Int. J. Oral Maxillofac. Surg. 2017; xxx: xxx–xxx
http://dx.doi.org/10.1016/j.ijom.2017.06.025, available online at http://www.sciencedirect.com

International Journal of Oral & Maxillofacial Surgery

Clinical Paper
TMJ Disorders

Outcomes of office-based temporomandibular joint arthroscopy: a 5-year retrospective study

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R. H. Hossameldin, J. P. McCain: Outcomes of office-based temporomandibular joint arthroscopy: a 5-year retrospective study. Int. J. Oral Maxillofac. Surg. 2017; xxx: xxx–xxx.

Abstract. Temporomandibular joint (TMJ) arthroscopy is a minimally invasive surgical approach for intra-articular TMJ diseases. Office-based arthroscopy using the smallest TMJ scope allows for good visualization, as well as the ability to lavage the joint in an office setting. This study aimed to assess the efficacy of an office-based TMJ arthroscopic technique. A retrospective evaluation of 363 patients with a TMJ disorder was performed. These patients underwent office-based arthroscopy using the OnPoint 1.2 mm Scope System (Biomet Microfixation, Jacksonville, FL, USA) in Florida, USA, from July 2007. The following outcomes of the procedure were assessed: improvement in painless range of mandibular motion, pain on loading, and functional jaw pain; these were evaluated using a visual analog scale (VAS) over an average follow-up period of 263.81 ± 142.1 days. The statistical analysis was performed using IBM SPSS Statistics version 20. Statistically significant improvements in TMJ pain and function, and other variables ($P = 0.001$) were shown following TMJ arthroscopic lysis and lavage. Office-based arthroscopy using the OnPoint System was demonstrated to be a safe and efficient procedure for the treatment of patients with TMJ disorders as the first level of the algorithm of care.

Key words: TMJ; arthroscopy; office-based; TMD; minimally invasive.

Accepted for publication 26 June 2017

'Temporomandibular joint disorder' (TMD) is a collective term describing several clinical problems that include the masticatory musculature, the temporomandibular joint (TMJ) and associated structures, or both[1]. The symptomatology may include pain in the masticatory muscles, in the TMJ, and in associated hard and soft tissues[1]. Other symptoms may include reduction in mandibular range of motion (ROM), the presence of TMJ sounds, and/or headaches and facial pain[2,3].

TMJ diseases affect approximately 10 million people in the USA[4]. Seventy-five percent of adults show at least one sign of joint dysfunction on examination and as many as one third have at least one clinical symptom[5,6]. Causes of TMD are complex and are most likely multifactorial. Capsule inflammation or damage and muscle pain or spasm may be caused by abnormal occlusion, parafunctional habits (teeth grinding, teeth clinching, lip biting),

0901-5027/000001+08

Please cite this article in press as: Hossameldin RH, McCain JP. Outcomes of office-based temporomandibular joint arthroscopy: a 5-year retrospective study, *Int J Oral Maxillofac Surg* (2017), http://dx.doi.org/10.1016/j.ijom.2017.06.025

stress, anxiety, or abnormalities of the intra-articular disc[7].

Given the challenges of diagnosis of the etiology of TMJ diseases, most practitioners start with conservative non-surgical therapy and then use more invasive modalities of TMJ surgical management to address persistent TMJ derangement[8–12]. Following non-surgical management, various arthroscopic treatments exist, ranging from minimally invasive surgery through a range of more advanced procedures. Arthroscopic management of the TMJ has excellent reported results following failed non-surgical therapy. Smolka et al. treated 45 patients with TMJ internal derangement with arthroscopic lysis and lavage. The success rate was 87% postoperatively when evaluating pain and mouth opening[13]. In a larger retrospective study of over 4800 TMD patients, McCain et al. found that clinical outcomes (ROM, pain, diet, and disability) improved significantly following arthroscopic surgery over a follow-up period ranging from less than 6 months to 2 years postoperative[14].

In some cases of TMJ disease it is difficult to assess whether an open or more invasive surgical procedure is indicated based on magnetic resonance imaging (MRI) findings and clinical examinations. The availability of a 'real-time' diagnostic imaging system at the onset of surgical treatment may alleviate the need for more invasive surgical procedures and help guide the clinician to less invasive/traumatic surgery[15,16].

One of the diagnostic and surgical management approaches for TMJ diseases is office-based primary TMJ arthroscopy using the OnPoint 1.2 mm Scope System (Biomet Microfixation, Jacksonville, FL, USA). The OnPoint System provides real-time visualization of the superior joint space, as well as the ability to lavage/treat the joint in an office setting. This system has diagnostic capabilities immediately before and during surgery, thereby maximizing treatment options. Additionally, it offers the potential to reduce costs by allowing certain patients to be treated in an office setting rather than in the operating room[17,18].

