CASE REPORT

Orthodontic management of mandibular anterior crowding using extraction or open coil spring mechanics techniques: a case report

Saransha Mehra[1], Seema Gupta[2], Santosh Kumar[3], Arun Kumar Chauhan[3]

Abstract

INTRODUCTION: *Mandibular anterior crowding is a common orthodontic issue caused by insufficient space, leading to misalignment of lower front teeth. This condition affects both aesthetics and function.*

OBJECTIVE: *The aim of this case report is to highlight the effective management of mandibular anterior crowding using different treatment approaches, particularly focusing on the management of lower incisors.*

CASE DESCRIPTION: *Three patients presented with complaints of misaligned lower and upper front teeth that were aesthetically unpleasing. Detailed clinical evaluations were performed, including intraoral and extraoral photographs, dental models, and pre-treatment OPG (Orthopantomogram) and lateral cephalogram radiographs. Based on these diagnostic records, treatment planning involved two main options: 1) Extraction of a periodontally compromised lower incisor, using the resultant space to realign the remaining teeth, or 2) Alignment with the use of open coil spring mechanics, which could provide the necessary space for correction without the need for extractions or 3) Extraction of a periodontally compromised lower incisor, maintaining the space for prosthodontic rehabilitation.*

RESULTS: *The post-treatment records demonstrated a complete resolution of the mandibular anterior crowding, with significant improvement in both aesthetics and occlusion. The periodontal health also showed marked improvement, confirming the effectiveness of the selected treatment strategies*

Keywords- mandibular anterior crowding, lower incisor extraction, open coil spring

1.Introduction

Mandibular anterior crowding is a prevalent concern in orthodontics, characterized by the misalignment of lower front teeth due to insufficient space. This condition is often caused by various factors, including genetics, tooth size discrepancies, or early loss of primary teeth. Mandibular crowding not only affects the appearance of the smile but can also lead to functional issues such as difficulty in proper chewing, speech problems, and an increased risk of periodontal disease due to difficulty in maintaining oral hygiene. Addressing this condition requires a thorough assessment of the severity of the crowding, the patient's overall periodontal health, and the available space for realignment.

1. *Post graduate student*
2. *Professor and Head*
3. *Professor*

Department of Orthodontics
Kothiwal Dental College & Research Centre

Corresponding author
Saransha Mehra
Post graduate student
Department of Orthodontics
Kothiwal Dental College & Research Centre
Moradabad, Uttar Pradesh

Orthodontic treatment options for managing anterior crowding vary based on the individual case. Non-extraction methods, such as using mechanical devices like expanders or aligners, are often preferred for mild to moderate crowding. However, in cases of severe crowding or when periodontal health is compromised, extraction of one or more teeth may be necessary. The use of open coil springs to create space without extractions is also a widely used approach. These treatment strategies can significantly improve both aesthetics and function. This case report highlights the effective management of mandibular anterior crowding in three patients through various orthodontic approaches, aiming to achieve optimal results while preserving periodontal health.

2.1 CASE REPORT FOR EXTRACTION CASE

A 22-year-old male patient presented to the Department of Orthodontics at Kothiwal Dental College and Research Centre, Moradabad, with a chief complaint of misaligned lower and upper front teeth, which he found aesthetically unpleasing. Additionally, the patient reported sensitivity in the affected region. Clinical examination revealed the presence of stains and calculus, indicating poor oral hygiene due to crowding in the mandibular anterior region. This led to the development of gingival recession in relation to tooth 31. Detailed clinical evaluations, including intraoral and extraoral photographs, dental models, and pre-treatment OPG (Orthopantomogram) and lateral cephalogram radiographs, were conducted. Based on these diagnostic records, moderate crowding of 6 mm and a Bolton's discrepancy of 5.5 mm

were observed. Consequently, the treatment plan involved the extraction of a periodontally compromised lower incisor, with the aim of utilizing the resultant space to level and align the lower anterior teeth. Prior to initiating treatment, well-informed consent was obtained from the patient.

Pre, mid, and post-treatment photographs of the occlusal and frontal views are shown in Figures 1. These images illustrate the improvements in both the alignment and aesthetics of the patient's anterior teeth following treatment. The pre-treatment images highlight the crowding and misalignment, while the post-treatment images demonstrate the successful resolution of these issues. The mid-treatment images show the extraction of the periodontally compromised lower incisor, with the engagement of an .014 NiTi round wire for alignment. For retention, a fixed lingual retainer was placed in the lower arch to maintain the results.

