

Interdisciplinary management of a mutilated Class II division 1 malocclusion with deep bite and missing first molars using a modified MUST appliance - A Case Report

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ABSTRACT

Introduction: Orthodontic management of cases presenting with compromised permanent first molars are difficult in aspects of treatment due to the loss of anchor teeth. Therefore, a problem-oriented approach is always preferred as an aid in treatment line.

Description: In this report, we discuss a case with multiple orthodontic problems ie. Class II division 1 malocclusion, deep bite, crowding and grossly decayed first molars of all four quadrants. The management of this case was done using a modification of the MUST appliance for uprighting the lower molars and closure of molar extraction spaces.

Results: The total treatment duration was 23 months and results were stable after a 1 year follow up.

Conclusion: Correct diagnosis and effective biomechanics are the key to successful treatment of compromised dentition.

KEYWORDS: Class II malocclusion, Interdisciplinary management, Modified MUST appliance, Mutilated dentition

INTRODUCTION

Adult orthodontic treatment though challenging, has become an integral part of present day orthodontics. Acceptable orthodontic treatment in adults can be treated either as an adjunctive or a comprehensive approach.¹ Class II division 1 malocclusion is one of the most prevalent malocclusion in the Indian population. Camouflage treatment to mask the skeletal problem may be a viable alternative for adult patients.²⁻⁴ Most of the adult patients present with early loss of first permanent molars especially lower molars resulting in mesial inclination of second molars.⁵ This mesial inclination hampers space available for placement of a molar implant hence, mesialization of second molars with its uprighting is carried as an alternative in orthodontic treatment requiring sound biomechanics to achieve correct posterior intercuspation and few facial changes.⁶

CASE REPORT

Diagnosis

A 17-year-old female patient reported to the Orthodontic outpatient department, with the chief complaint of irregular

and forwardly placed upper front teeth. On examination, the patient was found to be mild leptoprosopic and dolichocephalic. Moderate crowding was present in upper anterior segment with mild crowding in the lower anterior segment. Both maxillary and mandibular arches were constricted. (Figure 1) Patient presented with a mutilated dentition comprising of missing mandibular right first permanent molar and grossly decayed maxillary right first permanent molar, maxillary left first permanent molar, mandibular left first permanent molar, mandibular right second premolar. Both the third and fourth quadrant's second molars were mesially inclined. Periodontal conditions were favorable for orthodontic treatment with a fair oral hygiene. Patient presented with a vertical facial pattern and cephalometrically, Wits value of 4.5mm and ANB of 7 degrees. (Figure 2) (Table 1)

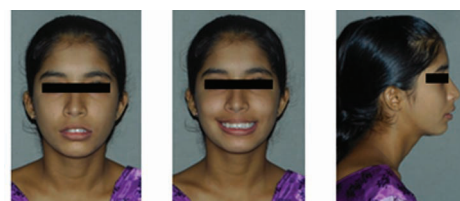




Figure 1: Pre-treatment Photographs

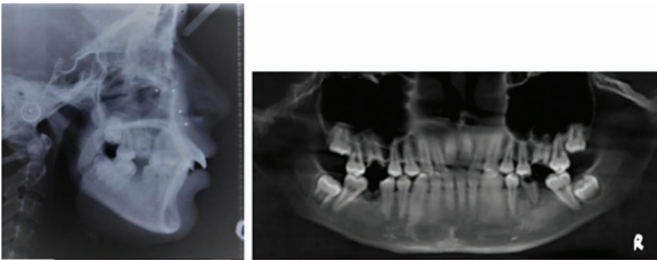


Figure 2: Pre-treatment Radiographs

Table 1: Cephalometric measurements

Parameters	Normal value	Pre-treatment	Post treatment
SNA	81.8sd 3.7	80	78
SNB	79.2 sd 2.3	74	73
ANB	2.3 sd 1.1	6	5
Wits	0 to -1	4	2
Co-A	93.6 sd 3.2	90	88
Co-Gn	120.6 sd 4.5	118	114
LAFH	67 - 69	71	67
FMA	24.2 sd 3	32	31
SN-Go-Gn	32	39	39
Gonial angle	128 sd 7	133	132
Cant of occlusion	9	9	13
LHNB(deg/mm)	25/4	21/5	26/6
UHNA(deg/mm)	22/4	36/7	21/3
IMPA	90	84	90
Interincisal angle	135	126	136
Overjet	2mm	7	3
Overbite	2mm	4.5	3

