priyal R, Jamenis SC, Jawale B, Mahajan N. (2020). A survey to assess the knowledge and attitude of adults from the age group of 18 to 35 Years towards comprehensive orthodontic treatment - A questionnaire based study on adult orthodontics. IP Indian J Orthod Dentofacial Res, 6(4):1-8.
7. Rodrigues L, Jawale B, Kadam A, Rajani P. (2020).Single phase correction of tongue thrust habit alongside fixed orthodontic treatment for closure of spaced dentition and midline diastema in a male patient with class i malocclusion without need for a two phase appliance therapy - A case

report. IP Indian J Orthod Dentofacial Res;6(3):1-7.
8. Jawale B, Rodrigues L, Shinde K, Kangane S, Hattarki R, Mhatre S. (2020). Rhinoplasty, septoplasty and genioplasty with fixed orthodontic mechanotherapy for non-surgical correction of a patient with “Long face syndrome” Having a class III malocclusion on a class ii skeletal jaw base - A case report. IP Indian J Orthod Dentofacial Res;6(3):1-7.
9. Jawale B, Rodrigues L, Kalarickal B, Nagarahalli K, Deshpande R, Patil T. (2020). Fixed Orthodontic Treatmentand Space Closure with Second and Third Molar Protraction into First Molar Extraction Space- A Case Report on Correction of Mutilated Malocclusion. Ann. Int. Med. Den. Res.; 6(5):DEXX-DEXX.
10. Rodrigues Lishoy, Jawale Bhushan, Rajani Priyal and Kadam Aljeeta. (2020). Management Of A Borderline Extraction Case Of A Female Patient Having A Mid Face Deficiency By Non Extraction Protocol With Proximal Stripping For Profile Improvement And Smile Arc Correction- A Case Report Int. J. of Adv. Res. 8 (Jun). 649-663] (ISSN 2320-5407).
11. Case C S. (1964). The question of extraction in orthodontia, American Journal of Orthodontics, 50: 660–691.
12. Case C S. (1964). The extraction debate of 1911 by Case, Dewey, and Cryer, Discussion of Case: the question of extraction in orthodontia. American Journal of Orthodontics, 50: 900–912;
13. \Tweed C. 1944).Indications for the extraction of teeth in orthodontic procedure. American Journal of Orthodontics 30: 405–428.
14. Cleall JF, Begole EA. (1982). Diagnosis and treatment of Class II Division 2 malocclusion, Angle Orthod 52:38-60.
15. Strang RHW. (1957). Tratado de ortodoncia, Buenos Aires: Editorial Bibliogra´fica Argentina, p. 560-70, 657- 71.