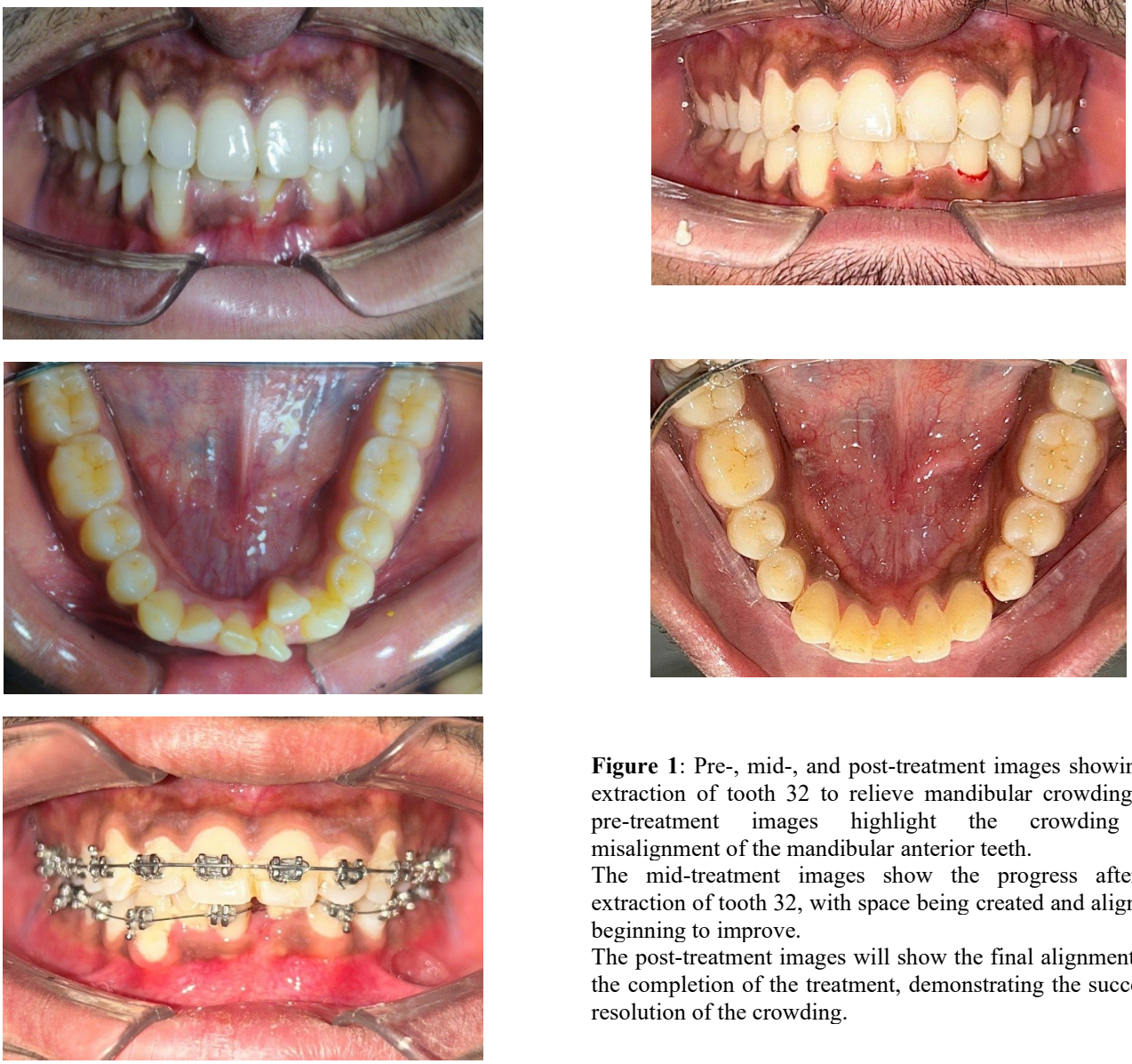
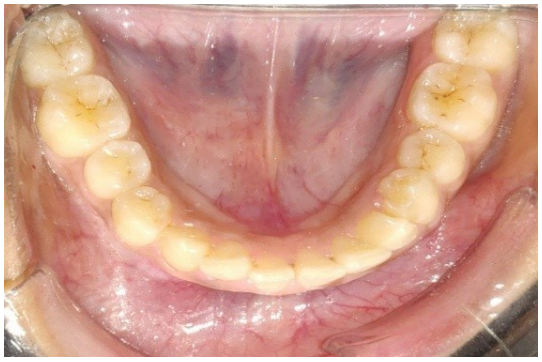


