

# Orthodontic management of anterior disc displacement without reduction

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## Abstract

This article presents a novel idea for managing patients with anterior disc displacement without reduction that often develops in susceptible patients during routine orthodontic treatment. The patient was a 24-year-old male who presented with class I right molar and canine relationship and class III left molar and canine relationship on a class I skeletal base, complaining of bimaxillary crowding. The case was treated with fixed orthodontic appliance with maxillary expansion and unilateral mandibular extraction to eliminate the mandibular crowding. Due to a life crisis, the patient developed anterior disc displacement on the right joint. A maxillary occlusal splint was fabricated to reduce the symptoms and attempt to recapture the disc; however, this attempt failed. An attempt was then made to recapture the disc using occlusal pivots and elastics. The disc was eventually recaptured, and the patient resumed normal jaw function and mouth opening. This case report aims to demonstrate a new way to achieve stable occlusion in a patient who sustained disc displacement.

## Keywords:

Disc displacement, jaw deviation, limited mouth opening, orthodontic

## Introduction

Derangement of the condyle disc complex may be associated with severe pain and limitation in function. In the closed-jaw position, the disc is positioned anteriorly to the condylar head, and the disc does not reduce with jaw opening.<sup>[1]</sup> The disc mechanically obstructs translation of the condyle, which is associated with limited jaw opening and jaw deflection towards the affected side. The signs include maximum assisted mouth opening of less than 40 mm,<sup>[2]</sup> deflection of the mandible to the ipsilateral side upon opening and protrusion, and restriction of movement to the contralateral side.<sup>[3]</sup> Symptoms may include sharp, sudden, and intense pain (if present) localized to the periauricular area as well as a sudden decrease in mandibular movement due to the “closed lock”.<sup>[3]</sup>

## Diagnosis and etiology

Diagnosis is based on the patient's history, clinical examination, and related tests. Differential diagnosis may include masticatory myalgia, myositis, degenerative joint disease, and temporalis tendonitis. Less common conditions may include temporomandibular joint (TMJ) ankylosis, coronoid hyperplasia, capsular fibrosis, and synovial chondromatosis.<sup>[4]</sup> A 24-year-old male patient presented to the orthodontic clinic for routine orthodontic treatment. His chief complaint was, “I do not like my smile.” Clinical examination revealed V-shaped upper and lower arches with bimaxillary crowding (5 mm maxilla and 9 mm mandible), lower midline shifted to the right by 2 mm, crossbite in relation to upper right lateral incisor and lower right canine, lower chin deviation to the right, and reciprocal right TMJ clicking during opening and closing [Figure 1]. We believe that the cause of the jaw shift was due to the malocclusion; however, the patient was

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**Figure 1:** Initial photograph shows (a-c) the frontal and frontal smiling with the jaw deviation to the right and lateral shows straight facial profile; (d and e) the constricted upper and lower arches with bimaxillary crowding; and (f) class I molar and canine in the right side; (g) lower midline deviated to the right side by 3 mm; (h) class III molar and canine in the left side



**Figure 2:** Progress photographs when patient showed jaw deviation after disc displacement without reduction; (a) frontal picture shows patient opening with deviation to the left; (b) frontal picture shows patient closing and jaw is shifted to the left; (c-e) right, frontal and left side view with maxillary splint in place as emergency treatment for anterior disc displacement without reduction

going through difficult times, which led to stress and parafunctional habits, such as nocturnal clenching and bruxism, that resulted in the anterior disc displacement without reduction.

### Treatment Objectives and Approaches

Treatment approaches depend on whether the case is acute or chronic. Manual manipulation to regain normal disc-condyle relationship may be considered in acute cases.<sup>[2]</sup> If successful, the patient is then advised to wear

an anterior positioning appliance for the first 2–4 days, followed by nighttime use. Once stabilization is achieved, a stabilization appliance may be used only for nighttime.<sup>[5]</sup> If unsuccessful, a minimally invasive surgical procedure may be considered to return the disc to the normal functioning position. Conservative supportive therapies should include advising the patient to avoid activities that aggravate the condition, advising the patient to perform gentle jaw exercises that help regain opening, prescription of non-steroidal anti-inflammatory drugs (NSAIDs) for pain control and resolution of inflammation, and

the fabrication of a stabilization occlusal appliance for nighttime use. In chronic cases, the patient should be referred to an oral and maxillofacial surgeon to surgically recapture the disc, using a Mitek screw<sup>[6]</sup> to stabilize the condylar disc complex. Alternative treatments may include auriculo-temporal nerve block to differentiate a primary diagnosis of joint pain from muscular pain.<sup>[7]</sup>

