The “Thumbs-up” sign and trapeziometacarpal joint injection: a useful clinical indicator

Jason M. Erpelding · Dimitryi Shnayderman ·
Dara Mickschl · Roger A. Daley · Steven I. Grindel

Published online: 2 October 2014
© American Association for Hand Surgery 2014

The online version of this article (doi:10.1007/s11552-014-9683-1) contains a video, which is available to authorized users

Abstract

Background Several clinical studies investigating the accuracy and efficacy of trapeziometacarpal injection exist. Some studies utilize anatomical landmarks for proper injection placement while others utilize modalities including ultrasound and fluoroscopy. The changes of limb position that occur at the time of intra-articular injection can provide valuable visual and tactile feedback to the clinician. The purpose of this study is to investigate the occurrence of the “Thumbs-up” sign with injection of the thumb trapeziometacarpal joint as a useful and reliable clinical indicator of intra-articular trapeziometacarpal injection and correlate level and duration of pain relief.

Methods Trapeziometacarpal joint injections were performed on twenty-seven thumbs utilizing anatomic landmarks. At the time of injection, the presence or absence of the “Thumbs-up” sign was noted, and needle location was verified after injection with orthogonal mini-C arm fluoroscopic images. Visual analog pain scale scores were obtained pre-injection and by follow-up telephone calls at 1 week, 6 weeks, and 3 months post injection.

Electronic supplementary material The online version of this article (doi:10.1007/s11552-014-9683-1) contains supplementary material, which is available to authorized users.

J. M. Erpelding · D. Shnayderman · D. Mickschl · R. A. Daley ·
S. I. Grindel
Medical College of Wisconsin Department of Orthopaedic Surgery,
MCW Clinics at Froedtert East, 9200 W. Wisconsin Ave.,
Milwaukee, WI 53226, USA

J. M. Erpelding (✉)
Sanford Health, Orthopedics & Sports Medicine, 2301 South 25th
St., Fargo, ND 58103, USA
e-mail: nodakhanddoc@yahoo.com

Results Twenty-four of twenty-seven injections demonstrated a positive “Thumbs-up” sign. There were three negative “Thumbs-Up” injections. The thumbs-up sign demonstrated a 92.3 % sensitivity. Eighteen of twenty-seven thumbs had sustained relief at 3 months post injection.

Conclusions The “Thumbs-up” sign is a practical clinical tool that gives the practitioner important visual feedback at the time of injection. Patient relaxation and joint compliance are limiting factors. The “Thumbs-up” sign is an inexpensive indicator of successful intra-articular injection and may obviate the need and expense of advanced imaging modalities at the time of injection.

Keywords Thumbs-up sign · Trapeziometacarpal joint · Injection

Introduction

Corticosteroid injection of the thumb trapeziometacarpal joint is a common component of the conservative treatment regimen to provide pain relief from degenerative arthritis. Several studies have investigated the accuracy and efficacy of trapeziometacarpal injection utilizing various injection techniques based on anatomical landmarks while others have utilized various modalities including ultrasound and fluoroscopy [1–3, 6–10]. The accuracy of first pass injection rates of the trapeziometacarpal joint without imaging modalities and relying solely on anatomical landmarks vary from 58–91 % [2, 7, 10]. We hypothesize that the changes of thumb position that occur around the time of intra-articular trapeziometacarpal joint injection can provide valuable visual and tactile feedback to the practitioner.

To our knowledge, no study of trapeziometacarpal joint corticosteroid injection has described this novel sign we have coined the “Thumbs-up” sign, or its occurrence with

successful intra-articular trapeziometacarpal joint injection. The “Thumbs-up” sign involves passive extension of the thumb due to an increase in joint pressure that occurs during trapeziometacarpal joint injection. We intended to determine whether the presence or absence of the “Thumbs-up” sign at the time of trapeziometacarpal joint injection was a reliable indicator of an intra-articular injection. We evaluated and correlated the presence or absence of the “Thumbs-up” sign with pain relief by visual analog scale and duration of pain relief.

Materials and Methods

Our study was approved by the Medical College of Wisconsin/Froedtert Hospital Institutional Review Board (IRB# PRO00017043).

Full institutional review board approval was obtained, and all eligible patients prospectively presenting to the clinics of the two senior authors for care of their thumb arthritis and electing to proceed with trapeziometacarpal joint injection were invited to participate in the study. Informed written consent was obtained from all patients for being included in the study. Subjects 18 years of age or older without prior trapeziometacarpal joint surgery were eligible to participate in the study. Over a 4-month period, consecutive trapeziometacarpal joint injections were performed on twenty-seven thumbs in twenty-six subjects by the two hand and upper extremity fellowship-trained senior authors, or a hand surgery fellow. The two senior authors were not involved in collection of post-injection data. One subject was unable to be contacted for their subsequent follow-up VAS scores and was lost to follow-up.