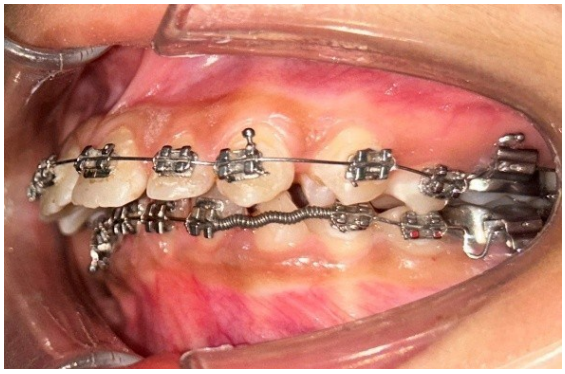
Figure 1: Pre-, mid-, and post-treatment images showing the extraction of tooth 32 to relieve mandibular crowding. The pre-treatment images highlight the crowding and misalignment of the mandibular anterior teeth.
The mid-treatment images show the progress after the extraction of tooth 32, with space being created and alignment beginning to improve.
The post-treatment images will show the final alignment after the completion of the treatment, demonstrating the successful resolution of the crowding.

2.2 CASE REPORT FOR OPEN COIL SPRING MECHANICS TECHNIQUES

A 26-year-old male patient presented to the Department of Orthodontics at Kothiwal Dental College and Research Centre, Moradabad, with a chief complaint of misaligned lower and forwardly placed upper front teeth, which he found aesthetically unpleasing. Clinical examination revealed the rotation of tooth 33 and the presence of stains and calculus, indicating poor oral hygiene due to crowding in the mandibular anterior region. Detailed clinical evaluations, including intraoral and extraoral photographs, dental models, and pre-treatment OPG (Orthopantomogram) and lateral cephalogram radiographs, were conducted. Based on these diagnostic records, mild crowding of 3 mm and a Bolton's discrepancy of 2.2 mm were observed.

The treatment plan involved a non-extraction approach, as indicated by the diagnostic measurements. Space for aligning tooth 33 was gained using an open coil spring on a 0.018 SS wire, after initial leveling and alignment with a 0.014 NiTi wire. The coil spring was activated after one month, and once sufficient space was achieved, tooth 33 was bonded. To relieve lower anterior crowding, a step-down 0.012 NiTi wire was placed. Post-treatment images are yet to be taken, as successful alignment was demonstrated at mid-treatment. (Figure 2)





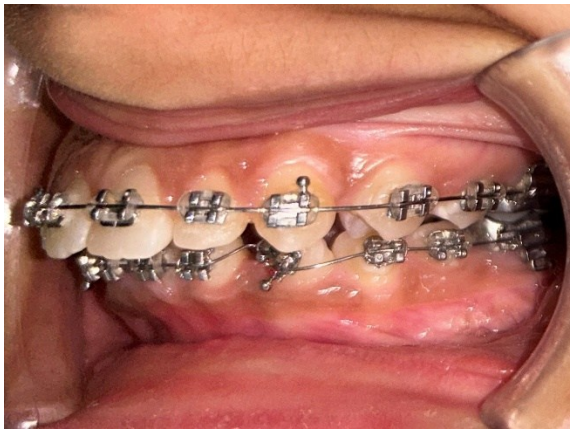


Figure 2: Pre, mid treatment of space for aligning tooth 33 was gained using an open coil spring on a 0.018 SS wire

2.3 CASE REPORT FOR EXTRACTION AND MAINTAINING THE SPACE FOR PROSTHODONTIC REHABILITATION.

Tooth extraction followed by space maintenance is a common treatment approach in orthodontics and prosthodontics, especially when there is a need to preserve space for future prosthetic rehabilitation. This approach is often indicated

when teeth are compromised due to periodontal disease, trauma, or but tooth size and arch length discrepancy is not present and even retraction is not required. The maintenance of the space ensures proper alignment and facilitates the placement of prostheses, improving both the functional and aesthetic outcomes for the patient.

A 26-year-old female patient presented to the Department of Orthodontics at Kothiwal Dental College and Research Centre, Moradabad, with a chief complaint of forwardly placed upper front teeth. Clinical examination revealed gingival recession in relation to tooth 31 and grade III mobility due to a traumatic bite. Detailed clinical evaluations, including intraoral and extraoral photographs, dental models, and pre-treatment OPG (Orthopantomogram) and lateral cephalogram radiographs, were conducted. Based on these diagnostic records, it was determined that no retraction was required; only leveling and alignment of the lower anterior region were necessary. A Bolton's discrepancy of 0.2 mm was observed. The treatment plan involved the extraction of tooth 31 and maintaining the space for prosthodontic rehabilitation. To prevent any movement of the adjacent teeth and preserve the space, a Begg's retainer with an acrylic extension on tooth 31 was used for retention. This retainer ensured the space remained open for the future prosthodontic restoration, providing both functional and aesthetic benefits in the long term. (Figure 3)

