



Complex regional pain syndrome (CRPS)

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ABSTRACT

Complex regional pain syndrome (CRPS), once known as reflex sympathetic dystrophy, Sudeck's dystrophy and causalgia, is a pain syndrome with indistinctive pathophysiology and unpredictable clinical course. CRPS can develop after a limb fracture, injury or damage to the peripheral or central nervous system. The diagnosis of CRPS is based on the signs and symptoms obtained from the medical history and physical examination. The disease is often resistant to treatment, and its course is not always favorable. A brief overview of this clinical entity is presented, and most relevant and up-to-date information is discussed.

Keywords: algodystrophic syndrome; intensity of pain; rehabilitation

INTRODUCTION

Complex regional pain syndrome (CRPS) is a chronic pain condition that can affect any region of the body, but most frequently arms and legs. It is characterized by complex regional pain of unknown etiology, most commonly posttraumatic with musculoskeletal dysfunction, and vascular and cutaneous manifestations. It is also known as a reflex sympathetic dystrophy (RSD) or causalgia or Sudeck's atrophy or algodystrophy. CRPS is a chronic, progressive, painful condition that affects skin, muscles, joints and bones. Early identification and beginning of a proper therapy give the patient better prognosis and a chance for recovery. Progression to chronic phase is associated with an adverse prognosis and reduction of functionality.

ETIOLOGY

There is still no reliable evidence about the cause of the CRPS. In some cases, the sympathetic nervous system plays an important role in the presentation of pain. Another theory suggests that the immune system is the trigger for CRPS, which leads to inflammatory symptoms of redness, increased body temperature and swelling of the affected region (1).

Two forms of CRPS are distinguished. CRPS-I is a chronic nervous disorder that usually affects arms and legs after minimal trauma or no trauma in medical history. CRPS-II is considered to be caused by direct trauma to the peripheral nerves.

CRPS occurs as a result of damage to the nervous system, also including the nerves that control the blood vessels and sweat glands. The damaged nerves are no longer able to control the blood flow, sensory sensations and thermoregulation of affected regions. The immune response causes sweating, redness, inflammation, heat or muscle spasms. All this leads to the pathologic conditions of blood vessels, bones, muscles, nerves, and skin. Causes of CRPS

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range from minor injuries, such as sprains, to serious injuries, such as direct trauma of nerve, or rarely the trauma or infection of the arm or leg, or sudden illness such as heart attack or stroke. Even a longer period of immobility can lead to CRPS. Also it may be caused by conditions that did not cause direct trauma to the affected limb.

CLINICAL FEATURES

CRPS is most common in patients aged 40-60 years. Women are affected 2-4 times more than men. Persons aged 20-40 years, as well as children, are rarely affected. Clinically the disease comprises the characteristic triad of symptoms including the autonomic nervous system associated, such as increase of skin temperature, color and sweating abnormalities; sensory impairments, such as pain and hyperalgesia; and motor deficiencies such as paresis, tremor, and dystonia. The principal symptom is intense, burning pain. The pain is much stronger than expected for the type of trauma that caused the pain. By the time, it becomes stronger, and the condition rarely improves. Pain begins at the point of trauma, but it is often extending throughout the length of the limb either on the arm or leg on the opposite side of the body.

Emotional stress often increases the intensity of pain. Sensory changes are frequent, including hypo- or hyperesthesia, hypo- or hyperalgesia and allodynia. Extreme sensitivity to stimuli may be in the area of injury, even a slight one, such as clothing or a light touch. Swelling, excessive sweating and changes in bone and skin tissue may also appear. Constant pain causes deterioration of emotional and physical condition and can lead to permanent changes in the muscles and bones. Eventually leads to muscle spasms, reduction or loss of amplitude of motion in the joints. The skin of the affected area is initially hot and red, and then switches to the cold and livid (1).

CRPS may have three levels, but all three are rarely developed. Some people simultaneously develop more symptoms. Stage 1 (the last 1-3 months) there are changes occurred in skin temperature, rapid growth of nails and hair, muscle spasm and pain at the point of trauma, consuming and severe pain on the touch, the skin is gradually getting red spots, thin and shiny, swollen and sweaty. Stage 2 (last 3-6 months) continuing changes in the skin,

nails break more often and easier, the pain becomes stronger, hair grow slower, there is a weakness of muscles and joints. Stage 3 (irreversible changes) limited movements of the extremities, the dissolution of muscle mass, the pain of the entire limb.

