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SINGLE NEEDLE VERSUS DOUBLE NEEDLE ARTHROCENTESIS FOR MANAGEMENT OF PATIENTS WITH CLOSED LOCK OF TEMPROMANDIBULAR JOINT

Ayman M.Gouda;* Hatem Abd Elrahman** and Niveen A.Askar***

ABSTRACT

This study aimed to compare the efficacy of the single needle versus the double needle arthrocentesis in the management of patients with closed lock of TMJ. Twelve patients whom suffering from closed lock of the TMJ were selected and divided into two groups, Group I was treated with single needle arthrocentesis and Group II with double needle arthrocentesis. Both groups were evaluated clinically and radiographically. All patients of both groups showed reduction of pain scores recorded on the VAS scale, and marked increase in the mouth opening, protrusive movement and lateral movement at 1, 3 and 6 months follow-up. From this study, it is concluded that adequate results for treatment of closed lock of TMJ were achieved with single and double needle arthrocentesis in the form of improved function and pain reduction. Single needle arthrocentesis might be a comparable technique to double one yet it remains a fertile ground for further trials and investigations.

KEY WORDS: Arthrocentesis; Closed Lock; TMJ

INTRODUCTION

Tempromandibular joint (TMJ) internal derangement (ID) is one of the most common forms of TMJ disorder[1] . Internal derangement of TMJ may be defined as a disruption within the internal aspects of the disc from its normal functional relationships with the mandibular condyle and the articular portion of the temporal bone[2]. Thus, the term has been used synonymously with disc displacement[1].

Closed lock of the TMJ is considered a consequence of a non-reducing deformed disc acting

* Demonstrator, Oral and Maxillofacial Surgery Department, Faculty of Oral and Dental Medicine, Cairo University
** Professor, Oral and Maxillofacial Surgery Department, Faculty of Oral and Dental Medicine, Cairo University
*** Lecturer, Oral and Maxillofacial Surgery Department, Faculty of Oral and Dental Medicine, Cairo University

as an obstacle to sliding condylar head[3]. Nitzan et al[4-6] proposed the anchored disc phenomenon as an etiology for closed lock, suggesting it as an independent entity from the non-reducible anteriorly displaced disc. The particular MRI appearance of this entity is a disc fixed to the glenoid fossa (static or stuck disc).

Arthrocentesis and hydraulic distention of the TMJ has been described as an effective modality in decreasing joint pain and increasing the range of mouth opening in patients with closed lock of the TMJ [7, 8]. Success rate for TMJ arthrocentesis in closed lock, as reported in literature, have varied from 70% to 95 %[9, 10].

The effectiveness of joint lavage in those cases may be explained by the joint space expansion achieved with the introduction of fluid and by the washing out of inflammatory mediators and catabolytes. On the basis of observation suggesting that increased joint space friction and reduced joint lubrication are involved in the process of disc displacement [11, 12]. A combined technique providing the injection of hyaluronic acid at the end of the procedure to improve joint lubrication was proposed [13-18].

The currently adopted technique to perform arthrocentesis of the TMJ provides a double access to the joint space. Such an access is performed by the positioning of two needles within a small virtual cavity (superior joint space). The classical 2-needle technique is easily applicable in the absence of fibrous adherence, while it is more difficult to perform in the presence of intra-articular adherence. Furthermore, even though tolerability is improved with respect to arthroscopy, the positioning of 2 needles within a small cavity may cause some discomfort to patients particularly at the time of the first lavage [19].

A possible suggestion to improve the tolerability of TMJ arthrocentesis was introduced in 2008 by Nardini et al [20] who introduced a modified approach that provides the execution of a single needle technique. He claimed that the use of a single needle for both fluid injection and aspiration might have some advantages with respect to the traditional 2-needle approach, the first of which being a reduced time of execution. The positioning of a single needle should allow a super and stable access to the joint space, while positioning of a second needle might interfere with the stability of the first one.

This study is designed to compare the clinical outcome of both single needle approach and double needle one in treating patients with closed lock of TMJ.

