



# Revista Española de Cirugía Ortopédica y Traumatología

[www.elsevier.es/rot](http://www.elsevier.es/rot)



## ORIGINAL PAPER

# [Translated article] Out-of-sheath corticosteroid injections through the dorsal webspace for trigger finger and trigger thumb. A prospective cohort study<sup>☆</sup>

I. Jiménez<sup>a,b,\*</sup>, J. Medina<sup>a,b</sup>, A. Marcos-García<sup>a,b</sup>, G.L. Garcés<sup>b,c</sup>

<sup>a</sup> Servicio de Cirugía Ortopédica y Traumatología, Hospital Universitario Insular de Gran Canaria, Las Palmas de Gran Canaria, Las Palmas, Spain

<sup>b</sup> Departamento de Ciencias Médicas y Quirúrgicas, Facultad de Medicina, Universidad de Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Las Palmas, Spain

<sup>c</sup> Servicio de Cirugía Ortopédica y Traumatología, Hospital Perpetuo Socorro, Las Palmas de Gran Canaria, Las Palmas, Spain

Received 7 February 2021; accepted 20 March 2021

### KEYWORDS

Injection;  
Pain;  
Trigger finger;  
Trigger thumb;  
Webspace;  
Flexor tendon

### Abstract

**Background and objective:** Steroid injections are effective in the treatment of trigger digits but the pain during the injection is an always-present accompanying effect. The aim of this study was to assess the effectiveness and perceived pain during an out-of-sheath corticosteroid injection through the dorsal webspace in the treatment of trigger digits.

**Material and method:** A total of 126 consecutive patients were included. A subcutaneous (out-of-sheath) corticosteroid injection was performed through the dorsal webspace in all digits. In cases where signs or symptoms persisted, a second injection was offered. Visual analog scale for pain during the injection, DASH questionnaire, success rate and complications were collected. **Results:** They were 86 women and 40 men with a mean age of 61 years. The mean VAS for pain during the injection was 3.8. Twelve patients were lost to follow-up. The overall success was 68% and success after a single injection was 54%. The best result was achieved on the ring finger. Patients who were not previously operated on carpal tunnel syndrome responded better. No complications were noted.

**Conclusions:** The extra-sheath corticosteroid injection through the dorsal webspace is effective and safe. It seems to be less painful than the reported scores for the palmar midline technique although it should be assessed in a comparative study.

© 2021 SECOT. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

DOI of original article: <https://doi.org/10.1016/j.recot.2021.03.009>

<sup>☆</sup> The preliminary results of this study were presented orally at the annual congress of the French Hand Surgery Society in 2019, the abstract of which was published in their journal (Hand Surg Rehabil. 2019;38:419. doi:10.1016/j.hansur.2019.10.079).

\* Corresponding author.

E-mail address: [isidro-jimenez@hotmail.com](mailto:isidro-jimenez@hotmail.com) (I. Jiménez).

<https://doi.org/10.1016/j.recot.2021.03.012>

1888-4415/© 2021 SECOT. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Please cite this article as: I. Jiménez, J. Medina, A. Marcos-García et al., [Translated article] Out-of-sheath corticosteroid injections through the dorsal webspace for trigger finger and trigger thumb. A prospective cohort study, Revista Española de Cirugía Ortopédica y Traumatología, <https://doi.org/10.1016/j.recot.2021.03.012>

## PALABRAS CLAVE

Infiltración;  
Dolor;  
Dedo en resorte;  
Pulgar en resorte;  
Comisura;  
Tendón flexor

## Infiltración comisural dorsal en el tratamiento del pulgar y los dedos en resorte. Estudio de una cohorte prospectiva

### Resumen

**Antecedentes y objetivo:** Las infiltraciones de corticoides son efectivas en el tratamiento de los dedos en gatillo, pero el dolor percibido por el paciente durante la inyección es un efecto acompañante siempre presente. El objetivo de este estudio fue evaluar la efectividad y el dolor percibido durante una infiltración corticoidea depositada fuera de la vaina tendinosa utilizando la técnica comisural dorsal.