Treatment Objectives

The treatment objectives were to manage the mutilated dentition and achieve an Angle’s class I molar (of second molars) and canine relation, decrowding in both the arches, an ideal overjet and overbite without altering the vertical facial dimensions. Hence, we planned to extract all the grossly decayed molars and lower right second premolar followed by retraction of upper anteriors in available space, uprighting of both sides mandibular second molars using a modification of MUST appliance, followed by implant assisted prosthetic rehabilitation of lower right second premolar and correction of deep bite.

Treatment Progress

Roth appliance (0.022” bracket slot) was selected for bonding in both arches and banding was done only for maxillary second molars at the initial stage and Nance palatal arch was placed to augment anchorage. GIC bite blocks were placed on both upper second molars palatal cusps to raise the bite for lower arch bonding. Continuous 0.014 NiTi wires were placed as initial aligning wires in both arches. However, both upper lateral incisors were excluded from the initial alignment. (Figure 3)

After 4 months of leveling and aligning in upper arch, canine retraction (implant assisted) was initiated in upper arch on 0.19x0.25 stainless steel wire bypassing both upper lateral incisors thereby simultaneously creating space for them. As both lower second molars were mesially tipped hence their uprighting was done using a modified MUST 7appliance. This MUST appliance was fabricated using 0.018 spl+ AJ Wilcock wire with anti-rotation bends to prevent molar rotation while uprighting.(Figure 4,5)



Figure 3: Leveling and Aligning Photographs



Figure 4: Mid-treatment Photographs with MUST appliance

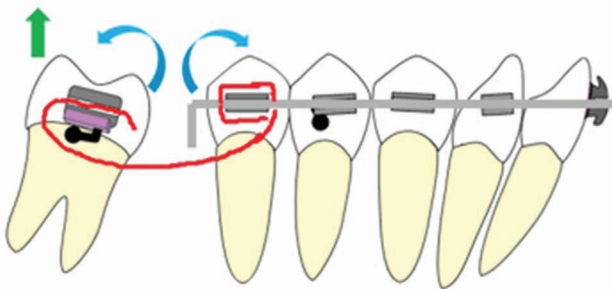


Figure 5: Biomechanics of MUST appliance

Post canine retraction, both upper lateral incisors were bonded and aligned with 0.014 Niti wire. To open the bite, lower incisors were intruded using an intrusion utility arch for 2 months followed by lower canine intrusion. After all corrections were achieved, continuous 19x25 ss wire was placed in maxillary and mandibular arches with mild expansion in lower arch to improve buccal occlusion. Midline implant in the upper arch was placed simultaneously during lower anteriors intrusion and upper anteriors retraction on continuous 0.19x0.25 stainless steel wire for effective bite opening. In our case, midline implant failed within 1 week due to frenal irritation, hence T loops were fabricated in upper arch wire to close the remaining spaces. The case was settled on 0.014 spl+ Australian round wire and 2oz Class II elastics were given at the settling stage for a good buccal occlusion. The total treatment duration was around 23 months. Hawley’s retainers were delivered for retention. Post-treatment patient had a better smile and an acceptable occlusion.

Patient was referred for implant rehabilitation of lower right second premolar post debonding. A titanium implant from MIS company of dimension 3.75x11.5mm was placed by ridge split method due to reduced width of bone followed by Bio-Oss bone graft in the region. After waiting period of 6 months for osseointegration, metal ceramic crown was placed. (Figure 6, 7, 8)



