Medical Research Archives

European Society of Medicine

OPEN ACCESS

Published: November 30, 2023

**Citation:** Lofink, S., and Trumble, T., 2023. The effectiveness of Wharton's jelly versus steroid injection for the treatment of thumb carpometacarpal joint arthritis for pain relief and the increase of function. Medical Research Archives, [online] 11(11). https://doi.org/10.18103/mra.v11i11.4699



**DOI:** https://doi.org/10.18103/mra.v11i11.4699

ISSN: 2375-1924

RESEARCH ARTICLE

# The effectiveness of Wharton's jelly versus steroid injection for the treatment of thumb carpometacarpal joint arthritis for pain relief and the increase of function

**Spencer Lofink[1]* and Thomas Trumble[1]**

[1]Bellevue Hand Surgery and Overlake Hospital.

*spencer.lofink@hotmail.com

## ABSTRACT

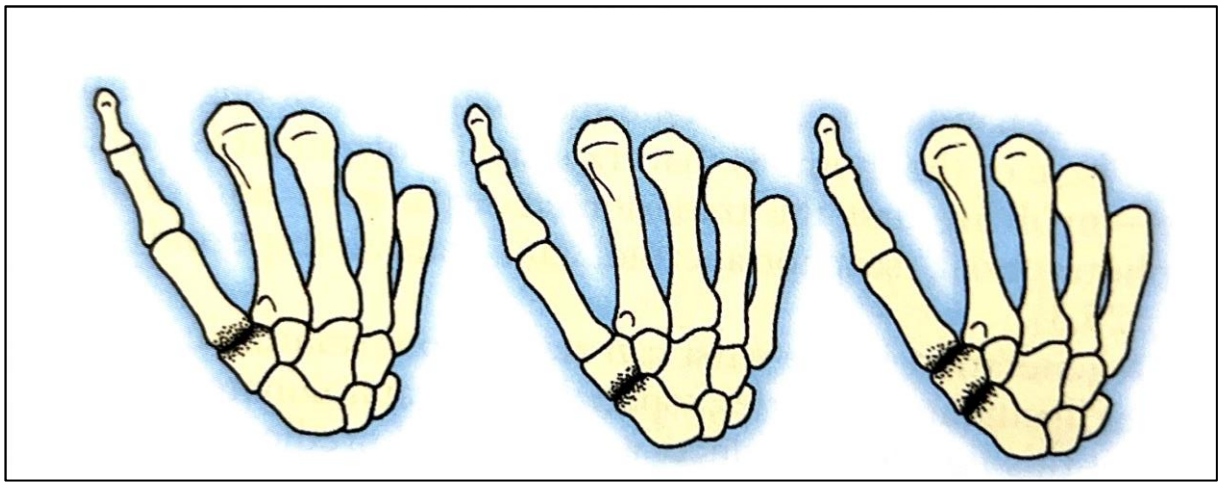
We compared the effectiveness of Wharton's jelly versus steroid injection into the carpometacarpophalangeal joint by comparing 60 patients in two cohorts with a follow up evaluation at three months and then at one year. We evaluated preoperative and postoperative grip strength, pinch strength, thumb range of motion, Disabilities of Arm, Shoulder, and Hand (DASH) score and a Visual Analog (VAS) pain score before the injection and then at 3 months and 12 months after injection. The patients in the steroid injection group had substantial improvement in their DASH and VAS pain scores as well as their pinch strength at 3 months $p < .05$. However, by the 12-month evaluation the benefits of the steroid injection had completely dissipated. The patients in the Wharton's jelly cohort had improvements at 3 months in terms DASH and VAS score and pinch strength and this improvement persisted at the one-year evaluation. However, grip strength and thumb range of motion did not substantially improve in either group.

## Introduction

Thumb arthritis can be painful and disabling, especially for individuals who require dexterity and strength for their occupations or avocations. Conservative measures have included bracing and oral nonsteroidal anti-inflammatory medications, and steroid injections have also been routinely used[1,2]. Although Day et al showed that in a minority of cases, steroid injections can have a long-term benefit, Weiss and Goodman concluded that despite steroid injections the patients frequently required surgery[3,4]. Studies have also evaluated the effectiveness of platelet enriched plasma injections into the thumb CMC joint, however, the authors only reported improvement in the VAS pain score but no improvement in the DASH score or pinch strength[19]. Reports of Wharton's jelly injection for knee arthritis have demonstrated improvement in symptoms as well as improvement in magnetic resonance imaging of the cartilage[6, 17, 25]. There was noted to be an increase in the anti-inflammatory markers such as anti-inflammatory cytokines TNF-RI, TNF-RII, and IL-1RA within the blood tests of patients receiving Wharton's jelly[26]. There are no reports of the use of Wharton's jelly for the treatment of thumb arthritis. Because we have not had significant clinical success with platelet enriched plasma injections in our practice for thumb arthritis, we designed this study to evaluate the effectiveness of Wharton's jelly compared to that of a steroid injection with both subjective and objective parameters for thumb CMC joint arthritis.

