

Complex Regional Pain Syndrome Following Trigger Finger Release

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Abstract

Complex Regional Pain syndrome (CRPS), formerly known as Reflex Sympathetic Dystrophy (RSD), is a disabling problem which occurs infrequently in the upper extremity after trauma and, rarely, as a complication of surgery. Tenovaginitis as a causative inciting factor is rarer still. We report two recent patients, seen after tenovagotomy, who presented with CRPS. Patients were diagnosed clinically and treated with multi-modality therapy. These cases, and our review of current literature, demonstrate that this unique syndrome should be considered in the differential diagnosis of post-traumatic and post-operative hand pain. Early treatment affords improved outcome, though overall results are disappointing.

INTRODUCTION

Complex Regional Pain Syndrome (formerly known as reflex sympathetic dystrophy or “causalgia” from the Greek meaning “burning pain”) is a pain syndrome defined by the American Association for Hand Surgery as “pain, accompanied by loss of function and evidence of autonomic dysfunction.”¹² CRPS was first described by Silas Weir Mitchell in 1864 when he published his findings on nerve injuries following gunshot wounds sustained during the Civil War.²³ Although unaware of the etiologic connection with the sympathetic nervous system, Mitchell noted the condition resulted from injury to a major mixed nerve in the proximal portion of the extremity. Current knowledge extends these findings, demonstrating CRPS commonly results from extremity trauma, compounded by post-traumatic events, and is affected by external influences, physiologic makeup and congenital or genetic factors.³

In this report we present two patients who underwent trigger finger release (tenovagotomy), who subsequently developed postoperative complications of CRPS. Trigger finger, synonymous with stenosing tenosynovitis, is a common cause of hand pain and disability.⁴⁵ While the operative procedure to correct trigger finger is relatively straight forward, complications of surgical release can sometimes lead to significant morbidity.⁵ Complications most commonly reported relating to this procedure include: digital nerve injury, incisional tenderness, recurrence of trigger finger, and/or bow stringing of the flexor tendons

with resulting loss of full finger function.⁴⁵

CASE 1

A 57 year old male presented to an outside facility with trigger finger of the right ring finger; release was subsequently performed. During the initial post operative period he experienced early swelling, pain and erythema that was determined to be non-infectious in origin. He presented to our facility five weeks post-operatively with right hand and upper extremity pain. He described the pain as “shooting and tingling” in quality and noted diminished sensation of his thumb, index and middle fingers. Discomfort was limiting range of motion in his thumb and index finger. Physical exam revealed swelling and erythema of the right hand, extending from the fingertips to the base of the wrist. In addition he demonstrated pain out of proportion to stimulation at the volar aspect of the fingers and palmar area.

A presumptive diagnosis of CRPS was made based upon the clinical picture. Lyrica and nonsteroidal anti-inflammatory medications were begun. Occupational therapy was started. After 6 weeks with minimal improvement, a sympathetic nerve block was instituted for the patient’s associated autonomic dysfunction. While nerve block was successful in providing short term relief, he has required frequent re-injections to maintain pain reduction. The patient has undergone other therapeutic modalities including paraffin wax treatment, electrotherapeutic pulsed stimulation (ETPS) and neuromuscular acupuncture resulting in only modest improvement in the severity of his symptoms.

CASE 2

A 66 year old diabetic male presented to our facility for evaluation of trigger finger of the right index and ring fingers. Following consultation, the patient underwent uneventful trigger finger release. Initial post-operative follow-up was unremarkable. Four weeks post-operatively, the patient returned to clinic and reported recent onset of right hand swelling and erythema of the surgical site. He also noted a decreased range of motion of the index, middle and ring fingers of his right hand secondary to pain and swelling. Exam revealed erythema at the operative site with tenderness and swelling. He was treated with antibiotics for presumed cellulitis.

Further follow-up showed persistence of pain, erythema, and swelling. A warm, sweaty palm and fingers were noted on the affected hand, and exquisite sensitivity to touch predominated the symptoms of the index, middle and ring fingers and palm, all suggesting a clinical diagnosis of CRPS. Gabapentin and elavil plus nonsteroidal anti-inflammatory drugs were prescribed. Occupational therapy was begun. The patient refused a trial of sympathetic block. Only minor improvements in symptoms were achieved.

