Complex Regional Pain Syndrome

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Abstract

Complex Regional Pain Syndrome (CPRS) is a syndrome associated with severe pain in a distal limb with associated peripheral sensory, vasomotor, sudomotor/oedema and motor/trophic changes. Current internationally accepted diagnostic criteria are know as the Budapest Criteria which allow a clinical diagnosis to be made on the basis of a combination of symptoms and signs seen in these four clinical categories. The syndrome has also been called Reflex Sympathetic Dystrophy and Algodystrophy in the past. CRPS involves a complex process where local tissue changes and peripheral & central nervous system changes have been reported in studies but the pathophysiology has not been fully explained. Epidemiological studies report a variance in incidence rates but a higher incidence in women, in the upper limb, after fracture and also a pattern of recovery is seen. Vitamin C prophylaxis has been demonstrated to reduce the incidence of CRPS post wrist fracture in a multicentre study, graded as level 1 evidence. A multidisciplinary approach to management is recommended.

Keywords Algodystrophy; Complex Regional Pain Syndrome; Reflex Sympathetic Dystrophy

Introduction

Complex Regional Pain Syndrome (CRPS) is a condition which is often first seen in Orthopaedic clinics and is a common reason for referral to a pain team. This article will explore how to approach diagnosis, and will discuss natural history, pathophysiology and current approaches to management. It will also make some recommendations about early management in an Orthopaedic clinic.

Recognizing CRPS

From time to time you will meet a patient in clinic complaining of severe pain in a limb, preventing them from using it normally after a fracture or operation. It is usually unrelenting pain keeping them awake at night and they may also describe a number of features they have noticed in the limb such as swelling, temperature and colour change. They could have noticed that even light touch provokes severe pain and be unable to wear a sock or shoe, or hold a knife or fork. Their distal limb can look dusky and poorly perfused or red and swollen. It may feel either warmer or colder when compared to the other side. Sometimes a clear peripheral nerve injury can be detected but the symptoms and signs they report are usually seen in a more extensive area than the territory of the identified nerve. They may hold their limb protectively, avoid moving it or occasionally they seem to neglect it. They can also describe strange or distressing neurological symptoms.[1] Later, they can go on to develop abnormal hair or nail growth on the affected limb and radiographs may show patchy osteopoenia.[2] They cannot always function normally and may struggle to cope with social roles. They can present as distressed, depressed or suffer from another concurrent mental health disorder, such as post-traumatic stress disorder, for example, if they suffered significant trauma at the initiating event.

It is likely your patient has Complex Regional Pain Syndrome (CRPS). The syndrome has been called a variety of other names in the past: severe distal limb pain was described as a sequel to limb injury during the American civil war. The terms Causalgia, Reflex Sympathetic Dystrophy, Algodystrophy and Sudeck's Atrophy have all been used as labels for this condition.[3] Ironically, by the time that you see your patient you may have already missed the opportunity to use a simple therapy that could have significantly reduced the likelihood of their developing CRPS after, for example, as in wrist fracture. The treatment that can abolish this complication if given early enough is a course of the antioxidant Vitamin C, 500 mg a day for 50 days and costing as little as five pounds sterling. This is one of the few examples of level 1 evidence in the CRPS literature.[4]

How do I make a diagnosis of CRPS?

The current internationally accepted diagnostic criteria for CRPS are called the 'Budapest Criteria' (Table 1).[5] The Budapest Criteria require a patient to have at least two signs and three symptoms in four categories — sensory, vasomotor, sudomotor/oedema and motor/trophic. While this does help to provide clarity in communicating diagnosis, it introduces a categorical cut off in patients with symptoms and signs that can vary over time. The Budapest Criteria do not cover all the features that have been described in CRPS. Symptoms and signs not encompassed by the criteria include the radiographic features described by Sudeck and other "out of limb" neurological symptoms and signs implying central nervous system involvement rather than exclusively a peripheral process.[2,6,7]

Importantly, however, CRPS is a ***diagnosis of exclusion***. The Orthopaedic team must exclude pathological causes such as bone or joint disruption, infection, thrombosis or peripheral vascular disease if their patient develops a red, hot and swollen or cold and poorly perfused limb after fracture, after surgery or after both.

What is likely to happen to your patient?

