

Acute Occlusal Change Following Acute Anterior Disc Displacement without Reduction: A Case Report

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A 35 year-old female presented with the complaint of sudden occurrence of bite change and concurrent opening limitation, as well as pain in the right temporomandibular joint (TMJ) during mouth opening. From her history it was revealed that she had simple clicking of right TMJ for several years before onset of these symptoms, and that the clicking sound subsided recently after development of opening limitation. On clinical examination, anterior open bite, midline shift of the mandible to right, and premature contacts on left posterior teeth were observed. Maximum mouth opening and lateral movement to left were also restricted. On magnetic resonance images, the right TMJ showed anterior disc displacement without reduction and the posterior joint space is greatly collapsed by retrusion of the condyle. It was thought that the sudden occurrence of occlusal change would be resulted from abrupt displacement of the mandible associated with development of the anterior disc displacement without reduction. The stabilization appliance traction therapy was performed initially for first 3 months along with physical and pharmacologic therapy. However, the anterior open bite and opening limitation didn't resolve and the position of mandible still remained altered. So the stabilization appliance was changed to intermaxillary traction device. Then the mandible returned progressively to normal position and the occlusion became more stable and comfortable. After 5 months of intermaxillary traction therapy, the anterior open bite was dissolved completely and the occlusion became stabilized satisfactorily along with recovery of normal mouth opening range. On post-treatment magnetic resonance image, remodeling of condylar head was observed.

Key words : Acute occlusal change, Anterior disc displacement, Intermaxillary traction therapy, Magnetic resonance image

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I. INTRODUCTION

Temporomandibular joint (TMJ) disorders were composed with various pathologic joint conditions including the displacement of articular disc or inflammatory conditions in articular tissues. It has been known that the displacement of articular disc can cause the various symptoms such as pain, movement limitation, clicking joint sound, rarely occlusal change^{1,2)}. It was proposed that the disc displacement could affect occlusion through two ways. The first is a direct, mechanical impact of displaced disc on the condylar position³⁾. The

second way is through inflammatory response such as considerable swelling of retrodiscal tissue. The latter is more common and can be dissolved through the subsidence of joint swelling followed mainly by the anti-inflammatory treatments using medications and/or physiotherapy. In contrast, the former is less common and its treatments have not even been well-established, even though it has long been stated.

In this case report, we described a patient with internal derangement in right TMJ who presented with the limitation of mouth opening and the subsequent acute occlusal change. The TMJs were evaluated as to morphology and relative position of the disc and condyle based on the magnetic resonance images (MRI) taken at pre- and post-treatment in order to explain the mechanism causing acute occlusal change. The effectiveness of intermaxillary traction therapy in resolving anterior open bite associated with the disc displacement without reduction was also discussed.

II. CASE REPORT

A 35 year-old female visited the Department of Oral Medicine, Kyungpook National University Hospital with the complaints of sudden occurrence of bite change and concurrent opening limitation and pain in the right temporomandibular joint (TMJ) on wide opening. From her past history, it was revealed that she had simple clicking of right TMJ for about 2 years before the development of these symptoms. The clicking sound subsided recently, immediately after development of opening limitation.

On clinical examination, there was an anterior open bite and the maximum interincisal distance was 20mm and the lateral movement of mandible to left was significantly reduced to 3 mm. Shift of the mandibular position to right and premature contacts on the left 2nd molar were also observed (Fig. 1). She had tenderness on palpation in the right TMJ. On magnetic resonance image, the right TMJ showed the anterior disc displacement without reduction and the condyle displaced posteriorly in the mandibular fossa with the decreased posterior joint space (Fig. 2).

Based on the patient's history and clinical and MRI findings, we supposed that the opening limitation should result from the acute disc displacement without reduction of the right TMJ, and the anterior open bite and the premature contacts on left posterior teeth might be associated with the posterior displacement of the right condyle in the mandibular fossa.

After giving the patient an assuring explanation about the condition and its prognosis as well as self-care instruction, firstly right TMJ manipulation was performed to reduce the displaced disc on the condyle head. However, the procedure was not successful. Then the treatment directed to supportive therapy including medication using NSAID and tranquilizer, and physical modalities like ultrasound and TENS. A maxillary stabilization appliance was fabricated for the patient and recommended to wear it during sleep. the subsequent visits for a short follow-up evaluation of the patient and minor adjustment of the appliance were done once a week.

