



EVALUATION OF ARTHROCENTESIS WITH CORTICOSTEROIDS VERSUS ARTHROCENTESIS WITH HYALURONIC ACID IN THE MANAGEMENT OF TEMPOROMANDIBULAR JOINT OSTEOARTHRITIS

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ABSTRACT

Aim: to evaluate the clinical results, radiographic results and levels of inflammatory mediators following arthrocentesis with intra-articular injection of steroids versus arthrocentesis with intra-articular injection of hyaluronic acid in temporomandibular joint osteoarthritis.

Materials and Methods: Ten patients suffering from Osteoarthritis with pain and crepitation during jaw movements together with radiographic evidence of bony erosions were included in the study. The patients were divided into two groups, five patients in group A were treated with arthrocentesis followed by intra-articular injection of corticosteroid and five patients in group B were treated with arthrocentesis followed by intra-articular injection of Hyaluronic acid.

Results: Patients in both groups showed significant reduction in pain and increase in maximum mouth opening; however, arthrocentesis with intra-articular injection of HA showed better clinical results compared to arthrocentesis with intra-articular injection of corticosteroids. Less inflammatory mediators were found in the Corticosteroid group patients compared to HA group patients. No evidence of new bone formation was seen in both groups after 4 months postoperatively.

Conclusion: Better clinical results were achieved after Arthrocentesis followed by intra-articular injection of hyaluronic acid when compared to arthrocentesis with intra-articular injection of corticosteroids. Less inflammatory mediators were associated with arthrocentesis with corticosteroids injection compared to arthrocentesis with HA injection. Long term follow up is required to be able to assess new bone formation following arthrocentesis with intra-articular injection of HA or corticosteroid.

KEYWORDS: Osteoarthritis, Hyaluronic acid, Arthrocentesis, Corticosteroids

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INTRODUCTION

Osteoarthritis (OA) is degenerative diseases that can result in total destruction of joint structures.¹ Diagnosis of OA is carried out through the criteria described by Dworkin and LeResche² based on the bony changes of the articulating surfaces of the joint, crepitation on jaw movements and pain on mouth opening.

Many conservative approaches were carried out for the management of temporomandibular joint (TMJ) OA including arthrocentesis, injection of hyaluronic acid (HA), physical exercises, injection of steroids and acupuncture.³

Arthrocentesis is a simple, minimally invasive technique that breaks up the joint adhesions and wash away the inflammatory mediators and necrotic tissues from the joint.⁴ A study by Gulen et al⁵ resulted in significant decrease of interleukins and tumour necrosis factor alpha in the synovial fluid following arthrocentesis.

Hyaluronic acid can act as a lubricant and provides nutrition to the meniscus and showed excellent results in treating large joints.⁶ The combination between arthrocentesis and HA injection was found to have much better results when compared to arthrocentesis alone in the treatment of osteoarthritis in horses.⁷

Corticosteroids are anti-inflammatory drugs that have been used for therapeutic and diagnostic purposes.⁸ Many studies examined the intra-articular use of corticosteroids and final positive results were achieved.^{9,10} The combination between arthrocentesis and corticosteroids injection resulted in better function and less pain with mandibular movements.¹¹

A study was performed to compare the results between the effects of HA injection and corticosteroid injection without arthrocentesis for patients suffering from OA. Both drugs resulted in significant reduction of pain but comparing between the side effects of the two drugs, the HA was found to be superior over the corticosteroids.⁹

MATERIALS AND METHODS

Ten patients suffering from OA of the TMJ with an age range between 35 and 65 years and a mean age of 49.3 ± 5.4 years were selected from the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Cairo University. Inclusion criteria included cases with OA associated with pain and crepitation during jaw movements and a radiographic evidence of OA in CT scans showing bone erosions, or flattening in the condyle and/or the articulating fossa.

