

Skin Manifestations of Complex Regional Pain Syndrome

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PRACTICE POINTS

- Common dermatologic manifestations of complex regional pain syndrome (CRPS), which often are nonspecific and often the presenting symptoms of the syndrome, include allodynia, edema, erythema, hypopigmentation or hyperpigmentation, and petechiae.
- Diagnosis and management of CRPS are the most important steps in treating dermatologic manifestations of the syndrome.

To the Editor:

Complex regional pain syndrome (CRPS) is a neurologic condition characterized by chronic pain and sensory changes, including allodynia and hyperalgesia, that usually affect the extremities.^{1,2} The syndrome is defined by the International Association for the Study of Pain (IASP) as a condition that appears regionally after an injury, with a variety of symptoms that often exceed the expected clinical course both in magnitude and duration, causing impairment of motor function and variable progression.³

Although CRPS most often is described following minor peripheral trauma, other precipitating causes include surgery and vascular events.⁴ Additional features of the condition include autonomic dysfunction, edema,

and trophic changes.¹ Symptoms of CRPS traditionally present in 3 stages, with notable skin changes most often documented in stages II and III.²

Skin changes are a known manifestation of the syndrome, but reports in the dermatologic literature are scarce. Qureshi and Friedman⁵ identified only 23 articles in the dermatology literature since 1990 in which skin changes in CRPS were described. We present a patient with a diagnosis of CRPS who developed hyperpigmentation and sclerotic changes, including skin thickening, induration, and skin tightening.

A middle-aged Black woman presented to dermatology for evaluation of progressive hyperpigmentation, hyperhidrosis, and sclerotic changes to the skin. Approximately 3 years prior, the patient was given a diagnosis of CRPS of the hands and feet. Pain symptoms started approximately 3 years prior to the onset of symptoms. Symptoms started in the left hand and eventually spread to the right arm, left leg, and subsequently to the right leg. The first dermatologic change the patient noticed was tightening of the skin in the affected area that led to decreased mobility, which improved over time—partly on its own and partly with physical therapy.

A biopsy performed by an outside dermatologist at the initial presentation demonstrated scleroderma-like changes, which were treated with creams but without improvement. Scleroderma was later ruled out by the same dermatologist. Skin tightening improved over time, with complete resolution approximately 1 year after the onset of symptoms.

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Upon presentation to our clinic, the patient reported continuing intermittent flares of CRPS; however, she said she was most concerned about diffuse hyperpigmentation, which spread to include the face, arms, abdomen, legs (Figure), and buttocks and persisted after skin tightening resolved.

To treat the hyperpigmentation, a decision was made to first focus on a localized area. Facial hyperpigmentation was chosen because it was of greatest concern to the patient. She was instructed to use azelaic acid gel 15% in the morning, tretinoin cream 0.05% at night, and sunscreen daily. The patient had mild improvement in hyperpigmentation after a 4-month period but has been inconsistent in follow-up. She continues to have intermittent flares of CRPS, which may interfere with her response to treatment. In addition to the aforementioned regimen of azelaic acid gel and tretinoin, she has continued to work with a pain specialist to better control the neurologic symptoms and pain associated with her CRPS.

Complex regional pain syndrome, a neurological condition characterized by chronic pain, affects women 3 times more often than men. The syndrome is more common in the fourth and fifth decades of life.^{1,2}

There are 2 subtypes of CRPS. Type I (also known as reflex sympathetic dystrophy) is more common and occurs following minor trauma without peripheral nerve

injury. Type II (otherwise known as causalgia) occurs following more notable trauma with injury to a peripheral nerve.^{1,6} Onset of symptoms most often is secondary to minor peripheral trauma. More common triggers include soft-tissue injury (40%); fractures and subsequent orthopedic surgery (25%); and visceral lesions, such as myocardial infarction and cerebral vascular accident (12%).⁵ Regardless of the inciting event, prolonged immobilization of a limb has been identified as an important predisposing factor. One study found that 47% of patients who received a diagnosis of CRPS previously underwent immobilization of the same limb.⁷

The pathogenesis of CRPS has not been fully elucidated. Possible explanations include central nervous system sensitization to thermal, mechanical, and pain stimuli; sympathetic dysfunction leading to vasomotor, pseudomotor, and trophic changes; and inflammatory cytokine release and microcirculatory dysfunction, causing tissue injury.^{1,2,6}

The diagnosis of CRPS is based on clinical findings. Using the Budapest Criteria established to define CRPS, a clinical diagnosis can be made when all of the following criteria are met: chronic continuing pain disproportionate to any inciting event; 1 or more reported symptoms from 3 or more of the categories of involvement including sensory, vasomotor, pseudomotor, edema, and motor or trophic; 1 or more sign at the time of evaluation in 2 or more of the categories of involvement including sensory, vasomotor, pseudomotor, edema, and motor or trophic.⁸ Dermatologic findings are a common presenting feature of CRPS and are included in the Budapest Criteria used for diagnosis. In a retrospective chart review (N=26), researchers found that vascular findings were the most common dermatologic manifestation of CRPS—edema in 58% of patients and erythema in 54%.⁹ Other common manifestations included dermatitis (35%), erythematous papules (23%), and cutaneous atrophy (23%). Hyperpigmentation, which was present in our patient, was seen in 8% of patients in the chart review.⁹

Complex regional pain syndrome progresses through 3 stages; dermatologic changes are present in each stage and are more severe in later stages. Stage I lasts 2 or 3 months and is characterized by onset of pain, usually burning type, accompanied by allodynia and hyperalgesia. Early vasomotor and pseudomotor changes, such as erythema and edema, may become apparent.^{1,2} Stage II lasts 3 to 6 months and is characterized by more severe edema and more obvious trophic changes. Functional limitations, such as limited range of motion and muscle weakness, begin to manifest. Stage III—the final and most severe stage—is characterized by obvious hair, skin, and nail changes, as well as functional limitations.^{1,2} The waxy thickened skin changes and hyperpigmentation observed in our patient are characteristic of stage III. Furthermore, our patient experienced decreased mobility and limited range of motion secondary to tightening of the skin, a characteristic motor change of late-stage



A, Diffuse dark brown to black patches on the superior right leg, which can be distinguished from the normal baseline color on the inferior portion of the lower extremity. B, Diffuse dark brown to black patches on the left leg, which can be seen along the anterior knee, anterior-medial shin, and on the dorsal foot.

CRPS. Although chronic pain and allodynia are the most common characteristics of CRPS, skin changes also can cause notable distress and early dermatologic manifestations can be a chief concern.

Dermatologic management is focused to address the specific skin changes of CRPS. However, traditional treatment of the common dermatologic findings of CRPS is difficult and often unsuccessful; instead, the most successful treatment of skin findings involves controlling the underlying CRPS.⁹ Current treatment options include removal of any nidus of tissue trauma, sympathetic neural blockade with a local anesthetic, spinal cord stimulation to interrupt dysregulated sympathetic innervation, and physiotherapy or occupational therapy to desensitize skin.^{1,10}

Given the complexity of CRPS and the variability of its presentation, management of the syndrome and its associated dermatologic conditions often requires interdisciplinary care and coordination of multiple specialties. Dermatologists can play an important role in both identification of CRPS and co-management of affected patients. Early diagnosis of CRPS has been universally identified as a key prognostic factor. For that reason, dermatologists should be aware of CRPS and include the syndrome in the differential diagnosis when presented with severe cutaneous findings following trauma either with or without peripheral nerve damage, suggestive of CRPS.

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