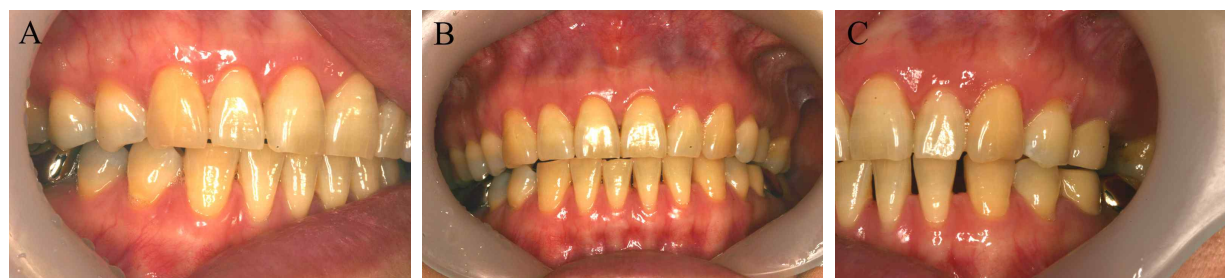


Fig. 1. Photographs showing pre-treatment occlusion. A. right, B. front, C. left

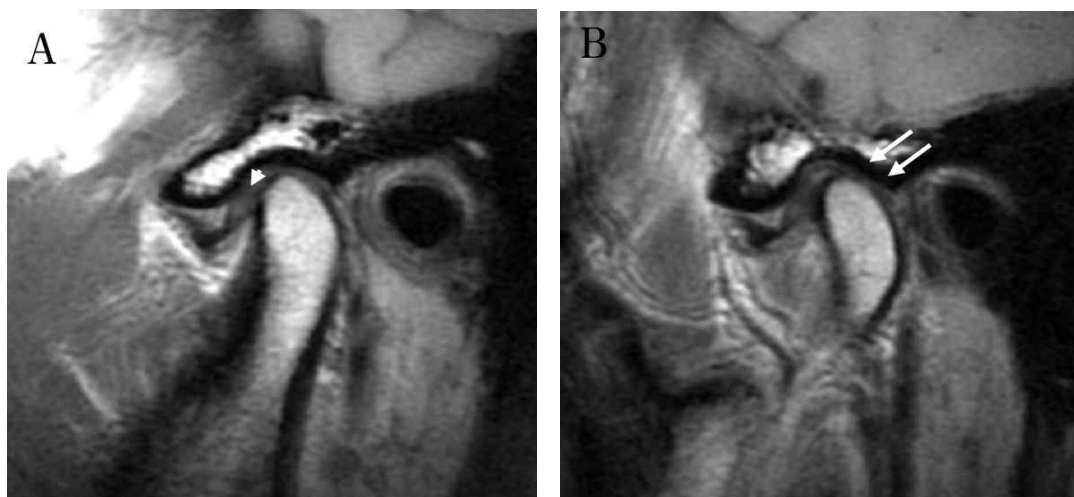


Fig. 2. Pre-treatment proton density weighted magnetic resonance images of right TMJ in closed jaw position. A: midsagittal cross-sectional view. White arrowhead indicates the distal end of displaced disc. B: slightly medially cross-sectional view. Two white arrows indicate the collapse of posterior articular cavity.

