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Comparative study in patients with symptomatic internal derangements of the temporomandibular joint: analgesic outcomes of arthrocentesis with or without intra-articular morphine and tramadol

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Abstract

Our aim was to find out whether pain was better controlled if morphine or tramadol was injected intra-articularly after arthrocentesis with Ringer's lactate in patients with painful temporomandibular joints (TMJ). This placebo-controlled, double-blind study involved 30 patients who had not responded to conservative treatment and who were divided randomly into 3 groups of 10 patients each. All patients had arthrocentesis, and the drugs were given as intra-articular injections immediately after the procedure. One group was give 5% Ringer's lactate 1 ml, the second morphine 1 mg, and the third tramadol 50 mg. Visual analogue scales (VAS) for pain were recorded at maximum mouth opening and at rest before intra-articular injection and after 15 and 30 min; at 1, 2, 3, 8, 12, 24, 36 and 48 h; and at 1, 3, and 6 monthly follow-up. The mean (SD) VAS decreased from 6.90 (1.45) to 2.6 (2.5) in the control group, from 7.30 (1.64) to 1.20 (0.79) in the morphine group ($p = 0.005$), and from 7.10 (1.73) to 1.50 (1.78) in the tramadol group ($p = 0.005$). We conclude that morphine given by intra-articular injection after arthrocentesis gives a significant, sustained (6 months) improvement in pain relief compared with simple arthrocentesis alone. The effect was similar with tramadol except that it was shorter lived.

Keywords: TMJ; Arthrocentesis; Injections; Intraarticular; Analgesia; Morphine; Tramadol

Introduction

Symptomatic derangement of the temporomandibular joint (TMJ) is a therapeutic challenge. Although it is difficult to find out the precise reasons for the symptoms, studies have confirmed that inflammation is among the causes of TMJ-related pain. Substantial concentrations of inflammatory mediators of pain have been found in the synovial fluid in patients with painful dysfunctional TMJ.[1,2]

Arthrocentesis is a simple and minimally invasive technique that is a highly effective way to wash out the inflammatory mediators and relieve intra-articular pain. The direct action of drugs instilled on to intracapsular receptors also reduces pain. Recently, an increasing number of controlled clinical trials have shown the analgesic efficacy of opioids given locally for postoperative pain.[2,3] Opioids have been given into various peripheral sites and their analgesic effects studied. There is increasing evidence, particularly in inflamed tissue, that exogenous opioids can produce potent analgesic effects by interacting with opioid receptors outside the central nervous system.[4–6]

Morphine is a widely-used opioid that is accepted as the most effective treatment for pain. Tramadol is an opioid

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used to manage pain, which has a similar analgesic effect to morphine.[7–9] The aim of this study was to find out whether morphine or tramadol injected intra-articularly after arthrocentesis with Ringer's lactate controlled the pain, and to find out whether this effect persisted.

Patients and methods

The study was approved by the Ethics Committee of Marmara University School of Medicine (0094), and informed consent was obtained from all patients.

Thirty patients (25 women and 5 men aged between 16 and 50 years) had their internal derangements of the TMJ classified as Wilkes stage III or higher according to magnetic resonance images (MRI). Only patients who did not respond to conservative management were included. All patients had complained of pain for periods varying from 6 months to 5 years. The exclusion criteria were: the presence of any systemic disease, a history of drug abuse, current use of opioids, and allergy to either of the experimental drugs.

The MRI scans were obtained preoperatively at T1-weighted, T2-weighted, and proton sequences. All groups had internal derangements with anteriorly displaced articular discs in the sagittal plane that would not reduce, and varying amounts of effusion in the upper synovial compartment.[10,11] No scans were obtained after arthrocentesis.

Patients with confirmed internal derangements were referred to the Department of Prosthodontics for treatment with splints. An anterior-guided occlusal splint was fabricated, which the patient wore for not less than 8 h a day for three months. Occlusal adjustments were made at each appointment. Anti-inflammatuary agents, muscle relaxants, and physiotherapy (mouth stretching exercises) were recommended in addition.[12]

The patients who did not respond to conservative management were selected for arthrocentesis, and were divided randomly into three groups using sealed envelopes.

All three groups ($n = 10$ in each) were treated by arthrocentesis and the drugs were given as intra-articular injections just after the procedure. All local anaesthetics and arthrocentesis were done by the same surgeon.

Surgical technique

The surface of the skin was disinfected with povidone iodine, and local anaesthesia achieved with 2% articaine hydrochloride 0.5–1 ml (DS Forte Ultracain®; Aventis) by injecting it into the joint cavity and withdrawing the needle gently. A 20-gauge needle was placed into the upper joint space about 10 mm in front of, and 2 mm below, the tragus. After distention of the superior compartment with Ringer's lactate 2 ml, another needle of the same diameter was placed roughly 20 mm anterior, and 8 mm below, the tragus. A syringe of solution was injected into the superior joint space through the first needle under pressure and the second needle provided the outflow. The joint was effectively irrigated with Ringer's lactate 60–100 ml. After the lavage, one of the needles was removed and the study drug given gently through the remaining needle.

One group was given 5% Ringer's lactate 1 ml, the second morphine 0.01 g (morphine hydrochloride, Galen) made up to 10 ml with Ringer's lactate, and in the third tramadol 50 mg (half an ampoule of Contramal100 mg, Abdi İbrahim) was mixed with 5% Ringer's lactate 1 ml. The control group were given only Ringer's lactate (Eczacıbaşı) 1 ml. The injections were prepared outside the operating theatre and marked as A, B, or C by the nurse. The drug given was recorded on the patient's follow-up chart and neither the surgeon nor the patient were aware of which they had had.

Patients were also give tenoxicam 20 mg if needed, and instructed to record the total amount of the drug used postoperatively, together with their visual analogue score (VAS) for pain, on which 0 = no pain, and 10 = the worst pain imaginable.

The patients were evaluated before the procedure and postoperatively at 15 and 30 min; 1, 2, 3, 8, 12, 24, 36, and 48 h; and 1, 3, and 6 months. VAS pain scores were recorded.

The preoperative and postoperative 15 min, and 1, 3, and 6 month values were recorded by the surgeon, whereas the postoperative 30 min, and 1, 2, 3, 8, 12, 24, 36, and 48 h values were recorded by the patients on their follow-up charts. Maximum mouth opening, assisted mouth opening, and the degree of lateral and protrusive movements were measured and evaluated preoperatively, and at 1, 3, and 6 months by the surgeon.

Statistical analysis

We used IBM SPSS Statistics for Windows (version 20.0, IBM Corp, Armonk, NY, USA) for the statistical analysis. Descriptive statistics are expressed as mean (SD), and number (%). The distributions were tested for normality using the Shapiro–Wilk's test. One-way analysis of variance (ANOVA) was used to assess the significance of differences among the measurements in the three groups. Absolute values were not normally distributed, so we used the non-parametric Kruskal–Wallis test to assess the significance of differences. When results of the Kruskal–Wallis test indicated that the difference was significant, the significance of between-group differences was calculated with the help of the Bonferroni–Dunn test.

When a normal distribution had been established in the analysis of the differences in certain dependent measurements, the t test for paired samples was used, while theWilcoxon signed-ranks test was used when this could not be established. The significance of differences between the qualitative data were assessed using the chi square or Fisher's exact test as applicable, because of the small sample size. The results are presented with test statistics and p values. Probabilities of less than 0.05 were accepted as significant.