MATERIAL AND METHODS

The present study was conducted on twelve patients (all females) selected from those attending the outpatient clinic of the Oral Surgery Department, Faculty of Oral and Dental Medicine, Cairo University between 2008 to 2010. Patients' ages were ranging from 21 to 45 with an average of 30 years at the time of the procedure. All patients suffer from joint pain and limited mouth opening and were examined clinically and with MRI (Fig1). On clinical examination, MMO ranged from 12 to 20 mm opening of the mouth was associated with the deviation of the mandibular midline toward the affected side, contralateral movements were limited and protrusive movements were restricted. Pain was present on palpation and during opening movements. On palpation, there was evidence of hypomobility of the joint. Based on this a diagnosis of closed lock was made in all patients. On MRI examination, all patients showed ADDWR. All patients were informed preoperatively about the procedure, its

possible complications and the materials used. They gave their consent to participate. Patients were randomly divided into two equal groups as follows:

Group I: Each joint underwent single needle arthrocentesis using 40 ml Lactated ringer's solution.

Group II: Each joint underwent double needle arthrocentesis using 40 ml Lactated ringer's solution.

By the end of the procedure 1 ml Suplasyn was injected into the upper joint cavity in both groups.

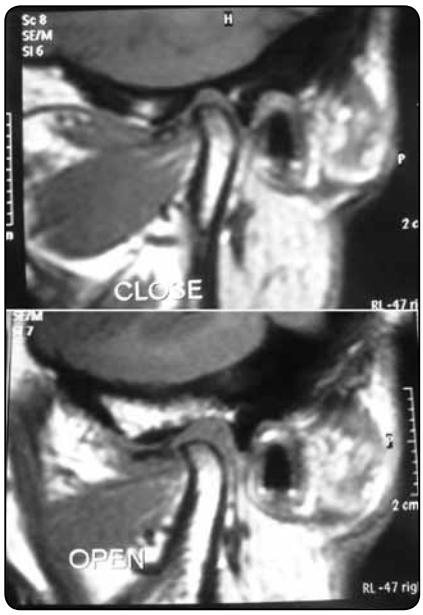

FIG. (1) Preoperative MRI showing closed lock

The operative procedure

Arthrocentesis of the superior joint compartment was performed in all patients under local anesthesia with conscious sedation as described by Nitzan et al[5]. For the auriculotemporal nerve block, 0.3 to 0.5 ml anesthetic solution was injected. The entry point of the inflow needle located 10 mm anterior to the tragus and 2mm below imaginary canthal-tragal line (Fig 2) 0.2 to 0.3 ml anesthetic solution was injected into the upper joint compartment as well. A 21 gauge needle was inserted into the upper joint compartment followed by the injection of 3 ml Ringer solution to distend the joint space under pressure. Then the syringe was removed to allow ejection out of the injected fluid (Fig 3). The injection-ejection process was performed for a total of about 40 ml of lactated Ringer's solution.

In group II, another outflow 21 gauge needle is inserted 20 mm anterior to tragus and 8mm below canthal-tragal line into the distended compartment in the area of the articular eminence (Fig 4), and the superior joint space was irrigated with 40 ml Ringer's solution, allowing a free flow through the first needle (Fig5). On termination of the procedure in both groups, 1ml commercially available sodium hyaluronate was injected into the superior compartment (Fig6). Then mandibular manipulation was performed attempting to recapture the displaced disc. Postoperatively, soft diet, nonsteroidal anti-inflammatory drugs, physiotherapy, and an interocclusal appliance, to be used daily as long as possible. The patients were evaluated by the questionnaire and by clinical examination at 1, 3, 6 months postoperatively.

