

Case Report

Improvement of Chronic Morning Hand Stiffness and Pain with Stellate Ganglion Block in a Seronegative Patient: A Case Report

Dong Hee Kang , Sie Jeong Ryu , Doo Sik Kim , Ju Duck Kim ,
Hyung Joo Chung , Ji Wook Kim* 

Department of Anesthesiology and Pain Medicine, Kosin University College of Medicine, Busan, Korea

Abstract

Chronic hand pain poses a clinical challenge, especially when standard diagnostic tests return negative results. This case report details a 45-year-old woman who experienced persistent stiffness and pain in both hands for 20 years, which was effectively treated with a stellate ganglion block (SGB). The patient, employed in an office setting that required extensive computer use, noticed her symptoms worsened during busy work periods. Despite negative blood tests for rheumatoid factor, anticyclic citrullinated peptide antibody, and other inflammatory markers, she endured prolonged morning stiffness and pain. Previous treatments, including nonsteroidal anti-inflammatory drugs, were either ineffective or poorly tolerated. After receiving three weekly SGB treatments, the patient reported significant relief from pain and stiffness, with her Numerical Rating Scale score dropping from 7 to 2 and stiffness decreasing by about 50%. Similar improvements were noted with left-sided SGB treatments. At a three-month follow-up, the patient remained mostly symptom-free, experiencing a notable enhancement in her quality of life and work performance. This case indicates that SGB may serve as an effective alternative for treating seronegative chronic hand pain syndromes, particularly in patients unresponsive to traditional therapies. The mechanism behind SGB's effectiveness is complex, involving the modulation of sympathetic nervous system activity, inhibition of pain signal transmission, and promotion of vasodilation. While this case showed remarkable treatment outcomes, similar results may not be guaranteed for all patients. More research is necessary to determine the long-term efficacy and safety of SGB for similar patient populations and to assess its potential cost-effectiveness in managing chronic pain conditions.

Keywords

Stellate Ganglion Block, Chronic Hand Pain, Seronegative Arthritis, Ultrasound-guided Injection, Chronic Pain Management

1. Introduction

Chronic hand pain has diverse etiologies, including osteoarthritis, fibromyalgia, rheumatoid arthritis, and repetitive strain injuries. Diagnosis and treatment become particularly challenging when initial outpatient blood tests yield negative

results for major differential diagnoses [1-3]. We report a case of successful treatment in a patient with chronic hand pain accompanied by morning stiffness, along with a literature review. This case report was conducted in accordance with the

*Corresponding author: wookoficu@naver.com (Ji Wook Kim)

Received: 14 November 2024; **Accepted:** 28 November 2024; **Published:** 7 December 2024



Copyright: © The Author(s), 2024. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

case report guidelines of the Kosin University Hospital Ethics Committee. Formal research ethics committee approval was not required; thus, no reference number was generated. This study was conducted ethically in accordance with the principles of the Declaration of Helsinki.

2. Case Presentation

A 45-year-old Asian female of Korean nationality was referred to our pain clinic with complaints of bilateral hand stiffness and pain upon waking, preventing finger flexion. The patient reported that these symptoms began 20 years ago following childbirth and have persisted since. Initially, mild stiffness was present in the distal interphalangeal joints upon waking, but it gradually spread to all finger joints over the years. At first, the symptoms would improve within 20 minutes, so she did not seek specific treatment. However, the condition had significantly worsened over the past three years, prompting her to seek medical attention.

The patient worked in an office job requiring extensive computer typing, often for 8-10 hours a day. She noted symptom exacerbation during periods of increased workload, particularly during project deadlines. Even during rest periods

or weekends, while the duration of pain and stiffness decreased, their intensity persisted. The stiffness typically lasted for 2-3 hours each morning, after which daily activities and work were manageable, albeit with some discomfort.

Regarding her medical history, the patient had been receiving psychiatric treatment for depression that began five years ago. For the past three months, she had been hospitalized due to suicidal ideation. Apart from allergies to dog hair and alcohol, which manifested as skin rashes and respiratory discomfort, she had no other significant medical history. She denied any family history of rheumatological disorders.

A comprehensive panel of laboratory tests was conducted. Rheumatoid factor, anticyclic citrullinated peptide antibody, erythrocyte sedimentation rate, and C-reactive protein were all within normal limits. Antinuclear antibody, uric acid, and thyroid function tests were negative. Complete blood count showed a slightly elevated white blood cell count of $12,000/\mu\text{L}$, which was not clinically significant. Physical examination revealed no visible joint deformities, swelling, or erythema. Range of motion in all finger joints was full, albeit painful at the extremes. Radiographs of both hands showed no significant findings, with no evidence of joint space narrowing, erosions, or osteophytes (Figure 1).

