



An audit of 405 temporomandibular joint arthrocentesis with intra-articular morphine infusion

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SUMMARY. The management of refractory pain in the temporomandibular joint (TMJ) is both challenging and controversial. Arthrocentesis is a simple technique that can be used instead of more invasive procedures in patients with pain that fails to respond to conventional conservative measures. We undertook an audit of 405 arthrocenteses in 298 patients over a 10-year period who had refractory pain in the TMJ. The pain was assessed subjectively by a visual analogue scale, both before arthrocentesis and at 1 and 6 months, and 1 year afterwards. A significant reduction in pain score was found after arthrocentesis ($P < 0.001$) and 269 patients (90%) found the procedure beneficial. We recommend arthrocentesis as an effective, minimally invasive technique in patients with continuing pain in the TMJ that is unresponsive to conservative management.

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INTRODUCTION

Dysfunction of the temporomandibular joint (TMJ) is a therapeutic challenge for oral and maxillofacial surgeons. Such disorders may cause pain, sounds such as clicking or crepitus, and irregular or deviating jaw function.^{1,2} It has been suggested that classification, diagnosis, and treatment of TMJ pain and dysfunction can be based on the position and shape of the TMJ disc.^{3–5} The question of whether disc displacement is the result, cause, or an accompanying factor in dysfunction remains open to debate. Arthroscopic studies have confirmed the concept that inflammatory processes of the synovium, capsule or retrodiscal tissue are the underlying causes of TMJ related pain. Substantial concentrations of inflammatory mediators of pain have been found in synovial fluid in patients with painful dysfunctional TMJs.^{6–8}

Controversy continues to surround the role of surgery in the management of pain and dysfunction of the TMJ, although only about 5% of all patients being treated for TMJ disorders are actually operated on.^{9,10} Arthrocentesis is now increasingly recognised as first line surgical intervention in patients who do not respond to conservative management. The physical action of lysis and lavage in the superior joint space rather than repositioning the disc is thought to be responsible for the success of this procedure.^{11–13} The use of intra-articular morphine has been described in arthrocentesis of the TMJ and arthroscopy of the knee with good clinical effect,^{14–16} and suggests that opiate receptors may be present within

the TMJ. Indeed the effects of intra-articular morphine have been reversed with naloxone.¹⁶ Arthrocentesis with intra-articular morphine injection has therefore been adopted in our practice as first line surgical intervention in patients in whom conservative management has failed.

These measures included all or some of the following: a soft diet, jaw exercises (either patient directed, or in more severe cases after a course of active physiotherapy), non-steroidal analgesic agents, and bite-raising appliances.

We audited the efficacy of arthrocentesis in the management of patients with pain and dysfunction of the TMJ that was refractory to conservative treatment. A total of 405 arthrocenteses were performed over a 10-year period (1993–2002) for 298 patients. To our knowledge, this is the largest reported series. Pain was assessed subjectively using a visual analogue scale (VAS), both before arthrocentesis at 1, 6 months, and 1 year after the procedure.

METHODS

All patients included in this study had failed to respond to conservative management such as limiting mouth opening, soft diet, remedial exercises, physiotherapy, analgesics, or bite-raising appliances. The pain had been present for varying periods ranging from less than 6 months to 5 years or longer. Patients were asked to rate their TMJ pain subjectively using a VAS, with 0 being no pain and 10 the worst pain imaginable. The same VAS

was used throughout the study. A total of 298 patients (405 joints) were treated. All procedures were carried out by the same operator (VI). Pain scale was recorded preoperatively, and 1 and 3 months and 1 year postoperatively. At the end of this period, patients were asked whether they would have the same procedure again. Exclusion criteria included any previous invasive procedures on the TMJs, evidence of psychological problems (including the diagnosis of atypical facial pain or clinically evident depression) or gross anatomical joint discrepancy. The latter was assessed by magnetic resonance imaging (MRI) in patients with symptoms of protracted mechanical restriction. The VAS scores were tabulated preoperative and postoperative values were compared. The pain scores were assessed statistically by the chi square test, using Arcus Quickstat Biomedical software (Longman, Cambridge, UK). As this was a retrospective audit, there was no control group for comparison.