FIG. (2) Photograph showing insertion of the inlet needle

FIG. (3) Photograph showing the fluids get off the same injection needle

FIG. (4) Photograph showing insertion of the outlet needle

FIG. (5) photograph showing free flow of irrigation through the outflow needle

FIG. (6) Photograph showing intra-articular Suplasyn injection

RESULTS

All patients of both groups showed reduction of pain scores recorded on the VAS, except one case in group I who showed increase of pain scores during the follow-up period. All patients of both groups showed increase mouth opening (Fig 7a, b), protrusive movements and lateral movement to the un-affected side at 1, 3 and 6 months follow up period. Statistical analysis data represented a statistically significant reduction in pain scores and showed significant improvement in MMO, jaw dysfunction. While there was no statistical significance difference between the two groups regarding improvement in MMO and jaw dysfunction (Fig 8, 9, 10)

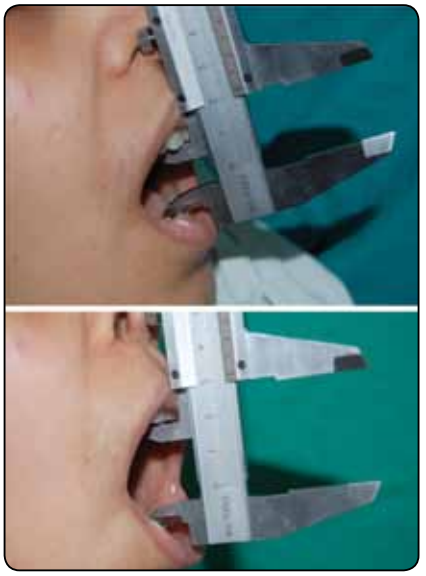

Fig. (7a) Photograph showing preoperative MMO (right) and postoperative opening (Group I)

FIG. (7B) Photograph showing preoperative MMO (right) and postoperative opening (Group II)

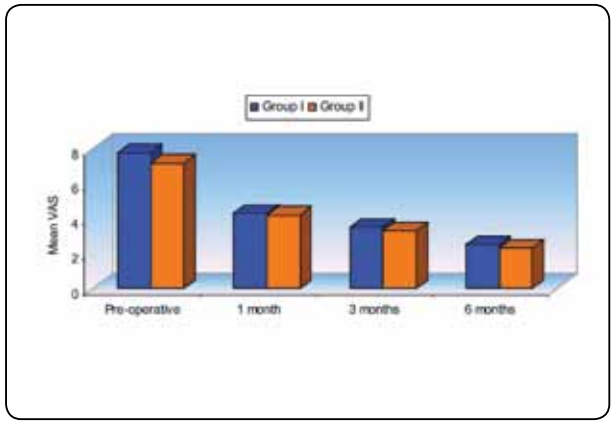

FIG. (8) PBar chart representing mean VAS in the two groups

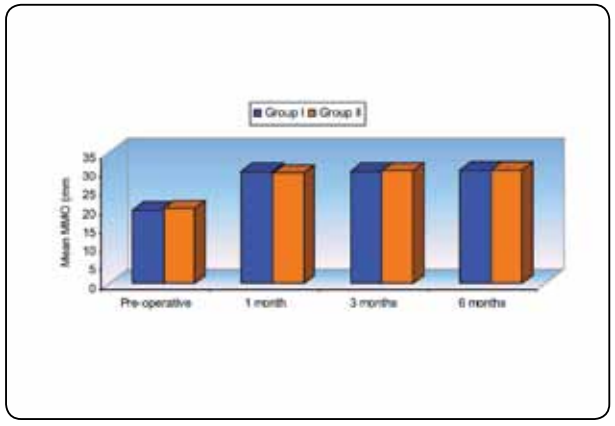

FIG. (9) Bar chart representing mean MMO in the two groups

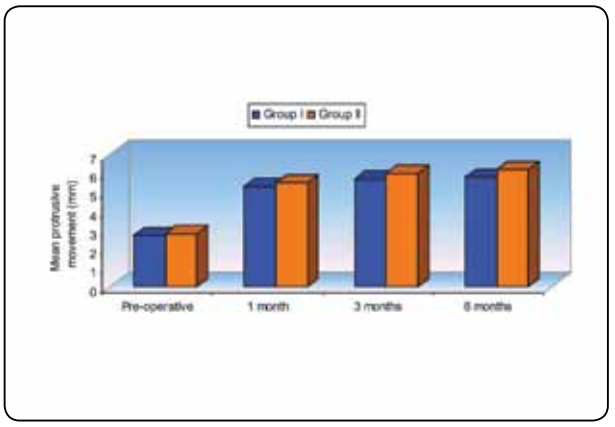

FIG. (10) Bar chart representing mean protrusive movement in the two groups

DISCUSSION

During the 1990s the management of TMJ disorders moved forward from a series of treatments provided by non-specialist maxillofacial surgeons towards an increasingly sub-specialist lead practice. With the collection of cases under the care of an individual surgeon has come the realization that open joint surgery for the correction of pain and dysfunction is not necessarily the best option [21].

