

Case Report

Correction of Lower Crowded Dentition with Fixed Orthodontic Self-Ligating Bracket System – A Case Report

Vaibhav Jain¹, Piyush Bolya², Archana Nagora³, Sachin V Jayraj¹

¹Post-Graduate, ²Professor and Head, ³Senior lecturer,
Department of Orthodontics and Dentofacial Orthopedics
Pacific Dental College and Research Centre (PDCRC), Udaipur, Rajasthan, Bharat

*Corresponding Author Email: vaibhavjain2503@gmail.com

ABSTRACT

Dental crowding is a prevalent orthodontic issue encountered globally. This case report details the diagnosis and treatment of a 21-year-old male patient presenting with significant crowding, deep bite, and midline deviation. The primary concern reported by the patient was crowding and dissatisfaction with their smile's aesthetics. Clinical examination revealed an Angle Class I malocclusion with severe crowding. Fixed orthodontic appliances were employed to comprehensively address the severe crowding, resulting in successful correction. Patient was having dental history of root canal treated teeth with 32, 41, 42 and extracted 31 as he was having periapical cyst I.R.T 31

KEYWORDS: Self ligation, Crowding, Extraction, Periapical abscess

INTRODUCTION

The decision to extract teeth for orthodontic treatment has been a subject of significant discussion throughout history. Over the past century, treatment planning philosophies have shifted between prioritizing non-extraction therapy and extraction of all four premolars. Recently, a single-tooth extraction approach, specifically targeting a lower incisor, has gained popularity. This case series presents three patients with various malocclusions successfully treated using mandibular incisor extraction¹. Adults with normal molar alignment (Angle Class I) often experience crowding in their front teeth, impacting roughly a quarter of women and a smaller percentage of men.

Determining the necessity of tooth extraction remains a critical decision for orthodontists during treatment planning. The ongoing debate regarding extraction versus non-extraction approaches represents one of the most

enduring philosophical controversies in orthodontic practice. This controversy encompasses both biological and mechanical considerations². Historically, orthodontic treatment plans primarily focused on either complete tooth preservation (non-extraction) or extraction of all four first premolars. However, recent years have witnessed a growing interest in an alternative approach: the extraction of a single mandibular incisor. Traditionally reserved for cases with a misplaced or compromised incisor, this strategy is gaining traction as a viable option for achieving optimal outcomes through simplified mechanics in carefully selected patients⁴.

This crowding occurs because the jaw size doesn't accommodate all the teeth comfortably, causing overlapping and rotations. Third molars and natural forward pressure on the teeth can worsen this issue. Orthodontic treatment aims to correct such misalignments

and improve facial aesthetics by aligning the teeth with the facial features⁵. This case study successfully treated lower front teeth crowding, a deep bite, and a misaligned midline in an Angle Class I patient using braces after removal of 31 having periapical cyst which cannot be saved due to large pathology.



Figure 1



Figure 2



Figure 3

Figures 1, 2 and 3: Pre-Treatment Extra-Oral Photographs

Extraoral examination revealed a straight facial profile, Mesocephalic head shape (medium skull proportions), and symmetrical facial features. The patient's lips were competent (meeting comfortably at rest), and speech function was unimpaired. (Figures 1, 2 and 3)

The patient demonstrated good oral hygiene. The mucosa, palate, and tongue appeared normal. Examination revealed crowding of the lower incisors with a deep bite of 4.5 mm and an overjet of 2 mm. A midline shift of 0.5 mm to the right was observed on the lower arch. The molar and canine relationship bilaterally was in Class I (normal molar relationship). The transverse relationship (upper and lower arch width) was also normal. (Figures 4, 5 and 6) Discoloration of the lower left central incisor was noted. Further investigation using a periapical radiograph (IOPA) revealed a periapical cyst involving all lower incisors.

Intra oral analysis indicated a -2 mm discrepancy in the upper arch (lack of spacing) and a -6.5 mm discrepancy in the lower arch (greater spacing needed). A positive curve of Spee of 3 mm was present (increased curvature in the lower incisor region). The overall arch shapes of the maxilla and mandible were normal. No clinical signs of temporomandibular joint dysfunction (clicking, discomfort) or limitations/deviations in jaw movements were observed.



