

# Arthroscopic temporomandibular joint disc repositioning using a transmeatal suturing technique: A cadaveric feasibility study

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Article

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## ABSTRACT

**Background:** Various arthroscopic discopexy techniques were described for temporomandibular joint (TMJ) disc displacement with a different success rate. One of these techniques, is the novel technique introduced by Chi Yang et al in 2012 in which the disc is sutured with the retrodiscal tissues through transmeatal approach. Although this technique is highly successful, it is reported by several operators who tried to apply it to be extremely complex.

**Objectives:** To assess the feasibility of Yang's arthroscopic discopexy technique for TMJ disc displacement using the transmeatal approach.

**Materials and Methods:** Yang's arthroscopic transmeatal discopexy technique is conducted on six temporomandibular joints of fresh human cadavers. The feasibility of that technique was assessed by the success rate of the procedure by the same operator.

**Results:** The technique was successfully performed in two thirds of the joints (n=4) and failure in the remaining one third (n=2).

**Conclusion:** The technique is feasible but it needs a highly experienced TMJ arthroscopist.

**Key Words:** Temporomandibular joint, Disc displacement, Transmeatal, Discopexy, arthroscopy.

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## INTRODUCTION:

Disc displacement (DD) is one of the most common disorders affecting the temporomandibular joint (TMJ) and often results in pain, clicking and limitation in mouth opening.<sup>[1, 2]</sup> Various arthroscopic discopexy techniques were described for treatment of this disorder with a different success rates.<sup>[3, 4]</sup> In 2012, Chi yang et al.<sup>[5]</sup> published a new arthroscopic suturing technique in which the suture inserted through the junction of the disc and the retrodiscal tissue and tied underneath the cartilage of the external auditory canal through a transmeatal approach.<sup>[5, 6]</sup>

According to many authors, this technique is one of most successful discopexy techniques which may be due to the proper suture design and sufficient release of the anterior attachment of lateral pterygoid muscle.<sup>[3, 7]</sup> Although this technique has a high success rate, it is a complex procedure and need specific custom made suture instruments which includes a 12-gauge suture needle and a pair of self-designed suture grippers (a lasso-type and a hook-type) which are expensive and difficult to obtain.<sup>[7, 8]</sup> We performed Yang's arthroscopic transmeatal discopexy technique on six fresh human cadavers to evaluate its feasibility.

## MATERIALS AND METHODS:

Yang arthroscopic suturing technique was conducted on six temporomandibular joints of fresh human cadavers

obtained from Princess Fatma academy according to the legal and ethical framework governing body donation. The whole procedure was performed with the same operator who is well experienced with endoscopic assisted temporomandibular surgeries including disc suturing with a high success rate.

### *Surgical technique*

A 2.7 mm arthroscope (Stryker- Germany 0° angle) is used. A 12- gauge suturing needle and a pair of needles with an exchangeable lasso-type and hook-type suture gripper (Shanghai ShenDing Industrial Co. Ltd., Shanghai, China) are used for disc suturing. The disc repositioning suture is non-resorbable medical woven polyester with an inner core (Shanghai Pudong Golden Ring Co. Ltd., Shanghai, China).

The triple channel arthroscope is introduced into the upper compartment of the joint. An incision is made near the anterior attachment region to insert the working channel for disc release. A 12-gauge suturing needle is inserted between the first two punctures into the junction of the disc and the retrodiscal tissue, the needle is pushed in till it comes out of the retrodiscal tissue medially. A third transmeatal puncture is performed 10 mm away from the tip of the tragus. The lasso-type suture gripper is inserted

through the third puncture into the posterior recess.

The suture is put into the 12-gauge needle and it is caught by the lasso and pulled through the third puncture outside the external auditory canal. The 12-gauge needle is retracted from the retrodiscal tissues but still remaining in the joint cavity. The hook-type suture gripper is inserted through the third puncture to catch the other end of the suture and pulled again outside the external auditory canal. The sutures are tied and the knots placed underneath the cartilage of the external auditory canal.

Operator determines the success rate of the procedure by counting the number of TMJs in which suturing procedure were successfully performed.

