Reviewer's report

**Title:** Temporomandibular joint disc repositioning using anchor: an effective method to treat internal derangement in stage to

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**Reviewer:** Larry Wolford

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This paper evaluates 81 consecutive patients with 81 TMJs operated with TMJ internal derangement between December 1, 2003, and December 1, 2006. All patients had magnetic resonance imaging (MRI) and clinical examination before surgery and then MRIs were taken between one to seven days post surgery. The authors state that a progressive physical therapy regimen and home exercises (or CPM exercises) were carried out for about three months.

They also state that in patients with postoperative occlusal changes an "orthopedic traction" was exerted continuously to stabilize the occlusal changes. Postoperative the authors report that the MRIs confirmed that 77 of the 81 joints were excellent and one joint was good with an effective rate of 96.30%. Only three patients required a second open surgery. The authors concluded that "this procedure has proved successful results in the treatment of TMJ ID", although the evaluation was only short term (1 to 7 days). They conclude that "the disc repositioning using anchor is an effective treatment method for TMJ ID".

This is an interesting paper from several view points. I was very much interested in this paper because it is one of the first papers by different authors that support the use of condylar anchors to stabilize the articular discs. An interesting point is that these are 81 consecutive patients with displaced articular discs, but apparently the patients all had unilateral displaced discs since only 81 joints were treated. In my experience, the majority of patients have bilateral disc displacements. Is a unilateral disc displacement a common finding in their culture or do they just select cases with unilateral disc displacements to perform this procedure, or do they only treat one side, even though the discs were displaced in both sides? I think this would be important and interesting information to include. In my experience, patients with Stage 4 internal derangements often do not do well with disc repositioning surgery and may commonly require total joint prostheses. However, with a follow-up of 1 to 7 days, almost any procedure will "look good" with imaging as the only criteria for success.

The authors adequately describe the surgical technique.

The true value of this study was to evaluate disc position within one week post surgery. No other factors were studied. What criteria did the authors use to determine whether cases were excellent, good, or poor in quality of outcome? It appears in the MRI imaging, particularly in image E, that the disc has been over corrected and posteriorly displaced. In figure D, the disc certainly does not
appear to be in normal configuration with the condyle and articular eminence.

Patients with post surgical malocclusion were treated with "traction treatment" but the results of occlusion, function, pain, etc., were not presented in this paper. Those who understand joint anatomy associated with displaced articular discs would understand that when discs are repositioned that this will predictably cause a shift in the occlusion, displacing the involved condyle and mandible downward and forward. Since all these cases appear to be unilateral cases, this would shift the condyle on the ipsilateral side downward and forward causing the chin and occlusion to shift towards the contralateral side and would shift a Class I occlusion to a Class III end-on relationship on the ipsilateral side with a posterior open bite as well as shift the occlusion to a cross bite on the contralateral side. Essentially all these patients would have to be placed into this "traction treatment." What is this traction treatment? How many of these patients had malocclusion post surgery and what were the long-term outcomes? Essentially all the patients would have required this treatment if they had good occlusions before surgery. With this traction device, this would place significant loading into the TMJ and could cause subsequent disc redislocation, increased pain and dysfunction, and accelerated arthritic changes. However, since no clinical objective or subjective evaluations are included, then eliminate any reference to post surgical patient management and focus on the purpose of this paper: 1 to 7 day MRI post surgical evaluation of disc position.

RECOMMENDATIONS FOR THIS MANUSCRIPT: Since this manuscript only evaluates the TMJ by MRI one to seven days post surgery, then the following issues must be addressed.

1. Title. Change to "Temporomandibular Disc Repositioning Using Titanium Anchors: An MRI Assessment One to Seven Days Post Surgery". This title describes what this study is really about.
2. Do these 81 consecutive patients only have unilateral internal derangements since only 81 joints were treated? If so, this should be so stated and an explanation as to why.
3. Eliminate any mention of the traction treatment and any other postoperative management as even relatively short-term clinical evaluations are not included in this study.
4. Describe the interrelationships that define whether the MRI results show excellent, good, or poor outcomes.
5. Emphasize that this is only a one to seven day follow-up study following open joint procedures using anchors to reposition the articular discs.
6. In the conclusion paragraph, the authors state that compared with other disc repositioning methods, the significant advantages of this procedure are as follows: "It is more stable for the repositioned disc to be anchored which greatly enhances the stabilization of the operation".
This statement is completely erroneous and anecdotal because the results of one to seven day MRI study does not support this conclusion. Long-term treatment outcomes of at least 1 year or more are required to substantiate this statement. This statement must be removed.

