

Evaluation of temporomandibular joint disc-repositioning surgery with Mitek mini anchors

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ABSTRACT

Purpose: The aim of this study is to evaluate outcome of Mitek mini anchors (DePuy Mitek, Raynham, MA) in TMJ discopexy and assess patient satisfaction based on MRI findings. **Patients and Methods:** 7 patients suffered from significant pain and dysfunction diagnosed on MRI findings as anterior disc displacement without reduction selected for this study. Anchor stability, assessment of positional changes and roofing were evaluated by postop MRI and OPTGs. Satisfaction was assessed with VAS. Preop and postop maximum interincisal opening measurements were compared. **Results:** There was significant difference between preop and postop *P* values of MIO and VAS. All 7 patients noted complete absence of pain at the postop 1-year follow-up. Only 1 patient had postop clicking but showed remarkable improvement of jaw functions (MIO). The articular disk was observed at its normal position in 6 patients except one patient whom MRI confirmed postop partial roofing. OPTGs reveal neither radiologic changes around the mini anchors in the condylar head nor any positional shifts. **Conclusion:** Disc repositioning with Mitek mini anchors represent improvement in post-op VAS scores and clinical findings (MIO) based on comparison preop and postop MRI scans and panoramic films. However, our study group consists of limited number of patients, further studies with more number of cases are required to evaluate the outcomes

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INTRODUCTION

Anterior disc displacement without reduction (ADDwoR) is one of the most common entity causing temporomandibular disorders (TMD).^[1] Loss of structural integrity of the posterior, medial, and lateral supporting ligaments often accompanies with and extensive deformity of the disk occurs at the late stages.^[2] Surgical options for ADDwoR involves isolated or combined procedures such as arthrocentesis, arthroscopy, discectomy, disc repositioning procedures, or discopexy.^[3]

The discopexy of inflamed and often degenerated ligaments contributes to the post-op instability of the disc.^[4] The discectomy is suggested rather than discopexy in such cases.^[5] Failures related to a lack of long-term stability of the operated articular disc made seeking new techniques for disc anchoring.^[6]

Anchors have been used in various surgical procedures to suspend or fixate some soft tissue to soft or hard tissues. They can be used in orthopedic, esthetic, reconstructive, and orbital procedures.^[7,8] Mitek mini anchors showed long-term stability and successful results for temporomandibular disc repositioning.^[6,9]

The purpose of this study is to evaluate 1-year follow-up results of discopexy with Mitek mini anchors for patient satisfaction visual analog scales (VAS) and clinical findings maximal interincisal opening (MIO) based on comparison between pre-op/

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post-op magnetic resonance imaging (MRI) scans and panoramic films (OPTG).

MATERIALS AND METHODS

Patients and methods

Patients suffering from significant pain and mouth opening referred without any progression after splint therapy. Arthrocentesis was constituted as first stage of treatment. Arthrotomy was offered as the second treatment stage to unresponsive patients to arthrocentesis. We performed a retrospective study evaluating seven patients who underwent TMJ disc repositioning.

Inclusion criteria for the study were:^[1] ASA I status patients^[2] any improvement after initial treatments (splints and arthrocentesis), severe pain, and limited mouth opening^[3] diagnosed with ADDwoR based on MRI and clinical examination^[4] at least 1-year post-op follow-up^[5] remaining anteriorly displaced relative to the condylar head, regardless of the jaw position^[6], normal in shape (biconcave)^[7] discs, which were imaged as thick posterior band, short antero-posterior length, central thin part or decreased anterior band in MRI excluded from study.

Clinical evaluation

All clinical and radiological evaluations were performed by one examiner. All patients filled out the subjective evaluation forms, which include VASs for: Pain for both TMJs (0 = no pain, 10 = worst pain). Five patients had bilateral and two had unilateral painful TMJs. The examiner filled out the objective evaluation forms, which

include MIO. All evaluation forms were filled out 1 week before the surgery and at 12th month after surgery.

Radiological evaluation

Patients were diagnosed with ADDwoR by MRI scanning using a 1.5-T system (8-channel radiofrequency head coil, Siemens Vision Plus, Erlangen, Germany). Post-operative TMD roofing was evaluated according to “intermediate zone criterion method” by both MRI and clinical examination at the post-op 12th month. This method analyzes the location of the intermediate zone of the disk in relation to the mandibular head and the articular tubercle [Figure 1].^[10] OPTGs were obtained at the 1st post-op week, 6th month and 12th month. The post-op OPTGs were superimposed for assessment of positional changes due to resorption and anchor stability [Figure 2].