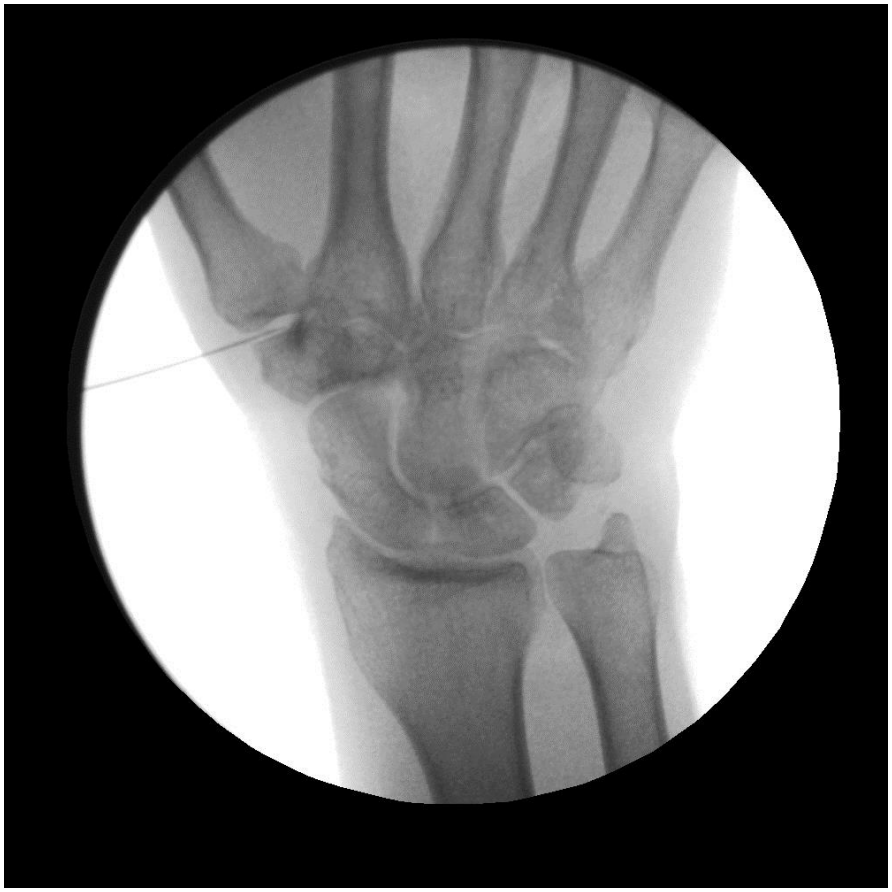
## Methods:

In this study, we compared 60 consecutive cases of steroid injection for patients with stage one thumb basal arthritis with 60 consecutive patients who received a Wharton's jelly injection with a similar clinical and radiographic presentation with injections performed between January 2019 to July of 2022. The study was HIPPA compliant and conformed to the ethical guidelines of the 1975 Declaration of Helsinki, and institutional review board approval was obtained. Thumb basal joint arthritis is defined as stage one if it only involves the CMC joint, stage two if it only involves the scaphotrapezial trapezoid (STT) joint and stage three if it involves both the CMC joint and the STT joint (Figure 1)[1].



The more practical classification for CMC joint arthritis involves three stages. 1. Arthritis that only involves the CMC joint. 2. Arthritis that only involves the scaphotrapeziotrapezoidal (STT) joint. 3. Arthritis that involves both the CMC and the STT joints.