DIAGNOSIS

The diagnosis of CRPS can be difficult and early diagnosis is important. Medical history and physical examination are crucial. Additional tests may help I establishing the diagnosis: test of the sympathetic nervous system, thermometry test which can show the temperature changes in the affected limb, bone scintigraphy, X-ray image overview of the situation of the bony part, MRI or CT that can display a number of changes in tissues, and electromyoneurography (EMNG) analysis of the condition of nerve conduction system. A diagnosis is also clinically determined using International Association for the Study of Pain (IASP) diagnostic and Budapest criteria.

IASP (International Association for the Study of Pain) diagnostic criteria for CRPS

1. Event that caused the damage or the cause of immobilization;
2. The continuous pain, allodynia, or hiperalgesia in which the pain is disproportionate to causing event;
3. Edema, differences in blood flow in the skin or abnormal sudomotor activity in the region of pain (may be a sign or symptom);
4. This diagnosis is excluded if there are other conditions or circumstances which would be significant for the degree of pain or dysfunction. *If it has been noted without „extensive nerve damages,” the diagnosis of CRPS I; * If it has been noted with “extensive nerve damages“, the diagnosis of CRPS II;

Budapest criteria should be used for diagnosing Complex Regional Pain Syndrome (CRPS): A: patients with continuous pain that is disproportionate to the causing event; B: patients with at least one sign of two or more categories; C: patient reports at least one symptom in three or more categories; D: no other diagnosis can better explain signs and symptoms.

Sensory: allodynia (light touch or sensitivity to temperatures or deep somatic pressure or movement of the joints) or hyperalgesia (by needle penetration).

Vasomotor: asymmetry of temperature (more than one degree) or color changes on the skin or asymmetry of skin color.

Sudomotor/edema: edema or changes in sweating or asymmetry in perspiration.

Motor/trophic: decreased range of motion or motor dysfunction (weakness, tremor, dystonia) or trophic changes (hair, nails, skin) (3,4).

The current IASP criteria for the diagnosis of CRPS have a low specificity and significant possibility for overdiagnosis. Haren et al. compared the IASP and Budapest diagnostic criteria for. The study evaluated 113 patients with CRPS 1 and 47 control patients without symptoms of CRPS. IASP criteria had high diagnostic sensitivity (1.00), but low specificity (0.41), whereas the Budapest criteria had high sensitivity (1.00) and higher specificity (0.68). On the basis of this comparative study, it was shown that the Budapest criteria for the diagnosis of CRPS are more reliable than the IASP criteria (5).

Treatment

There is no curative therapy for CRPS, but the reduction or cessation of hardship of complex regional pain syndrome is possible if treatment begins as soon as possible or within a few months from the onset. Combination of different therapies is often required. Treatment should be adjusted to the individual case. Pharmacological therapy can be used, including analgesics, steroids, antihypertensives and antidepressants. Analgesics, non-steroid antirheumatic drugs in appropriate dose can provide acceptable pain control. Antidepressants which are used for the treatment of pain originating from damaged nerves (neuropathic pain). Corticosteroids which can reduce inflammation and improve mobility in the joints of the affected limb. Bone-loss drugs which prevent or slow down the loss of bone mass. The main focus is on reducing the intensity of symptoms and help to resume a normal life by doing the required daily activities, if possible. Physical and occupational therapy should start as soon as possible. Additionally educating the patients on how to save the joints and muscles and prevent the progression of clinical picture by the adequate movements is essential. Some type of psychotherapy can help patients to reconcile and organize life with CRPS. Numerous pharmacological substances

are available for the treatment of neuropathic pain. It often takes a triple drug therapy thus tricyclic antidepressants, anticonvulsants and systemic local anesthetic. When the patient does not respond to the treatment, we incorporate a spinal cord stimulator or intrathecal morphine pump into him. A surgical treatment is required extremely rarely (6). Studies show that a low doses of intravenous ketamine can considerably alleviate the pain, but there is no improvement of function.

