Original Article

Arthrocentesis for Internal Derangement of Temporomandibular Joint: with and without Sodium Hyaluronate

Savita Gupta[1], Amit Kumar Sharma[2], Jeetendra Purohit[3], Sugandha Jain[4], Hirkani Attarde[5]

[1]Professor and Head, [2,3]Reader, [4]Post Graduate Student, Jaipur Dental College, Jaipur, Rajasthan;

[5]Associate Professor, Dr DY Patil Dental College and Hospital, Nerul, Navi Mumbai

ABSTRACT

Introduction: Arthrocentesis is an effective, diagnostic and therapeutic modality for internal derangement of temporomandibular joint. Sodium Hyaluronate has been proposed as an alternative therapeutic agent with similar therapeutic effects. The aim of the study was to evaluate the role of Sodium Hyaluronate as an adjunct in treatment of patients with internal derangement of temporomandibular joint.

Methodology: A comparative study on 40 patients between the age group 20-64 years with internal derangement of temporomandibular joint was undertaken to evaluate the role of sodium hyaluronate as an adjunct in treatment.These patients were diagnosed clinically and radiographically with temporomandibular joint internal derangement who failed to respond to conservative treatments. They were divided in two groups randomly, each comprising of 20 patients. Group A comprised of patients who underwent arthrocentesis with Ringer Lactate and followed by injection with Sodium Hyaluronate. Group B were patients who underwent arthrocentesis with Ringer Lactate only. Results were evaluated on the parameters of pain, mouth opening, clicking, deviation, determination of range of lateral and protrusive movements and other complications. They were evaluated on pre-operative day, immediate post operative day and first, third and sixth month post operatively.

Results: There was marked difference in all symptoms viz. of pain, mouth opening, clicking, deviation, determination of range of lateral and protrusive movements in group A as compared to group B with group A showing better response.

Conclusion: Sodium Hyaluronate injection is the preferred treatment for patients suffering with temporomandibular joint internal derangement who were refractory to corroborative methods.

INTRODUCTION

Temporomandibular joint (TMJ) is a giglymoarthroidal joint. It is the only mobile joint in the entire maxillofacial region and is a part of craniomandibular articulation. It is unique because of the fact that both the joints need to move simultaneously for proper functioning as the force per unit area is much larger than most weight bearing joints of the body.[1] To facilitate the ease in motion the joint consists of fibro articular disc, synovial fluid, ligaments and capsule. It is a dual compartment structure. The condyle articulates with the temporal bone in the mandibular fossa. These two bones are separated by articular disk, which divides the TMJ into superior and inferior compartment, but as the force of mastication overcome the resistance of these structures. TMJ is subjected to disorders commonly known as temporomandibular joint disorders (TMDs) such as TMJ hypermobility, ankylosis, internal derangement, degenerative joint disease. The symptoms include pain, limitation and deviation in mandibular range of motions, TMJ sounds, headache and facial pain[2], internal derangement and osteoarthritis.

In past, many non-invasive conservative treatment modalities were tried out for internal derangement which are joint uploading, use of anti-inflammatory agents, physiotherapy etc, but many of these procedures fail to alleviate symptoms or the progression of the disease. Such conditions may require surgical intervention like dissectomy, capsular plication, menisectomy, eminectomy etc. The introduction of arthroscopy improved the outcome by 80-90%. Arthrocentesis is traditionally defined as a procedure in which the fluid in a joint cavity is aspirated with a needle and a therapeutic substance is injected.[3] Arthrocentesis is a relatively less invasive, simple, inexpensive and an effective modality that can be performed under local anesthesia.[2] Arthrocentesis is used both as a diagnostic and therapeutic modality. It is also known to eliminate fibro adhesions, which occur in cases of haemorrhage in the joint, tear or perforation of the disc and septic arthritis.[3]

Two major constituents responsible for free movement of TMJ are surface active phospholipids and Hyaluronic acid. Surface active phospholipids, the major boundary lubricants protect the articular surface, and are highly effective lubricants. Hyaluronic acid (HA), a high molecular weight mucopolysaccharide, forms a full fluid fill that keeps the articular surfaces separated and prevents friction. In vitro, adherence of the Hyaluronic acid to phospholipid membranes (lipososmes) protects them from hydrolysis by phospholipase A 2. Thus, HA probably plays an important indirect role in joint lubrication by adhering to surface active phospholipids, which are protected against uncontrolled degradation by phospholipase A 2.[4] Sodium Hyaluronate (SH) has been proposed as an alternative therapeutic agent .