The average age for the patient was 64 years of age. The male patients averaged 62 years of age and the female patients averaged 66 years of age. None of the patients had prior thumb surgery. There was no significant difference between the two cohort groups in terms of age, gender, or pre-injection measurements of grip or pinch strength, or thumb range of motion. The decision to have the Wharton's jelly injection, or the steroid injection was left up to the patient, but clearly a major factor in the decision for the patient was that the steroid injection is covered by insurance whereas the Wharton's jelly injection is not covered by Insurance. All the patients had tried bracing and oral anti-inflammatory medication before proceeding with the injection with the steroid medication using betamethasone, or the Wharton's jelly injection. Injections were performed under fluoroscopic guidance, making sure that the needle was within the thumb CMC joint before the injection was performed. Prior to the joint injection, a local anesthetic with 1% plain lidocaine was administered to the skin. Care was taken not to inject the anesthetic into the joint so that there was no dilution of the steroid or Wharton's jelly injections. (Figure 2).



X-Ray guided injections were performed with fluoroscopy to ensure proper placement of the needle into the joint space.

In the case of the steroid injection, 6 milligrams of betamethasone were injected into the CMC joint. The betamethasone was obtained from American Regent Inc. In the case of the Wharton's jelly, 1 cc of the Wharton's jelly was injected. The Wharton's jelly was obtained from BioIntegrate and produced in New York, NY. The Wharton's jelly arrived on dry ice, was maintained at a temperature of -20 degrees Celsius, and was defrosted over a five minute period before the injection was performed.

The clinical measurements were performed in a blinded fashion by a team of therapists using the AMA guidelines to make measurements of CMC joint abduction, adduction and opposition as well as thumb metacarpophalangeal (MCP) and interphalangeal (IP) joint measurements. Grip strength and lateral pinch strength were determined using a Jamar dynamometer (Asimov Engineering, Los Angeles, CA) and a pinch meter (Therapeutic Instruments, Clifton, NJ). DASH and VAS pain scores were completed by the patients before the injection and at three months and twelve months after the injections

## Data Analysis:

Statistical analysis was performed using paired *t*-tests to compare preoperative and postoperative values for the implant space height as well as grip and pinch strengths. Spearman correlation coefficients (*r*) were used to analyze relationships between grip and pinch strength, thumb motion, and the parameters determined in the DASH and VAS questionnaire.

## Results:

There were no complications following injection in either cohort in terms of infection, nerve disorder, or ongoing pain at the injection site. In the steroid injection cohort, the patients improved significantly at 3 months in terms of pinch strength from 14 ± 4.0 to 24 ± 6.4 lbs. ($p < .05$). The DASH score also improved from 40. ± 8.3 to 18 ± 4.6 lbs. at 3 months ($p < .05$), but by 12 months, the improvement in pinch strength (16 ± 4.6 lbs.) and DASH score (32 ± 8.1) was no longer significant. ($p > .05$). In a similar fashion, the VAS score improved from 6.2 ± 1.5 pre-injection to 3.3 ± 1.2 at three months ($p < .05$), but by 12 months there was again no longer a significant difference at 5.6 ± 1.4 ( $p > .05$). In the Wharton's jelly cohort, the patients also improved significantly at 3 months in terms of pinch strength from 15 ± 3.8 to 23 ± 6.8 lbs. ($p < 0.05$). However, the pinch strength not only remained significantly improved at 12 months but continued to improve to 27 ± 7.3 lbs. ($p < .05$). This trend is repeated with the DASH scores for the Wharton' jelly cohort as they improved from 42. ± 7.1 to 20 ± 7.3 lbs. at 3 months ($p < .05$) and to 17 ± 4.2 lbs. at 12 months ($p < .05$). The VAS score also improved from 6.4 ± 1.4 to 3.6 ± 1.6 at 3 months ($p < .05$) and to 3.4 ± 1.3 at 12 months ($p < .05$). There was no significant improvement in grip strength or thumb ROM after injection in either the steroid injection or Wharton's jelly cohorts (Table 1). Disease side, handedness, and gender did not affect outcomes. During the study, two patients in each cohort advanced from stage one basal joint arthritis to stage three arthritis. None of these patients with stage three arthritis had persistent improvement of their clinical parameters in any measurements.

## Discussion:

The prevalence of doctor-diagnosed thumb basal joint arthritis in adults was estimated at 1.4% of the population (2.2% in women and 0.62% in men)[1]. Although braces and NSAIDs can provide some relief, they frequently do not provide enough improvement in symptoms to allow patients to return to their jobs and recreational activities, especially for individuals with technically demanding jobs. Many individuals would like to defer surgery until they retire. These individuals would benefit from a nonsurgical option that may provide sustained relief. Our experience is that steroid injections provide great relief for several months, but the effects are not sustained through an entire year. This is illustrated by the results of this current study. Sometime between three and twelve months, our patients in the steroid group had a decrease in pinch strength and an increase in DASH and VAS pain scores. As a result, 12 month follow-up DASH, VAS and pinch strength were not significantly different than the prior to the injection.

