



Article

Arthrocentesis of Temporomandibular Joint Techniques: Literature Review

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Abstract: Temporomandibular disorders (TMD) affect the masticatory system, causing pain, limited mouth opening, and negatively impacting daily activities and quality of life. Conservative treatments are commonly used, but when ineffective, minimally invasive procedures like arthrocentesis are considered. This technique, first introduced in 1987, involves the washing of the temporomandibular joint (TMJ) space to reduce inflammatory mediators and release adhesions, distinguishing it from arthroscopic methods. Over the years, variations in technique, including single-needle and double-needle methods, have been developed, along with advancements in imaging technologies like ultrasonography and cone beam computed tomography. Studies show that arthrocentesis is highly effective in treating conditions such as anterior disc displacement and internal derangements, with pain relief and improved mouth opening achieved in many cases. It has also been applied successfully to manage disc adhesions, synovitis, and osteoarthritis, often providing long-term relief. Arthrocentesis is considered a first-line surgical treatment for TMD, offering an effective, low-complication, and cost-efficient solution. This review underscores the significance of arthrocentesis as a valuable option for patients not responding to conservative treatment.

Keywords: Temporomandibular, Arthrocentesis, Displacement, Internal Derangements, Minimally Invasive Treatment

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1. Introduction

Temporomandibular disorders (TMD) are pain disorders of the masticatory system, i.e., the masticatory muscles and temporomandibular joints (TMJs) [1]. They cause joint pain and limit mouth opening, thus having an adverse impact on daily living activities and the quality of life [2]. TMD treatment options usually start with conservative methods whose main aim is to relieve pain and restore normal mouth opening. When conservative treatment is not fully effective, however, minimally invasive surgical technique options such as arthrocentesis are considered to maintain jaw movement normally and improve the quality of life. In contrast to arthroscopic technique, TMJ arthrocentesis is performed not having intra-articular visualization and consists in washing the regain of joint space in order to minimized inflammatory mediators and release adhesions [3]. According to the literature studied, the first time such a procedure was performed in the upper joint space of the TMJ was in 1987 by Murakami and co-authors. By using a pumping technique which then has been referred to as 'hydraulic distention' [4], [5]. The conventional technique for arthrocentesis was first introduced in 1991 by Nitzan et al. who used a two-needle

technique [6]. The specific points for entering the TMJ were derivative from the entry region for arthroscopy as reported by McCain [7]. In 1998, Laskin performed the technique using the same posterior entry point that was applied by Nitzan et al. but placing the anterior needle in point close proximity (3–4 mm) in parallel to the posterior one. In his view, arthrocentesis did not need access to the anterior recess of the joint and such a placement had the feature of being easier to perform [8]. In 2009, Alkan and Kilic used automated irrigation arthrocentesis of the TMJ – ultimately, this represents doubled-puncture arthrocentesis with one of the needles connected to a surgical implant motor. The modification resulted in higher hydraulic pressure in the joint and a shorter duration of the procedure [9]. Arthrocentesis can also be represented with only one needle. Single-needle arthrocentesis with a three-way stopcock was explained by Alstergren et al. in 1995 [10]. To achieve stable access to the TMJ and to make the technique more suitable for the patient, single needle procedure were developed further [11]. In 2008, study by Guarda-Nardini, using a single port technique with a single needle, Rehman and Hall in 2009, applied the Shepard cannula, which has two ports [11], [12]. Şentürk and Cambazoğlu in 2015, classified arthrocentesis methods into single- and double-puncture ones with single-puncture methods subcategorized as type 1 and type 2 [13]. Single-needle procedure use one puncture point with a single needle, while double-needle techniques use two puncture points with two needles. The sub categorization of single-needle techniques reflect differences in the number of needle ports and lumens. The introduction of arthrocentesis was almost immediately followed by reports of various means being employed to visualize the TMJ during the procedure. In 1991, Nabeith and Speculand were the first to use ultrasonography [14]. In 2006, Honda and Bjørnland described a technique for puncturing the upper temporomandibular joint space with the aid of cone beam computed tomography [15]. A meta-analysis in 2020, was reported a randomized clinical trials studies of treatments with arthrogenous TMDs. The analysis reported that pain relief and mouth opening improvements were achieved faster by intra articular injections technique, arthrocentesis and arthroscopy than by conservative treatment methods and recommended the use of minimally invasive procedures (including arthrocentesis) as a first-line surgical treatment in TMD cases preceding to or simultaneously with conservative methods [16].

