

Needle-Free Jet Lidocaine Administration for Preinjection Anesthesia in Trigger Finger Injection: A Randomized Controlled Trial

Brandon E. Earp, MD,* Spencer J. Stanbury, MD,* Ariana N. Mora, BA,* Philip E. Blazar, MD*

Purpose To evaluate the efficacy of needle-free jet lidocaine (J-tip) administration for pain reduction in trigger finger corticosteroid injection compared with simultaneous lidocaine injection with corticosteroid.

Methods A prospective randomized clinical trial was performed in which patients received either 0.25 mL of 2% lidocaine administered by J-tip just prior to 0.5 mL of corticosteroid injection by needle or 0.5 mL of 1% lidocaine and 0.5 mL of corticosteroid administered simultaneously through a needle for the treatment of trigger finger. Both the expected pain preinjection and the actual pain experienced postinjection were measured with a visual analog scale (VAS). Pain catastrophizing scale (PCS) scores were recorded before injection.

Results The use of the J-tip demonstrated a lower mean actual pain, 3.3 VAS, compared with the control group, 4.6 VAS. Both study groups anticipated more pain than they actually experienced. The PCS did not correlate to pre- or post-injection scores.

Conclusions Needle-free jet administration of lidocaine reduces the pain associated with trigger finger injection. Patients anticipate more pain than they experience with trigger finger injection. (*J Hand Surg Am.* 2017; ■(■):1.e1-e5. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic I.

Key words Trigger finger, injection, corticosteroid, randomized controlled trial.



CORTICOSTEROID INJECTION HAS BEEN demonstrated to be an effective treatment for stenosing tenosynovitis of the finger (trigger finger).^{1,2} For many patients, the administration of trigger finger injections causes substantial pain and anxiety. Needle phobia is reported by approximately 10% of patients, and 2% report an intense and persistent fear of injections.^{3,4} The preadministration of local anesthetics by needle is not recommended because this induces additional anxiety and discomfort.⁵

Anesthetic creams, vapocoolant sprays, distraction, and verbal reassurance have been utilized to alleviate discomfort and anxiety.^{6–9} Vibration was recently demonstrated to be ineffective for trigger finger injection anesthesia.¹⁰ Needle-free subdermal administration of lidocaine (J-tips) for intravenous placement pain reduction has been demonstrated in randomized, placebo-controlled trials.^{11,12} J-Tips introduce subdermal lidocaine through a pressurized air mechanism. We postulated that these devices

From the *Department of Orthopedic Surgery, Brigham and Women's Hospital, Boston, MA.
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Corresponding author: Philip E. Blazar, MD, Department of Orthopedic Surgery, Brigham and Women's Hospital, 75 Francis St., Boston, MA 02115; e-mail: pblazar@partners.org.

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could substantially reduce the discomfort induced during trigger finger corticosteroid injection. To our knowledge, J-tip utilization has not been investigated for trigger finger injection.

MATERIALS AND METHODS

Sixty adult patients presenting to the investigators' practices were prospectively enrolled in this study. A sample size estimate revealed that, to obtain 80% power with an alpha of 0.05, based on published data stating the minimally significant clinical difference of pain scores, 12 participants would have to be enrolled in each group.^{13,14} Any patient 18 years of age or older indicated for a trigger digit steroid injection was eligible for the study. Patients were excluded if they had symptoms in multiple digits on the same hand, had nonstenosing tenosynovitis, had a prior injection in the affected finger, were unable to understand the study procedures (non-English-speaking or aphasic), or had severely impaired vision because of concerns for completing the visual analog scale (VAS). Prior to the actual study, the two senior investigators (B.E.E. and P.E.B.) performed injections in a limited number of prestudy patients to familiarize themselves with the technique and noted that the ability to administer anesthesia for thumb injections was unpredictable and markedly more difficult. Therefore, patients who had a diagnosis of a trigger thumb were excluded in this study. Institutional review board approval was obtained prior to the initiation of the study, and all patients signed an informed consent form prior to participation. Consolidated Standards of Reporting Trials (CONSORT) guidelines were adhered to.

The diagnosis of stenosing tenosynovitis was based on a history of triggering and the presence of tenderness over the A1 pulley upon clinical examination. After determining eligibility for the study and obtaining informed consent, 1 of the treating physicians administered a 1-page questionnaire that collected demographic data (age and sex) and comorbidity information (diabetes, narcotic use, and prior cortisone injection for another diagnosis).

Following informed consent, patients were randomly assigned to either the control or the J-tip group. A computerized random number generator was used to create random permuted blocks with allocation concealment by sequentially numbered, opaque, sealed envelopes that were opened in the patient's presence. The person generating the allocation system did not manage the allocation of patients to the 2 groups. Neither patients nor investigators were blinded to which group they

belonged; however, preinjection questionnaires were completed prior to learning to which group the patient was allocated.

Prior to injection, all patients completed a VAS documenting the amount of pain they expected from the procedure (0 [no pain]–10 [severe pain]) and the pain catastrophizing scale (PCS), which is a 13-item validated instrument that scores the patient based on rumination, magnification, and helplessness (0–52 scale). Following injection, patients of both groups completed a second VAS to note how much pain they actually experienced from the procedure. Participation of the study was complete following injection and completion of the second VAS.

Patients in the control group were treated with 0.5 mL of 1% lidocaine and 0.5 mL of 40 mg/mL triamcinolone in a single injection following sterile preparation. Patients in the J-tip group were treated with a needle-free jet injection (National Medical Products Inc, Irvine, CA) of 0.25 mL of 2% lidocaine 2 to 10 minutes prior to receiving a needle injection of 0.5 mL 40 mg/mL triamcinolone. The volumes were chosen to ensure the same dose of lidocaine was given to both groups. Needle injections were performed with a 25-gauge needle inserted over the A1 pulley. The site of the prior J-tip injection was easy to identify because a skin impression was always visible within the first few minutes. The injection was done with the same technique for both groups by the 2 senior authors (B.E.E. and P.E.B.) and the medication was injected extrasynovially in order to make the treatment more reproducible (Fig. 1). This method of injection is supported in previous studies.¹

The 2 groups were compared using the Mann-Whitney U test to analyze the difference between the postinjection VAS scores. The Wilcoxon sign-rank test was used to test the difference between expected pain and actual pain felt for the J-tip and control groups.

RESULTS

A total of 106 consecutive patients were prospectively screened for study participation. Eighteen eligible patients declined to enroll and 28 patients were excluded after having met 1 of the exclusion criteria. The resulting 60 patients form the basis of this study. The average age was 65.8 years (range, 40–86 years). The groups were similar in terms of age, sex, injection location, and previous corticosteroid injections (Table 1). The most common associated comorbidities were 9 cases (4 control group, 5 J-tip group) of diabetes mellitus type II (15%), 3

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