Figure 4



Figure 5



Figure 6

Figures 4, 5 and 6: Pre Treatment Intraoral Photographs

The OPG's patient showed that patient had impacted on the lower third molar. There was Radiolucency seen at the roots of lower incisors (Figure 7 &8).

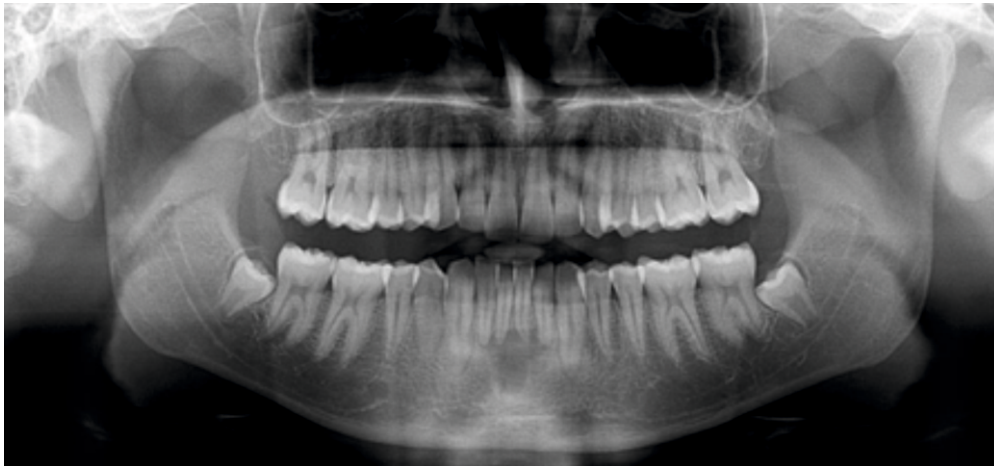


Figure 7 : Pre-Treatment OPG



Figure 8 : Pre-Treatment Lateral Cephalogram

DIAGNOSIS

Class I Jaw base with average growth pattern (Figure - 8) having Angle Class I Malocclusion with Proclined Skeletal upper and lower incisors, crowding, deep bite, and midline shifting.

ETIOLOGY

The primary contributing factor in this case is believed to be the eruption of third molars in the lower jaw on both sides (bilaterally). This eruption has resulted in crowding of the lower anterior teeth.

TREATMENT OBJECTIVES

- Achieve proper alignment of crowded teeth in both the upper (maxillary) and lower (mandibular) arches
- Correct the deep bite (excessive vertical overlap of the upper front teeth over the lower front teeth)
- Address the midline discrepancy (misalignment) in the lower arch
- Establish a Class I molar relationship (normal alignment of the molars)
- Achieve an ideal arch form for both the upper and lower

jaws

- Optimize Overjet (horizontal overlap of the upper front teeth over the lower front teeth) and overbite (vertical overlap of the upper front teeth over the lower front teeth) to desired levels

TREATMENT PLAN

Based on a comprehensive evaluation, including clinical examination, dental and orthodontic history, Extraoral and intraoral photographs, and radiographs, a treatment plan was formulated to address the malocclusion. Fixed orthodontic appliances with self-ligating brackets were chosen to achieve the desired tooth movements and alignment in both the maxillary and mandibular arches. Treatment involved the extraction of tooth #31 (lower left central incisor) due to its poor prognosis (non-vital with extensive pathology). This extraction aimed to alleviate crowding in the lower anterior segment. Root canal treatment was performed on teeth #32 (lower left lateral incisor), #41 (upper right canine), and #42 (upper right first premolar) before bonding the lower arch. The treatment concluded with the removal of retainers on both upper and lower arches.

TREATMENT PROGRESS

Informed Consent and Initial Procedures

Following informed consent, a comprehensive medical history was documented for the patient. Scaling (removal of calculus and plaque) was performed as initial treatment to prepare the teeth for bracket placement.

Tooth Extraction and Appliance Placement

Due to a poor prognosis, tooth #31 (lower left central incisor) was extracted. Self-ligating brackets with 0.022" slots were then bonded to all teeth in both arches. Buccal tubes with 0.022" slots were bonded to all first molars.

Alignment and Leveling

Nickel-titanium thermal wires of progressively increasing sizes (0.014", 0.018", and finally 0.016" x 0.022") were employed in both arches to achieve leveling and alignment of the teeth.

