

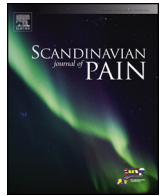


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The risk of pain syndrome affecting a previously non-painful limb following trauma or surgery in patients with a history of complex regional pain syndrome

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HIGHLIGHTS

- Chronic regional pain syndrome (CRPS) is a challenging complication after surgery or trauma.
- Among patients with a history of CRPS, rates of recurrent CRPS in a second extremity were evaluated.
- This rate was compared to general population incidence as reported in the literature.
- It was also compared to reported rates of CRPS after distal radius fracture.
- Patients with a history of CRPS may be at increased risk for CRPS in a second extremity.

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ABSTRACT

Background and purpose: Complex regional pain syndrome (CRPS) is a challenging complication after surgery or trauma. This study sought to determine the incidence of CRPS after a second inciting event in a previously unaffected extremity in patients with a history of an ongoing CRPS diagnosis in another extremity.

Methods: A retrospective review identified patients with CRPS seen in clinic over a 20-month period. The incidence of CRPS after subsequent surgery or injury in a previous unaffected extremity was determined and compared to an average incidence reported in the literature.

Results: Ninety-three patients had a diagnosis of primary CRPS. Nineteen (20.4%) developed CRPS in one or more additional extremity compared to the incidence of 23.4 per 100,000 (0.0234%) in the literature (odds ratio 1069.6, $p < 0.0001$, 95% CI 562.0–2035.7). Twenty patients had a documented secondary injury or surgery in a second extremity. Fifteen (75%) developed secondary CRPS compared to a CRPS incidence rate of 6.4% following distal radius fracture, as determined by literature review (odds ratio 11.7, $p < 0.001$, 95% CI 5.9–23.2).

Conclusions: These results suggest that patients with a history of CRPS are more likely to develop secondary CRPS compared to the rates reported in the literature among the general population.

Implications: Patients with a history of CRPS should be counselled that they may be at risk for developing secondary CRPS if they undergo surgery or sustain trauma to another extremity.

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1. Introduction

Complex regional pain syndrome (CRPS) is a challenging condition, defined as pain, functional impairment, autonomic dysfunction and vasomotor abnormalities often occurring in the extremities. Initiated in the periphery, CRPS has functional and central nervous system implications. It is well known that CRPS frequently occurs as the sequelae of a trauma or surgical procedure. Knowledge of the symptoms and signs with which a patient with

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Table 1
IASP CRPS diagnostic criteria.

1. Continuing pain, which is disproportionate to any inciting event
2. Must report at least one symptom in *three of the four* following categories:
 - *Sensory*: reports of hyperesthesia and/or allodynia
 - *Vasomotor*: reports of temperature asymmetry and/or skin colour changes and/or skin colour asymmetry
 - *Sudomotor/oedema*: reports of oedema and/or sweating changes and/or sweating asymmetry
 - *Motor/trophic*: reports of decreased range of motion and/or motor dysfunction
 - (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin)
3. Must display at least one sign at time of evaluation in *two or more* of the following categories:
 - *Sensory*: evidence of hyperalgesia (to pinprick) and/or allodynia (to light touch and/or deep somatic pressure and/or joint movement)
 - *Vasomotor*: evidence of temperature asymmetry and/or skin colour changes and/or asymmetry
 - *Sudomotor/oedema*: evidence of oedema and/or sweating changes and/or sweating asymmetry
4. There is no other diagnosis that better explains the signs and symptoms.

CRPS may present is critical; CRPS is a clinical diagnosis with no pathognomonic test or examination finding. The most cited diagnostic criteria are the International Association of the Study of Pain (IASP) “Budapest criteria” (Table 1) [1]. This classification includes a spectrum of patient symptoms and physical exam findings which may lead to the diagnosis but requires that the pain be out of proportion to the inciting event with no other identifiable cause or diagnosis.