METHODS

The present study was conducted on 40 patients of age ranging between 20-64 years diagnosed clinically and radiographically (MRI) with internal derangement of TMJ. Patients having difficulty in mouth opening and reduced jaw movements or having pain and clicking sound in TMJ and patients with deviation of mandible to the involved site and patients whose MRI showed internal derangement of TMJ and available for periodic review were included in the study. Patients with any previous invasive procedure on TMJ or evidence of psychological problems or grossly protracted mechanical restriction or patients having bony ankylosis, advanced resorption of the glenoid fossa and malignant tumors were excluded from the study.

All patients who satisfied the criteria were put on conservative management such as controlling mouth opening, soft diet, remedial exercises, physiotherapy, analgesics or bite raising appliances. 40 patients who failed to respond to conservative management were randomly divided into two groups. Group A comprised of 20 patients who underwent arthrocentesis with Ringer lactate (RL) and followed by injection SH. Other 20 were clubbed in group B who underwent arthrocentesis with RL only.

For the purpose of this study, a dual needle device was used. All patients were put on postoperative regime consisting of NSAIDs, muscle relaxants, physiotherapy, opening the mouth to its maximal width, lateral motion of the jaw towards the unaffected side and protruding the jaw without deviation. Patients were evaluated for reciprocal click sounds of TMJ as per the guidelines by Dr William B Farrar. The grade of the reciprocal click is the average of the grades of the opening and closing clicks. Higher the grade, more severe is the problem. Results were evaluated on the parameters of pain, mouth opening, clicking/joint noises, deviation, determination of the range of lateral movements, determination of the range of protrusive movements and complications on pre-operative day, immediate post-operative day, first, third and sixth month post-operative day.

RESULTS

The pre-operative TMJ pain was measured with Visual Analogue Scale (VAS). There was a significant reduction in pain in both the groups. After six months almost all subjects in group A reported with no pain, whereas half of the patients in group B reported of mild pain (Figure 1). There was marked increase in mouth opening in group A compared to group B, which was statistically significant having ($p < .001$) (Figure 2).

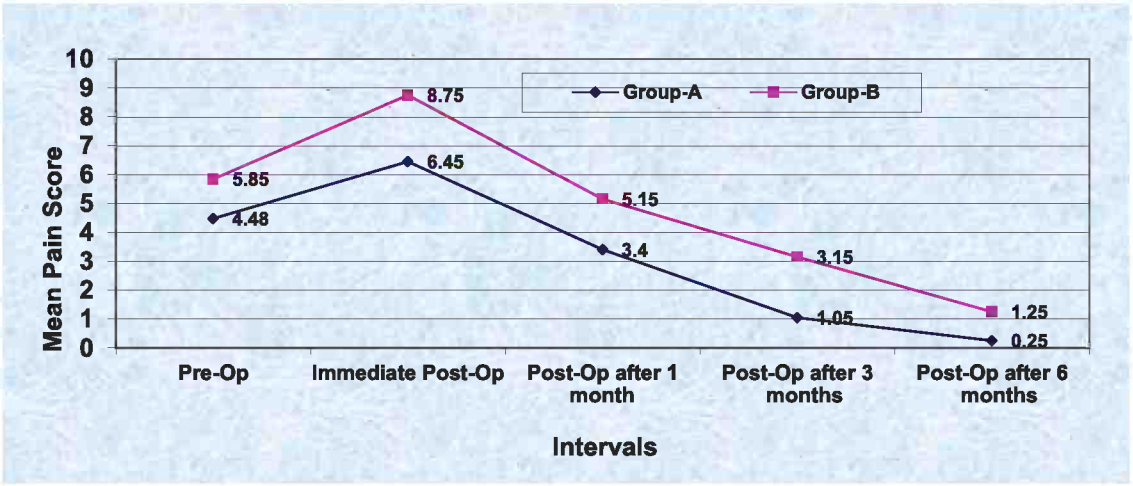

Figure 1: Pain score at various intervals in patients with internal derangement of temporomandibular joint.