**Material y método:** Se incluyeron 126 pacientes consecutivos. Se realizó una infiltración esteroidea subcutánea (fuera de la vaina) a través de la comisura dorsal. En los casos en que los signos o síntomas persistieron, se ofreció una segunda infiltración. Se registró el dolor percibido durante la infiltración mediante la escala visual analógica, el cuestionario DASH antes del tratamiento y al final de seguimiento, la tasa de éxito y las complicaciones.

**Resultados:** Fueron 86 mujeres y 40 varones con una edad media de 61 años. La puntuación media del dolor durante la infiltración fue de 3,8. Doce pacientes se perdieron durante el seguimiento. El éxito global fue del 68% y el éxito tras una única inyección fue del 54%. El mejor resultado se obtuvo en el dedo anular. Los pacientes que no habían sido operados previamente del síndrome del túnel carpiano respondieron mejor. No se objetivaron complicaciones.

**Conclusiones:** La infiltración esteroidea fuera de la vaina tendinosa y utilizando la técnica comisural dorsal es efectiva y segura en el tratamiento de los dedos en resorte. Parece ser menos dolorosa que los resultados publicados para la técnica palmar sobre la línea media, aunque esto debe evaluarse en un estudio diseñado para ello.

© 2021 SECOT. Publicado por Elsevier España, S.L.U. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Stenosing tenosynovitis, trigger finger or spring finger is one of the most common causes of hand pain and disability, affecting 2.6% of non-diabetic adults and up to 10% of the diabetic population.<sup>1,2</sup> The goal of treatment is to restore smooth, painless gliding of the tendons and full range of motion in the affected finger.

Trigger fingers can be effectively and efficiently treated by steroid injections,<sup>3-8</sup> but pain experienced by the patient is an ever-present side effect. Few studies have assessed patient-perceived pain during trigger finger injections, but the score seems to vary depending on the injection technique.<sup>9-13</sup>

The palmar technique over the midline and depositing the injection into the tendon sheath is probably the most commonly used technique, but others have been described, such as the distal palmar technique, the mid-axial technique or an intra-vain technique through the dorsal webspace.<sup>1,8-10,14</sup>

The volar region of the hand is more innervated than the dorsal region and therefore injection through the dorsum may theoretically be less painful than injection through the palm. This claim has recently been questioned in some studies conducted to evaluate the least painful method of performing a digital block, in which volunteers prefer a single injection through the palm rather than 2 through the dorsum. In the treatment of trigger fingers, only one dorsal injection would be performed and not 2, so the best technique for injection remains a controversial issue.<sup>6,9,15-19</sup>

Injection within the tendon sheath has been associated with an increase in perceived pain compared to a subcutaneous technique.<sup>20</sup> Some studies have shown that subcutaneous palmar injection is as effective as the intra-sheath technique, reducing the risk of flexor tendon and pulley injury; therefore, depositing the injection within the tendon sheath appears to be unnecessary.<sup>1,21,22</sup>

The aim of this study was to evaluate the effectiveness and perceived pain during subcutaneous corticosteroid injection using the dorsal commissural technique in the treatment of trigger fingers.

## Material and method

### Study population and design

Following approval by the clinical research committee of our centre (CEIC-CHUIMI-2015/789) and after evaluating the safety and potential efficacy of the dorsal web space technique,<sup>23</sup> all patients diagnosed with spring finger by one of 3 orthopaedic surgeons and traumatologists during a one-year period were invited to participate in this prospective cohort study (Fig. 1). Written informed consent was obtained from all subjects prior to the study. All procedures followed conformed to the ethical standards of the committee responsible for human experimentation (institutional and national) and to the Helsinki Declaration of 1975, revised in 2008.

