The Incidence of Complex Regional Pain Syndrome in Simultaneous Surgical Treatment of Carpal Tunnel Syndrome and Dupuytren Contracture

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Abstract

Background: To determine the incidence of complex regional pain syndrome (CRPS) in the concurrent surgical treatment of Dupuytren contracture (DC) and carpal tunnel syndrome (CTS) through a thorough review of evidence available in the literature. **Methods:** The indices of 260 hand surgery books and PubMed were searched for concomitant references to DC and CTS. Studies were eligible for inclusion if they evaluated the outcome of patients treated with simultaneous fasciectomy or fasciotomy for DC and carpal tunnel release using CRPS as a complication of treatment. Of the literature reviewed, only 4 studies met the defined criteria for use in the study. Data from the 4 studies were pooled, and the incidence of recurrence and complications, specifically CRPS, was noted. **Results:** The rate of CRPS was found to be 10.4% in the simultaneous treatment group versus 4.1% in the fasciectomy-only group. This rate is nearly half the 8.3% rate of CRPS found in a randomized trial of patients undergoing carpal tunnel release. **Conclusions:** Our analysis demonstrates a marginal increase in the occurrence of CRPS by adding the carpal tunnel release to patients in need of fasciectomy, contradicting the original reports demonstrating a much higher rate of CRPS. This indicates that no clear clinical risk is associated with simultaneous surgical treatment of DC and CTS. In some patients, simultaneous surgical management of DC and CTS can be accomplished safely with minimal increased risk of CRPS type 1.

Keywords: CRPS, carpal tunnel, Dupuytren contracture

Introduction

Dupuytren contracture (DC) is treated by fasciotomy, fasciectomy, and injections, while the surgical treatment for carpal tunnel syndrome (CTS) is decompression via release of the transverse carpal ligament. Controversy exists as to whether these procedures should be performed at the same time. There is limited literature on the subject. One single-center study noted a 4.6% incidence of DC in those with CTS. Previous publications have even suggested each pathology can present as a complication of the other.^{14,17}

A 1980 study showed a 53% rate of complex regional pain syndrome (CRPS) in those treated with fasciectomy and simultaneous carpal tunnel release.¹⁵ Recent studies, as well as reports of personal experience, have demonstrated no increased rates of complication in simultaneous surgery and vary in their recommendations for and against the practice.^{4,7,11} The American Society for Surgery of the Hand (ASSH) has not published a position paper. Its 1996 update recommended performing carpal tunnel surgery at a later date due to the possibility of accelerated scar forma-

tion producing a suboptimal result.¹ In 2007, the society simply recognized that the practice is controversial, without giving an official recommendation.¹⁶

A complication that causes concern among surgeons treating patients with both CTS and DC is the potential postoperative development of CRPS type 1. An incidence of 2.1% to 5% has been reported after carpal tunnel release, while the incidence of CRPS after surgical treatment of DC ranges from 4.5% to 40%.^{9,10,12} There is concern that the incidence is even higher in combined approaches to these conditions due to early research on simultaneous treatment

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Table 1. Summary of Pooled Data From Utilized Studies.

	Fasciectomy with CTR			Fasciectomy only		
	Total	CRPS	Recurrence	Total	CRPS	Recurrence
Coert et al ³	10	2	0	548	25	295
Gonzalez and Watson ⁷	30	3	4	30	0	0
Lilly and Stern ¹¹	70	0	4	50	1	6
Nissenbaum and Kleinert ¹⁵	15	8	7	—	—	—
	125	13	15	628	26	301

Note. CTR= carpal tunnel release; CRPS = complex regional pain syndrome.

of these challenging conditions.¹⁵ This problem has since been further evaluated in the literature, but little evidence exists to support simultaneous surgical management. We reviewed the evidence available in the literature, including surgical texts and published manuscripts, to analyze surgical management of these conditions when occurring simultaneously.

Materials and Methods

Literature Search

The indices of 251 hand surgery books in the personal collection of an academic hand surgeon were searched for concomitant references to DC and CTS. Seven books contained such references. These references include acknowledgment of the incidence of concomitant disease, recommendations on treatment, and discussion of disease mechanisms (Level of Evidence: Prognostic, V).^{1,6,8,13,16} However, none met the criteria for inclusion as defined in the “Study Eligibility” section.

To identify published, original research that reported the outcomes of patients treated with simultaneous fasciectomy or fasciotomy for DC and carpal tunnel release, a PubMed search was conducted using the following search parameters: (Dupuytren’s [Title]) AND carpal tunnel. Search limitations included human subjects and English language. The search returned a total of 30 studies. Of these studies, only 4 met the criteria as defined in the “Study Eligibility” section.

Study Eligibility

The literature was evaluated for relevance to this study subject. Studies were eligible for inclusion if they evaluated the outcome of patients treated with simultaneous fasciectomy or fasciotomy for DC and carpal tunnel release using CRPS as a complication of treatment. Studies where one disease presented as a manifestation or sequelae of the other were excluded, rather than as simultaneous conditions, were excluded. Also excluded were studies where a record of adverse events and complications was not present.

Table 2. Odds Ratios for CRPS and Recurrence After Simultaneous Surgical Treatment of DC and CTS.

CRPS	1.103
Recurrence	0.085

Note. CRPS = complex regional pain syndrome; DC = Dupuytren contracture; CTS = carpal tunnel syndrome.