Mitek anchor

The Mitek mini anchor (DePuy Mitek, Raynham, MA, USA) consist of a titanium alloy shaft with 2 0-Ethibond braided polyester suture threaded through its eyelet and its wings. The shaft is made of 90% titanium metal alloy, 6% aluminum, and 4% vanadium. The two retention wings are made of nickel and titanium. Bone integration, holding intact the disc in proper place, and long-term stability of Mitek mini anchors in the TMJ is indebted to these two retention wings and sutures.^[11,12]

Surgical technique

All patients were operated under general anesthesia with nasotracheal intubation. After small pre-auricular incision, blunt subfascial dissection was used to reach the postglenoid tubercle of the zygomatic arch. A 45-angled

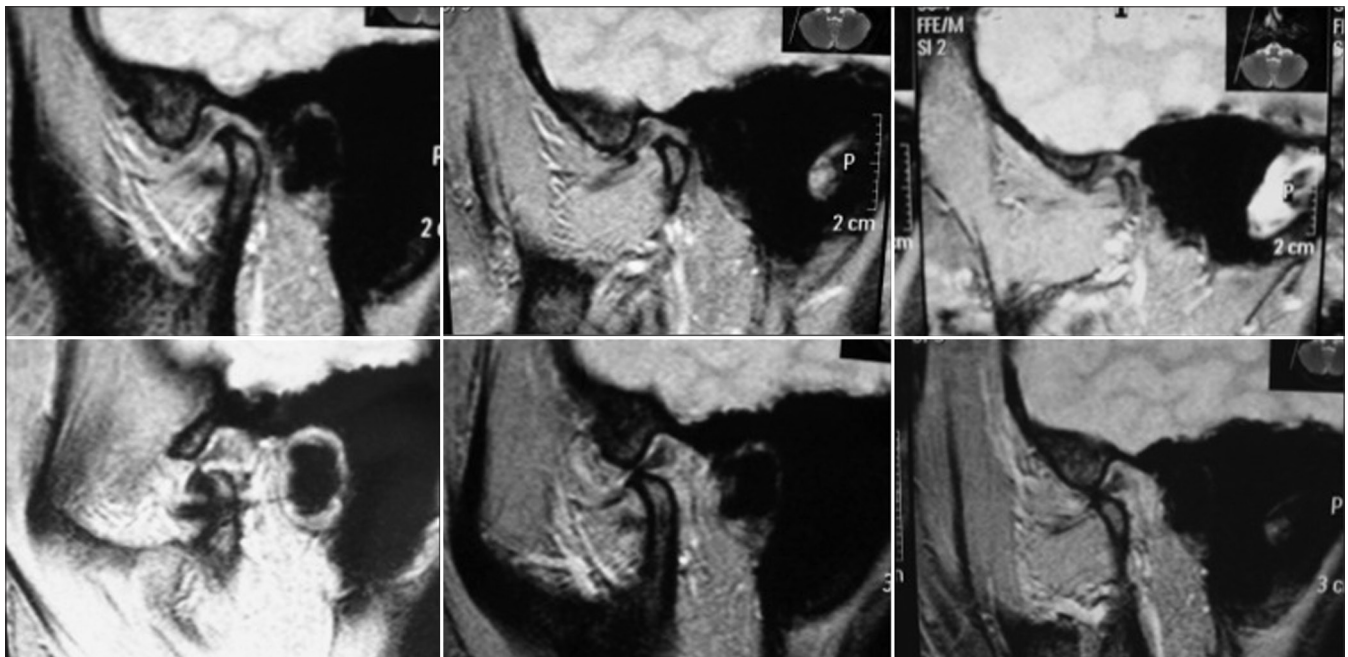


Figure 1: Post-op 1-year MRI scans. The discs remain their position

incision was done on superficial temporal fascia to protect the facial nerve and subperiosteal dissection was continued from postglenoid tubercle to the anterior aspect of articular eminence. The joint capsule was inflated with %0.9 saline and the capsular "T" incision