DISCUSSION

Complex regional pain syndrome (CRPS) is a chronic neurologic disorder characterized by spontaneous, often “burning” pain that is out of proportion to the inciting cause and which is commonly accompanied by autonomic dysfunction.²³ The incidence of CRPS is unknown, primarily because the diagnosis is often underrecognized. Prospective studies, however, suggest that a mild form of CRPS may occur in as many as 30-40% of fractures or surgical trauma when the diagnosis is actively sought.⁶⁷ Conversely, severe, chronic CRPS is much less common, with a prevalence of <2% overall in most retrospective series.⁸⁹ Specifically, the reported prevalence is 1-2% after various fractures, 2-5% after peripheral nerve injury and up to 35% following Colles’ fractures.³⁷⁸ It is more frequent in females than males, with a ratio of 2-3:1, and affects upper extremities more often than lower extremities.³⁷⁸⁹ CRPS is described in all age groups, with cases reported in children as young as two. Development of CRPS is most commonly associated specifically with carpal tunnel release, Dupuytren’s contracture release, knee surgery, amputation and hip arthroplasty.²³⁷ An association is also demonstrated with excessively tight casts.²³⁷¹⁰¹¹ Rarely, CRPS develops following visceral trauma such as stroke and MI, or in association with Osteogenesis Imperfecta, neoplasms

involving the lung, breast, ovary and CNS, and even with pregnancy.¹²⁷⁸⁹ While common complications relating to surgical tenovagotomy have been described, none specifically report or address the development of CRPS as a result of this procedure.

As there are no known pathognomonic physiologic or metabolic markers associated with CRPS, diagnosis is made clinically.²³⁷ In order to meet the diagnostic criteria, a patient must have: diffuse pain, impairment or loss of motor function, and autonomic dysfunction such as abnormal vasomotor activity causing inappropriate vasodilation or vasoconstriction and/or abnormal sudomotor (nerves that stimulate sweat glands) activity resulting in excessive, or non-existent, stimulation of sweat glands. The role of the sympathetic nervous system is well established, however the effect is quite variable among individual cases.²⁷⁸¹²¹³ Additional symptoms include: swelling, stiffness, discoloration, hyperhidrosis, and osteoporosis. Ultimately it is the intimate association between the pain and the autonomic dysfunction that causes a loss of function leading to CRPS. For this reason, individual symptoms are not specific enough to term the condition CRPS.

Complex Regional Pain Syndrome presentation can vary dramatically. As a disease entity, CRPS is divided into two subtypes: type I CRPS, which typically develops following minor trauma or surgery, without an identifiable nerve injury, and type II CRPS, which involves overt nerve injury (Table 1).²³¹⁴¹⁵ Discomfort may be confused with a poor postoperative result or as traumatic sequelae, the time course can vary considerably, and progression may be rapid or delayed.³

{image:1}

To accurately categorize this condition, a consensus was held by the American Association of Hand Surgery to establish some congruency among practitioners and to assist in accurate diagnosis. The first criterion is diffuse pain, which typically occurs out of proportion to the inciting injury or factor and in a non-anatomical distribution. Patients often describe the pain in CRPS as hyperalgesia (the perception of pain greater than would be expected based on the inciting event), hyperpathia (pain produced by noxious stimuli that appears after a delay, and outlasts the initiating stimulus, spreading beyond the normal neural distribution), or allodynia (the perception of pain stimulated by an innocuous stimuli).²³⁷ Pain usually spreads beyond the area of initial injury as the disease progresses and in severe cases

can involve the entire limb, or rarely the contralateral limb.³⁷¹⁶ The second criterion is impairment or loss of function and includes any activity or deficiency in motion associated with pain. The third criterion, autonomic dysfunction, can be observed as skin, soft-tissue, or blood flow changes which are demonstrated by temperature irregularities, lack of or increase in amount of perspiration, increase or decrease in nail growth, atrophy of skin or subcutaneous tissue, edema, increase or decreases in blood flow, or characteristic signs seen on bone scan, which include Sudeck's osteoporosis.¹¹⁷¹⁸ While the first and second criterion might be difficult for the physician to objectively identify, the third criterion, that of autonomic dysfunction, displays more objective evidence for the CRPS diagnosis.