The patients were divided into 2 groups; group A including 5 patients performed arthrocentesis followed by intra-articular injection of corticosteroid and group B including 5 patients performed arthrocentesis followed by intra-articular injection of HA. Any patients with severe systemic diseases, autoimmune disease, coagulation disorders, pregnancy or lactation and those patients with previous TMJ injections were excluded from the study. All the cases were performed under local anaesthesia.

Conservative management was carried out for all the patients in terms of non steroidal anti-inflammatory drugs, physiotherapy, patient education and splints before they were included in the study.

A straight line was drawn on the patients face from the outer canthus of the eye till the middle of the tragus of the ear. The posterior point of entrance was located along this line, 1 cm anteriorly to the middle of the tragus and 2mm below the line while the anterior entrance point was located 2 cm anteriorly to the middle of the tragus of the ear and 1 cm below the canthotragal line.

Arthrocentesis procedure was then started by injecting Articaine 4% with epinephrine 1:100000 at the entrance points. Patients were asked to open their mouth widely and protrude their mandible. An 18-gauge needle was inserted into the posterior entrance point in the superior joint space. A 5ml Ringer's lactate solution was then injected into the joint prior to the insertion of the second needle to

distend the superior joint space and release any adhesions. The second needle was then inserted through the anterior entrance point to allow the lactated Ringer's solution to flow freely through the superior joint space.

Ringer's lactate solution (300-400 ml) was injected simultaneously from both needles (Fig.1) and allowed to pass through the superior joint space and during the process of injection, the patients were asked to move their mandible in various directions including opening, closing, protrusive and lateral excursions to facilitate the lysis of any adhesions.



Fig. (1) Free flowing of the lactated Ringer's solution through the superior joint space.

This procedure was performed for all the patients in both groups. The anterior needle was then removed followed by intra-articular injection of 1ml of betamethasone (Betafos 7mg/2 ml ampoule, Amoun Pharmaceuticals, Egypt) in group A patients and 1ml of HA (Curavisk 20mg/2ml syringe, Curasan, Germany) in group B patients, then the posterior needle was removed and a pressure pack was placed over the injection points.

A sample from the joint fluid was collected preoperatively and after 4 months postoperatively through the puncture of an 18-gauge needle into the superior joint space followed by simultaneous injection and aspiration of 1cc of saline solution for five times and finally transferring the sample to the lab to examine the levels of tumor necrosis factor

alpha (TNF- α) and interleukin (IL-6).

Follow up was carried out immediate postoperatively and after 1 week, 2 weeks, 4 weeks, 2 months and 4 months postoperatively in terms of:

- Pain with various mandibular movements utilizing the Visual analogue scale (VAS).
- Maximum mouth opening (MMO) by measuring the distance between the upper central and lower central incisors in millimeters.

However preoperative and 4 months postoperative records were obtained in terms of:

- Clicking/crepitus in the joint.
- A sample from the joint fluid was taken to examine the levels of tumor necrosis factor alpha (TNF- α) and interleukin (IL-6).
- Radiological assessment of the joint with CT scans.

RESULTS

Ten selected patients (30 % males and 70 % females) were divided randomly into two groups. Five patients (2 males and 3 females) were included in group A and five patients (1 male and 4 females) were included in group B. Arthrocentesis followed by Corticosteroid injection was performed for group A patients, while arthrocentesis followed by injection of HA was performed for group B patients.

According to the VAS of pain, significant decrease in pain was observed in the two groups at the end of the follow up period; however pain reduction was more significant in group B patients when compared to group A (Table 1).

During different follow up periods, patients were classified according to the severity of pain where by the end of the follow up period all the patients in both groups were presented with no pain or mild pain (Table 2).

A sample from Joint fluid was collected preoperatively and after 4 months postoperatively and the levels of interleukin 6 (IL-6) and tumour necrosis factor α (TNF- α) was measured.

A significant decrease in the level of IL-6 and TNF- α in joint fluid was observed after 4 months postoperatively in both groups; however more decrease was noticed in group A patients compared to group B (Table 4, 5).