Figure 2: Post-op 1-year follow-up OPTG

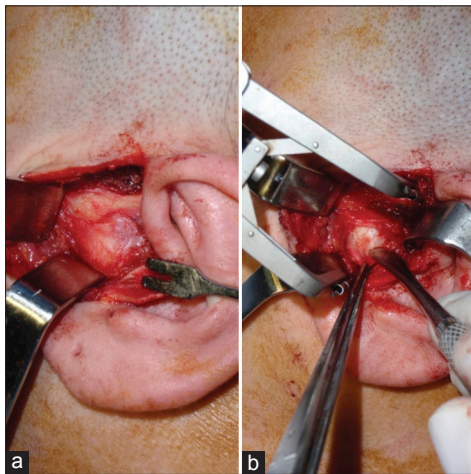


Figure 3: (a) Joint dissection. (b) Application of Wilkes retractor to widen joint cavity

was performed. The superior and inferior compartments were evaluated for any adhesions and tissue integrity. The articular eminences and subcondylar regions were dissected to allow placement of 1.5-mm K-wires. The Wilkes retractor was applied to distract the joint cavity [Figure 3]. All discs were freed and the excessive posterior bilaminar tissue was resected. The mini anchors were inserted on the most posterior aspect of the mandibular condyle. Discs were fixed to the anchors using two horizontal mattress Ethibond sutures [Figure 4]. Watertight suturing of the well-opposed joint capsule edges and closure was performed with respect to tissue planes. Placement of subcutaneous sutures is followed by skin closure.

Measurements and statistical methods

Pre-operative and post-operative VAS scores and MIO were evaluated by the two-sample paired *t* test. The data were analyzed using SPSS 11.0 (SPSS Inc, Chicago, IL, USA).

RESULTS

A total of 12 disc repositioning procedures were performed on seven patients (four females, 3 males, age range 32-52; mean age, 40.4 years. All seven patients noted painful symptoms before surgery on the VAS, and showed a complete absence of TMJ pain at post-op 1-year. There was a significant difference between pre-operative and post-operative VAS ($P < 001$) [Figure 5].

The average preop MIO was 22.8 mm and the average postop MIO was 31.5 mm. The average increase of MIO was 8.7 mm. Significant difference was found between pre-op and post-op values ($P < 001$) [Figure 6].

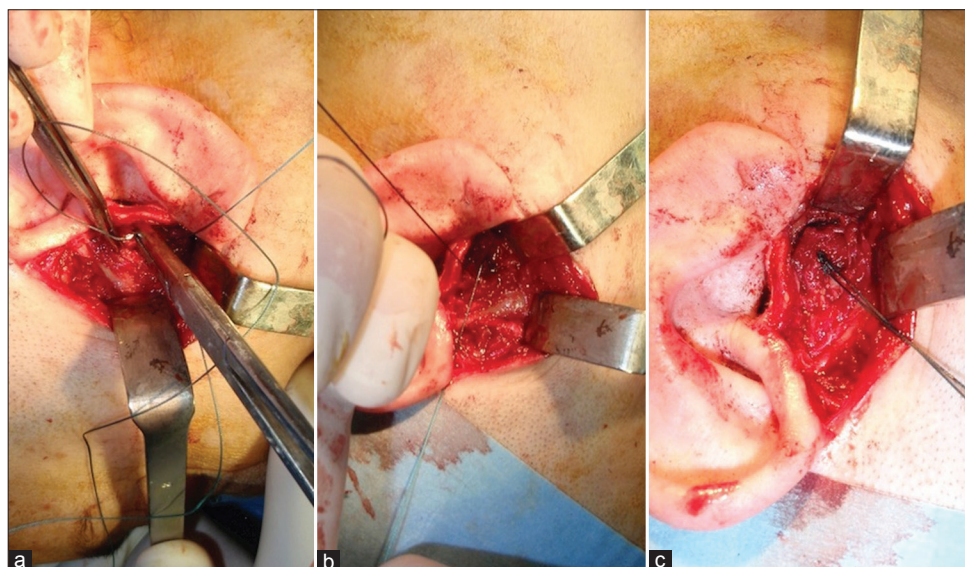


Figure 4: Disc suturing after placement of Mitek mini anchor at the posterior-lateral pole of the condyle. (a) The Adson forceps holds the posterior part of the articular disc. (b) The disc is approximated. (c) The disc is positioned and fixed with the 2-0 Ethibond suture to the implanted anchor

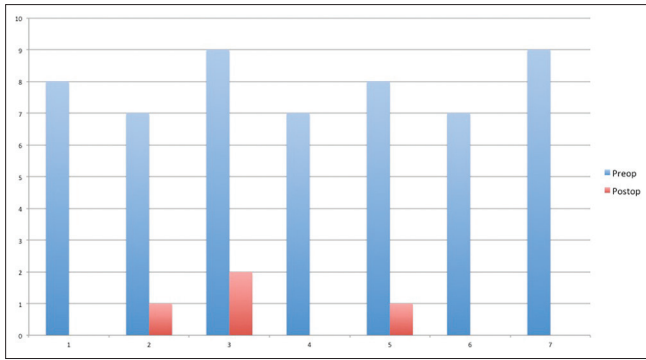


Figure 5: Comparison of pre-op VAS scores with post-op 1 year

One patient had unilateral joint clicking who showed remarkable important MIO improvement, whereas the other six patients were pain and click free.