The treatment of CRPS is complex and can involve a number of modalities in sequence or simultaneously.²³ The involvement of surgeon, primary care physician, psychiatrist, and physical therapist can be useful as the condition causes both physical and psychological disabilities.²³⁷⁹ Reduction of pain, preservation of limb function, and return to work are the primary goals of treatment, however psychological comorbidities, such as anxiety and depression, are common and should be treated concurrently.¹²³⁷¹⁹²⁰ Approximately 1/3 of patients will not improve despite all therapeutic interventions.²³⁷⁹ Physical therapy to prevent arthrofibrosis includes active and passive ROM with stress loading and Transcutaneous Electrical Nerve Stimulation (TENS) as well as desensitization techniques and/or sensory re-education.³⁷²⁰ Pharmacological treatment includes a number of mechanisms to control pain associated with dystrophic or causalgic responses. These include: membrane stabilizers, competitive inhibition of neurotransmitters, receptor blockade, blockade of end-organ effects of sympathetic stimulation, desensitization of central pain-signaling neurons and the blockade of sympathetic-somatic coupling.²³⁷ Surgical sympathectomy, involving complete sympathetic denervation of limb fibers from stellate ganglion to T2 and T3, is reserved for patients with refractory CRPS as results have been variable, showing only transient or no beneficial effects, with most studies containing only a small number of patients.⁷¹⁴²⁰²¹ Studies on spinal cord stimulation, acupuncture, vitamin c, bisphosphonates and steroid use have also shown some benefit in the reduction of pain.⁷²⁰²¹ The proposed mechanism thought to be responsible for the reduction of pain in trials with bisphosphonates is due to the reduction in the local acceleration of bone remodeling and, secondarily, by their effects on nociceptive primary afferent nerve fibers

present in bone.⁷¹³²² Alternatively, calcitonin, previously suggested for pain reduction, has not shown a statistically significant benefit in recent studies.²³⁷¹³ Four recent reviews that investigated the benefit of cognitive behavioral therapy, physiotherapy or occupational therapy demonstrated modest improvement in symptoms.⁷¹⁶¹⁹²³²⁴²⁵ Overall, the information in the literature should be regarded as a guide to the treatment of CRPS. Early recognition and a multi disciplinary approach appear to be the most important factors in obtaining a positive outcome.¹²³⁷⁹²³²⁴²⁵

Complex Regional Pain Syndrome is a relatively uncommon entity, occurring after traumatic injury, and rarely after surgical procedures. We describe two recent cases of CRPS which followed tenovagotomy. Numerous studies have documented the development of Complex Regional Pain Syndrome following distal upper extremity procedures such as carpal tunnel release, Dupuytren's contracture release, and amputation. CRPS has also been described following minor trauma resulting in fractures, burns, and venipuncture; however, to the best of our knowledge there are no case reports documenting the development of CRPS specifically following trigger finger release in the current literature. A positive outcome to CRPS is favored when patients are treated early and from a multi-modality approach. Limited research is currently available for guiding appropriate therapy, and unfortunately while modest improvement can be achieved in some cases, significant disability frequently results.

References

1. Amadio PC, Mackinnon SE, Merritt WH, Brody GS, Terzis JK. Reflex sympathetic dystrophy syndrome: consensus report of an ad hoc committee of the American association for hand surgery on the definition of reflex sympathetic dystrophy syndrome. *Plast Reconstr Surg* 1991;87:371-375.
2. Lankford LL. Reflex sympathetic dystrophy. In: Green DP, ed. *Operative hand surgery*. 1st ed. New York: Churchill Livingstone, 1982: 627-660.
3. Koman AL, Poehling GG, Smith BP, Smith TL. Complex Regional Pain Syndrome. In: Green DP, ed. *Operative Hand Surgery*, 5th ed. New York: Churchill Livingstone, 2005:2015-2044.
4. Ryzewicz M, Wolf JM. Trigger digits: principles, management, and complications. *J Hand Surg* 2006;31:135-146.
5. Thorpe AP. Results of surgery for trigger finger. *J Hand Surg[Br]* 1988;13:199-201.
6. Bickerstaff DR, Kanis JA. Algodystrophy: an under-recognized complication of minor trauma. *Br J Rheumatol* 1994;33:240-248.
7. Albazaz R, Wong YT, Homer-Vanniasinkam S. Complex regional pain syndrome: a review. *Ann Vasc Surg* 2008; 22:297-306.
8. Atkins RM. Complex regional pain syndrome. *J Bone*