### Treatment Planning and Progress

The treatment consisted of expanding the upper arch using the quad helix appliance, extracting tooth lower left first premolar to relieve mandibular crowding, and comprehensive fixed orthodontic appliance therapy using 0.022" Roth prescription (3M Unitek, Victory Series, Washington D.C, USA). Two months after initiating the treatment, the patient came to the ER clinic complaining of severe pain in the right TMJ. Clinical examination revealed limitation of mouth opening with deviation to the right during mouth opening. An upper night guard was inserted along with a prescription of NSAIDs for a week to relieve the pain [Figure 2]. A slight improvement was noted, but the jaw deviation was still present. Magnetic resonance imaging (MRI) was requested using T1 and T2 open and close after removing the brackets to eliminate distortion. The MRI revealed anterior disc displacement without reduction in the right joint [Figure 3].

The patient was presented with two treatment options: The first was to recapture the disc via joint surgery using a Mitek screw (Mitek Anchor, Mitek Products Inc., Westwood, MA, USA) to stabilize the disc into the condylar head; the second was to capture the disc using the fixed orthodontic appliance. The latter option was selected. Once 0.017" x 0.025" stainless steel upper and lower archwires were reached, a pivot composite buildup on the lower right first molar and a class II elastic (1/4", 4.5 oz) with vertical component was given to allow displacement of the right condyle inferiorly and anteriorly to recapture the disc. On the left side, inverted V elastics (from lower left canine to upper left canine to lower left first premolar) were used from the lower canine and premolar to the upper canine to stabilize the joint on this side [Figure 4].

### Results

After two months of continuous elastic wear, the disc was recaptured, and the patient resumed normal function [Figures 5 and 6]. Short class II elastics from lower molar to upper first premolar were continued for another three months to ensure normal disc condylar complex articulation [Figure 5]. After that, class II elastics were discontinued for three months to ensure stability of the joints. The case was then debonded, and the patient's occlusion finished in class I molars, canines, and coincident midlines [Figure 7].

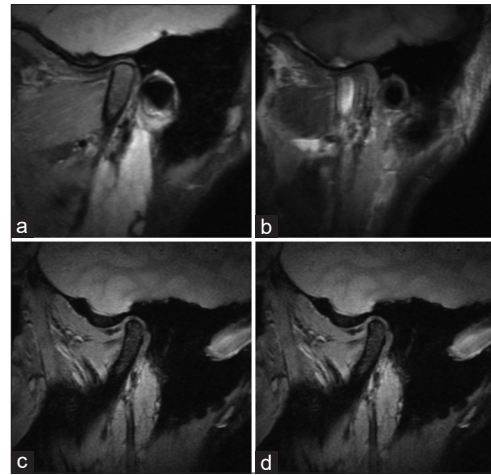


Figure 3: MRI image for both right and left joints in an open and closed position; (a) left joint in a closed position; (b) left joint in an open position; (c) right joint in a closed position; and (d) right joint in an open position

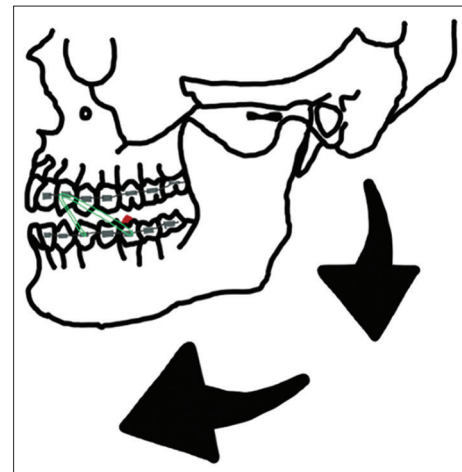


Figure 4: Diagram shows the use of occlusal pivot and the intra-oral elastic in an inverted V shape with class II component to ensure rotating the mandible in a downward and forward direction, making space for the disc to move to its normal position, and allow the mandibular condyle to move forward to recapture the disc

