

BASAL JOINT ARTHRITIS OF THE THUMB: A PROSPECTIVE TRIAL OF STEROID INJECTION AND SPLINTING*

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INTRODUCTION

Non-operative treatment for trapeziometacarpal (TM) arthritis is often attempted prior to operative intervention. Initially, non-operative treatment of TM arthritis entailed only splinting and oral non-steroidal anti-inflammatory medications¹; however, as intra-articular injections of corticosteroids for the treatment of arthritis became accepted, physicians started utilizing this measure as one of the principle non-operative treatment measures for TM arthritis². While there have been several reports on the results of operative treatment, there have been no well-controlled clinical prospective studies investigating the effectiveness of non-operative management.

The purpose of this study was to evaluate prospectively the effectiveness of a single corticosteroid injection and three weeks of splinting for TM arthritis, and to correlate its effectiveness based on an established radiographic staging system of trapeziometacarpal osteoarthritis^{1,3}. Our hypothesis was that corticosteroid injection and splinting would provide temporary relief of symptoms due to TM arthritis irrespective of the radiographic stage.

MATERIALS AND METHODS

A prospective study of the non-operative treatment of TM arthritis by corticosteroid injection and splinting was initiated in March 1998. A consecutive series of thirty seven patients

were registered in the study. All patients were called back for the purpose of this study; seven patients were lost to follow up. Thirty patients were included in the analysis. The average period of follow-up was 25 months (range, 18 – 31 months). The average age of the patients at the time of injection was sixty-one years (range, 41 – 80 years). There were three men and twenty-seven women.

For inclusion in the study, patients had pain isolated to the base of the thumb, tenderness over the TM joint, a positive grind test⁴, and x-ray findings of arthrosis or joint subluxation. Patients who had previous treatment for TM arthritis were excluded from the study.

Prior to injection, all patients completed a DASH⁵ outcomes questionnaire evaluating pain severity, duration of symptoms, disease side, hand dominance, habit of smoking, and difficulty performing daily activities such as opening a jar or turning a key. At the first follow-up visit, six weeks after the injection, and at final follow up (18 to 31 months after the injection), the DASH outcomes questionnaire was re-administered. At the six week follow up, all patients were asked if they had experienced pain relief at one month after injection. At final follow up, all patients were asked if they had experienced pain relief at three months, twelve months and eighteen months after injection. Three radiographic views of the thumb were taken at the initial visit to classify the disease according to Eaton³. Three hand surgeons graded each thumb independently. The recorded stage of the disease was the majority vote of the three surgeons. At final follow up, grip strength and key pinch values were recorded bilaterally.

The solution injected into the TM joint contained 1.0 milliliter of depo-medrol (forty milligrams per milliliter), 0.5 milliliter of 1 per cent lidocaine without epinephrine, 0.5 milliliter of 0.5 per cent marcaine without epinephrine, and 0.5 milliliter of bicarbonate. The injections were performed by the two senior hand surgeons in a standard fashion. The TM joint was palpated with the left thumb while the right hand adducted and abducted the patient's thumb. The injection was then performed with a 25-gauge needle just proximal to the radial base of the thumb metacarpal bone, volar to the extensor pollicis brevis tendon. The needle was angled 45 to 75 degrees distally, manipulated until it was not abutting bone, advanced until it pierced the joint capsule, and the solution was injected. Joint inflation was confirmed by palpation during the injection process. The TM joint was then splinted with a pre-made cloth thumb spica splint according to size for three weeks.

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For statistical analysis, the chi-square statistic was used to determine the statistical significance between categorical variables; for continuous variables, comparison of the means was assessed using the student t-test.

RESULTS

Six of thirty thumbs were radiographically graded as stage 1, seven were stage 2, ten were stage 3, and seven were stage 4 disease. The patients had been experiencing pain in the base of their thumbs for an average of 18 months (range, 6 – 96 months) at the time of the first clinic visit. Sixteen patients had arthritis in the right thumb, and fourteen had arthritis in the left thumb; twenty-seven patients were right hand dominant, and three were left hand dominant. Of these numbers, seventeen patients had arthritis in their dominant thumbs, while thirteen patients had disease in their non-dominant thumbs. Twenty four patients were non-smokers, and six were smokers. The pre-injection pain score on an analog scale of 1 to 10 averaged 7.8 (range, 5 – 9). Daily activities such as opening a jar or turning a key were graded as ‘severely’ difficult on the DASH questionnaire.