On the other hand, the patients in the Wharton's jelly cohort were able to maintain statistically significant improvements in pinch strength, as well as the DASH and VAS pain scores, for at least twelve months after the injection. As expected, neither cohort sustained an increase in joint range of motion, because it would be unlikely for this injection to overcome the contracture of the joint tissues surrounding the thumb. These results suggest that patients who would like to postpone a surgical procedure to alleviate their stage 1 thumb CMC joint arthritis pain may find the most prolonged relief with a Wharton's jelly injection. Like the steroid injection series by Day et al, the patients with more significant disease advancement did not have favorable responses to the injection either with steroid or Wharton's jelly[3]. There is very little information about the effect of Wharton's jelly for the treatment of osteoarthritis of any joint and no prior studies of thumb basal joint injections[3, 7, 8, 13, 15, 25, 26].

Although one study reported an increase in anti-inflammatory markers, the exact mechanism that Wharton's jelly decreases the symptoms of joint arthritis is not known[25]. While it is unclear with which mechanism the Wharton's jelly improved our patients' symptoms, it is clear that there was a marked benefit due to it. Future research may focus on the direct mechanism or further exploring the effect of Wharton's jelly on other joint pain across the body. One shortcoming of this study was that the patients were not randomized into the two different study groups, however, without funding to provide these injections at the same cost we could not effectively randomize the patients. The other shortcoming of the study was that the increased cost of the Wharton's jelly may have biased the study by preselecting out more motivated patients to adjust their activities or the cost may have increased the placebo effect of Wharton's jelly. On the positive side, the study did include pre-injection data so that we did not have to rely on comparing the results to the opposite side due to the fact that bilateral thumb arthritis was so common in our cohorts. The fact that there was such a significant improvement in DASH and VAS scores in the Wharton's jelly cohort at 12 months post-injection compared to the steroid cohort suggests that Wharton's jelly injections may have led to a substantial advance in the treatment of thumb arthritis.

## Conflict of Interest Statement:

None

## Funding Statement:

None

## Acknowledgement Statement:

None

## References:

1. Shuler MS, Luria S, Trumble TE. Basal joint arthritis of the thumb. J Am Acad Orthop Surg. 2008;16(7):418-23.

2. Vermeulen GM, Slijper H, Feitz R, Hovius SE, Moojen TM, Selles RW. Surgical management of primary thumb carpometacarpal osteoarthritis: a systematic review. J Hand Surg Am. 2011;36(1):157-69.

3. Day CS, Gelberman R, Patel AA, Vogt MT, Ditsios K, Boyer MI. Basal joint osteoarthritis of the thumb: a prospective trial of steroid injection and splinting. J Hand Surg Am. 2004;29(2):247-51.

4. Weiss AC, Goodman AD. Thumb Basal Joint Arthritis. J Am Acad Orthop Surg. 2018;26(16):562-71.

5. Arasegawa Y, Muramatsu K, Inoue K, Ueda T, Jyouichi K, Kinoshita D. The Relationship of Patient Characteristics and Prolonged Pain after Treatment of Carpometacarpal Joint Arthritis of the Thumb. J Hand Surg Asian Pac Vol. 2023;28(1):53-60.

6. Arrigoni C, D'Arrigo D, Rossella V, Candrian C, Albertini V, Moretti M. Umbilical Cord MSCs and Their Secretome in the Therapy of Arthritic Diseases: A Research and Industrial Perspective. Cells. 2020;9(6).

7. Challoumas D, Murray E, Ng N, Putti A, Millar N. A Meta-analysis of Surgical Interventions for Base of Thumb Arthritis. J Wrist Surg. 2022;11(6):550-60.

8. Chen X, Sun L, Wang S, Wang Y, Zhou Y, Li Y, et al. Effects of Prunus Tomentosa Thumb Total Flavones on adjuvant arthritis in rats and regulation of autophagy. Technol Health Care. 2023;31(S1):123-36.

9. Clarke S, Hagberg W, Kaufmann RA, Grand A, Wollstein R. Complications with the use of Artelon in thumb CMC joint arthritis. Hand (N Y). 2011;6(3):282-6.

10. de Villeneuve Bargemon JB, Jaloux C, Dobelle E, Plomion M. Comment on Tanaka et al. :Suspension arthroplasty using the palmaris longus tendon with a suture button for thumb trapeziometacarpal arthritis: A retrospective observational study. J Orthop Sci. 2023;28(4):949-50.