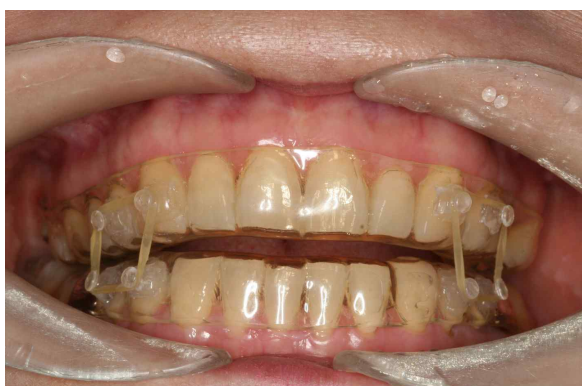


Fig. 3. The intermaxillary traction devices seated in each dental arch with elastics installed at premolar area

Although the stabilization appliance therapy and other supportive therapies continued for 3 months, the patient still has pain and tenderness in her right TMJ, the opening range increased only a little (maximal interincisal distance = 28 mm) and the bite discomfort still remained significantly and the anterior open bite didn't resolve yet. Thus, we decided to try the intermaxillary traction treatment for the patient in an attempt to correct the occlusal change as well as to close the anterior open bite. The intermaxillary traction treatment was performed by

using two full-coverage plastic appliances seated on each the upper and the lower dental arch during sleep. As long as the appliances are worn in the mouth, it is expected that a pivoting action would be produced by the pivoting fulcrums on most distal occlusal surface of the appliance, and intermaxillary elastics on buccal surface of canine and premolar area (Fig. 3).

After 3 months of using nocturnal intermaxillary traction therapy along with appropriate physical and medical therapy, there appeared a contact between the upper and lower central incisor and the mouth opening range increased to 35mm of interincisal distance. After 6 months of intermaxillary traction therapy, the maximum mouth opening range was increased to 42mm and the anterior open bite was resolved (Fig. 4). The patient reported the relief of joint pain during daily life and more comfortable occlusion. The tenderness on right condyle and surrounding structures on palpation subsided. With using shimstock, the bilaterally even and stable contacts were verified on anterior as well as posterior teeth. The patient was very satisfied with the improvement of occlusal condition following the application of intermaxillary traction therapy.

On post-treatment MRI of the right TMJ, the



Fig. 4. Photographs showing post-treatment occlusion. A. right, B. front, C. left

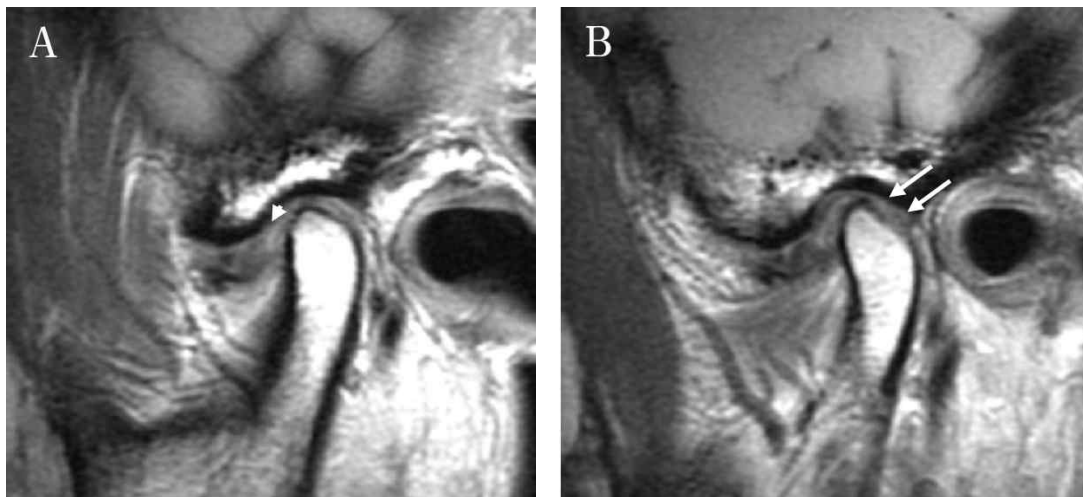


Fig. 5. Post-treatment proton density weighted magnetic resonance images of right TMJ in closed jaw position. A: midsagittal cross-sectional view of condyle. White arrowhead indicates the distal end of displaced disc. B: slightly medially cross-sectional view of condyle. Two white arrows indicate the flattening in posterior portion of condyle and the relief of collapse of posterior articular space

condyle showed increased motion range and evidence of bony remodeling on its head. Especially, the remodeling by focal bone resorption in the posterior portion of right condylar head was observed without discontinuity of cortical bone of condyle (Fig. 5).