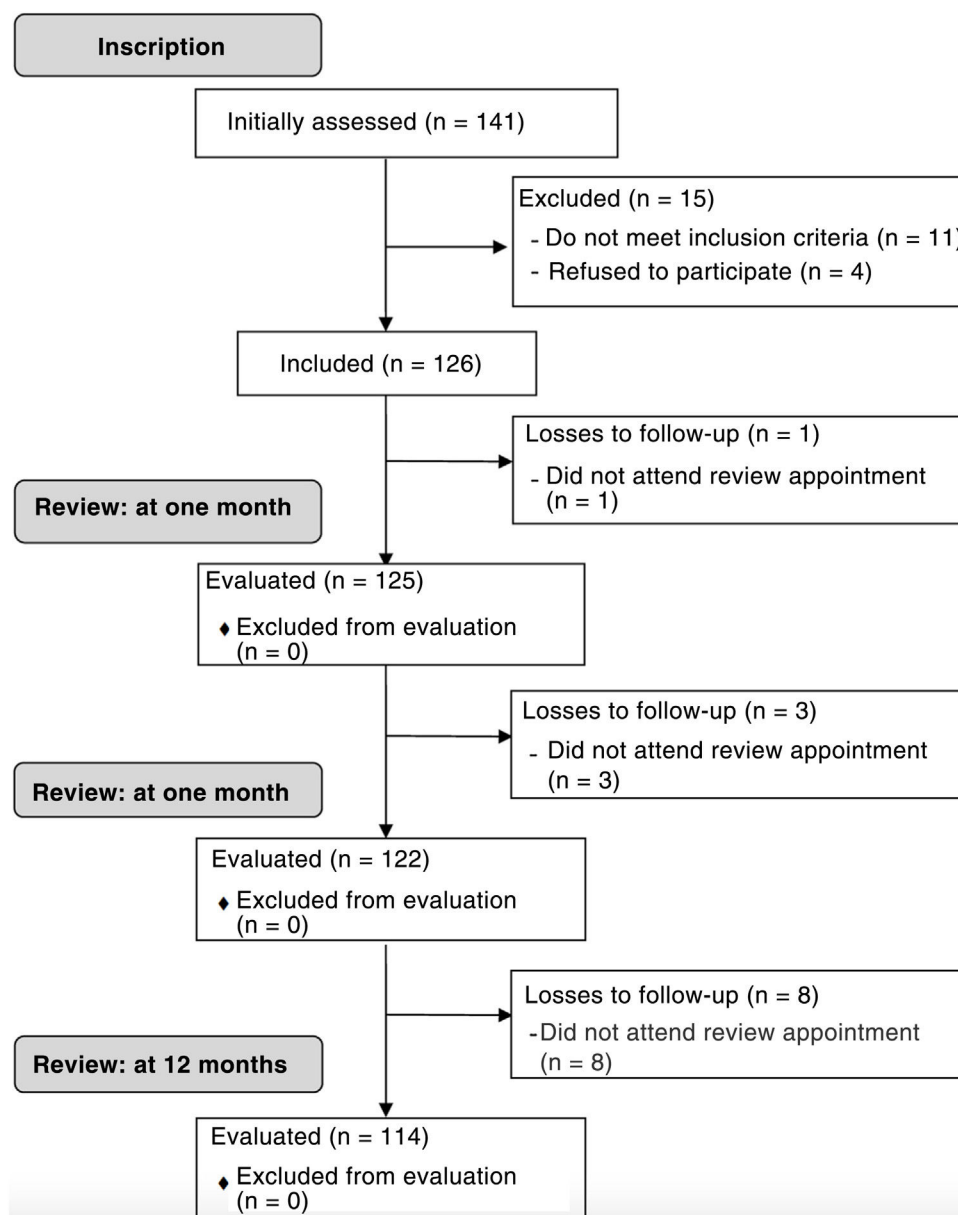


Figure 1 Flow diagram of the study.