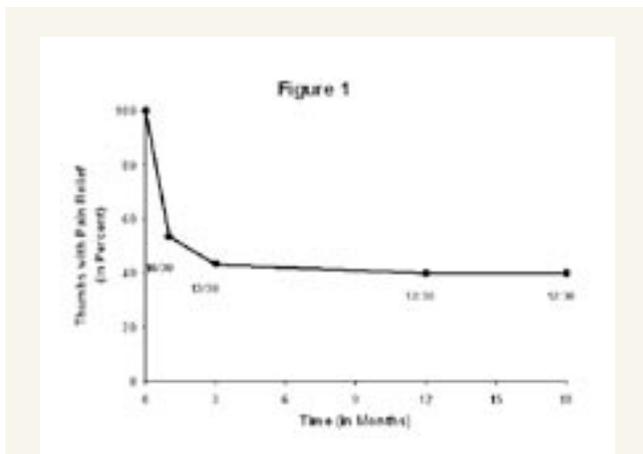


Figure 1: The percentage of all thumbs in the study with pain relief after a single injection of corticosteroids and three weeks of splinting over time. The one month data was gathered from the six week follow up visit. The three, twelve, and eighteen month data was gathered from the final follow up visit. The actual number of thumbs out of thirty at each time point was listed.

SIX WEEK AND FINAL FOLLOW-UP

Thirteen patients (43%) experienced a mean improvement in pain intensity of 5.5 points (range, 3 – 7) at six week follow up. Seventeen patients (57%) did not experience relief. Of the thirteen patients with initial symptomatic relief, twelve (92%) continued to experience relief at final follow up, lasting an average of 21 months (range, 13 – 29 months; Figure 1). There was a corresponding improvement in the patients’ ability to perform daily activities from ‘severely’ difficult to ‘minimally’ difficult. For the twelve patients who had sustained symptomatic relief at the time of final follow-up, average grip strength was 95% (range, 85 – 105%), and average key pinch strength values were 90% (range, 85 – 113%) of the contralateral side.

Only one patient who had pain relief at six weeks did not have long-term relief, and underwent a tendon interposition arthroplasty procedure twelve months after the injection.

The seventeen patients who did not experience pain relief from the injection at the six week follow-up did not improve subsequently. Eleven patients (65%) underwent either a tendon arthroplasty (n = 9) or an arthrodesis (n = 2) of the TM joint of the thumb. Of those patients who did not have symptomatic relief yet did not undergo surgery, average grip strength was 65% (range, 36 – 82%), and average key pinch strength values were 70%, (range, 50 – 94%) of the contralateral hand. The differential in grip and pinch strength values of the patients who did not experience pain relief was significantly more than the differential in those who did experience relief from the injection (p < .05).

DATA BASED ON EATON STAGING

In Eaton stage 1 disease, five of six patients (83%) had relief from the corticosteroid injection for the duration of the study (average, 23 months; range, 18 - 29 months). In stages 2 and 3 disease, seven patients (41%) experienced relief at six weeks; six of these patients (35%) had relief at final follow-up (average, 19 months; range, 15 – 26 months). Nine patients (53%) underwent basal joint surgery. In stage 4 disease, six of seven patients (86%) did not experience any pain relief, and three (43%) underwent surgery (Figure 2). It is statistically unlikely (p < .05) that the long term positive response rate in stage 1, the positive response rate in stages 2 and 3, and the negative response rate in stage 4 could have been achieved by chance.

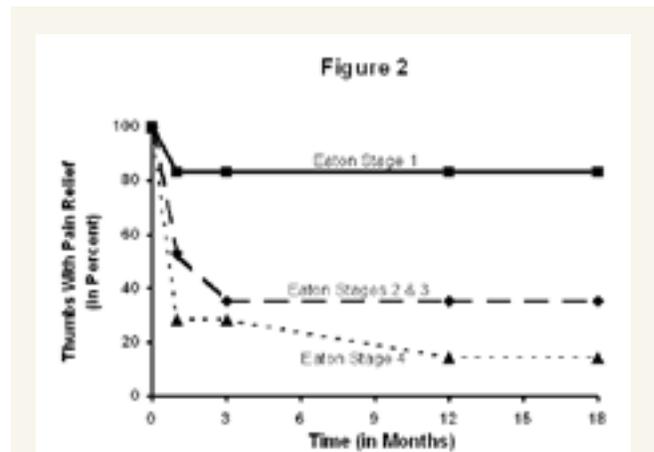


Figure 2: The percentage of thumbs divided according to Eaton radiographic staging with pain relief after a single injection of corticosteroids and three weeks of splinting over time. For stage 1, n = 6. For stages 2 and 3, n = 17. For stage 4, n = 7.

