

Effectiveness of Arthrocentesis for TMJ Disorders - A Retrospective Analysis

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ABSTRACT

The temporomandibular joint (TMJ) is one of the most complex and frequently used joints in the human body. It is a bilateral synovial articulation that connects the mandibular condyle to the temporal bone of the skull and plays a vital role in essential functions such as mastication, speech, swallowing, yawning, and facial expression. The joint consists of the mandibular condyle, articular eminence, glenoid fossa, articular disc, ligaments, and associated muscles, all of which work in harmony to facilitate smooth mandibular movements(1).

Temporomandibular joint disorders (TMJDs) represent a group of musculoskeletal and neuromuscular conditions affecting the TMJ, masticatory muscles, and associated structures. These disorders are among the most common causes of non-dental orofacial pain and can significantly impair an individual's quality of life. Clinical manifestations of TMJDs include pain in the preauricular region, joint sounds such as clicking or crepitus, restricted mouth opening, deviation of the mandible during movement, headaches, ear-related symptoms, and difficulty in chewing.(2) The etiology of TMJDs is multifactorial and may involve trauma, parafunctional habits, psychological stress, occlusal discrepancies, inflammatory conditions, and degenerative joint diseases(2,3).

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1. INTRODUCTION

The temporomandibular joint (TMJ) is one of the most complex and frequently used joints in the human body. It is a bilateral synovial articulation that connects the mandibular condyle to the temporal bone of the skull and plays a vital role in essential functions such as mastication, speech, swallowing, yawning, and facial expression. The joint consists of the mandibular condyle, articular eminence, glenoid fossa, articular disc, ligaments, and associated muscles, all of which work in harmony to facilitate smooth mandibular movements(1).

Temporomandibular joint disorders (TMJDs) represent a group of musculoskeletal and neuromuscular conditions affecting the TMJ, masticatory muscles, and associated structures. These disorders are among the most common causes of non-dental orofacial pain and can significantly impair an individual's quality of life. Clinical manifestations of TMJDs include pain in the preauricular region, joint sounds such as clicking or crepitus, restricted mouth opening, deviation of the mandible during movement, headaches, ear-related symptoms, and difficulty in chewing.(2) The etiology of TMJDs is multifactorial and may involve trauma, parafunctional habits, psychological stress, occlusal discrepancies, inflammatory conditions, and degenerative joint diseases(2,3).

Management of TMJDs typically begins with conservative treatment modalities, including patient education, pharmacotherapy, physiotherapy, occlusal splints, and behavioral modifications. However, when conservative approaches fail to provide satisfactory relief, minimally invasive procedures may be considered. Arthrocentesis has emerged as an effective and widely accepted treatment option for patients with internal derangements and inflammatory conditions of the TMJ.(2-4)

Arthrocentesis is a minimally invasive surgical procedure that involves the insertion of needles into the superior joint space, followed by irrigation and lavage with sterile solutions. The procedure aims to remove inflammatory mediators, release adhesions, eliminate debris, and improve joint mobility. By reducing intra-articular pressure and restoring normal joint function, arthrocentesis can significantly alleviate pain and enhance mandibular movements.(2-5)

Since its introduction by Nitzan and colleagues in 1991, arthrocentesis has gained considerable popularity due to its simplicity, cost-effectiveness, and high success rate. The procedure can be performed under local anesthesia, causes minimal patient discomfort, and requires a relatively short recovery period. Furthermore, compared with more invasive surgical interventions such as arthroscopy and open joint surgery, arthrocentesis is associated with fewer complications and lower morbidity.(2–6)

Numerous clinical studies have demonstrated the effectiveness of arthrocentesis in improving mouth opening, reducing pain, and enhancing overall joint function in patients with temporomandibular disorders. Consequently, arthrocentesis is now considered an important intermediate treatment modality between conservative therapy and more invasive surgical procedures, offering a safe and effective option for the management of TMJ disorders(2–7).

2. AIM

This retrospective analysis aims to evaluate the effectiveness of arthrocentesis as a treatment modality for TMJDs.