The diagnosis was made based on the patient's symptoms and signs, such as painful springing or locking of the involved finger when the patient flexes and extends it.

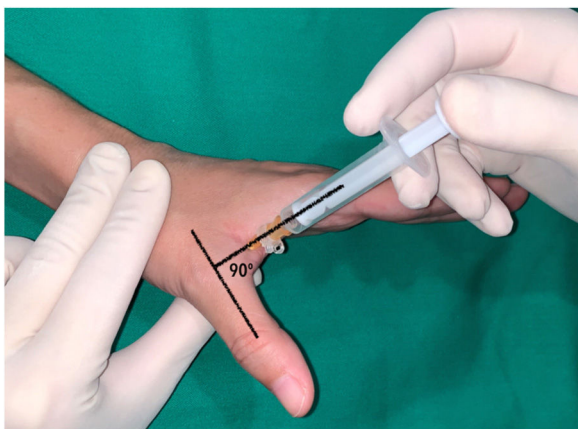
Inclusion criteria: any adult patient diagnosed with trigger finger who agreed to participate. Exclusion criteria: (1) involvement of more than one finger; (2) contraindication for treatment according to the product package insert, such as known allergy to the injection components or uncontrolled diabetes mellitus (glycosylated haemoglobin > 8%); (3) inflammatory or autoimmune arthritis; (4) previous injection or surgery on the affected finger; and (5) pregnancy or breastfeeding.

The minimum follow-up was 12 months.

### Injection technique

In all cases a 2 ml syringe loaded with 1 ml betamethasone 6 mg/1 ml (Celestone Cronodose®, Merck Sharp & Dohme Laboratories, Spain) and 1 ml mepivacaine 2% (Normon Laboratories, Spain) was used. Puncture was performed using a 25 G needle (SurGuard2, Terumo®, Terumo Medical Corporation, USA).

In the thumb, a dorsal-ulnar injection was performed at the level of the metacarpophalangeal joint, keeping the thumb in maximum abduction and directing the needle into the subcutaneous cellular tissue at the level of the head of the first metacarpal at a 90° angle to the axis of the thumb (Fig. 2).



**Figure 2** Dorsal-ulnar injection performed on the thumb at the level of the metacarpophalangeal joint keeping the thumb in maximum abduction, directing the needle towards the subcutaneous cellular tissue at the level of the head of the first metacarpal at an angle of 90 with respect to the axis of the thumb.



**Figure 3** Dorsal web space injection performed on the index finger keeping the metacarpophalangeal joint slightly flexed and directing the needle towards the metacarpal head at an angle of 45 with respect to the axis of the metacarpal.

In the long fingers, the puncture was performed keeping the metacarpophalangeal joint slightly flexed (approximately 30) and directing the needle into the subcutaneous cellular tissue at the level of the metacarpal head at an angle of 45 with respect to the axis of the finger (Fig. 3). In the index finger, a dorsal-ulnar injection was performed (through the second web space). The technique was not performed through the first web space because it is wider and deeper, which, in our experience, makes it difficult to guide the needle. In the middle and ring fingers, dorsoradial or dorsal-ulnar injection was performed according to the investigator's preference. Finally, the little finger was infiltrated dorsoradially.

The location of the needle tip outside the tendon sheath was confirmed by asking the patient to slightly flex the finger after inserting the needle and verifying that the needle did not move with flexor tendon movement.

**Table 1** Green's classification for trigger fingers.

Grade	Clinical findings
I	Pain on pulley A1
II	Trigger. The patient can actively extend the finger
III	Blocked. The patient passively extends the finger.
IV	Fixed stiffness in flexion

Source: Wolfe.<sup>1</sup>

All patients were reviewed in the clinic at 1 month, 3 months and 12 months. Those patients in whom signs or symptoms persisted at the 1-month or 3-month visit were offered a second injection.