Physical therapy can reduce pain and improve range of motion and muscle strength. The result is better if the disease is diagnosed at an earlier stage. The application of heat and cold which can alleviate the swelling and sweating. Analgesics can be locally applied in the form of a gel. Transcutaneous nerve stimulation (TENS) which can reduce chronic pain by electrical impulses on the nerve endings. Spinal cord stimulation with small electrodes, low-power electricity which reduces the intensity of pain. Significant therapeutic results have also been achieved by acupuncture treatments.

Besse et al (7) analyzed the importance of implementation of vitamin C in respondents who underwent surgery due to CRPS of hand or foot. Clinical presentation of patients with CRPS before and after surgery in two separate groups was studied. The first group did not use vitamin C, while the second group were preoperatively given vitamin C in a daily dose of 1g. All patients underwent surgery, so gender, age, type of pathological changes, anamnesis of CRPS, psychological status and cost benefit were monitored. Of the total number of patients 420 (185 G1; 235 G2), in 9.6% of respondents from the group 1 CRPS is back even after surgery, while in group 2 that percentage was 1.7. Based on all this it was concluded that vitamin C is good in the prevention of CRPS, especially after surgery due to fractures.

Anandukmar et al. presented a study case and described the case of 48 year old woman who had a presentation of pain on the right side of the neck which has spread on the right arm, caused by CVI. By clinical evaluation, based on the BDC (Budapest diagnostic criteria) for CRPS, she belonged to a group 1. Physical treatment was initially focused on the education of neurophysiology of the pain and reduction of kinesiphobia on the arm where pain

is projected. There was a significant improvement of functional status and the pain is decreased. Based on this, a modulator of pain is implemented in the form of transcutaneous electrical nerve stimulation, kinesiotherapy and physical therapy for a period of 7 weeks. The patient had a complete improvement of clinical picture and the symptoms have reduced over the next six months (8).

Freedman et al. proven that in the treatment of CRPS a multidisciplinary approach is required which includes physical and occupational therapy, psychological evaluation and treatment, pharmacological approach, not so rare more aggressive methods like blocker of sympatheticus, sympathectomy, and spinal cord stimulation (SCS) (9).

Zecevic et al. evaluated the effects of early initiation of combined therapy in CRPS-1, on upper extremities. The study included 36 patients in the first stage of CRPS of upper extremities. The average age was 42.6 years, and from the total number 26 respondents were female. Right side of upper extremities was more often affected compared to the left side. All patients were treated with combined therapy which included analgesics, electrotherapy, magnetotherapy and kinesiotherapy. Period for monitoring patients was from 90 to 250 days. And the average duration of treatment was 91.5 days. The severity of pain, paresthesia of extremities, changes in skin color and cutaneous manifestations were observed three times, at the beginning of treatment, after 6 weeks, and at the end of treatment. The pain which is registered on the first measurement amounted to 5.70 (at 10 cm visual analogue scale). During the treatment it was progressively decreasing and on the second measurement averaged 3.6, and in the end amounted 0.34. Vasodilation was registered in 30 patients, and the asymmetrical skin temperature in 21. At the beginning of treatment 16.6% of patients were without significant clinical symptoms and at the end of treatment that percentage was 72.22%. The conclusion of this study is that a carefully selected physical treatment in combination with analgesics and nonsteroidal anti-inflammatory drugs may improve the clinical picture of patients with CRPS-1, if the treatment starts as soon as possible (10).

CRPS is a very rare disease in the pediatric population. The disease is characterized by symptoms of

persistent pain, sensitive and vascular alterations associated with psychosocial dysfunction. In children and adolescents there is however a different aspect of this disease that is different compared to adults. One of the methods that can help in diagnosis is bone scintigraphy. A treatment of pain in children is different, it is not specific. Physical therapy and relaxation techniques give certain improvements. However, depression needs to be treated. In children as part of this syndrome occurs fibromyalgia CRPS-1. Oliveria and colleagues, in their research, have presented a clinical study case in adolescent girl with persistent pain, trembling and impaired function of the lower limbs and with symptoms similar to a small trauma. The treatment was successfully completed by the application of gabapentin, vitamin C, physical and psychotherapy (11).

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