TECHNIQUE OF ARTHROCENTESIS

The procedure was performed as a day case under general anaesthesia. The TMJ was palpated and the upper joint space enlarged by downward and forward displacement of the mandible by an assistant. The upper joint space was entered with a 19-G needle and an outflow portal was created with a second 19-G needle. The joint was lavaged with 50 ml of 0.9% normal saline solution.

At the end of the procedure, morphine 10 mg (in 1 ml) was infused into the joint, followed by gentle manipulation.

RESULTS

Of the 298 patients included in this study, most were female (268 female, 30 male). The ages ranged from 15 to 75 years (median 44 years). Bilateral TMJ pain occurred in 107 patients (36%). Most patients recorded their pain prior to arthrocentesis as greater than 5 on a visual analogue scale (Table 1). There was no obvious difference in pain scores in patients with unilateral or bilateral TMJ pain.

There were no adverse effects of arthrocentesis such as weakness of the facial nerve, and patients were discharged home with simple analgesics. The pain scores

recorded on the VAS before the arthrocentesis and 1 and 6 months, and 1 year later are shown in Table 1. There was significant reduction in pain score after arthrocentesis (chi-square = 366.95, $P < 0.001$) After 1 year, 269 patients (90%) stated that they found the procedure helpful and said that they would have it again if their symptoms worsened. Twenty-nine patients (10%) did not find the procedure helpful.

DISCUSSION

Arthrocentesis is effective by lysis and lavage of the joint space, thereby breaking down adhesions and removing inflammatory mediators. In this study, pain scores alone were studied as increased pain results in decreased mouth opening and increased joint dysfunction.¹⁷ Relief of pain leads to improvement of both mouth opening and dysfunction. In our study the success rate, as judged by reduction of pain scores after 1 year was 90%, which is similar to other studies that have reported pain relief in up to 98% of cases.^{11,13} However, these were small studies of less than 20 patients each.

Intra-articular morphine after arthroscopy of the knee has a considerable effect on pain and the effect can be reversed by the use of intra-articular naloxone, which confirms the presence of opiate receptors in knee joints.^{15,16} An extensive meta-analysis of the use of intra-articular opiates has confirmed a definite, mild analgesic effect. However, it is still not clear if this is dose dependent.¹⁸ Intra-articular opiates in the TMJ are more controversial. Bryant *et al.* found no advantage when compared with placebo in 21 patients although they used a mixture of morphine and naloxone.¹⁹ Ho *et al.* described significant benefits of intra-articular morphine injection after arthrocentesis of the TMJ.¹⁴

Before intra-articular morphine was used routinely in our patients, we undertook a pilot study in 40 patients to find out which was the best drug for relieving pain after arthrocentesis. Ten patients were each injected intra-articularly with morphine (10 mg), fentanyl (25 µg in 1 ml), bupivacaine (1 ml of 0.5% solution), or normal saline (1 ml).

We found that both bupivacaine and fentanyl had pain-relieving effects for only 8–12 hours, saline had no analgesic effect, and morphine was most effective, relieving pain for several days or weeks. Although fentanyl is a more potent analgesic agent than morphine, we thought that because of its high lipid solubility, it was more rapidly eliminated from the joint capsule. Others have found local anaesthetic agents to be more beneficial.^{20,21} We are currently undertaking laboratory-based studies to look for opiate receptors in the TMJ.

We noted that 90% of patients would, if indicated have the procedure again. Twenty-nine patients did not find

Table 1 Pain scores (0–10) recorded for pain in the TMJ before arthrocentesis and at three postoperative visits

Pain score	Before arthrocentesis	Months postoperatively		
		1	6	12
0	0	39	124	144
5 or less	10	193	110	88
6 or more	288	66	64	66

the procedure useful, 10 of these patients had initial pain scores less than 5 and the remaining 19 had pain scores of 10 on VAS. It is possible that these 29 patients had minimal inflammation in the TMJ, and had pain arising from associated masticatory muscle spasm rather than directly arising from the TMJ itself.

Our results are encouraging and show a significant improvement in TMJ pain after arthrocentesis. The procedure is a simple, minimally invasive, and effective day case procedure and we recommend its use as first line intervention in patients with pain in the TMJ that is refractory to conservative treatment.

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