Analysis

Data from the 4 studies (Level of Evidence: Prognostic, II) were pooled and the incidence of recurrence and complications, specifically CRPS, was noted.^{3,7,11,15}

Results

The pooled data were collected and are shown in Table 1. The study by Coert et al³ gave the incidence of CRPS in the fasciectomy-only group as a percentage, which was then converted to the number of instances shown in the table.

Next, the data regarding incidence of complications in each procedure were collected and used to calculate the respective odds ratios, shown in Table 2. The odds ratios were calculated with the assumption that fasciectomy with simultaneous carpal tunnel release is a risk factor for CRPS.

These data suggest that the odds of recurrence of DC in fasciectomy with simultaneous carpal tunnel release are significantly lower than that with fasciectomy alone, while the odds of developing CRPS are slightly higher.

When the data from all studies were analyzed, the rate of CRPS was found to be 10.4% in the simultaneous treatment group versus 4.1% in the fasciectomy-only group.

Discussion

CRPS type 1, formerly known as reflex sympathetic dystrophy, is a known complication of hand surgery. It can manifest after trauma, surgery, or other inflammatory processes. CRPS presentations are highly variable, and symptoms of inflammatory, sensory, autonomic, trophic, or motor features can all represent signs of this debilitating condition. History and physical exam findings are the main

clinical tool utilized for diagnosis, and a 3-phase bone scan can provide confirmation.⁵ However, the evaluation of CRPS to give a precise percentage risk of development is difficult due to a number of factors, including the variation in definition of CRPS by physical exam, the variation in official definition as the disease has evolved over the years, and the inaccurate labeling of undiagnosed CRPS type 2 and CRPS type 1.

The literature is conflicted in regard to this condition as a sequela after intervention for common pathologic conditions of the hand. An early description of CRPS after simultaneous surgical treatment of CTS and DC warned hand surgeons of a poor outcome.¹⁵ As the era of evidence-based medicine continues to come to the forefront, these surgical dictums need to be reinvestigated. Our literature search shows that the subject is rarely mentioned in textbooks utilized as part of the standard resources for hand surgeons in training. The data in this meta-analysis show a 10.4% incidence of CRPS among the published cases of simultaneous surgical treatment. The concurrent surgical approach can be a safe method for treating these conditions simultaneously (Level of Evidence: Systematic Review, III).

Simultaneous surgical treatment is not the only therapeutic option, as strategies for treatment of these conditions can include options such as steroid injections for CTS and collagenase injections for DC. The data from the above studies showed an incidence of CRPS type 1 of 10.4% for simultaneous surgical management. However, when the results from the study by Nissenbaum and Kleinert are excluded due to the lack of a control group, that rate drops to 4.54%. This compares favorably with the rate of 4.14% for patients undergoing fasciectomy alone and demonstrates only a marginal increase in the occurrence of CRPS by adding the carpal tunnel release to patients in need of median nerve decompression. In addition, this rate is half the 8.3% rate of CRPS found in a randomized trial of patients undergoing carpal tunnel release.² This report contradicts the original reports demonstrating a much higher rate of CRPS.¹⁵ However, due to the many variations and limitations inherent in each of these studies, the validity of a formal meta-analysis was questioned and the decision was made to forego that method of analysis.

The opinion is split regarding simultaneous surgical treatment. In a survey of members of the ASSH, 50% of responders would not or would only sometimes perform these procedures together due to the risk of the development of CRPS.¹¹ Further research is needed to determine the outcomes of simultaneous surgical treatment and provide data sufficient for an evidence-based report.

In the study by Nissenbaum and Kleinert, no group received treatment for DC via partial fasciectomy alone.¹⁵ For that reason, the data from that study were unable to be

included in the calculated odds ratios. This represents a significant confounding factor, as the study gives a strong recommendation against simultaneous treatment. This study is also the oldest of the four, with the 3 more recent studies showing a much lower rate of CRPS among patients in the simultaneous treatment group.

The study by Coert et al described a series of operations that included both primary surgeries and recurrent surgeries, without a clear delineation in data between the two.³ While adverse effects and incidences of recurrence were listed, it is unclear whether those were described at primary or secondary operations. Another limitation of this study is that the instances of recurrence and extensions of digits were not explicitly listed, making the comparison between the 4 studies impossible.

Further limiting this study is the lack of description of the disease severity and surgical approaches used for both the carpal tunnel release and for palmar fasciectomy. While some studies describe their techniques,^{3,7} others do not provide the details of the procedures.¹¹ This can be important because severity of symptoms in both conditions, need for more extensive releases, or larger surgical exposures could theoretically increase the risk of an adverse outcome.

In conclusion, previous studies do not demonstrate a clear clinical risk associated with simultaneous surgical treatment of DC and CTS. While the original study by Nissenbaum and Kleinert was the basis for the previous doctrine against simultaneous treatment, more recent studies have not shown similar results. In some patients, simultaneous surgical management of DC and CTS can be accomplished safely with minimal increased risk of CRPS type 1.

Ethical Approval

This study was approved by our institutional review board.

Statement of Human and Animal Rights

This article does not contain any studies with human or animal subjects.

Statement of Informed Consent

Informed consent was obtained from all individual participants included in the study.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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