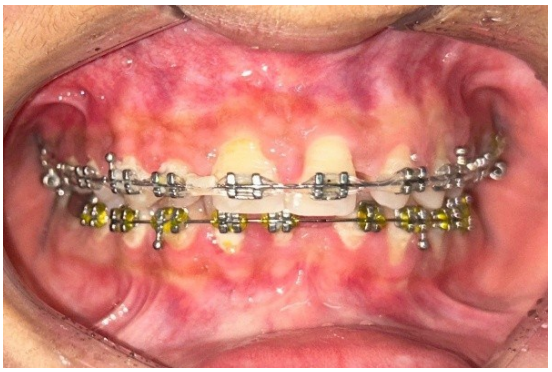


Figure 3: Pre-treatment, mid- treatment, post treatment of the treatment plan involved the extraction of tooth 31 and maintaining the space for prosthodontic rehabilitation.

3. DISCUSSION.

The three case reports presented here highlight the various orthodontic approaches used to address different dental issues, including crowding, misalignment, and the need for space maintenance for prosthodontic rehabilitation.

In the first case, the extraction of a periodontally compromised lower incisor was essential in resolving moderate mandibular anterior crowding. The presence of gingival recession and poor oral hygiene due to crowding necessitated the removal of the affected tooth. Following extraction, the space was utilized to level and align the remaining lower anterior teeth, resulting in improved aesthetics and occlusion. The use of a fixed lingual retainer ensured long-term retention of the achieved results, preventing relapse.

The second case employed an open coil spring technique to align a rotated tooth (33) in a patient with mild crowding. This non-extraction approach effectively utilized space gained through the open coil spring, with initial leveling done using a 0.014 NiTi wire. Once sufficient space was created, the tooth

was bonded, and the remaining crowding was managed with a step-down wire. This case demonstrates the flexibility of non-extraction techniques in treating mild crowding and misalignment, with successful alignment achieved at mid-treatment.

In the third case, the extraction of tooth 31 was performed to preserve space for future prosthodontic rehabilitation. The patient had gingival recession and grade III mobility due to a traumatic bite. By maintaining the space with a Begg's retainer, the treatment provided the necessary foundation for a prosthetic restoration, ensuring long-term functional and aesthetic benefits.

Together, these cases illustrate the versatility and effectiveness of various orthodontic treatment plans, tailored to the individual needs of each patient.

4. CONCLUSION.

The presented case reports highlight the successful management of various orthodontic challenges using different treatment approaches. In the first case, the extraction of a periodontally compromised lower incisor addressed moderate crowding and improved both the alignment and aesthetics of the lower anterior teeth. The use of a fixed lingual retainer ensured long-term retention of the achieved results. The second case demonstrated the effectiveness of non-extraction treatment using open coil spring mechanics to align a rotated tooth and relieve lower anterior crowding, showcasing the versatility of non-invasive orthodontic techniques. In the third case, the extraction of a compromised tooth and maintenance of space for prosthodontic rehabilitation ensured the preservation of function and aesthetics. The use of a Begg's retainer with acrylic extension successfully prevented tooth movement and maintained space for future prosthetic restoration. Overall, these cases emphasize the importance of personalized treatment planning, addressing both aesthetic and functional concerns, and achieving long-lasting results through effective space management and retention strategies.

5. REFRENCES

1. Proffit, W. R., Fields, H. W., & Sarver, D. M. (2018). *Contemporary Orthodontics* (6th ed.). Elsevier Health Sciences.
2. Nanda, R. (2009). *Esthetics and Biomechanics in Orthodontics*. Elsevier Health Sciences.
3. Cameron, A. C., & Sadowsky, C. (2007). *Orthodontics: Diagnosis and Management of Malocclusion and Dentofacial Deformities*. Saunders.
4. Bayram, M., & Özkurt-Kayahan, Z. "Use of Open Coil Springs for Space Management in Orthodontic Treatment." *European Journal of Orthodontics*, 2013;35(1):88-94.
5. Thompson, J. R., & Kuhlberg, S. J. "Fixed Retainers: A Literature Review." *Journal of Clinical Orthodontics*,2000;34(7):393-399.
6. Kapila, S. D., & Conley, R. S. "Contemporary orthodontic space management: Current approaches and future directions." *Seminars in Orthodontics*, 2019;25(1):36-44.
7. Ziegler, C. V., & Kuhlberg, S. "The role of fixed and removable retainers in orthodontic treatment." *Journal of Clinical Orthodontics*, 2021;55(2):92-98.
8. Dawson, D. H., & Lee, R. S. "Use of open coil springs in orthodontic mechanics." *European Journal of Orthodontics*, 2020:42(2):210-215.
9. Chung, K. H., & Kim, K. H. "Orthodontic treatment of periodontally compromised teeth and considerations for prosthodontic rehabilitation." *Journal of Prosthodontic Research*,2020;64(1):1-9.