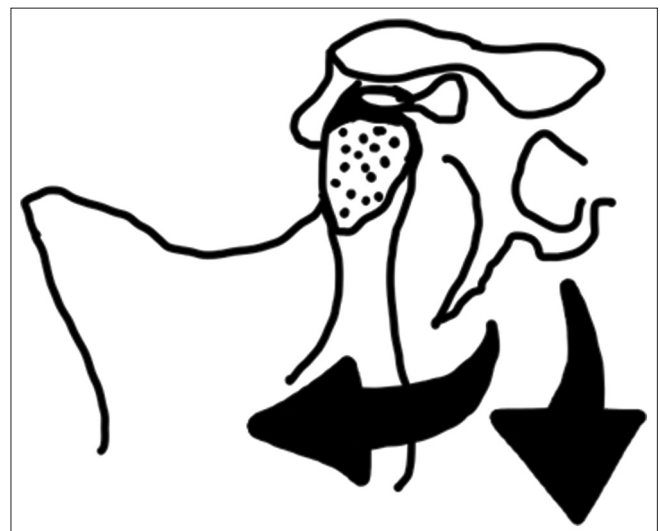


Figure 5: Condylar movement to recapture the disc



**Figure 6:** Progress photographs after disc was recaptured showing (a) no deviation with maximum mouth opening patient open in straight path; (b) frontal picture shows centered chin; (c and d) maxillary and mandibular views show normal U-shaped arches; (e) right side view shows class I molar and canine; (f) frontal view shows normal overbite and centered midlines; (g) left side view shows class I molar and class II canine with slight overjet on the left side



**Figure 7:** Final photograph; (a) frontal picture shows centered chin; (b) smiling with maxillary midline in center and chin in center; (c) lateral profile picture; (d and e) maxillary and mandibular views show normal U-shaped arches; (f) right side view shows class I molar and canine with normal overjet; (g) frontal view shows normal overbite, overjet and centered midlines; (h) left side view shows class I molar and canine with normal overjet

## Discussion

Several attempts have been made in the literature to recapture the anterior disc displacement without reduction,<sup>[2,7-11]</sup> such as mandibular manipulation to recapture the displaced disc by pulling the condyle of the affected side downward and forward. Arthroscopic disc fixation to the condylar head uses resorbable pins for internal derangement of the temporomandibular joint (stage II–IV). A preliminary report of 34 joints used two resorbable pins (SmartNail) placed in each joint, employing arthroscopic surgery to treat symptomatic internal derangement for 34 joints. The result was a decrease in the pain scores which remained low after 24 months of follow-up. Movements began to recover in three months, and mouth opening increased from 34 mm to 43.22 mm one year after surgery. Clicking, lateral deviation, and contralateral excursions improved significantly. MRI showed disc fixation to condyle head in closed and opened mouth. Our presented technique was non-invasive in correcting the disc displacement without reduction. The patient resumed function as the patient's orthodontic treatment need was accomplished. Mehra and Wolford<sup>[6]</sup> wrote a paper on using the Mitek mini anchor for TMJ disc repositioning. Their approach was for a patient undergoing orthognathic surgery with no history of TMJ pathology or degenerative disease. The idea of their technique was to salvage the joint before orthognathic surgery to ensure stability of the mandibular surgery which was different from our treatment goal. The anterior repositioning appliance (ARS) used as a functional appliance effectively re-established the condylar disc relationship. This technique is suitable as a short-term solution; however, as soon as the patient stops using the splint, the disc may displace from the head of the condyle due to the malocclusion. The narrow upper arch will direct the jaw to be shifted and the condyle will be placed distal to the disc. Our technique aimed to provide a stable occlusion which would stabilize the joint so the disc would be articulating with the condylar head constantly. In our patient, the attempt was made to disocclude the condylar head downward and forward to ensure recapturing the disc using 0.017" × 0.022" stainless steel archwires in both arches to secure jaw movement rather than teeth movement, since we were using the occlusal pivot together with the use of different inter-arch elastics to allow the disc to return to its normal position by creating the ideal joint space. The treatment time took longer than expected due to the COVID lockdown; however, we recaptured the disc and achieved class I canines, molars, and centered midlines. The patient was able to resume normal jaw function and normal range of motion. We believe this technique is ideal for patients

with anterior disc displacement without reduction and malocclusion.

## Conclusion

The anterior disc displacement without reduction is a benign and self-limiting condition. The first line of treatment is mandibular manipulation to recapture the displaced disc. If mandibular manipulation is successful, the patient should be provided with an occlusal appliance. If mandibular manipulation fails, the patient should be educated about the condition and any means of conservative treatment should be applied before resorting to invasive methods such as surgery. Our non-invasive orthodontic technique provided an ideal way to manage the anterior disc displacement without reduction provided the disc shape is within normal limits and there is no tear in the disc or perforation. Such patients will benefit from reducing TMJ symptoms and resume normal jaw function and stable occlusion.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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