7. Further in the conclusions, the authors state "of all the consecutive 81 patients (81 joints), undergoing disc repositioning, postoperative MRIs confirm that over 96.30% patients had successful results". This statement needs to be changed to state that: "The discs were adequately surgically repositioned confirmed by MRI at one to seven days post surgery." Successful results would indicate that long term these patients did well and there is no information or evidence to support that.

8. The last statement must be deleted from the paper as it states that the authors’ technique is an effective method for treating TMJ ID, but a one to seven day follow-up study does not support this contention.

What is very surprising in reviewing this paper is that these patients were treated between December 1, 2003, and December 1, 2006; 3 to 6 years ago, yet the follow-up is only one to seven days. What happened to the follow-up on these patients? Why is there no subjective or objective evaluation of these patients with at least a year follow-up that would evaluate and confirm the success of this procedure? What an opportunity this patient population would have provided to obtain information that could have been a major contribution to the literature if the patients were clinically evaluated long term, one to five years post surgery relative to occlusion, jaw function, pain levels, abilities to eat and chew, disability, required additional operations, the presence of headaches, noises in the joints, etc.

This could have been an outstanding study, but instead it is a one to seven day follow-up of MRIs only. This appears to be a missed opportunity to provide very convincing information to the results of this technique.

SURGICAL TECHNIQUE. I am a strong supporter of bone anchors and feel they help provide the most predictable method to stabilize the TMJ articular discs. I will make some constructive comments in reference to the authors’ technique.

1. It appears the authors strip a lot of the blood supply to the condylar head in order to put these anchors in. The periosteum is completely stripped from the condylar heads. The lateral pole of the condyle also is denuded of soft tissue attachment. This over-exposure of the condylar head can increase subsequent condylar arthritic changes and resorption. Better results can be obtained by keeping as much soft tissue attached to the condyle as possible including the periosteum, tissues attached to the lateral pole, etc. The anchors can be placed directly through the periostium.

2. The suture material (2-0 Ethibond suture) the authors use to secure the disc in position is quite light to support the discs particularly with any
significant loading of the joint (ie. traction treatment, clenching, bruxism, eating tough foods). Although I agree with using Ethibond, 0 Ethibond is heavier and thicker. It provides better support to the discs with less chance for breakage and the suture pulling through the disc.

3. Since the discs are oftentimes medially displaced as well as anteriorly displaced, running the sutures as the authors have illustrated, basically straight vertically, may allow the discs to tend to shift medially causing a decrease in the lateral joint space. Unless the disc is supported by suturing to the lateral capsule, a post surgical medial displacement is possible.

4. The incision is quite impressive and large. In actuality, this technique can be done through an incision a quarter of size of the authors', but each surgeon needs to be comfortable with the amount of exposure that they need.

5. On the MRIs shown, A, B, and C are all on the same patient preop and are essentially the same view. You only need one presurgical image. D, E, and F must be from the same joint and show the disc posteriorly displaced in D and E. In F the disc is thickened, quite short, but sitting directly over the top of the condyle. G is a coronal view and shows that the disc is medially displaced, although covering the medial two-thirds of the condyle.

There is decreased lateral joint space. Perhaps showing more than one patient's MRI would be helpful with a discretion of the patient's age, sex, length of time disc was displaced, classification, etc.

RECOMMENDATIONS TO THE AUTHORS FOR A FUTURE STUDY. The amount of information that could be obtained from this patient population long term would be very helpful and would be a major addition to the literature, but the following areas would need to be assessed:

1. Successes and failures of patients one to six years post treatment.
2. Take MRIs at longer term follow-ups to evaluate the quality of outcomes.
3. Objectively evaluate the patients relative to incisal opening and excursion movements as well as occlusal assessment (Class I, II, or III, open bite, etc.) and joint noises.
4. Subjectively evaluate the patients for TMJ pain, myofascial pain around the head and neck, headaches, jaw function, diet, disability, facial nerve dysfunction, etc. This type of information would be very helpful to improve the understanding of the TMJ treatment the authors are promoting.

Relative to this current manuscript, my comments how to improve it stand. If these changes are made as recommended, then this paper could be published to describe the immediate effectiveness of disc repositioning using the authors'anchor technique with immediate post surgical results, but all references
to management of these patients post treatment and any statements that advocate that this technique is an effective method for treatment of TMJ ID must be eliminated.

The authors need to state that this is only a one to seven day follow-up and by no means is an indication that these discs remain in place long term.

This study does not confirm long-term stability nor the quality of treatment outcomes as it is only a one to seven day postsurgical imaging assessment of disc position. Further studies clinically and with imaging are necessary to confirm that this is a viable technique to stabilize the articular disc in position with anchors.

This paper will need editorial help to improve the English and sentence structure.

RECOMMENDATIONS. I believe this paper could be accepted if the above-stated revisions are incorporated for this manuscript.