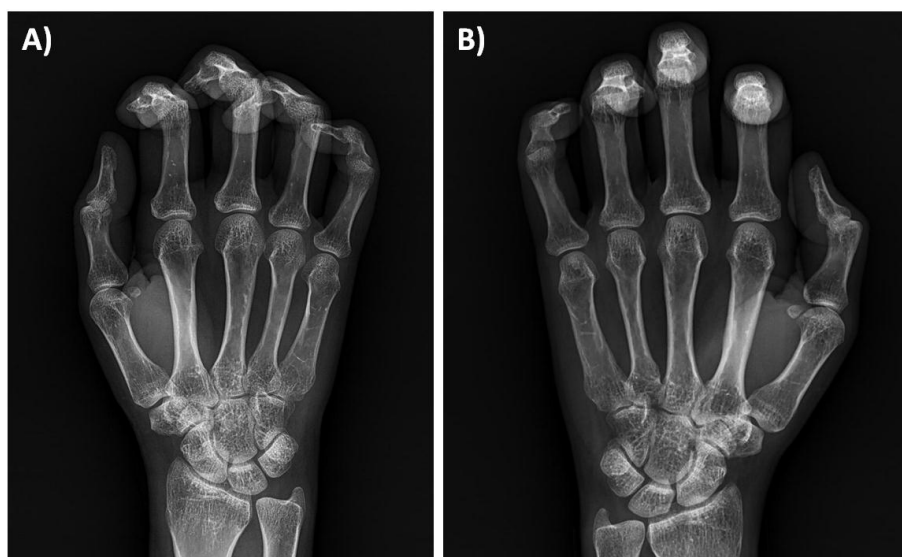


Figure 1. X-ray image of patients both hands: A) Left hand; B) Rt. Hand.

The patient had previously been prescribed nonsteroidal anti-inflammatory drugs by the rheumatology department. However, she had self-discontinued these medications due to severe heartburn and gastroesophageal reflux, which she found intolerable. Given her negative stance towards oral analgesics and the lack of response to conventional treatments. We included a prescription for nortriptyline, a tricyclic antidepressant with analgesic properties, and outpatient ultrasound-guided SGB.

The decision to perform SGB was based on emerging evi-

dence of its efficacy in various chronic pain conditions and its potential to modulate sympathetic nervous system activity. Initial right-sided SGB was performed due to more severe right hand pain. The procedure was conducted under ultrasound guidance with the patient in supine position. After identifying the C7 transverse process and taking care to avoid the carotid artery and internal jugular vein, a 25G 38mm needle was inserted laterally to medially, parallel to the ultrasound probe. The needle tip was positioned above the longus colli muscle. After aspiration to confirm no vascular

puncture, a mixture of 5 mL of 0.75% bupivacaine (1 mL) and dexamethasone (2.5 mg) was injected. The spread of the medication was confirmed before concluding the procedure. The patient was observed for 20 minutes for hemodynamic changes and complications, but no adverse effects were noted.

After a single injection, the patient's Numerical Rating Scale score (NRS) for right hand pain decreased from 7 to 4, with stiffness reduced by approximately 50%. The patient reported feeling "a warmth sensation" in her right hand immediately after the procedure. Following the second treatment one week later, the NRS decreased further to 2, with additional reduction in stiffness.

After three procedures, spaced one week apart, most pain and stiffness in the right hand had resolved. Encouraged by these results, left-sided SGB treatment was initiated and followed a similar protocol. The patient expressed high satisfaction after three left-sided SGB treatments, reporting that both hands felt "almost normal" for the first time in two decades.

Follow-up at three months post-treatment revealed that the patient remained largely symptom-free, with only occasional mild stiffness on particularly cold mornings. The patient's quality of life had markedly improved. She reported being able to type for longer periods without discomfort. She expressed a desire to continue with maintenance SGB treatments if needed. This case highlights the potential of SGB as an effective treatment option for chronic hand pain and stiffness of unclear etiology, particularly in patients who have not responded to conventional treatments. It also underscores the importance of a multidisciplinary approach in managing chronic pain conditions, considering both the physical and psychological aspects of patient care.