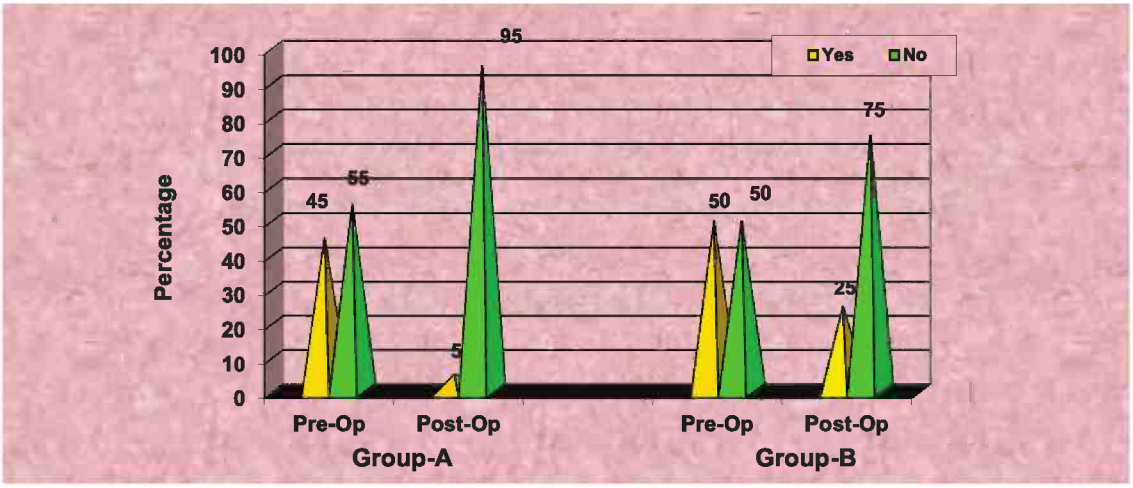

Figure 2: Mouth opening (in mm) at various intervals in patients with internal derangement of temporomandibular joint.

Patients were also evaluated for lateral jaw movements. There was an increase in lateral movements in both the groups on first, third and sixth post operative interval. It was observed that group A subjects as compared to group B reported increase in lateral movements. Pre and post operative protrusive jaw movements measured for group A and group B patients is given in figure 3.