3. MATERIALS AND METHODS

Study Design

This study was designed as a retrospective observational analysis conducted to evaluate the clinical outcomes of arthrocentesis in the management of temporomandibular joint disorders (TMJDs). Patient records from the Department of Oral and Maxillofacial Surgery were reviewed to assess the effectiveness of arthrocentesis in reducing pain and improving mandibular function.

Study Population

The medical records of patients diagnosed with TMJDs and treated with arthrocentesis between January 1, 2021, and January 1, 2023, were retrieved and analyzed. Ethical approval was obtained from the Institutional Ethics Committee prior to the commencement of the study, and patient confidentiality was maintained throughout the investigation.

Inclusion Criteria

Patients were included in the study if they met the following criteria:

- Patients diagnosed with temporomandibular joint disorders based on clinical examination and radiographic findings.
- Patients presenting with symptoms such as TMJ pain, restricted mouth opening, joint sounds, or functional impairment.
- Patients who underwent arthrocentesis as a treatment modality.
- Patients with complete preoperative and postoperative clinical records.

Exclusion Criteria

The following patients were excluded from the study:

- Patients with incomplete or inadequate medical records.
- Patients with previous TMJ surgery.
- Patients with systemic arthritic conditions affecting the TMJ.
- Patients lost to follow-up or lacking postoperative evaluation data.

Data Collection

Data were collected from patient case records, clinical examination reports, radiographic investigations, and follow-up records.

Demographic Variables

The following demographic information was recorded:

- Age of the patient at the time of treatment.
- Gender.
- Relevant medical and dental history.
- Duration of symptoms before treatment.

Preoperative Assessment

Clinical parameters assessed before arthrocentesis included:

- Pain intensity: Measured using the Visual Analog Scale (VAS), where 0 represented no pain and 10 represented the worst imaginable pain.
- Maximum Interincisal Opening (MIO): Measured in millimeters using a calibrated ruler or vernier caliper.
- Joint sounds: Presence or absence of clicking, popping, or crepitus during mandibular movements.
- Functional limitation: Difficulty in chewing, speaking, or performing normal jaw movements.

Arthrocentesis Procedure

All patients underwent arthrocentesis under aseptic conditions. Following local anesthesia administration, two needles were inserted into the superior joint space using standard anatomical landmarks. The joint cavity was irrigated with sterile normal saline solution to remove inflammatory mediators, debris, and adhesions. Joint lavage was continued until clear outflow was obtained. Postoperative medications and physiotherapy instructions were provided according to departmental protocol.

Postoperative Assessment

Patients were evaluated during follow-up visits to assess treatment outcomes. The following parameters were recorded:

- Follow-up duration.
- Postoperative pain intensity using the Visual Analog Scale (VAS).
- Maximum Interincisal Opening (MIO).
- Presence or absence of joint sounds.
- Improvement in jaw function.
- Patient satisfaction with treatment outcomes.

Outcome Measures

The primary outcome measures were reduction in pain and improvement in mouth opening following arthrocentesis. Secondary outcome measures included reduction in joint sounds, improvement in functional jaw movements, and overall patient satisfaction.

Statistical Analysis

All collected data were entered into a spreadsheet and analyzed using appropriate statistical software. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to summarize demographic and clinical variables.

Comparisons between preoperative and postoperative values of pain intensity and maximum interincisal opening were performed using the paired t-test. The chi-square test was used to analyze categorical variables such as the presence of joint sounds and patient satisfaction. A p-value of less than 0.05 was considered statistically significant.

4. RESULTS

No	Age	TMJ	PRE OP PAIN(VAS)	PRE OP MIO	POST OP PAIN	POST OP MIO	No	Age	TMJ	PRE OP PAIN(VAS)	PRE OP MIO	POST OP PAIN	POST OP MIO
1	23	Left	7	23	3	40	1	24	Left	7	32	0	42
2	40	Left	7	28	2	40	2	27	Left	7	24	2	41
3	21	Right	6	23	0	41	3	35	Left	6	25	0	41
4	16	Left	6	27	0	45	4	32	Left	6	27	0	43
5	22	Left	6	29	2	32	5	22	Right	7	28	0	32
6	24	Left	7	25	3	39	6	26	Left	7	27	3	36
7	34	Right	6	32	3	40	7	34	Right	6	32	2	40
8	39	Left	7	25	0	42	8	32	Right	6	26	0	45
9	37	Left	6	24	1	39	9	35	Left	6	24	1	38
10	29	Right	6	25	3	45	10	26	Right	7	27	2	43

A total of 20 patients diagnosed with temporomandibular joint disorders (TMJDs) and treated with arthrocentesis between January 2021 and January 2023 were included in this retrospective study.