Figure 6: Post-treatment photographs

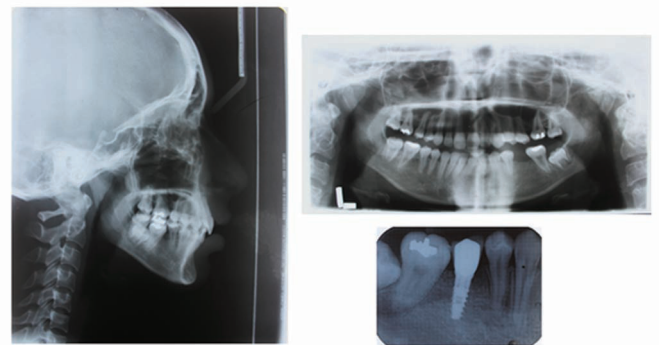


Figure 6: Post-treatment radiographs

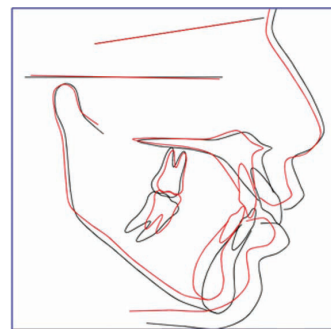


Figure 7: Superimposition

DISCUSSION

This case report demonstrates comprehensive treatment mechanics for managing a skeletal class II division 1 malocclusion with mutilated dentition. It is often found difficult for an Orthodontist when an extraction space usually exceeds more than 7mm i.e from the size of a premolar, thereby demands longer treatment time and comprehensive mechanics naming a few: uprighting tipped molars, decrowding, anchorage preparation and so on.⁸ Therefore, sound treatment mechanics should be applied during treatment to achieve a good treatment finish.⁹ Literature shows varied techniques¹⁰ for uprighting of tipped molars. In this case, we used a modified

MUST⁷ appliance the modification was in its wire i.e. we had used Australian wire (instead of recommended 16x22 Niti), as it is effective in not only uprighting but also helps in correcting any mild rotations present in lower molars, whereas if rectangular wire would have been used, it would have consumed more time in corrections of rotations and would have generated torque in already tipped molars. The anti-rotation bends given, had prevented any rolling in effect of the molars as a demerit of uprighting.¹¹

None of the modifications as mentioned in types i.e. MUST 1 or MUST 2 type were used. The premolar engagement of the wire was done directly over the bracket of lower premolars, hence being economical and prevented extensive armamentarium. We had uprighted lower molars by mesial root movement as distal crown tipping would have resulted in opening of excess spaces.¹⁰ Hence, uprighting of molars helped us in relieving lower arch crowding and simultaneously, maintained space for implant irt 45.

Molar uprighting would have resulted in extrusion¹⁰ mechanics of molars which would have deteriorated vertical facial pattern, hence GIC bite blocks were placed from day 1 to have depressive action and in every visit check of freeway space was made to know if any extrusion might have taken place. To prevent taxing of anchorage Nance palatal arch was used and mild posterior intrusion¹² was attained due to implant assisted retraction in upper arch, further upper anterior's position was maintained by midline implant which was later shifted (which eventually failed) to frictionless mechanics. T-loop retraction was started with 5 degrees alpha bend and 20-degree beta bends. Lower anterior

intrusion was sufficient with utility arch. Second molars and canines were effectively brought into a class 1 relation with 3mm overjet and overbite post treatment. The challenge in managing these cases is to attain coincident dental and facial midlines¹³ which in our case would have been compromised due to multiple missing teeth in lower right quadrant. Hence, space management should be performed with utmost expertise which will prevent not only skewing of the dental arches but also will maintain a mutually protected occlusion. The occlusal table was maintained due to the presence of third molars.¹⁴ The retention plan post debonding was use of Hawley's retainers in both arches and canine to canine bonded retainers. The results were stable post 1 year follow up.

A week after orthodontic debonding patient was referred to the department of Prosthodontics for the needful in lower right second premolar and after careful assessment, titanium implant was placed followed by metal ceramic crown as a prosthetic replacement.

CONCLUSION

Adult patients with compromised dentition can be treated successfully, if correct diagnosis and mechanics are used. Complicated mechanics should however be avoided. Skeletal anchorage is a present day boon and should be used for anchorage enhancement.

CONFLICTS OF INTEREST

Nil.

OJN

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