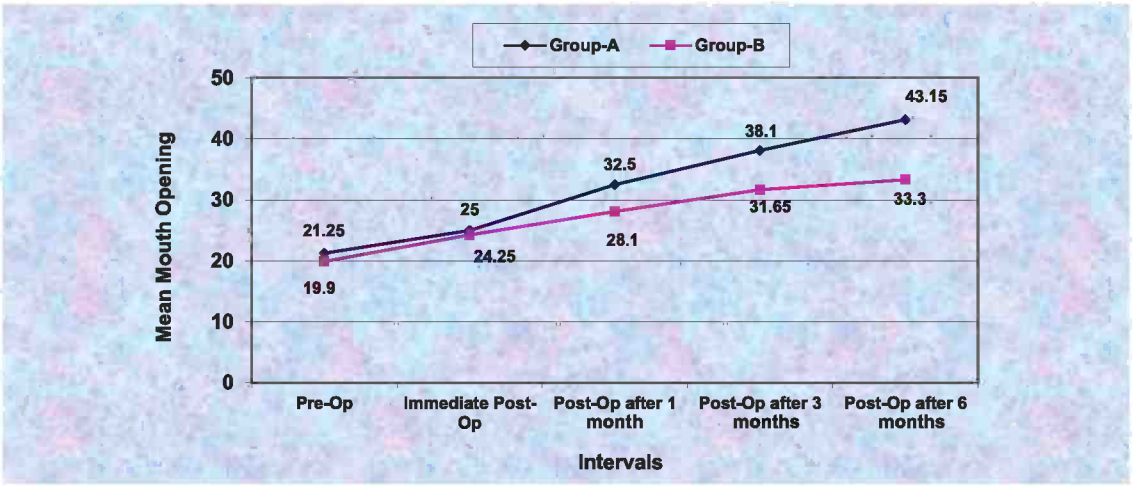

Figure 3: Protrusive jaw movements at various intervals in patients with internal derangement of temporomandibular joint.

The mean of right joint reciprocal click sounds measured in group A patients was 5.10± 4.79 mm and group B was 6.55±7.84 mm, which decreased in all the subsequent intervals to 1.35±1.88 mm in group A and 2.95 ±3.50 mm in group B, as measured at sixth month post operative interval. The mean of left joint reciprocal click sounds in group A patients was 4.80±6.91 mm and group B was 8.70±10.22 mm, which decreased from pre operative to subsequent post operative intervals. Six month post operative reciprocal click measured in group A patients was 1.65±5.67 mm and in group B was 3.15± 3.97 mm respectively.

For each patient deviation was marked as present or absent during mouth opening, from pre operative day to sixth month post operatively. After six months, it was found that only one patient in group A presented with deviation on mouth opening whereas five patients in group B reported of the same. Complications such as swelling in the surrounding tissues and mild paresthesia around the cheek and lower eye region were observed in three patients in group A and four patients in group B.

DISCUSSION

Joint loading and parafunction converts shearing forces into compressive stresses[3] which leads to interruption of blood supply and collapse of the lubrication system leading to development of hypoxia-reperfusion cycle, which in turn releases radical oxygen species (ROS) superoxide and hydroxyl ion.[5] The ROS degrade Hyaluronic acid as well.[3] Alterations in joint pressure, a variety of biochemical substances and constituents of the fluid may lead to clicking and derangement of the TMJ.[3] Internal derangement was first described by Hey and Davies in 1814 as a localized fault interfering with the smooth action of joint and has been defined as "an abnormal positional relationship of articular disc to mandibular condyle and the articular eminence".[1]

Arthrocentesis is recognized increasingly as first line surgical intervention in patients who do not respond to conservative management. The traditional procedure used two needles inserted through two separate puncture sites. One of the needles served for the inflow of the lavage solution and second as outflow[6]. Rahal A et al and Rehman and Hall [6,7] used the same type of needle device in their study.

Lavage of upper compartment by TMJ arthrocentesis forces apart the flexible disc from the fossa, washes away degraded particles with inflammatory components and decreases the intra articular pressure. In this study there was marked relief from pain in group A subjects as compared to group B subjects. This is in accordance with study done by Shakya P et al, Tuncal U.[8,9]

In the present study, there was a decrease in the clicking after TMJ lavage in both the groups with and without hyaluronate injection, though group A showed better results than group B which was in accordance with the studies done by Yeung et al [10] who reported reduction in joint clicking in 6 month duration. Arthrocentesis causes distention of the articular space thus causing relief from symptoms. In our study, jaw functions improved and maximal mouth opening increased earlier and longer in patients who received sodium hyaluronate. This may be explained by the lubricant effect of SH and the relief of pain. This was in accordance with studies done by Yeung[10] and Guarda Nardini et al[11] who showed clear and consistent benefit for six months.

CONCLUSION

The present study was a comprehensive approach to compare two arthrocentesis injections (with SH and without SH) for prognosis and patient's comfort. Sodium Hyaluronate injection is preferred treatment for patients suffering with temporomandibular joint internal derangement who were refractory to corroborative methods.

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Corresponding Author

Dr Sugandha Jain, 5/26, Vidyadhar Nagar, Jaipur, Rajasthan.
email:sugandha.jain86@gmail.com