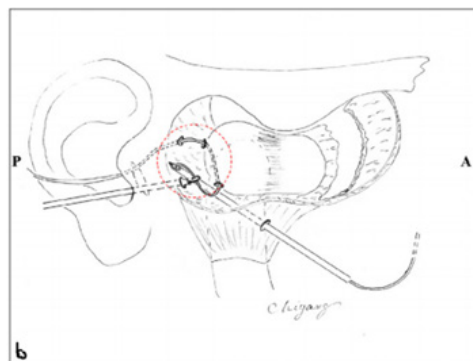
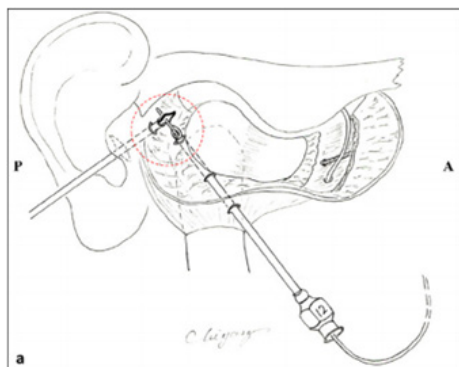


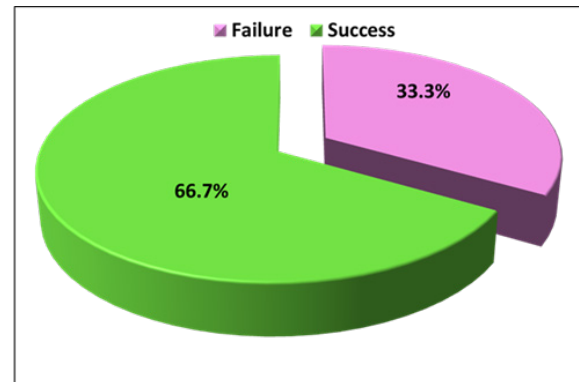
Figure 1 [6] . (a) Side view shows that the suture end is caught by the lasso-type suture gripper (A, anterior; P, posterior). (b) Side view shows that the other end of the suture is caught by the hook-type suture gripper.

**RESULTS:**

The suturing procedure was successfully performed in two thirds (66.7%) and failure in the remaining one third (33.3%).

**Table 1** showing the success rate of the suturing procedure

		n	%
Success	Success	4	66.7 %
	Failure	2	33.3%



**Figure 2** showing the success rate of the suturing procedure

**DISCUSSION:**

TMJ disc displacement is a common disorder and affecting a large number of populations worldwide.<sup>[9, 10]</sup> Numerous arthroscopic discopexy techniques have been introduced and developed over years for treatment of disc displacement, however, there have been reports of insufficient success rates and long term disc stability.<sup>[3, 7]</sup> Later in 2012, Yang et al.<sup>[5]</sup> published his novel discopexy technique which had been used in 2167 patients (2622 joints) with a high success rate of 95.42%.<sup>[5]</sup> Yang<sup>[5]</sup> stated that long term stability of the repositioned disc might be due to the suture anteroposterior traction force instead of lateral forces created by the previous techniques. The anteroposterior traction force of the suture making the disc able to resist the strength of the lateral pterygoid muscle as this traction is consistent with the long axis of the disc.<sup>[11]</sup> Moreover, complete release of the anterior attachment of lateral pterygoid muscle is an important factor for easy and stable disc repositioning in that technique.<sup>[12]</sup>

Although this technique has a high success rate, it is a complex procedure and need specific custom made suture instruments which includes a 12-gauge suture needle and a pair of self-designed suture grippers (a lasso-type and a hook-type) which are expensive and difficult to obtain.<sup>[7, 8]</sup> Due to this complexity of the technique, Yang<sup>[6]</sup> published a new article in 2017 to introduce his surgical procedures step by step to be easier but operators still reported that technique one of the most challenging to perform.<sup>[7]</sup> So we conducted this technique on six fresh human cadavers to evaluate its feasibility.

As reported by other operators, we found that the steps of suturing procedure are difficult especially with the lasso and hook suture grippers which may be due to the different insertion angulation of lasso and hook suture gripper compared to 12-gauge needle. This angulation difference creating difficulty for lasso and hook suture gripper to face 12-gauge needle easily during suture capturing. During the suturing procedure, multiple instruments being used inside the joint space which is small to accommodate these instruments. This creating difficulty to moving easily with the suturing instruments inside the joint space.

#### **CONFLICT OF INTEREST**

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This clinical study was self-funded by the authors, with no conflict of interest.

#### **CONCLUSIONS:**

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Yang's [5] arthroscopic transmeatal discopexy technique is a feasible but it needs a long learning curve due to its high technical difficulty.

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