In 2010, Israel stated that there was no statistically significant difference in outcomes when performing primary TMJ arthroscopy in the office setting compared to the operating room under general anesthesia in terms of pain reduction and improvement in ROM ($P = 0.064$). This gave a logistical advantage to office-based arthroscopy, since it costs less than performing the procedure in an operating room environment[19].

However, information remains incomplete regarding the ability to (1) diagnose patients successfully during office-based visits, and (2) document the outcomes of patients treated in an office setting (TMJ arthroscopic lysis and lavage procedure) following diagnosis[20].

The aim of this study was to examine the clinical safety and efficacy of the OnPoint System in an office setting, as well as to gauge the ability of the system to improve the diagnostic accuracy of TMJ diseases. The hypothesis was that surgically indicated TMD patients would be assessed accurately during their office visit using a minimally invasive approach that would produce an excellent clinical outcome.

Materials and methods

All consecutive patients who were treated for TMJ diseases by office-based arthroscopy at MiamiOMS, Miami, Florida, USA, from July 2007, were evaluated.

To be included in the study sample, patients had to meet the following inclusion criteria: (1) clinical diagnosis of articular disorder of the TMJ (pain, clicking, and/or locking); (2) unilateral or bilateral TMJ involvement; (3) failed conservative, non-surgical treatment for a minimum of 2 months; (4) MRI study done for the assessment of internal derangement of the TMJ; (5) internal derangement of the TMJ ranging from Wilkes stage I to stage V[21].

Patients who had condylar tumors and those who had undergone any prior surgery were excluded as study subjects.

The guidelines of the Declaration of Helsinki were followed in this investigation. This research was granted an exemption in writing.

Outcome variables

Preoperative and postoperative clinical assessments were performed on all patients, including patient history and a physical examination. The chief complaint, history of present illness, history of medications, imaging assessment (panoramic radiography, MRI), maximum inter-incisal opening (MIO), direct and indirect joint loading, joint noise (click, crepitations), and an assessment of muscle and joint pain were recorded. The Wilkes classification of various internal derangements of the TMJ was selected; however, the final staging of internal derangement was determined after performing the primary single-puncture office arthroscopic procedure. A visual analog scale (VAS) ranging from 0 to100 (0 representing maximum pain/dysfunction and 100 representing no pain/proper function) was used to score pain and function at the first visit and last visit. These clinical assessments were analyzed to determine the outcome in regards to success or failure. The primary outcome variable of success or failure was determined by the reduction in joint pain postoperatively. Secondary outcome variables included joint function, MIO, need for medications, joint loading sign, and muscle pain.

Surgical technique

Prior to the induction of intravenous sedation, the patient's MIO was obtained. The patient was lightly sedated to facilitate opening and closing of the mouth and moving the mandible in excursive positions. Local anesthesia (2% lidocaine with 1:100,000 epinephrine) was injected superficially beneath the skin at the planned fossa portal, lavage portal, and insufflation portal using a 30-gauge needle on a dental anesthesia syringe. Insufflation of the superior joint space with 2% lidocaine via a 22-gauge needle on a 3-ml syringe was performed while placing the opposite thumb over the planned puncture site until the joint space was adequately filled while the jaw was maintained in an open and forward position by the patient.

The OnPoint 1.2 mm Scope System was used for the diagnostic and surgical procedures. The OnPoint System consists of a console, monitor, and disposable kit. The system also includes a disposable arthroscope, cannulas, trocars, and a 22-gauge lavage needle, along with other disposable items, which eliminates the need for sterilization.

Following local anesthesia, the superior joint space was entered. Entry was similar to the traditional fossa portal technique by entering the superior joint space at the maximum concavity of the glenoid fossa, followed by the insertion of the outflow lavage needle to establish lavage track. After the outflow port was made with the 22-gauge needle, arthroscopic arthrocentesis was initiated with continuous irrigation and lavage using 160 ml lactated Ringer's solution with 1:300,000 epinephrine for lysis and lavage (Fig. 1). A diagnostic sweep of the arthroscope was done to tackle and visualize and examine the seven points of interest of the superior joint space: medial synovial drape, pterygoid shadow, retrodiscal tissue, posterior slope of the glenoid fossa, articular disc position and dynamics, intermediate zone, and anterior recess. During this procedure, any small adhesions were lysed with the

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