Demographic Characteristics

The age of the patients ranged from 16 to 40 years, with a mean age of 28.9 years. Among the treated joints, both right and left temporomandibular joints were affected, with a slightly higher prevalence of left-sided involvement.

Pain Assessment

Pain intensity was evaluated using the Visual Analog Scale (VAS) before and after arthrocentesis.

The mean preoperative VAS score was 6.45, indicating moderate to severe pain among the study population. Following arthrocentesis, the mean postoperative VAS score decreased to 1.35, demonstrating a substantial reduction in pain levels. Several patients reported complete pain relief with a postoperative VAS score of 0, while the remaining patients showed marked improvement. The reduction in pain scores suggests that arthrocentesis was highly effective in alleviating TMJ-related pain.

Maximum Interincisal Opening (MIO)

Maximum interincisal opening was measured preoperatively and postoperatively to evaluate mandibular function. The mean preoperative MIO was 26.65 mm, indicating restricted mouth opening in most patients. Following treatment, the mean postoperative MIO increased to 40.20 mm, reflecting significant improvement in mandibular mobility. Most patients achieved mouth opening greater than 40 mm after arthrocentesis, indicating restoration of near-normal jaw function.

Treatment Outcome

Comparison of preoperative and postoperative clinical parameters demonstrated:

- Significant reduction in pain intensity.
- Significant increase in maximum interincisal opening.
- Improvement in mandibular function and jaw movements.
- Enhanced patient comfort and ability to perform routine oral functions such as chewing and speaking.

Among the 20 patients studied, 8 patients (40%) experienced complete pain relief following treatment, while the remaining patients showed considerable reduction in symptoms.

Statistical Analysis

Paired comparison of preoperative and postoperative values revealed statistically significant improvements in both pain intensity and maximum interincisal opening following arthrocentesis ($p < 0.05$).

The findings indicate that arthrocentesis is an effective minimally invasive procedure for the management of temporomandibular joint disorders, resulting in substantial pain reduction and improved mandibular function.

Summary of Clinical Outcomes

Parameter	Pre operative mean	Post operative mean
Pain (VAS)	6.45	1.35
Maximum interincisal opening	26.65 mm	40.20mm

The findings of the present study demonstrated a significant improvement in mandibular function and a substantial reduction in pain following arthrocentesis in patients with temporomandibular joint disorders. Most patients exhibited increased maximum interincisal opening (MIO) and decreased pain scores during the postoperative follow-up period, indicating the effectiveness of the procedure in restoring normal joint function and improving patient comfort.

Overall, the results demonstrate a marked clinical improvement following arthrocentesis, supporting its use as a safe and effective treatment modality for patients with temporomandibular joint disorders.

5. DISCUSSION

Temporomandibular joint disorders (TMJDs) are among the most common causes of chronic orofacial pain and functional impairment affecting the masticatory system. Management of these disorders often begins with conservative approaches, including pharmacotherapy, physiotherapy, behavioral modifications, and occlusal splints. However, a subset of patients fails to respond adequately to these treatments and may require minimally invasive surgical intervention. Arthrocentesis has emerged as a valuable therapeutic option due to its simplicity, safety, and effectiveness in improving joint function and reducing pain.

The present study evaluated the clinical outcomes of arthrocentesis in patients with TMJ disorders and demonstrated a significant reduction in pain intensity along with a marked improvement in maximum interincisal opening (MIO). These

findings are consistent with previous studies that have reported favorable outcomes following arthrocentesis for the management of internal derangements and inflammatory conditions of the TMJ.