III. DISCUSSION

From the clinical and MRI findings, the patient was diagnosed as anterior disc displacement without reduction of the right TMJ. The acute occlusal changes including anterior open bite was thought to be caused by abrupt posterior displacement of the

right condyle in the mandibular fossa, which might be associated with push-back of the displaced disc. Such posterior displacement of right condyle shall cause the mandible to shift to right and rotate backward, possibly resulting in anterior open bite and heavy contact on left molar.

The acute occlusal changes have long been stated that they could present as a symptom of temporomandibular disorders (TMD). The presentation of acute occlusal changes depends on the related clinical conditions, for example, the retrodiscitis with considerable swelling on retrodiscal tissue can cause ipsilateral condyle to be displaced anteriorly, which lead mandible shift to the opposite side.

Acute occlusal change following displacement of

the articular disc is usually attributed by posterior displacement of ipsilateral condyle, resulting from the disc's pushing back. Consequently, the acute occlusal change presents as heavy contact on ipsilateral molar area along with the shift of the mandible to same direction³⁾.

In this case, the anterior open bite was followed by condylar shift. This occlusal change presented in this case was different from what was stated by Okesson. Such a difference is thought to be due to patient's own occlusal pattern. As some patients show the premature contact on nonworking side during lateral excursion of mandible, the site of premature contact resulted by the change in condylar position might be influenced by patient's occlusal pattern. Therefore, the anterior open bite is considered to be possibly caused by premature contact on left molar area following posterior displacement of right condyle.

However, it is still unclear why not all internal derangement involves the acute occlusal changes. In fact, it is not frequent that acute occlusal change is observed among the patients with internal derangement. This is probably because, in most internal derangement, the elongation of discal ligament may allow disc to be displaced so anteriorly that the force elicited on condyle by displaced disc is too weak to overcome the tonus of masticatory muscle. On the contrary, not enough elongation of discal ligament may limit the extent of disc displacement, leading the disc to be firmly trapped on anterior portion of condyle and, hence, the condyle to stand back toward posterior wall of articular fossa. Kurita et al. reported that there would be the significant difference in condylar position between the joints with normal disc and anterior disc displacement with reduction, but not between the joints with normal disc and anterior disc displacement without reduction⁴⁾. They suggested that if the disc displacement is slight, the condyle is displaced posteriorly, but as the disc displacement become more anteriorly displaced, the condyle returns to the normal position. In Fig. 4, it is shown that as disc was displaced more

anteriorly, the collapse of posterior joint space was relieved.

As long as the disc still remains displaced anteriorly to the condylar head, the anterior open bite would have little opportunity to be resolved immediately. Even if the disc displacement would be prolonged for a long time, there might be the occurrence of the tooth migration, which result in the permanent occlusal change. The best way to relieve the acute occlusal change resulted from internal derangement is to reduce the displaced disc into proper position. Though the displaced disc can sometimes be reduced by manual manipulation of the mandible, especially in an early period of disc displacement. it is not always achievable in clinical situation. Surgical approach is another option for disc reduction, but it is not recommendable because of poor benefit-cost ratio.

The functional stability of occlusion could be severely deteriorated by the sudden development of anterior open bite through loss of anterior and/or lateral guidance and disruption of even and simultaneous contacts in posterior teeth, which has been regarded as a requirement for normal occlusion. There is no doubt that the resolution of clinical symptoms shall be delayed as long as the jaw function remains unstable with poor occlusal contacts. In this case, even after 3 months of the stabilization appliance therapy along with the appropriate physical and drug therapy, the improvement of clinical symptoms was minimal. Pain and tenderness of the right TMJ and opening limitation still remained and the anterior open bite didn't improve at all. Then we decided to change the treatment strategy to the manner that the recovery of occlusal stability should be tried first with using the intermaxillary traction therapy.

The intermaxillary traction therapy was first introduced by Rheu et al. in an attempt to close the anterior open bite associated with TMJ osteoarthritis. They used the orthodontic elastics placed on anterior teeth between the upper and the lower dental arches to produce counter-clockwise rotation of the mandible as well as to decrease the

articular pain by reducing the interarticular pressure⁵⁾. In addition, intermaxillary traction can be applied for the relief of acute anterior open bite produced by clock-wise rotation of the mandible, not by extrusion or intrusion of the teeth. Choi et al. also reported the clinical effectiveness of the joint distraction therapy for anterior open bite resulted as a consequence of degenerative disease of TMJ⁶⁾.