## Tools and measurements

Demographics; comorbidities; time from symptom onset to diagnosis; Green's classification (Table 1)<sup>1</sup>; Disabilities of the Arm, Shoulder and Hand (DASH; 0–100 points) before injection and at final follow-up<sup>24</sup>; pain during injection measured by visual analogue scale (VAS; 0–10 points); number of injections; success rate and complications were recorded. During and after injection, patients were specifically asked about the presence of paraesthesia or numbness of the finger.

Success was defined as complete resolution of symptoms with no recurrence of pain or trigger finger during the 12 months of follow-up.

Recurrence was defined as the appearance of symptoms (pain) or signs (trigger or block) after an asymptomatic period of at least one month.

Pain score was measured after injection in an adjoining room using a 10 cm line (from 0 = no pain to 10 = the worst pain experienced), where patients marked a score.

## Statistical analysis

All data were analysed using Microsoft Excel 2011 (version 14.6.0, 2010; Microsoft Corporation, USA), StatPlus: mac (version V6 2016; AnalystSoft Inc., USA) and MatLab (version R2019a; The MathWorks Inc., USA). Statistical analysis of the data was performed using Student's *t*-test for paired samples, the Chi-square test and Fisher's exact test. A value of  $p < .05$  was considered statistically significant.

## Results

One hundred and twenty six of the 141 consecutive patients were included. Demographic characteristics of the patients and the distribution according to the affected finger are shown in Table 2.

The mean VAS score for pain during injection was 3.8 points (range 0–10; standard deviation [SD]: 2.3; 95% confidence interval [95% CI95%]: 3.4–4.2) and was considered as no pain (VAS for pain=0) in 4 patients; mild pain (VAS for pain=1–4) in 78, moderate pain (VAS for pain=5–7) in 36 patients and severe pain (VAS for pain=8–10) in 8 cases. These categories were arbitrarily created to stratify patients.



**Table 2** Demographic data and digital distribution.

Age (years), mean (range)	61 (42–82)
Sex, n	
Woman	86
Man	40
Diabetes mellitus, n (%)	
Yes	14 (11)
No	112 (89)
Previous carpal tunnel surgery, n (%)	
Yes	18 (14)
No	108 (86)
Time since onset of symptoms (months), mean (range)	7 (1–24)
Affected finger, n (%)	
Thumb	38 (30)
Index	12 (10)
Middle finger	48 (38)
Ring finger	24 (19)
Little finger	4 (3)
Grade according to Green, n	
I	6
II	28
III	86
IV	6

We found no statistically significant differences in the VAS score for pain according to the affected finger.

The mean DASH questionnaire score at diagnosis was 48 points (range 0–91; SD: 25; 95% CI: 44–52). The mean DASH questionnaire score at the end of follow-up was 8.6 points (range 0–50; SD: 16; 95% CI: 5.8–11) ( $p < .05$ ).

Twelve patients were lost to follow-up. In the 114 patients available at the end of follow-up, the overall success rate was 78/114 (68%).

The success rate after one injection was 62/114 (54%). Twenty-eight patients refused a second injection and were referred to surgery. The success rate of the second injection was 16/24 (66%).

Success rates according to affected finger and according to Green's classification are shown in Table 3.

There were 4 recurrences between the 3-month and 12-month review which were considered and analysed as treatment failures.

No neurological or other complications were observed.

We found no statistically significant difference in success rate between the diabetic and non-diabetic population (10/12 and 68/102, respectively;  $p = .33$ ).

There was a statistically significant difference in the success rate between patients who had previously undergone surgery for carpal tunnel syndrome and those who had not (8/18 and 70/96, respectively;  $p < .05$ ).

## Discussion

The results obtained in this cohort study support the use of steroid injection deposited outside the tendon sheath and performed using the dorsal commissural technique in

**Table 3** Success rate according to the affected finger and Green's classification.

Affected finger	n	Resolved	Unresolved	%
Thumb	34	18	16	53
Index	8	2	6	25
Middle	44	37	7	81
Ring	24	20	4	83
Little	4	1	3	33
Green's grade	n	Resolved	Unresolved	%
I	6	6	0	100
II	24	18	6	75
III	78	49	29	63
IV	6	5	1	83
Total	114	78	36	68

the treatment of trigger fingers as an effective, safe and potentially less painful technique.