- Joint Surg Br 2003;85: 1100-1106.
9. Duman I, Dincer U, Taskaynatan MA, Caker E, Tugcu I, Dincer K. Reflex sympathetic dystrophy: a retrospective epidemiological study of 168 patients. *Clin Rheumatol* 2007;26:1433-1437.
10. Field J, Protheroe DL, Atkins RM. Algodystrophy after Colles fractures is associated with secondary tightness of casts. *J Bone Joint Surgery Br* 1994;76:901-905.
11. Moir J, Wytch R, Ashcroft G. Intracast pressure measurements in Colles' fractures. *Injury* 1991;22:446-450.
12. Drummond PD. Involvement of the sympathetic nervous system in complex regional pain syndrome. *Int J Low Extrem Wounds* 2004;3:35-42.
13. Robinson J, Sandom J, Chapman P. Efficacy of pamidronate in complex regional pain syndrome type 1. *Pain Med* 2004;5:276-280.
14. AbuRahma AF, Robinson PA, Powell M, Bastug D, Boland JP. Sympathectomy for reflex sympathetic dystrophy: Factors affecting outcome. *Ann Vasc Surg* 1994;8:372-379.
15. Mehta SH, Lindenfeld TN. Complex Regional Pain Syndrome Including Reflex Dystrophy and Causalgia. In: DeLee JC, Drez DD, editors. *DeLee and Drez's Orthopaedic Sports Medicine*. 2nd ed. Philadelphia: Saunders, 2003: 441-467.
16. Karacan I, Aydin T, Ozaras N. Bone loss in the contralateral asymptomatic hand in patients with complex regional pain syndrome type 1. *J Bone Miner Metab* 2004;22:44-47.
17. Mackinnon SE, Holder LE. The use of three-phase radionuclide bone scanning in the diagnosis of reflex sympathetic dystrophy. *J Hand Surg [Am]* 1984;9:556-563.
18. Holder LE, Mackinnon SE. Reflex sympathetic dystrophy in the hands: clinical and scintigraphic criteria. *Radiology* 1987;152:517-522.
19. Perez RS, Kwakkel G, Zuurmond WW, de Lange JJ. Treatment of reflex sympathetic dystrophy (CRPS type 1): a research synthesis of 21 randomized clinical trials. *J Pain Symptom Manage* 2001;21:511-526.
20. Haynsworth R, Noe C. Percutaneous lumbar sympathectomy: a comparison of radiofrequency denervation versus phenol neurolysis. *Anesthesiology* 1991;74:459-463.
21. Bandyk D, Johnson BL, Kirkpatrick AF, Novotney ML, Back MR, Schmach DC. Surgical sympathectomy for reflex sympathetic dystrophy syndromes. *J Vasc Surg* 2002;35:269-277.
22. Manicourt DH, Brasseur JP, Boutsen Y, Depreux G, Devogelaer JP. Role of alendronate in therapy for posttraumatic complex regional pain syndrome type I of the lower extremity. *Arthritis Rheum* 2004;50:3690-3697.
23. Sahin F, Yilmaz F, Kotevoglou N, Kuran B. Efficacy of salmon calcitonin in complex regional pain syndrome in addition to physical therapy. *Clin Rheumatol* 2006;25:143-148.
24. Nelson D, Stacey B. Interventional therapies in the management of complex regional pain syndrome. *Clin J Pain* 2006;22:438-442.
25. Kingery W. A critical review of controlled clinical trials for peripheral neuropathic pain and complex regional pain syndromes. *Pain* 1997;73:123-139.

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