3. Discussion

Chronic joint pain is a prevalent health issue in modern society. In the United States, 21.2% of adults over 18 report chronic pain due to arthritis, with adults over 45 accounting for 88% of arthritis patients [4, 5]. Arthritis encompasses approximately 100 conditions affecting joints and surrounding tissues, significantly impacting wage loss, disability, and healthcare costs.

SGB is recognized as an effective treatment for various pain syndromes. While cases of successful SGB treatment for Complex Regional Pain Syndrome in fingers have been reported, this is the first reported case of successful SGB treatment in a patient with chronic hand arthritis symptoms similar to rheumatoid arthritis but seronegative [6].

SGB procedural methods and safety continue to improve. Ultrasound guidance enhances accuracy and safety, and SGB can be effectively utilized not only for pain management but also for various non-pain indications such as cardiovascular sympathetic stimulation reduction, limb blood flow improvement, and menopausal symptom relief [7, 8]. A key advantage of SGB is its rapid onset of effect. Studies demon-

strate that preoperative SGB can significantly reduce post-operative analgesic requirements [9]. SGB may have fewer systemic side effects compared to pharmacological therapies, making it a valuable alternative for patients concerned about long-term medication side effects.

The mechanism of action of SGB is multifaceted. It modulates sympathetic nervous system activity, inhibits pain signal transmission, and induces vasodilation. SGB can reduce inflammation by inhibiting the HIF-1 α /NLRP3 signaling pathway and inhibit neuronal apoptosis by decreasing Bax gene expression [10-12]. Additionally, it can regulate cortisol and aldosterone levels, modulating systemic inflammatory responses. However, SGB carries risks of temporary side effects such as Horner's syndrome, hoarseness, and pulse rate reduction, necessitating close post-procedure monitoring [7].

While our patient showed significant improvement over a three-month follow-up period, the importance of long-term follow-up in such cases. Chronic pain conditions often have a fluctuating course, and the durability of SGB effects over extended periods remains to be fully elucidated [13]. Future studies should aim to track patients for longer durations, ideally over several years, to assess the long-term efficacy and safety of SGB in managing chronic hand pain.

The complexity of chronic pain management necessitates a multidisciplinary approach [14]. In this case, the patient's concurrent psychiatric treatment for depression highlights the intricate relationship between chronic pain and mental health. A comprehensive treatment plan should involve collaboration among pain specialists, rheumatologists, psychiatrists, and other relevant healthcare professionals. This multidisciplinary approach can address not only the physical aspects of pain but also its psychological and social dimensions, potentially leading to more effective and holistic patient care.

From an economic perspective, while the initial cost of SGB treatment may be higher than some conventional therapies, its potential to reduce long-term medication use and improve functional outcomes could result in significant cost savings over time [15]. Chronic pain conditions often lead to substantial healthcare utilization and lost productivity. If SGB can effectively manage symptoms and reduce the need for ongoing pharmacological interventions, it may prove to be a cost-effective treatment option in the long run. However, formal cost-effectiveness analyses are needed to quantify these potential economic benefits.

This case suggests that SGB may be effective in chronic hand pain patients with negative blood tests. However, this single case cannot predict similar effects in all patients. Further accumulation of treatment data and additional research are needed to establish the efficacy and safety of SGB in similar patient groups.

4. Conclusion

Stellate ganglion block may be effective in chronic hand pain patients with negative blood tests. While this case

demonstrated dramatic treatment effects, similar results cannot be expected in all patients. It is necessary to accumulate patient treatment data, starting with patient groups similar to this case, when performing stellate ganglion blocks.