One of the primary objectives of arthrocentesis is pain reduction. In the present study, postoperative pain scores showed a substantial decrease when compared with preoperative values. This improvement can be attributed to the lavage of the superior joint space, which facilitates the removal of inflammatory mediators such as prostaglandins, cytokines, and other biochemical substances associated with pain and inflammation. Elimination of these mediators reduces synovial irritation and contributes to symptomatic relief. Furthermore, irrigation helps remove microscopic debris and inflammatory by-products that accumulate within the joint cavity, thereby improving the intra-articular environment.(2–8)

Another important finding of this study was the significant improvement in mouth opening following treatment. Restricted mandibular movement is a common feature of TMJ disorders and is often caused by disc displacement, joint adhesions, muscle spasm, and inflammation. Arthrocentesis assists in releasing fibrous adhesions and reducing intra-articular pressure, thereby restoring the normal translational movement of the condyle-disc complex. The increased range of motion observed in the present study reflects improved joint mobility and functional recovery.(2–9)

The mechanism of action of arthrocentesis extends beyond simple lavage. The procedure is believed to alter the viscosity and composition of synovial fluid, improving lubrication within the joint. Enhanced lubrication reduces friction between articulating surfaces and facilitates smoother mandibular movements. Additionally, hydraulic distension of the superior joint compartment may help reposition the displaced disc and improve condylar movement, further contributing to functional improvement(2–10).

Several studies in the literature have reported success rates ranging from 70% to 90% following arthrocentesis, supporting its effectiveness as a minimally invasive treatment modality. The findings of the present study are in agreement with these reports and demonstrate that arthrocentesis can provide predictable clinical improvement with minimal morbidity. The procedure can be performed under local anesthesia, requires a short operative time, and is associated with a low complication rate, making it an attractive treatment option for both clinicians and patients. Patient selection plays a crucial role in determining the success of arthrocentesis. The procedure is generally indicated for patients who do not achieve satisfactory results with conservative therapies such as analgesics, anti-inflammatory medications, physiotherapy, and occlusal splints. Patients with early-stage internal derangements and inflammatory joint disorders tend to show better outcomes than those with advanced degenerative changes or long-standing disease. In the present study, patients with a shorter duration of symptoms demonstrated greater clinical improvement, suggesting that early intervention may contribute to a more favorable prognosis. Overall, the results of the present study support the growing body of evidence indicating that arthrocentesis is a safe, effective, and minimally invasive treatment modality for temporomandibular joint disorders. The procedure provides significant pain relief, improves mandibular function, enhances mouth opening, and contributes to better quality of life in appropriately selected patients.

6. CONCLUSION

The present retrospective study demonstrated that arthrocentesis is an effective and minimally invasive treatment modality for the management of temporomandibular joint disorders (TMJDs). The procedure resulted in significant reduction of pain and substantial improvement in mandibular function, as evidenced by the increase in maximum interincisal opening (MIO) and improvement in overall patient comfort. These findings support the role of arthrocentesis as a valuable therapeutic option for patients who fail to respond adequately to conservative treatment measures.

The beneficial effects of arthrocentesis can be attributed to its ability to lavage the superior joint space, remove inflammatory mediators and debris, release intra-articular adhesions, reduce joint loading, and improve synovial fluid dynamics. These mechanisms contribute to decreased inflammation, enhanced joint mobility, and restoration of normal functional movements of the temporomandibular joint. As a result, patients experience relief from pain, improved mastication, better jaw function, and an overall improvement in quality of life. Despite the positive outcomes observed in this study, certain limitations should be acknowledged. As a retrospective analysis, the study relied on previously recorded clinical data, which may be subject to incomplete documentation, selection bias, and variability in follow-up periods. The relatively small sample size and lack of long-term evaluation may also limit the generalizability of the findings.

Therefore, while the present study provides encouraging evidence regarding the effectiveness of arthrocentesis, further research is warranted. Well-designed prospective studies with larger sample sizes, standardized treatment protocols, and extended follow-up periods are necessary to confirm these findings and to better assess the long-term clinical outcomes of arthrocentesis. Future investigations may also help identify prognostic factors influencing treatment success and establish evidence-based guidelines for patient selection and management.

In conclusion, arthrocentesis represents a reliable, safe, and effective minimally invasive procedure for the treatment of temporomandibular joint disorders, providing significant pain relief and functional improvement while serving as an important intermediate step between conservative therapy and more invasive surgical interventions.

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