Arthrocentesis bridging the space between surgical and non- surgical technique

Arthrocentesis is described for persons with internal TMJs disordered and not responding to conservative clinical management. It is indicated in patients suffer from anterior disc displacement with or without reduction [17]. Arthrocentesis has been significantly reported to be up to 91% effective in treating patients with anterior disc displacement without reduction [18], [19], and [20]

Studies recorded that arthrocentesis can produce long-term pain relief and dysfunction within patients with internal derangements of the TMJ [21], [22]. Findings of a study by Frost *et al* reported that arthrocentesis is considered as a first line technique for the treatment of chronic and acute closed lock TMD in internal derangement [23]. In similar manner, study by Thomas *et al* also reported in their findings that arthrocentesis is a useful procedure for treatment of acute closed lock of TMJ [24].

Arthrocentesis also can be applied in cases of disc adhesions, either next to the fossa or/ and the area in upper side of the articular tubercle, with difficult mouth opening (17). Studies reported that, in conditions of closed lock, the central portion of healthy disc actually separates away from the fossa, in turn, leaving rims fastened to surface of eminence so raised negative pressure in closed space in regain between fossa and disc. Actually the negative pressure difference constitutes a force appropriate to help the disc compressed versus the fossa (suction cup effect) [25], [26]. Arthrocentesis technique in turn, eliminate this negative pressure, then cause loosens of the adhered disc, and reinstitutes the sliding free movement. In the same time, it helps the joint to be reassume

its movement normally bringing about recovery of intra-articular pressure fluctuations, which in turn lead to normal perfusion of nutrients and medications. Thus, individuals with adhesion of the disc, there was marked with significant improvement in decreased deviation in addition to mouth opening [27].

In addition, this technique can be used in management of synovitis /capsulitis not responding to nonsurgical treatment [17]. Substantial concentrations of inflammatory mediators constituents related with the pain, have been found in synovial fluid among patients with painful TMJs dysfunctional. Lavage procedures of the upper joint space can reduces pain by certainly removing inflammation mediators from the joint regain [28].

Several studies reported that, arthrocentesis management can be implemented as palliation treatment for degenerative osteoarthritis [17], [27] and [29]

Individuals with TMJ osteoarthritis suffer from early morning stiffness in TMJ, with significant severe joint pain, in addition to limitation in mouth opening and function along with obvious swelling in the respective area [25]. All the previous symptoms arise related with increased intra articular pressure and joint overloading status, which cause sclerosis of subchondral bone [30], compromised blood supply which is related with a pain, and obscurity of elimination of inflammatory substrates which are removed normally during mobilization of the joint. (25). Arthrocentesis forces technique, can apart the constituents of the joint and also washes away and taken away inflamed synovial fluid, thereby reducing pain and loading effect thus alternately increasing and restore normal mouth opening [31],[32].

In addition, this technique can be used in treatment persons with painful joint noises occurring during mouth opening or / and closing [17]. Sounds of the clicking Joint could be discontinuous or constant which is caused by disc displacement. Arthrocentesis technique can distends the upper joint regain thereby induce removing the lag, and disc-condyle complex moves synchronously in turn can reducing the clicking of the jaw [31].

2. Conclusion

It appears that reasonable to summarized, arthrocentesis technique of TMJ disorders, is considered as appropriate management in certain conditions related with TMD because it is less invasive, very simple, and highly effective procedure, also it is inexpensive. It is a specific technique related with a low complications rate and clinically high benefits. These distinctive characteristics make arthrocentesis a valid technique option for individuals complained from TMJ disorders not responding for nonsurgical treatment.

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