Corticosteroid injection is a useful and safe treatment in stenosing tenosynovitis of the flexor tendons<sup>1,3,7</sup> but pain perceived during injection is always present. Among the different injection techniques described, using the medioaxial technique, a mean pain score of 4 has been published; using the palmar over midline technique, 5.4 (ranging from 3.3 to 6.6); using the distal palmar technique, 6 (only in 12 fingers), and finally, using the dorsal intra-axial technique, the mean VAS score was 6.8 (only in 5 fingers) (Table 4).<sup>9–13</sup> In our series, using a dorsal commissural extra-valvular technique, the mean VAS score was 3.8.

In our study population, resolution of symptoms was obtained after a single injection in 54% of cases, a result similar to previously published data for other techniques, which range from 44% to 66%. The overall success rate at the end of follow-up was 68%, also similar to previously published results using the palmar midline technique.<sup>2–7,25</sup>

In our cohort, we found no differences in the success rate between the diabetic and non-diabetic population, in contrast to what has been previously published in other studies.<sup>3,26,27</sup> We considered and analysed as diabetic those patients who reported being diabetic, but the rest of the patients did not undergo blood glucose testing. This may have underestimated the number of diabetic patients in the sample and should therefore be considered a limitation of the study.

In our study population, patients who had not previously undergone surgery for carpal tunnel syndrome responded better to injection. In vitro and in vivo studies have shown that the flexor tendons are displaced palmarly after opening of the transverse carpal ligament and this modifies the angle of entry of the flexor tendons into the A1 pulley, leading to increased friction.<sup>28,29</sup> Our results could be explained by the fact that this increased friction between the flexor tendons and the pulley entry would be more difficult to counteract by the anti-inflammatory effect of corticosteroids.

We observed a significant decrease in the score on the DASH questionnaire, although the final score was not zero, as would be expected after resolution of the condition. This result should be interpreted with caution, as other factors may influence the score on self-perceived question-

**Table 4** Published pain score for the different techniques described.

Author (year)	Technique	Cases	Mean score for VAS pain (0–10)
Jianmongkol et al. (2007) <sup>9</sup>	Mid-axial	53	4.0
	Palmar mid-line	48	4.8
Park et al. (2014) <sup>12</sup>	Palmar mid-line	30	5.6
	Palmar mid-line+vibration	30	5.6
	Palmar mid-line +false vibration	30	6.3
Earp et al. (2017) <sup>11,a</sup>	Palmar mid-line	29	4.6
	Palmar distal	12	6.0
Rosenbaum et al. (2018) <sup>10</sup>	Palmar mid-line	22	6.6
	Dorsal intra-sheath	5	6.8
Patel et al. (2019) <sup>13,a</sup>	Palmar mid-line	15	4.9
Our series	Dorsal out-of-sheath web space	126	3.8

<sup>a</sup> In order to compare only the perceived pain associated with the injection itself, the groups of patients in which non-injected local anaesthesia was used prior to the puncture have been removed from the table.

naires and disability questionnaires. This observation is in line with other studies showing that the DASH questionnaire score is largely determined by psychosocial factors that may not change even if the objective disease state under study does.<sup>30</sup>

The strengths of our work are: the functional status of the patients was assessed prospectively before and after treatment. The rate of follow-up loss was under 10%.

This study has limitations. Assuming that the needle tip was located outside the tendon sheath due to the absence of movement of the needle during flexion-extension of the finger could lead to an error, as strictly speaking, this method would only confirm that the needle tip was not inserted into the flexor tendon. The use of ultrasound could have been helpful in this respect. This is a prospective, non-comparative cohort and therefore lacks a control group. The sample size was small and this may have influenced the results of the subgroup analysis.