11. Fontes D. Basal joint arthroscopy indications in first CMC joint arthritis. Hand Surg Rehabil. 2021;40S:S117-S25.

12. Gander B, Wollstein R. Surgical Treatment for Thumb CMC Joint Arthritis. Curr Rheumatol Rev. 2013;9(2):113-8.

13. Gehrmann SV, Tang J, Li ZM, Goitz RJ, Windolf J, Kaufmann RA. Motion deficit of the thumb in CMC joint arthritis. J Hand Surg Am. 2010;35(9):1449-53.

14. Giddins G. Outcome of three very different treatments for thumb CMC joint arthritis. J Hand Surg Eur Vol. 2013;38(8):821.

15. Heineman JT, Forster GL, Stephens KL, Cottler PS, Timko MP, DeGeorge BR, Jr. A Randomized Controlled Trial of Topical Cannabidiol for the Treatment of Thumb Basal Joint Arthritis. J Hand Surg Am. 2022; 47 (7):611-20.

16. Hustedt JW, Deeyor ST, Hui CH, Vohra A, Llanes AC, Silvestri BL. A Prospective Clinical Trial Comparing Denervation With Suspension Arthroplasty for Treatment of Carpometacarpal Arthritis of the Thumb. J Hand Surg Am. 2023;48(4):348-53.

17. Kannan S, Viswanathan P, Gupta PK, Kolkundkar UK. Characteristics of Pooled

Wharton's Jelly Mesenchymal Stromal Cells (WJ-MSCs) and their Potential Role in Rheumatoid Arthritis Treatment. Stem Cell Rev Rep. 2022;18(5):1851-64.

18. Laronde P, Duriez P, Oca V, d'Almeida MA, Hustin C. Thumb basal joint arthritis: New classification, diagnostic and therapeutic algorithm. Hand Surg Rehabil. 2022;41 (4):419-25.

19. Loibl M, Lang S, Dendl LM, Nerlich M, Angele P, Gehmert S, et al. Leukocyte-Reduced Platelet-Rich Plasma Treatment of Basal Thumb Arthritis: A Pilot Study. Biomed Res Int. 2016;2016:9262909.

20. Luria S, Waitayawinyu T, Nemechek N, Huber P, Tencer AF, Trumble TE. Biomechanic analysis of trapeziectomy, ligament reconstruction with tendon interposition, and tie-in trapezium implant arthroplasty for thumb carpometacarpal arthritis: a cadaver study. J Hand Surg Am. 2007;32(5):697-706.

21. Maarse W, Watts AC, Bain GI. Medium-term outcome following intra-articular corticosteroid injection in first CMC joint arthritis using fluoroscopy. Hand Surg. 2009;14(2-3):99-104.

22. Matsuo T, Suzuki T, Hayakawa K, Kimura H, Matsumura N, Iwamoto T. Comparative study on the effectiveness of bone grafting for arthrodesis of the thumb carpometacarpal arthritis. J Hand Surg Eur Vol. 2023;48(4):309-15.

23. Passiatore M, Taccardo G, Cilli V, Rovere G, Liuzza F, Pannuto L, et al. Surgical treatment of carpometacarpal thumb arthritis with trapeziectomy and intra-tendon (FCR) suspension with one-loop APL: comparative cohort study. BMC Musculoskelet Disord. 2023;24(1):328.

24. Phan A, Calderon T, Hammert WC. Evaluation of PROMIS Scores 6 Weeks after Conservative Management of Carpometacarpal Thumb Arthritis. Plast Reconstr Surg Glob Open. 2022;10(10):e4493.

25. Gupta A, Rodriguez HC, Potty AG, Levy HJ, El-Amin Iii SF. Treatment of Knee Osteoarthritis with Intraarticular Umbilical Cord-Derived Wharton's Jelly: A Case Report. Pharmaceuticals (Basel). 2021;14(9).

26. Gupta A, El-Amin SF, 3rd, Levy HJ, Sze-Tu R, Ibim SE, Maffulli N. Umbilical cord-derived Wharton's jelly for regenerative medicine applications. J Orthop Surg Res. 2020;15(1):49.

27. Cocchiarella LA, G.B.J. Upper Extremity Impairment Evaluation. In: Cocchiarella LA, G.B.J., editor. Guidelines to the Evaluation of Permanent Impairment. 5th ed. United States: AMA Press; 2000. p. 437-510.