The disk position at the closed-mouth position on sagittal TMJ MRI images was evaluated using “intermediate zone method”. The articular disk was observed at its normal position in six patients except one patient whose MRI confirmed post-op partial roofing. This patient was free of joint pain. The comparison images of preop/postop OPTGs reveal neither radiological changes around the mini anchors in the condylar head nor any positional shifts.

DISCUSSION

Pain relief, long-term stability, and maintenance of the position of disc are the main objectives of TMJ disc repositioning surgery. Prior any surgical intervention, all predisposing factors must be eliminated with conservative approaches to assist success of the surgery. Since, neutralization of predisposing factors prevents similar post-op displacement of the anchored disc as well.^[5]

The transmission of loading forces to the anchor will be influenced by the angulation, depth, and site of anchor placement. The correct positioning of the anchor in the condylar head that is the most posterior aspect favors long stability of the disc; therefore, we placed all anchors according to this issue.

Securing disc at its new position is another factor, which could affect long-term results in our study. It was claimed that radiographic view of radiopaque artifacts (3-11 mm) might be created by even the simplest radiographic technique for the mandibular condyle.^[13] In our study, the anchors were cross-checked by super-positioning of three OPTGs and we did not observed any positional changes in our case serial.

The surgical method is chosen according to severity and duration of symptoms, clinical status, and radiological examination. MRI is the gold standard for diagnosing the

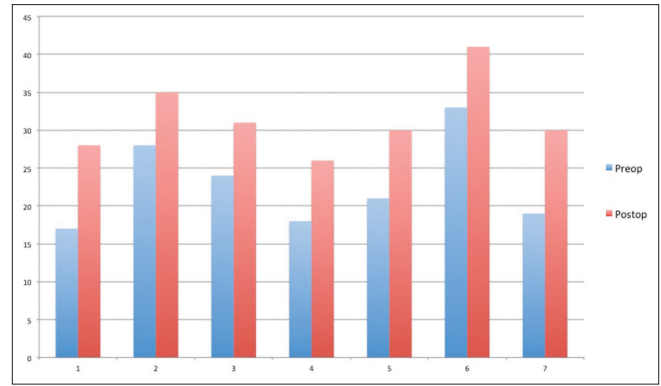


Figure 6: Comparison of pre-op MIO scores with post-op 1 year

discal position, joint effusion, and bone structures.^[14] The high diagnostic accuracy of MRI for discal abnormalities and configurations facilitate management of the surgical options.

Accurate diagnosis of the articular disc position could be achieved by correlation of MRI findings with clinical examination.^[10] Mehra and Wolford evaluated patient satisfaction and outcomes of the Mitek mini anchors for TMJ disc repositioning and found statistically significant reduction in TMJ pain, facial pain, headaches, TMJ noises and disability, and improvement in jaw function and diet.^[6] Valero *et al.*, showed long-term results with the use of Mitek mini anchors for surgical treatment of internal derangements.^[9] However, both of these studies did not evaluate operated patients post-operatively with MRI follow-up scans. Sanromán *et al.*, evaluated patients with post-operative MRI scans and found that the repositioned disc remained in place in 10 of 12 patients, whereas the other two patients had persistent anterior disc displacement.^[15] In our study, all patients were evaluated by MRI using “intermediate zone method” with the subjective and objective evaluations. Patient satisfaction about TMJ pain, and clinical evaluation of MIO expressed parallel conclusions with MRI findings. The articular disk observed in the normal position with all seven patients except from one patient whose images showed partial roofing but no pain clinically.

CONCLUSIONS

Mitek mini anchors represent significant improvement in post-op VAS scores and clinical findings (MIO) based on comparison preop and postop MRI scans and panoramic films. However, our study group consists of only seven patients, because of limited indications and well-selected cases that require disc repositioning. Further studies with more number of cases are required to evaluate the outcomes of disc repositioning with anchors based on comparison between preop and postop MRI scans over longer time periods.

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