According to the results of this cohort, steroid injection deposited outside the tendon sheath and performed using the dorsal commissural technique in the treatment of trigger fingers is effective and safe. This technique appears to be less painful and at least as effective as previously published results using the palmar midline technique, although this aspect needs to be evaluated in a comparative study designed for this purpose.

## Level of evidence

Level of evidence II.

## Authors' contribution

IJ and JM conceived the study, conducted the literature search and wrote the first draft of the manuscript. IJ, GG and AMG were involved in protocol development and obtaining ethical approval. IJ, AMG and JM participated in patient selection. IJ and GG were involved in data analysis. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

## Financing

This research was partially funded by the Foundation of the Colegio Oficial de Médicos de Las Palmas (Grant: XXIV, 2019 I+E Grand Edition).

## Conflict of interests

The authors have no possible conflict of interests to declare with respect to the research, authorship and/or publication of this paper.

## Acknowledgements

Our thanks to A. Samuel A. Jiménez, BEng., MSc, for their help with the statistical analysis of this investigation.

## References

1. Wolfe SW. Tendinopathy. In: Wolfe SW, Hotchkiss RN, Pederson WC, Kozin SH, editors. Green's operative hand surgery. 6th ed. Philadelphia: Elsevier Churchill Livingstone; 2011. p. 2064–188.
2. Ryzewicz M, Wolf J. Trigger digits: principles, management, and complications. *J Hand Surg Am.* 2006;31A:135–46.
3. Castellano J, Muñoz-Mahamud E, Domínguez E, Del Amo P, Izquierdo O, Fillat P. Long-term effectiveness of corticosteroid injections for trigger finger and thumb. *J Hand Surg Am.* 2015;40:121–6.
4. Dala-Ali BM, Nakhdehvari A, Lloyd MA, Schreuder FV. The efficacy of steroid injection in the treatment of trigger finger. *Clin Orthop.* 2012;4:263–8.
5. Mathew A. Mid-axial injection of steroid into the flexor sheath for trigger fingers. *J Hand Microsurg.* 2014;6:49–52.
6. Murphy D, Failla JM, Koniuch MP. Steroid versus placebo injection for trigger finger. *J Hand Surg Am.* 1995;20:628–31.
7. Halim A, Sobel AD, Eltorai AEM, Mansuripur KP, Weiss AC. Cost-effective management of stenosing tenosynovitis. *J Hand Surg Am.* 2018;43:1085–91.
8. Carlson CS, Curtis RM. Treatment of flexor tenosynovitis. *J Hand Surg Am.* 1984;9:286–8.