Preoperatively, all the patients in both groups were suffering from clicking and crepitus during different jaw movements, and at the end of the

follow up period, clicking sound significantly decreased but there was no significant change in crepitation sound.

CT scans preoperatively and after 4 months postoperatively showed slight difference concerning bone remodeling but no evidence of new bone formation was observed in both groups (Fig. 2, 3).

TABLE (1) Comparison of the mean pain scores between group A and B during different follow up periods.

Time period	Mean SD		P
	GROUP A	GROUP B	
Pre-op	5.41.14	5.61.14	0.78
Immediate post-op	5.61.14	4.80.83	0.24
Week 1	5.01.22	3.80.44	0.07
Week 2	4.20.83	3.00.70	0.03
Week 4	3.80.83	2.60.54	0.02
2 Months	3.40.54	2.00.70	0.007
4 months	2.80.83	1.40.54	0.01

* $P < 0.05$ Significant

TABLE (2) Severity of pain during different follow up periods.

Pain (VAS)	Number of Patients						
	Preop	Postop	Week 1	Week 2	Week 4	2 Month	4 Month
Group A							
No to mild pain	0	1	1	1	4	5	5
Moderate pain	4	4	4	4	1	0	0
Severe pain	1	0	0	0	0	0	0
Worst Pain	0	0	0	0	0	0	0
Group B							
No to mild pain	0	0	0	0	3	5	5
Moderate pain	3	4	5	5	2	0	0
Severe pain	2	1	0	0	0	0	0
Worst Pain	0	0	0	0	0	0	0

TABLE (3) Comparison of MMO during follow up periods between both groups.

Time period	Mean SD		P
	Group A	Group B	
Pre-operative	35.32.08	34.91.62	0.11
Immediate postop	37.42.32	38.3 1.57	0.36
Week 1	37.52.72	39.61.58	0.03
Week 2	39.72.42	41.20.95	0.05
Week 4	41.10.65	42.30.96	0.004
2 Months	42.12.2	44.61.59	0.008
4 Months	43.52.38	46.81.84	0.004

TABLE (4) Comparing interleukin 6 levels between the 2 groups.

	MeanSD of IL-6 levels		P
	Group A	Group B	
Preoperative	36.155.93	36.827.35	0.82
4 months	25.1211.51	27.747.35	0.64
P	0.0001	0.0001	

TABLE (5) Comparing TNF-α levels between the 2 groups.

	MeanSD of TNF α levels		P
	Group A	Group B	
Preoperative	22.458.59	31.659.11	0.03
4 months	14.474.64	27.678.12	0.001
P	0.0001	0.0001	

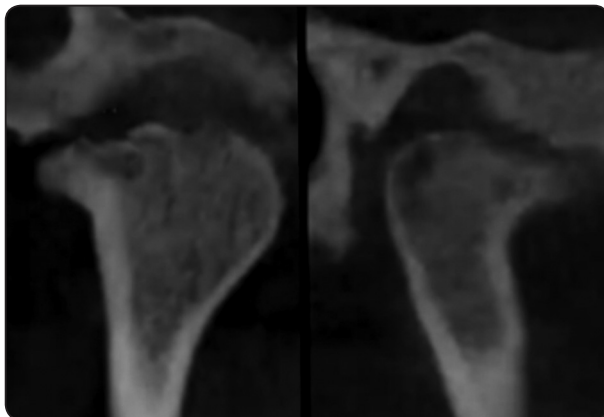


Fig. (2) Preoperative CT scan showing bony erosions in the condyle and eminence.