Your patient is likely either to make a complete or a partially compete recovery over the next 12 months.[8,9] One study that can be used to illustrate recovery prospectively followed 274 patients with distal radial fractures. It reported that 28% of

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The Budapest Criteria, © IASP

- Continuing pain, which is disproportionate to any inciting event.
- Must have at least one symptom in three of the four following categories:
  Sensory: reports of hyperaesthesia and/or allodynia.
  Vasomotor: reports of temperature asymmetry 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).
- 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 changes and/or asymmetry.
  Sudomotor/oedema: evidence of oedema and/or sweating changes and/or sweating asymmetry.
  Motor/trophic: evidence of decreased range of motion and/or motor dysfunction (weakness/tremor/dystonia) and/or trophic changes (hair/nails/skin).
- There is no other diagnosis that better explains the symptoms and signs.

Table 1

patients had pain, swelling, stiffness and vascular instability and in up to half of patients one of these features was present 2 weeks after coming out of plaster. At 12 months only around 2% still had all the features. Not all patients recovered completely, with up to half reporting ongoing stiffness.[10] Unfortunately a small minority of patients do go on to have chronic distal limb pain and the literature describes symptoms persisting for up to 8 years.[11] This pattern of early rapid recovery in some patients, followed by a pattern of recovery in the majority of patients over the ensuing 12 months, can perhaps be compared to the recovery profile of sciatica. Epidemiological studies suggest a wide range in the incidence of CRPS, from 5.4 per 100,000 in a US study to 16.3–26.6 per 100,000 in a Dutch study.[8,12] Complaints of pain by patients while still in plaster is associated with the development of CRPS and should alert the clinician to the possibility that CRPS is developing.[4]

What is known about the pathophysiology of CRPS?

Changes have been found both in local tissues and in the peripheral and central nervous systems. Pro-inflammatory cytokines can be isolated and small fibre axon damage has been described, along with changes in the vasculature and the presence of tissue hypoxia.[13–15] The damage to small nerve fibres rather blurs the previous concept that there are two types of CRPS, one with and one without nerve damage.[16] More recently, the possibility of antibodies to autonomic receptors points to a more complex peripheral picture.[17]

CRPS is proposed to involve a process of 'neurogenic inflammation', where the inflammatory process is driven largely by the nervous system.[18] In the brain a pattern of both structural and functional changes has been reported, based on magnetic resonance imaging studies.[19,20]

What therapies are used in CRPS?

Accepted guidance for the management of CRPS centres around physical therapy-based approaches, focused on reactivation of the affected limb alongside contextual medical and psychological interventions.[21] The recovery profile of CRPS, particularly in the early stages, makes the interpretation of studies in acute CRPS problematic if they are not controlled. Many commonly used pain therapies have yet to be subject to adequately powered multicentre studies in CRPS.

Immobilization – is it a helpful strategy?

It has been observed in the plaster room that some patients may have features of CRPS when they first come out of plaster, such as muscle wasting, skin colour changes and alterations to hair, nails and joint stiffness. One study explored the idea that CRPS may be related to immobilization. A group of 23 volunteers agreed to wear a forearm cast for a month. It was found that all of the individuals had at least one symptom or sign typical of CRPS by the end of the study. Significant changes were also seen on brain scanning using Positron Emission Tomography. This implies that immobilization can affect not only the limb but the brain as well.[22] Accepted clinical guidance for CRPS recommends a return to normal use of the affected limb rather than prolonged immobilization as a means of achieving pain relief.[21]

There has been a suggestion that CRPS may be a psychiatric condition, or a form of somatization disorder. This is because it can be triggered by minor injury and patients can present with significant emotional distress and sometimes with co-morbid mental health problems. The fact that the syndrome is difficult to diagnose, as there is no specific test for it, and patients tend to recover over time when they return to normal activity, has contributed to the debate.[23] This view does seem difficult to reconcile with pathophysiological findings, the fact that antioxidant therapy with Vitamin C can reduce the incidence of the condition post-fracture and the natural history and epidemiological observations. In one study no link to prior psychiatric morbidity was found in primary care data, although a systematic review exploring psychological factors and CRPS found an association with previous life events, but not other factors.[24,25] Some patients with established CRPS have been observed to have a phobic fear of movement and reinjury of the affected limb impacting on their ability to engage with rehabilitation. This has been addressed in selected patients using graded exposure techniques in one study with positive results.[26]

Physical and occupational therapy approaches

Physical therapy techniques provide the mainstay for helping patients return to normal activity. There is no specific evidence supporting any modality of treatment and 'Physiotherapy' can be used as a term encompassing a number of different approaches.