

Single-Stage Mini-Open Release for Bilateral Carpal Tunnel Syndrome – A Case Report

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Learning Point of the Article:

The single-stage mini-open release for bilateral carpal tunnel syndrome (CTS) is an efficient and cost-effective option for managing bilateral CTS, which allows for a quick recovery while minimizing the drawbacks of open and endoscopic methods.

Abstract

Introduction: Carpal tunnel syndrome (CTS) is the most common compressive neuropathy, often leading to significant impairment, especially in patients with bilateral involvement. When conservative trials fail, surgical options such as open, mini-open, and endoscopic carpal tunnel release are considered. This report highlights the use of single-stage bilateral mini-open carpal tunnel release, emphasizing its efficiency, reduced recovery time, and cost-effectiveness.

Case Report: A 58-year-old female with hypothyroidism presented with a history of numbness and tingling in the thumb, index, and middle fingers of both hands. Despite conservative management, symptoms persisted. The patient opted for a single-stage bilateral mini-open carpal tunnel release to save time and costs. The patient resumed daily activities within 2 weeks, showing significant improvement in disabilities of the arm, shoulder, and hand and Boston CTS questionnaire scores.

Conclusion: The mini-open technique for single-stage bilateral carpal tunnel release is an effective and efficient option for managing bilateral CTS. It provides adequate exposure and meticulous decompression, offering the benefits of both open and endoscopic methods while minimizing their drawbacks. This approach significantly improves patient outcomes and satisfaction.

Keywords: Carpal tunnel syndrome, mini-open release, carpal tunnel release, median nerve.

Introduction

With an incidence ranging from 1 to 5%, and a female preponderance, carpal tunnel syndrome (CTS) is the most frequently encountered compressive neuropathy [1]. The compression of the median nerve within the carpal tunnel results in CTS [2]. Thyroid and pituitary dysfunction, trauma, pregnancy, and rheumatoid arthritis are common causes of CTS [2]. There are several factors that can contribute to the syndrome, including genetic predisposition, diabetes, and obesity [2]. Patients with median nerve compression typically experience symptoms such as paraesthesia, pain, and numbness

along the distribution of the median nerve. If left untreated, the condition may progress and result in muscle weakness and permanent loss of sensation [2]. In patients with CTS, 22–87% present with symptoms in both hands, that is, bilateral CTS [3]. Various treatment modalities are available and can be categorized into conservative and surgical. When the trial of conservative management fails to relieve the patient of their symptoms, we opt for surgical intervention, that is, carpal tunnel release. In case of bilateral involvement, sequential unilateral or single-sitting bilateral carpal tunnel release can be done. A single-sitting bilateral release may be preferred due to the lower cost as

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Figure 1: Marking the incision line along the radial border of the fourth finger, indicated by the dashed line.



Figure 2: The flexor retinaculum visualized through the incision.

compared to sequential unilateral release [4]. Carpal tunnel release may be done by means of a long incision, the mini-open technique, or through the endoscopic method. The open release or long incision is associated with a longer recovery time, more post-operative pain, and associated injury to the median nerve, digital nerves and surrounding vessels [5]. The endoscopic method, although minimally invasive, carries a higher risk of median nerve injury due to poor visualization and is expensive compared to other methods [5]. The mini-open release offers a middle ground, being associated with a lower cost, less scarring, and a quick recovery as well [5].

The presence of bilateral involvement significantly impacts the patient's quality of life and should also be taken into account during treatment planning, making bilateral single-stage release through the mini-open technique a good choice for bilateral CTS. The mini-open release saves patients both time and money, making it a favorable choice. We present the case report of a patient with bilateral CTS who was managed with bilateral mini-open carpal tunnel release in a single sitting.

Case Report

A 58-year-old female presented to the orthopedics outpatient department with complaints of numbness and tingling sensation over the thumb, index, and middle finger of both hands, since 1 year. She was on medication for hypothyroidism since 5 years. She had no other comorbidities and had no

previous history of surgery or hand injury. She did not engage in smoking or alcohol intake. Phalen's, Durkan's, and reverse Phalen's tests were positive. X-ray yielded no positive findings where as ultrasonogram demonstrated a thickened flexor retinaculum and a decrease in the space between the median nerve and the flexor retinaculum.