Regarding the design of intermaxillary traction, two orthodontic elastics were placed on four orthodontic resin buttons attached on buccal surfaces of bilateral canine and premolar area of the appliance, respectively. Hence, the contractile force by two elastics is generated between the anterior portions of the maxilla and the mandible, which will produce the counter-clockwise rotational movement of the mandible in cooperation with the pivoting fulcrums built on most posterior sites of the appliance.

Although the intermaxillary traction appliance looks very similar to a pivoting appliance, they are quite different in that the intermaxillary traction appliance uses elastics placed between the upper and lower appliances to produce the active counter-clockwise rotational force to the mandible. However, the pivoting appliance doesn't use any active elastics acting on the mandible, so the counter-clockwise movement of the mandible would not be obtainable by it. The pivoting appliance loads the joints rather than distract the joint, as its pivots are anterior to the acting line of force enhanced by elevator muscles⁷⁾. The application of external force is similar to the usage of a high-pull headgear considered as one method for the treatment of anterior open bite by orthodontists⁸⁻⁹⁾.

Despite using intermaxillary traction therapy, patient's occlusion didn't return completely to the previous condition. It seems probably due to the minor changes in tooth position and/or shape such as extrusion, intrusion, attrition, which maybe occurred following the prolonged period of anterior open bite. Further treatment including occlusal

adjustment will be required to get more stable and comfortable occlusion.

Interestingly, the bony remodeling of right condyle, especially in posterior portion, was seen on post-treatment MRI. It may be attributed to the prolonged compressive load which was exerted on the posterior surface of condyle by the displaced disc. The prolonged compressive load is one of the most common cause of the condylar resorption in TMJ¹⁰⁻¹²⁾.

In conclusion, although the acute occlusal change including anterior open bite is uncommon in the patients with anterior disc displacement without reduction in TMJ, the clinical symptoms would not easily resolve as long as the jaw function remains unstable with poor occlusal contacts. Initially, the reduction of the displaced disc should be tried by the manual manipulation of the mandible. However, when the acute occlusal change would not resolve early, the intermaxillary traction therapy can be applied to get more stable occlusion and improved clinical results through counter-clockwise rotation of the mandible.

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국문초록

급성 비정복성 관절원판 변위에 따른 급성 교합변화의 증례

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정재광 · 허윤경 · 최재갑

35세 여자환자가 갑작스런 개구장애와 함께 발생한 급성 교합변화를 주소로 내원하였다. 환자는 이전 수년 동안의 관절잡음의 병력을 가지고 있었으며 관절잡음의 소실과 동시에 개구제한이 발생하였음을 보고하였다. 환자는 개구제한과 함께 개구시 우측 악관절의 통증을 호소하였으며 구강내 교합 검사 시 전치부의 개교합과 함께 하악이 우측으로 전위된 양상이 관찰되었다. 또한 좌측으로의 측방운동량 또한 감소된 것으로 관찰되었다. 자기공명영상에서 우측 악관절에서 비정복성 관절원판 전방 변위가 관찰되었으며 후방 관절강의 협착이 관찰되었다. 이 환자는 우측 악관절의 비정복성 관절원판 전방변위로 진단되었으며, 급성 교합변화는 변위된 관절원판에 의해 야기된 과두위치의 변화로 초래된 것으로 추정하였다. 처음 3개월간의 물리치료와 약물치료와 병행된 안정교합장치요법에서는 만족할 만한 치료결과를 얻지 못하였으나, 그 다음 약 8개월간 사용된 악간견인장치 치료를 통해서 통증 및 교합변화가 해소되었으며 정상적인 개구량으로 회복되었다. 술후 촬영된 자기공명영상에서 우측 과두가 재형성된 양상을 관찰할 수 있었다.

주제어: 관절원판 전방 변위, 급성 교합변화, 악간견인장치, 자기공명영상