The injection was comprised of 1 mL of 1 % Lidocaine without epinephrine and 1 mL (6 mg) of Celestone Soluspan. The 2 mL was then injected into the trapeziometacarpal joint and the presence or absence of the “Thumbs-up” sign at the time of injection was noted. The needle position was maintained and its position was then localized with two mini-c fluoroscopic images orthogonally oriented (Fig. 1) to determine intra- or extra-articular needle position was achieved. Visual analog pain scale scores prior to and at determined post-injection intervals (1 week, 6 weeks, 3 months) and duration of pain relief were recorded via telephone follow-up calls.

The mean age at the time of injection was fifty-nine (range, 45 to 78 years). There were sixteen females and ten males. The dominant thumb was injected in fourteen patients. The severity of arthritis for each trapeziometacarpal joint was classified according to Eaton Littler Classification [4, 5]. Three joints had stage I arthritis, eight had stage II, twelve had stage III, and four were stage IV.

Fig. 1 Anteroposterior fluoroscopic image verifying intra-articular needle placement following injection

Injection Technique

The trapeziometacarpal joint was localized by palpation. Initial distraction of the thumb was utilized to ease the introduction of the needle into the joint space. Once the needle was in position, the thumb was allowed to rest in a relaxed position without distraction and the 2-mL injection delivered (Fig. 2a). The practitioner then observed for the passive elevation of the thumb (Fig. 2b). Subjects were unaware of the response pre-injection as to the exact nature of thumb movement at the time of injection. The thumb was visually monitored at the time of injection for any signs of active thumb extension by the subject.

Statistical Analysis

The SAS software package, version 9.2 (copyright 2002–2008, SAS Institute, Cary, North Carolina) was utilized, and descriptive summaries were performed. A linear mixed model analysis was used. The differences of least squares means was utilized to determine if significant improvements in VAS occurred from pre-injection VAS to the 3-month VAS. A value of $p < 0.05$ was considered significant.

Source of Funding

No external funding source was utilized for this study.

Results

There were twenty-four positive “Thumbs-up” signs with fluoroscopically confirmed intra-articular needle placement. There were three injections where the “Thumbs-up” sign did not occur. The overall sensitivity of the “Thumbs-up” sign in

Fig. 2 **a.** Clinic photo of thumb position with needle in trapeziometacarpal joint prior to injection. **b** Clinic photo of thumb demonstrating the “Thumbs-up” sign immediately following injection. Note the passive elevation of the thumb with reference to the drape and table edge

our study was 92.3 ± 0.11 % (95 % CI). The mean pre-injection visual analog pain score was 6.39 (range, 3 to 10). This improved in twenty-four of twenty-five subjects to a mean VAS of 2.98 ± 0.42 at 1 week. At 6 weeks post injection, the mean VAS was 2.39 ± 0.42 , and 3.23 ± 0.42 at 3-months post injection. Statistically significant improvements in VAS were seen from the pre-injection VAS to the 1 week, 6 weeks, and 3 months VAS scores. Overall, the mean VAS improved 3.41 points ($p < 0.0001$) at the 1 week, 4.00 points ($p < 0.0001$) at 6 weeks, and 3.15 points ($p < 0.001$) at 3 months post-injection. Nineteen of twenty-six thumbs, 73 %, had sustained relief from the injections at the 3-month time period. Two subjects with Eaton stage II and stage III arthritis were considering trapeziectomy and LRTI at the time of the completion of this study. These subjects both had a positive “Thumbs-up” sign but only received 6 weeks of pain relief from the injection.

There were three negative “Thumbs-up” signs in the study. The first occurrence was felt to be due to poor patient tolerance and the inability of the patient to relax the thumb at the time of injection. This was an Eaton stage II thumb. Fluoroscopy confirmed intra-articular needle placement despite the negative result. The second injection involved delivery of the injection to scaphotrapeziotrapezoidal (STT) joint in an Eaton stage III thumb. This occurred as the needle is introduced without imaging for all injections; the injection was partially delivered due to increased resistance felt, and then verified with fluoroscopy to determine if the needle was in or out of the trapeziometacarpal joint. In this case, it was in the STT joint, and a negative “Thumbs-up” sign resulted. The needle was then redirected into the trapeziometacarpal joint, the remainder 1 mL of the injection delivered. A positive thumbs up sign resulted. This true negative proved to be of value by demonstrating that injection of the STT joint does not produce a false positive “Thumbs-up” sign. Fluoroscopy imaging was then repeated, and the needle was in the trapeziometacarpal joint. The third negative “Thumbs-up” sign was in a subject with severely limited range of motion of the thumb metacarpophalangeal and trapeziometacarpal joints with Eaton IV basilar arthritis.

