

Abnormal Thermoregulatory Responses in Patients with Reflex Sympathetic Dystrophy Syndrome

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ABSTRACT. *Objective.* To look for asymptomatic thermoregulatory abnormalities in the noninvolved limbs in patients with well established reflex sympathetic dystrophy syndrome (RSDS). The study was prompted by the observation of development of severe upper limb Raynaud's phenomenon in a young woman with a history of RSDS affecting both lower limbs.

Methods. Eleven patients and 11 age and sex matched control subjects underwent a standard thermal stress test: cold water immersion of a hand unaffected by RSDS in water at 15°C for one min. All controls had had injuries uncomplicated by RSDS.

Results. Lag time (the lag phase between the end of the cold challenge and the onset of rewarming) was significantly increased ($p < 0.01$) in the patient group (median 5.67 min, range 0.50 to > 15) compared to the control group (median 0.50 min, range 0.50 to 12.92). The median maximum temperature recovery was lower in the patient group (81.6%, range 0 to 170.4) than in the control group (119.3%, range 49.1 to 153.1).

Conclusion. Our findings support an association between RSDS and a generalized abnormal response to cold challenge. Further studies are required to examine the temporal relationship underlying this. Early screening for thermoregulatory dysfunction of patients after fractures might allow identification of patients at risk of developing RSDS. (*J Rheumatol* 1994;21:1319-24)

Key Indexing Terms:

REFLEX SYMPATHETIC DYSTROPHY SYNDROME
THERMOGRAPHY

RAYNAUD'S PHENOMENON
COLD CHALLENGE

A subgroup of patients with limb trauma go on to develop reflex sympathetic dystrophy syndrome (RSDS), which remains an ill defined clinical syndrome despite the increasing clinical interest it is attracting. In severe cases treatment can be very difficult¹, and the patient left with continuing pain and severe, functional disability. The pathogenesis of RSDS is ill understood^{2,3}. Following the observation of the development of severe Raynaud's phenomenon (RP) in a young woman who previously had RSDS in both lower limbs, we looked for asymptomatic thermoregulatory abnormalities in the noninvolved limbs in patients with well established RSDS.

CASE REPORT

A 27-year-old woman was referred to the rheumatology clinic in December, 1986 with pain and swelling of her left ankle, dating from an injury while playing soccer 12 years before. Her symptoms increased, and by the time of referral she required 2 crutches to walk. On examination her left foot was mottled, there was edema of her calf and lower leg, and her ankle and foot were cold and tender. Radiographs showed osteoporosis, and a diagnosis of RSDS was made. Left lumbar sympathectomy was performed with good relief of symptoms.

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In July, 1988 she developed similar pain, coldness, and color change of her right foot and ankle (without precipitating injury) and again responded well to lumbar sympathectomy, this time right sided.

In January, 1991 she reported coldness and discoloration of her hands in cold weather, typical of RP. There were no clinical or immunological features to support a diagnosis of connective tissue disease. Antinuclear factor was positive, this was in low titer, 1/10. A standard thermal stress test showed that the hand tested was cold and rewarmed slowly.

MATERIALS AND METHODS

Patients. Eleven patients with RSDS and 11 control subjects were studied (4 men and 7 women in each group). The median age of the patients was 48 years (range 14 to 60 years) and of the control subjects 46 years (range 17 to 70 years).

Only patients in whom the diagnosis of RSDS was in no doubt were included. They were recruited from the orthopedic and rheumatology clinics. The diagnosis of RSDS was made clinically on the basis of continuing pain, generally following an injury, and a combination of the following features in the affected part: change in temperature, change in color, alteration in sweating, edema, and trophic change. Osteoporosis on radiographs and abnormalities on isotope bone scanning were considered further support of the diagnosis but were not necessary requirements. Isotope bone scans using technetium HDP with standard delayed images were performed in all but one patient. The affected and nonaffected limbs were imaged on the same film enabling comparison. What was looked for was asymmetry between the 2 limbs.

Controls were recruited from the orthopedic clinic. All had made a satisfactory recovery from a significant limb injury, uncomplicated by the development of RSDS.

Patients or controls were excluded from the study if they had diabetes, unstable cardiac disease, or hypertension requiring vasodilator or beta blocker therapy. Only after entry into the study were patients and controls asked about the presence or absence of RP: RP was not an exclusion criterion.

The following were documented for each patient: the time interval between the injury and the cold challenge test, drug treatment, smoking habit, and