Nerve conduction study of both upper limbs revealed prolonged distal latency in both median nerves. Before surgery, we assessed the patient's hand function using two scoring systems. The disabilities of the arm, shoulder, and hand (DASH) [6] score was 75. The Boston CTS questionnaire (BCTQ) score [7] was also evaluated preoperatively. The symptom severity scale (SSS) was 41 and the functional status scale (FSS) was 32, indicating significant impairment. An attempt at conservative management with splinting, oral analgesics, and physiotherapy was made, but to no avail. Therefore, the patient was presented with the option of surgical release. Following an explanation of the various surgical approaches, she opted for a single-stage bilateral mini-open carpal tunnel release, as it would save her both time and money. The procedure was carried out under general anesthesia. The incision was marked along the radial border of the fourth finger in flexion, just distal to the distal flexion wrist crease, as shown in Fig. 1. A 5 cm incision was made. Soft tissue was dissected, and thenar muscles were retracted ulnar wards. The transverse carpal ligament was identified (Fig. 2) and cut. Complete release was confirmed through direct visual inspection. Compression dressing was done after wound closure. The patient tolerated the procedure well and experienced no post-operative complications. The sutures were removed on the 12th post-operative day, and wound healing progressed without any complications (Fig. 3). The patient was able to resume her daily activities within 2 weeks. The patient's hand function showed



Figure 3: Clinical image taken at the 6-week follow-up, illustrating healed surgical scars on both wrists.

significant improvement after surgery.

The DASH questionnaire [6], which assesses upper-extremity function through 30 items rated from 1 (no difficulty) to 5 (severe difficulty), showed her score drop from 17 at 2 weeks to 5 at 4 weeks, indicating improved daily functioning. The BCTQ [7], with its SSS and FSS, also showed improvement, with SSS decreasing from 21 to 13 and FSS from 12 to 9, reflecting reduced symptoms and enhanced function. Her DASH score dropped from 17 at 2 weeks to 5 by 4 weeks. Similarly, the BCTQ scores, which assess symptom severity and functional status, improved. SSS went from 21 at 2 weeks to 13 at 4 weeks, and FSS went from 12 to 9. The patient was extremely satisfied with the treatment.

Discussion

CTS, affecting 1–5% of the population, is the most common compressive neuropathy. Between 22 and 87% of CTS patients experience symptoms in both hands. For bilateral CTS, sequential unilateral or simultaneous bilateral release can be done. A single-stage mini-open release may be preferred, as it saves the patient's time and money, while avoiding the complications associated with open or endoscopic carpal tunnel release. The findings from our case are consistent with multiple studies comparing mini-open release with different surgical techniques for CTS. Nakamichi and Tachibana reported significantly less post-operative pain and a faster return to work with the mini-open technique compared to the traditional open method, which is corroborated by our patient's

swift recovery within 2 weeks without complications [8]. Similarly, Zyluk et al. studied minimally invasive carpal tunnel release in patients with unilateral and bilateral CTS. Despite differences in disease duration and comorbidities, both groups reported similar improvements in pain and hand function, suggesting that surgical benefits are consistent regardless of whether one or both hands are affected [9]. Atroshi et al. found that although the endoscopic method offered quicker recovery, it had a higher complication rate, particularly related to nerve injury [10]. The mini-open technique in our case provided adequate visualization and reduced nerve injury risk, balancing quick recovery and safety. Finsen and Andersen highlighted the cost-effectiveness and lower complication rates of single-surgeon carpal tunnel release, which our study supports by demonstrating the efficiency and safety of a single-sitting bilateral release performed by a single surgeon [11]. Beck and Deegan showed that single-session bilateral carpal tunnel release reduced overall costs and recovery time, findings echoed in our patient's case with her rapid recovery and high satisfaction [12]. Lastly, Concannon et al. indicated that the mini-open technique had outcomes comparable to the endoscopic method but with fewer complications and lower costs, reinforcing the balanced approach of effectiveness, safety, and cost observed in our case [13]. While long-term outcomes require further investigation, studies like Zheng et al. suggest low recurrence rates within a 3-year follow-up period for both mini-open and open carpal tunnel release techniques [14]. However, Cresswell et al. highlight the need for caution, as some studies report higher recurrence rates (up to 57%) in longer follow-up periods [15].

Conclusion

This case report supports the use of the mini-open technique for single-sitting bilateral carpal tunnel release as an effective and efficient option for managing bilateral CTS. Adequate exposure and meticulous decompression are paramount for achieving a good outcome in carpal tunnel release surgery. The mini-open technique achieves both, providing the benefits of open and endoscopic methods while minimizing their drawbacks.

Clinical Message

The successful application of the mini-open technique for single-stage bilateral carpal tunnel release highlights its potential as a cost-effective and efficient option for patients with bilateral CTS. This approach offers reduced recovery time and significant symptomatic relief making it a valuable alternative to traditional surgical methods. This case sheds light on the importance of individualized treatment plans and suggests adoption of the mini-open technique in managing bilateral CTS.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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