The adoption of conservative treatment modalities is based on the assumption that non-reversible and invasive therapies are not indicated to treat symptoms in the absence of a well identified pathogenetic pathway and only if that non-surgical treatment fails to alleviate the symptoms, minimally invasive surgical procedures were proposed with encouraging results. Arthrocentesis is the simplest and less invasive among these treatments, and its use seems to be primarily indicated in the case of disc displacement without reduction [22].

The effectiveness of arthrocentesis in those cases may be explained by the joint space expansion achieved with the introduction of fluid and by the washing out of inflammatory mediators

and catabolytes. On the basis of observations suggesting that increased joint friction and reduced joint lubrication are involved in the process of disc displacement [12]

In 2008, Nardini et al [19] suggested a modified approach to improve the tolerability of the TMJ arthrocentesis that provides the execution of a single needle technique. Considering the classical two needle technique difficult to be performed in the presence of intra-articular adherence. In the present study, the aim was to evaluate the clinical outcome of single needle arthrocentesis as a new technique for management of patients with closed lock of the TMJ versus the classical double needle arthrocentesis.

In the present study, MRI was carried out preoperatively for all patients, those images showed evidence of anterior disc displacement without reduction which agree with the clinical findings obtained from all patients, this agrees with the previous studies that considered MRI to have a high diagnostic accuracy in clinical settings when compared with arthrography and surgical observation [23]

In this study, local anesthesia (auriculotemporal nerve block) and conscious sedation was used for all patients who withstand the procedure favorably. Similar work was made by Dimitroulis et al [24] who suggest that intravenous sedation may be employed as an adjunctive measure for patient comfort.

All patients in group I, showed increase of MMO and jaw function, yet none of them restored the normal range of movement stated by Okeson [25]. This could be attributed to the use of only 2 ml of lactated ringer's solution in each injection-ejection process which could be insufficient to produce the required joint distention under pressure to break all joint adhesion. This may support the suggestion made by Nardini et al [19] to use 4 ml instead of 2 ml in each injection-ejection process.

All patients in this study showed decrease in pain score level of VAS, yet none of the patient showed complete recovery to normal pain score level. These findings are in general agreement with the results obtained by Keiseki Kaneyama et al [26] who stated that 50 ml of irrigation is sufficient to reduce the level of some but not all inflammatory mediators that needs about 300 ml to 400 ml to be eliminated.

Postoperative follow up of all patients in both groups revealed that no complication related to the arthrocentesis was detected; this finding is in general agreement with those of previous studies that described arthrocentesis as a simple, non-invasive and highly efficient procedure with low morbidity [8, 27]

The clinical findings of this study showed that all patients responds favorably to the intra-articular injection of 1ml sodium hyaluronate, this agrees with the previous studies made by Alpaslan[15] who found that arthrocentesis followed by sodium hyaluronate injection to be superior to arthrocentesis alone especially in patients with closed lock.

The present study revealed that single needle arthrocentesis has relative advantages over double needle arthrocentesis in term of being an easier technique, reduction in execution time and better tolerability by the patients as positioning of two needles within a small cavity (superior joint space) is more difficult in the presence of intra-articular adherences and cause more discomfort for the patients. These findings are in general agreements with the work made by Nardini et al[19] who stated that the use of single needle arthrocentesis will ensure a more stable access to the joint space, will

strongly limits trauma caused by positioning of a second needle and will reduce the overall execution time of the procedure.

CONCLUSIONS

Arthrocentesis remain an effective technique for treatment of closed lock of TMJ that is refractory to conservative management, and adequate treatment results were achieved with single and double needle arthrocentesis followed by intra-articular injection of sodium hyaluronate, yet single needle arthrocentesis remains a fertile ground for further trials and investigations.

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