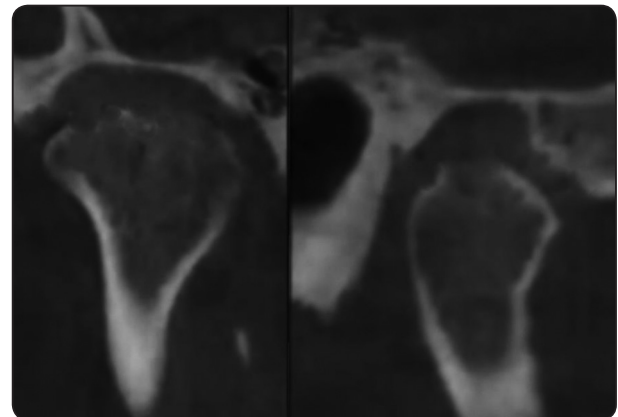


Fig. (3) CT scan showing no evidence of new bone formation after 4 months postoperatively.

DISCUSSION

In this study, all the patients were suffering from moderate to severe pain but there was a significant decrease in pain along the follow up periods in both groups, however more reduction in pain was noticed in HA group compared to corticosteroid group. This agrees with the studies of Alpalsan and Alpalsan ¹², Cascone et al ¹³ and Manfredini et al ¹⁴ who reported significant decrease in pain scores after performing arthrocentesis with HA injection and attributed this results to the the effects of fluid pressure from arthrocentesis, washing away of the inflammatory mediators and the lubrication action of the HA. Our result also agrees with Koop et al ⁹ reporting significant decrease in TMJ pain following injection of corticosteroids and hyaluronic acid.

In our study, the maximal interincisal distance was found to increase during different follow up periods in both groups, however there was a more significant increase in HA group patients when compared to the corticosteroid group. This is consistent with the study of Manfredini et al ¹⁴ who reported an increase in maximum mouth opening following arthrocentesis with HA injection. Our results also agree with Yeung et al ¹⁵ and Dolwick ¹⁶ who reported an increase of MMO following intra articular injection of HA. The authors attributed these results to the lubricant and analgesic properties of HA, decreases in the frictional coefficient in the joint and the release of adhesions resulting from the fluid pressure.

In the current study, the patients in both groups were presented with no or mild pain with lateral and protrusive movements at the end of the follow up period. This supports the findings of Alpalsan and Alpalsan¹² and Neo et al¹⁷ who reported that lateral movements were improved during different follow up periods following arthrocentesis and they attributed that to the breaking up of joint adhesions, increase in lubrication by HA and suppressing the inflammatory mediators by corticosteroids.

In the present study, clicking sound significantly decreased in all the patients in both groups, however crepitation sounds remained unchanged after 4 months postoperatively. This coincides with the findings of Yeung et al¹⁵ but disagrees with the findings of Alpalsan and Alpalsan¹² who reported that there was no significant decrease of clicking sounds following arthrocentesis.

In this study, the levels of IL-6 and TNF- α decreased significantly in both groups after 4 months postoperatively, however more decrease in levels was found in the corticosteroid group when compared to HA group. This is consistent with the studies performed by Takahashi et al¹⁸ and Gulen et al⁵ who reported that inflammatory mediators are normally absent in healthy joints and there was a significant decrease in inflammatory mediators following arthrocentesis for unhealthy joints. Our results was also found to be in agreement with Sezgin et al¹⁹ reporting that IL-6 levels decreased significantly after HA injection in knee joints. Comert²⁰ reported that corticosteroids affects the synovial tissues by suppressing the inflammatory molecules and passing through the cellular membrane and and the binding receptors located in the cytoplasm where these activated receptors eliminate the expression of pro inflammatory cytokines and inflammatory mediators.

In our study, CT scans showed slight bone remodeling but new bone formation wasn't evident after 4 month postoperatively in both groups. This

meets the findings of Li et al²¹ reporting that at least 9 months is required in order to observe new bone formation following intra-articular injection of HA.

CONCLUSION

Better clinical results were achieved after Arthrocentesis followed by intra-articular injection of hyaluronic acid when compared to arthrocentesis with intra-articular injection of corticosteroids. Less inflammatory mediators were associated with arthrocentesis with corticosteroids injection compared to arthrocentesis with HA injection. Long term follow up is required to be able to assess new bone formation following arthrocentesis with intra-articular injection of HA or corticosteroid.

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