Arch Expansion and Refinement

Following alignment, stainless steel wires of size 0.016" x 0.022" were used in conjunction with up and down elastics to establish arch compatibility (proper coordination between upper and lower arches). Subsequently, stainless steel wires of size 0.017" x 0.025" were utilized for finishing and detailing the occlusion (fine-tuning the bite).

Treatment Outcomes

Good profile is achieved (Figures 9, 10 and 11). Orthodontic treatment successfully addressed the initial crowding in the upper arch and spacing in the lower arch. Normal overbite (2 mm) and Overjet (2 mm) were achieved. A Class I molar and canine relationship (ideal alignment) was maintained. Additionally, the curve of Spee was flattened (reduced curvature in the lower incisor region. (Figures 12, 13 and 14)

Debonding and Retention

Approximately one year after treatment initiation, all fixed appliances were removed. Fixed canine-to-canine retainers were placed on both arches, along with removable retainers (Begg's wrap-around retainers) for additional support.



Figure 9



Figure 10



Figure 11

Figures 9, 10 and 11 : Post Treatment Extra -Oral Photographs



Figure 12



Figure 13



Figure 14

Figures 12, 13 and 14: Post Treatment Intra Oral Photographs



Figure 15 : Post Treatment OPG



Figure 16: Post Treatment Lateral Cephalogram

DISCUSSION

This case report describes a 20-year-old male patient who presented to Pacific Dental College with the primary concern of lower arch crowding. The patient desired aesthetic improvement through fixed orthodontic appliances and expressed a preference for non-extraction treatment. OPG reveals right inclination of all the teeth after treatment (Figure 15) and post-treatment cephalogram indicate straight profile Class I Jaw base (Figure 16).

Treatment Considerations

The decision to extract or preserve teeth during orthodontic treatment planning involves careful consideration of the entire case complexity. Factors influencing this decision include the patient's medical history, treatment compliance, oral hygiene, susceptibility to cavities, and overall tooth health.

In this specific case, the patient was informed about the poor prognosis of tooth #31 (lower left central incisor) due to a large cyst (Figure 15). Following informed consent, tooth #31 was extracted, and the resulting space was utilized to address the lower arch crowding without further extractions.

Treatment Phases

Leveling and Aligning: A sequence of nickel-titanium (NiTi) thermal round archwires of increasing sizes (0.014", 0.018", and finally 0.016" x 0.022") was employed in both arches to achieve proper tooth alignment and leveling. NiTi wires offer the advantage of shape memory, which enhances their performance during the leveling stage.

Arch Coordination and Finishing: Stainless steel archwires of size 0.016" x 0.022" were used to establish arch compatibility (proper coordination between the upper and lower arches). This was followed by finishing and detailing the occlusion (fine-tuning the bite) using 0.017" x 0.025" stainless steel wires in both arches.

Retention

Following treatment completion, fixed retainers were bonded to the upper and lower anterior teeth for long-term stability. Additionally, Hawley retainers (removable retainers) were provided for both the upper and lower arches.

CONCLUSION

Generally, all treatment objectives were achieved successfully. The treatment successfully corrected crowding in a young adult with a normal bite (Class I) by extracting a lower front tooth due to poor health. It achieved proper alignment and bite without needing additional tooth removal.

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

REFERENCES

1. Kokich VG, Shapiro PA. Lower incisor extraction in orthodontic treatment: Four clinical reports. *Angle Orthod.* 1984; 54: 139-153.
2. Klein DJ. The mandibular central incisor, an extraction option. *Am J Orthod Dentofac Orthop.* 1997; 111: 253-259.
3. Valinoti JR. Mandibular incisor extraction therapy. *Am J Orthod Dentofac Orthop.* 1994; 105: 107-116.
4. Bayram M, Ozer M. Mandibular incisor extraction treatment of a class I malocclusion with Bolton discrepancy: a case report. *Eur J Dent.* 2007; 1: 54-59.
5. Narmada IB, Pratiknjo IS, Anwari SS. Non-extraction Orthodontic Treatment in Angle Class I Malocclusion with Severe Crowding, Deep Bite, and Midline Shifting: A Case Report. *Acta Medica Philippina.* 2023 Jun 28; 57(6).