9. Jianmongkol S, Kosuwon W, Thammaroj T. Intra-tendon sheath injection for trigger finger: the randomized controlled trial. *Hand Surg.* 2007;12:79–82.
10. Rosenbaum YA, Benvenuti N, Yang J, Ruff ME, Awan HM, Samora JB. The effect of trigger finger injection site on injection-related pain. *Hand (N Y).* 2018;13:164–9.
11. Earp BE, Stanbury SJ, Mora AN, Blazar PE. Needle-free jet lidocaine administration for preinjection anesthesia in trigger finger injection: a randomized controlled trial. *J Hand Surg Am.* 2017;42:618–22.
12. Park KW, Boyer MI, Calfee RP, Goldfarb CA, Osei DA. The efficacy of 95-Hz topical vibration in pain reduction for trigger finger injection: a placebo-controlled, prospective, randomized trial. *J Hand Surg Am.* 2014;39:2203–7.
13. Patel KR, Fralinger D, MacGillis KJ, Wright-Chisem J, Mejia A. The anesthetic effectiveness of j-tip needle-free injection system prior to trigger finger injection: a double-blind randomized clinical trial. *Hand (N Y).* 2019;3, 1558944719890035.
14. Buch-Jaeger N, Foucher G, Ehrler S, Sammut D. The results of conservative management of trigger finger. *Ann Hand Surg.* 1992;11:189–93.
15. Fisher L, Gordon M. Anesthesia for hand surgery. In: Wolfe SW, Hotchkiss RN, Pederson WC, Kozin SH, editors. *Green's operative hand surgery.* 6th ed. Philadelphia: Elsevier Churchill Livingstone; 2011. p. 25–40.
16. Nolan MF. Two-point discrimination assessment in the upper limb in young adult men and women. *Phys Ther.* 1982;62:965–9.
17. Koo JP, Kim SH, An HJ, et al. Two-point discrimination of the upper extremities of healthy Koreans in their 20's. *J Phys Ther Sci.* 2016;28:870–4.
18. Williams JG, Lalonde DH. Randomized comparison of the single-injection volar subcutaneous block and the two-injection dorsal block for digital anesthesia. *Plast Reconstr Surg.* 2006;118:1195–200.
19. Wheelock ME, Leblanc M, Chung B, Williams J, Lalonde DH. Is it true that injecting palmar finger skin hurts more than dorsal skin? New level 1 evidence. *Hand (N Y).* 2011;6:47–9.
20. Yin ZG, Zhang JB, Kan SL, Wang P. A comparison of traditional digital blocks and single subcutaneous palmar injection blocks at the base of the finger and a meta-analysis of the digital block trials. *J Hand Surg Br.* 2006;31:547–55.
21. Taras JS, Raphael JS, Pan WT, Movagharnia F, Sotereanos DG. Corticosteroid injections for trigger digits: is intrasheath injection necessary? *J Hand Surg Am.* 1998;23:717–22.
22. Kazuki K, Egi T, Okada M, et al. Clinical outcome of extrasynovial steroid injection for trigger finger. *Hand Surg.* 2006;11:1–4.
23. Jiménez I, Garcés GL, Caballero-Martel J, Medina J. Dorsal web space injection technique in the treatment of trigger fingers and trigger thumb. Anatomical study. *Rev Esp Cir Ortop Traumatol.* 2020;64:355–60.
24. Rosales RS, Delgado EB, Díez de Lastra-Bosch I. Evaluation of the Spanish version of the DASH and carpal tunnel syndrome health-related quality-of-life instruments: cross-cultural adaptation process and reliability. *J Hand Surg Am.* 2002;27:334–43.
25. Wojan RD, Foeger NC, Gebelman RH, Calfee RP. Long-term outcomes following a single corticosteroid injection for trigger finger. *J Bone Joint Surg Am.* 2014;96:1849–54.
26. Griggs SM, Weiss AP, Lane LB, Schewenker C, Akelman E, Sachar K. Treatment of trigger finger in patients with diabetes mellitus. *J Hand Surg Am.* 1995;20:787–9.
27. Baumgarten KM, Gerlach D, Boyer MI. Corticosteroid injection in diabetic patients with trigger finger: a prospective, randomized, controlled double-blinded study. *J Bone Joint Surg.* 2007;89:2604–11.
28. Karalezli N, Kütahya H, Güle A, Toker S, Karabörk H, Ogun TC. Transverse carpal ligament and forearm fascia release for the treatment of carpal tunnel syndrome change the entrance angle of flexor tendons to the A1 pulley: the relationship between carpal tunnel surgery and trigger finger occurrence. *Sci World J.* 2013;2013:630–717.
29. Lee SK, Bae KW, Choy WS. The relationship of trigger finger and flexor tendon volar migration after carpal tunnel release. *J Hand Surg Eur Vol.* 2014;39:694–8.
30. Ring D, Lozano-Calderón S, Shin R, Bastian P, Mudgal C, Jupiter J. A prospective randomized controlled trial of injection of dexamethasone versus triamcinolone for idiopathic trigger finger. *J Hand Surg Am.* 2008;33:516–22, discussion 523–4.