While the exact incidence and prevalence of CRPS remains unknown, several studies have sought to provide an estimate with a reported incidence ranging from 20.6 to 26.2 cases per 100,000 person years [2,3]. Further research has been focused on the incidence of CRPS following specific injuries and surgeries. An incidence rate of 1.1–34.6% has been reported following distal radius fracture [4,21] and 25–30% following tibial fractures [5,22,23]. Common injuries and elective surgeries, including carpal tunnel release, fasciectomy for Dupuytren’s contracture and fractures of the distal radius are associated with subsequent CRPS [24,25].

It has been postulated that there is increased potential risk of CRPS spreading to a previously unaffected extremity after new traumatic insult such as a surgical procedure in a patient with a known history of CRPS. However, the exact risk of CRPS spreading remains unknown. The potential importance of this information to those treating patients with a history of CRPS is clear. Patients presenting with new extremity injuries or requiring surgery on another extremity may benefit from preventative therapy or early intervention if signs of secondary CRPS develop. When deciding whether to proceed with any elective extremity surgery, knowledge of and proper counselling about the possible increased risk of secondary CRPS would be beneficial. This retrospective study evaluates the hypothesis that patients with a history of CRPS are more likely to develop secondary CRPS in another extremity following subsequent surgery or injury. It also evaluates the potential importance of prophylactic care, increased vigilance and early symptomolytic intervention.

2. Methods

An Institutional Review Board-approved, retrospective review was conducted to identify patients presenting to our institution’s Orthopaedic Surgery clinic with a diagnosis of CRPS over a 20-month period from September 2012 to June 2014. This included both patients who developed CRPS after an injury for which they were being treated at our institution and those referred specifically for management of already existing CRPS. Potential study patients

Table 2
Patient demographics.

Characteristic	Value (n)
Sex	
Male	25.8% (24)
Female	74.2% (69)
Age (years)	41.4
Body mass index	29.3
Diabete mellitus	12.9% (12)
Current tobacco use	26.9% (25)

were identified using the International Classification of Disease (ICD-9) codes for complex regional pain syndrome/causalgia (352.2 and 355.71), algoneurodystrophy (733.7) and reflex sympathetic dystrophy (337.20, 337.21 and 337.22). All available patient records were reviewed to determine whether patients had documented signs and symptoms consistent with a diagnosis of CRPS based on the IASP “Budapest criteria.” Only patients meeting these criteria were included in the study.

2.1. Demographics

Demographic characteristics of study patients were documented including: age, sex, body mass index, medical comorbidities, current tobacco use and hand-dominance. Details including the extremity involved, aetiology of the inciting incident and classification of Type I or II CRPS diagnosis were noted, as well as subsequent treatment modalities and length of follow-up. All notes available in our electronic medical record system were reviewed to determine if the patient incurred a documented subsequent surgery or traumatic injury to another extremity. Details regarding any subsequent diagnosis of CRPS were recorded, again utilizing the “Budapest criteria” to confirm this diagnosis. For the purpose of this study, patients were considered as having developed “secondary” CRPS if this subsequent diagnosis occurred in a second, previously unaffected extremity.

2.2. General population incidence of CRPS

Based on PubMed search, a reported range of CRPS incidence rates in population-based studies was identified. An average incidence rate was utilized to compare to that seen in our study population. A second literature review was conducted to identify articles reporting the incidence of CRPS following distal radius fracture, a common and well-researched orthopaedic diagnosis. All available English language articles identified using a PubMed search of the terms “distal radius fracture” and “CRPS”. Those with a reported incidence per number of included patients were included, regardless of treatment modality utilized. The combined incidence rate from these articles was compared to the rate of secondary CRPS following a documented injury in this study group. An odds ratio was calculated in each comparison with a *p*-value of <0.05 and 95% confidence interval (CI) not including 1 considered statistically significant.

One-hundred and thirty-three patients seen during the study period had a documented CRPS-related diagnosis were identified. Of these patients, 93 patients meet the IASP diagnostic criteria for CRPS in one upper or lower extremity. All available records from before and after the study period were reviewed. Patients ranged from 8 to 72 years of age with a notable female predominance (74.2%). Some patients developed CRPS while already under our institutions care. Duration of symptoms at presentation among those referred with an already existing CRPS diagnosis ranged from a few weeks to several years. Other demographic characteristics are detailed in Table 2.

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