Disease-side, hand dominance, and smoking status did not affect the injection outcome (p > .05 for each comparison).

DISCUSSION

While current non-operative treatment options for the management of TM arthritis have included trials of nonsteroidal anti-inflammatory medications, thumb spica splinting and intra-articular steroid injections^{6,7}, there have been no studies to assess prospectively the effectiveness of these measures either alone or in combination. Swigart *et al.* reported on a retrospective analysis of one hundred and thirty thumbs treated with splinting for 3 - 4 weeks. Seventy six percent of patients with Eaton stage 1 or 2 disease and 54% of patients with stage 3 or 4 disease reported an improvement in symptoms at six months follow up⁸. Weiss *et al.* performed a short-term prospective analysis of the effectiveness of two different thumb spica splints for TM arthritis. Twenty-six patients were randomized into two groups, each began treatment wearing either a long or short thumb spica splint. The authors found that both types of thumb spica splints were equally effective insofar as pain reduction was concerned over a two week follow up period⁹. To our knowledge, however, there have been no studies evaluating prospectively the effectiveness of corticosteroid injection and immediate splinting in the treatment of TM arthritis.

Corticosteroid injections have been advocated as an effective method of pain relief in osteoarthritic joints¹⁰⁻¹⁴. There have been several studies reporting subjective improvements in symptoms in a variety of different anatomic areas, including the knees¹³, hips¹⁵, small joints of the hand¹⁶, metatarsophalangeal joints¹⁶, acromioclavicular joints¹⁶, and lumbar facet joints¹⁷. While previous authors have extended the use of corticosteroid injections to the TM joint^{2,18}, it is unclear whether or not intra-articular injections of corticosteroids provides relief beyond the initial 6-8 weeks¹⁹. We elected to study the effects of a combination of a single injection of corticosteroids and splinting based on the most promising results on the treatment of osteoarthritis in other joints and apparent satisfactory results of splinting alone as a modality to treat TM arthritis.^{8,20}

In our prospective analysis of thirty patients with varying radiographic stages of TM arthritis, 40% had significant and sustained relief of pain regardless of radiographic staging. The remaining 60% did not have relief beyond one month (Figure 1). When analyzed according to Eaton's modified radiographic

staging, however, over 80% of the patients with stage 1 disease had sustained pain relief for over 18 months, whereas, less than 25% of the patients with stage 4 disease experienced relief. The ineffectiveness of non-operative treatment for stage 4 disease may be due to the additional involvement of the adjacent scaphotrapezium joint. In stages 2 and 3 disease, however, where there are radiographic changes of joint space narrowing, osteophyte formation isolated to the TM joint, approximately one third of patients experienced long term relief. These data is of direct clinical relevance in the treatment of patients with disease isolated to the TM joint, as the expectations from corticosteroid injections, even in more advanced radiographic disease, can be quantified reliably.

Several limitations must be noted in the interpretation of our finding. Firstly, seven patients were located yet declined follow-up despite repeated attempts to examine them both at the treating clinic and at their homes or place of employment. This study, however, is the largest prospective series examining the non-operative treatment of TM arthritis. Secondly, there may be concern whether or not the injectate was delivered into the TM joint in all patients. All injections were performed by the two senior hand surgeons in this study, and the methodology as described was consistently employed. Moreover, fluoroscopy units are not available widely to check needle placement. The results may, therefore, be more widely generalized as a result.

The findings of this study refute our initial hypothesis that non-operative treatment of TM arthritis achieves only temporary relief from a single corticosteroid injection and three weeks of splinting irrespective of radiographic stage. Our findings demonstrate that non-operative treatment can provide reliably sustained relief during Eaton stage 1 disease. Once osteophytes or joint narrowing is seen radiographically, sustained pain relief is achieved less reliably. Though less frequently achieved, patients without scaphotrapezium arthritis may also experience long term relief if relief is achieved in the short term. Corticosteroid injection followed by splint immobilization may therefore be recommended as the initial treatment for stage 2 or 3 radiographic TM arthritis with a 35% possibility of long term relief.

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