Abbreviations

SGB Stellate Ganglion Block
NRS Numerical Rating Scale Score

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] van Delft ETAM, Jamal M, den Braanker H, Kuijper TM, Hazes JMW, Lopes Barreto D, Weel-Koenders AEAM. A systematic review on time trend incidence of rheumatoid arthritis in outpatient rheumatology clinics. *Front Med (Lausanne)*. 2022 Aug 24; 9: 933884. <https://doi.org/10.3389/fmed.2022.933884>
- [2] Bissonnette R, Warren RB, Pinter A, Agner T, Gooderham M, Schuttelaar MLA, Cr  py MN, Stingeni L, Serra-Baldrich E, Baranowski K, Korn S, Kurvits M, Plohberger U, Strange Vest N, Schliemann S; trial investigators. Efficacy and safety of delgocitinib cream in adults with moderate to severe chronic hand eczema (DELTA 1 and DELTA 2): results from multicentre, randomised, controlled, double-blind, phase 3 trials. *Lancet*. 2024 Aug 3; 404(10451): 461-473. [https://doi.org/10.1016/S0140-6736\(24\)01027-4](https://doi.org/10.1016/S0140-6736(24)01027-4)
- [3] Schmid AB, Fundaun J, Tampin B. Entrapment neuropathies: a contemporary approach to pathophysiology, clinical assessment, and management. *Pain Rep*. 2020 Jul 22; 5(4): e829. <https://doi.org/10.1097/PR9.0000000000000829>
- [4] Theis KA, Murphy LB, Guglielmo D, Boring MA, Okoro CA, Duca LM, Helmick CG. Prevalence of Arthritis and Arthritis-Attributable Activity Limitation - United States, 2016-2018. *MMWR Morb Mortal Wkly Rep*. 2021 Oct 8; 70(40): 1401-1407. <https://doi.org/10.15585/mmwr.mm7040a2>
- [5] Fallon EA, Boring MA, Foster AL, Stowe EW, Lites TD, Odom EL, Seth P. Prevalence of Diagnosed Arthritis - United States, 2019-2021. *MMWR Morb Mortal Wkly Rep*. 2023 Oct 13; 72(41): 1101-1107. <https://doi.org/10.15585/mmwr.mm7241a1>
- [6] Hey M, Wilson I, Johnson MI. Stellate ganglion blockade (SGB) for refractory index finger pain - a case report. *Ann Phys Rehabil Med*. 2011 May; 54(3): 181-8. English, French. <https://doi.org/10.1016/j.rehab.2011.03.001>
- [7] Shan HH, Chen HF, Ni Y, Yang JX, Zhou XL. Effects of Stellate Ganglion Block Through Different Approaches Under Guidance of Ultrasound. *Front Surg*. 2022 Jan 17; 8: 797793. <https://doi.org/10.3389/fsurg.2021.797793>
- [8] Feigin G, Velasco Figueroa S, Englesakis MF, D'Souza R, Hoydonckx Y, Bhatia A. Stellate ganglion block for non-pain indications: a scoping review. *Pain Med*. 2023 Jul 5; 24(7): 775-781. <https://doi.org/10.1093/pm/pnad011>
- [9] Kumar N, Thapa D, Gombar S, Ahuja V, Gupta R. Analgesic efficacy of pre-operative stellate ganglion block on postoperative pain relief: a randomised controlled trial. *Anaesthesia*. 2014 Sep; 69(9): 954-660. <https://doi.org/10.1111/anae.12774>
- [10] Shi ZM, Jing JJ, Xue ZJ, Chen WJ, Tang YB, Chen DJ, Qi XY, Huang L, Zou YQ, Wu XZ, Yang F. Stellate ganglion block ameliorated central post-stroke pain with comorbid anxiety and depression through inhibiting HIF-1 α /NLRP3 signaling following thalamic hemorrhagic stroke. *J Neuroinflammation*. 2023 Mar 21; 20(1): 82. <https://doi.org/10.1186/s12974-023-02765-2>
- [11] Xu, Qiao, Lei Li, Ke Yan, Siqi Ye. Mechanism of Stellate Ganglion Block Anesthesia Inhibiting Neuronal Apoptosis in Rats by Down-regulating Bax gene. *Wirel. Pers. Commun*. 137 (2024): 1843-1860. <https://doi.org/10.21203/rs.3.rs-1756030/v1>
- [12] Gunduz OH, Kenis-Coskun O. Ganglion blocks as a treatment of pain: current perspectives. *J Pain Res*. 2017 Dec 14; 10: 2815-2826. <https://doi.org/10.2147/JPR.S134775>
- [13] Zhou C, Li M, Zheng L, Chu Y, Zhang S, Gao X, Gao P. Efficacy and mechanism of stellate ganglion block in patients undergoing carotid endarterectomy. *Vascular*. 2023 Aug; 31(4): 708-716. <https://doi.org/10.1177/17085381221084800>
- [14] Gatchel RJ, McGeary DD, McGeary CA, Lippe B. Interdisciplinary chronic pain management: past, present, and future. *Am Psychol*. 2014 Feb-Mar; 69(2): 119-30. <https://doi.org/10.1037/a0035514>
- [15] Espinoza MA, Bilbeny N, Abbott T, Carcamo C, Zitko P, Zamorano P, Balmaceda C. Cost analysis of chronic pain due to musculoskeletal disorders in Chile. *PLoS One*. 2022 Oct 27; 17(10): e0273667. <https://doi.org/10.1371/journal.pone.0273667>