Intra-articular needle placement was confirmed with fluoroscopy. The first two subjects only received 6 weeks of relief from the injection. The third subject had greater than 3 months of relief.

Discussion

The optimal injection technique and the use of imaging modalities at the time of trapeziometacarpal joint injection are largely in part dependent on practitioner preference and the availability of these modalities. The “Thumbs-up” sign is a practical clinical tool that gives the practitioner important visual feedback at the time of injection. In our series, we found the “Thumbs-up” sign to have a 92.3 % sensitivity of indicating an intra-articular trapeziometacarpal joint injection.

Limitations of the study were the absence of a control group, patient discomfort at the time of needle placement and the ability to relax the thumb. The mobility of the joint being injected is also of importance, as limited passive trapeziometacarpal joint mobility will diminish or potentially eliminate the ability of the joint to passively fill and extend the thumb at the time of injection. We acknowledge the potential limitations of the “Thumbs-up” sign with more advanced stages of arthritis. However, we encountered 13 positive “Thumbs-up” signs in subjects with Eaton stage III or stage IV arthritis. Conclusions regarding stage IV thumbs is limited due to there were only three subjects. Two of these three subjects did have a positive “Thumbs-up” sign.

We encountered only three negative “Thumbs-up” signs, and no false positive “Thumbs-up” signs with injections verified with fluoroscopy not to be in the trapeziometacarpal joint. We were unable to make any statistically significant conclusions regarding overall pain relief or duration between those with and without a positive “Thumbs-up” sign due to the limited number of negative “Thumbs-up” injections. The case of injection of the STT joint did not produce a false-positive result, but a true negative. Then with redirection to the

trapeziometacarpal joint producing a positive “Thumbs-up” at half the normal volume injected for this study of only 1 mL. We recommend conducting further clinical studies to determine if a threshold volume to produce a “Thumbs-up” sign exists.

The “Thumbs-up” sign injection technique utilized at the time of trapeziometacarpal joint injection can eliminate the need of diagnostic modalities such as ultrasound or fluoroscopy guidance at the time of injection. In our series, we found it to be a reliable indicator of a successful intra-articular trapeziometacarpal joint injection.

Acknowledgments We kindly thank Shi Zhao, MS and Sergey Tarima, PhD of the Medical College of Wisconsin Department of Biostatistics for their assistance with data analysis.

Conflict of Interest All authors declare that they have no conflict of interest.

Statement of Human and Animal Rights All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent Informed consent was obtained from all patients for being included in the study.

References

1. Day CS, Gelberman R, Patel AA, et al. Basal joint osteoarthritis of the thumb: a prospective trial of steroid injection and splinting. *J Hand Surg [Am]*. 2004;29(2):247–51.
2. Eaton RG, Glickel SZ. Trapeziometacarpal osteoarthritis: staging as a rationale for treatment. *Hand Clin*. 1987;3:455–71.
3. Eaton RG, Lane LB, Littler JW, et al. Ligament reconstruction for the painful thumb carpometacarpal joint: a long-term assessment. *J Hand Surg*. 1984;9A:692–9.
4. Haara MM, Heliövaara M, Kröger H, et al. Osteoarthritis in the carpometacarpal joint of the thumb. Prevalence and associations with disability and mortality. *J Bone Joint Surg Am*. 2004;86-A(7):1452–7.
5. Helm AT, Higgins G, Rajkumar P, et al. Accuracy of intra-articular injections for osteoarthritis of the trapeziometacarpal joint. *Int J Clin Pract*. 2003;57(4):265–6.
6. Khan M, Waseem M, Raza A, et al. Quantitative assessment of improvement with single corticosteroid injection in thumb CMC joint osteoarthritis? *Open Orthop J*. 2009;3:48–51.
7. Maarse W, Watts AC, Bain GL. Medium-term outcome following intra-articular corticosteroid injection in first CMC joint arthritis using fluoroscopy. *Hand Surg*. 2009;14(2–3):99–104.
8. Mandl LA, Hotchkiss RN, Adler RS, et al. Can the carpometacarpal joint be injected accurately in the office setting? Implications for therapy. *J Rheumatol*. 2006;33(6):1137–9.
9. Meenagh GK, Patton J, Kynes C, et al. A randomized controlled trial of intra-articular corticosteroid injection of the carpometacarpal joint of the thumb in osteoarthritis. *Ann Rheum Dis*. 2004;63(10):1260–3.
10. Pollard MA, Cermak MB, Buck WR, et al. Accuracy of injection into the basal joint of the thumb. *Am J Orthop*. 2007;36(4):204–6.