The Clinical Journal of Pain
12:316–325 © 1996 Lippincott–Raven Publishers, Philadelphia

BA

Validation of Thermography in the Diagnosis of Reflex Sympathetic Dystrophy

*†Stephen Bruehl, Ph.D., *Timothy R. Lubenow, M.D., *Heather Nath, M.D., and *Olga Ivankovich, M.D.

*Rush Pain Center and Departments of *Anesthesiology and †Psychology and Social Sciences, Rush Medical College, Chicago, Illinois*

Abstract:

Objectives: To examine the validity of several thermogram-derived indices of autonomic functioning in the diagnosis of reflex sympathetic dystrophy (RSD).

Design: A series of chronic pain patients were classified diagnostically based on thermogram results using discriminant function analysis, and validity measures (e.g., sensitivity, specificity) were used to determine the accuracy of computerized thermographic pixel analysis in discriminating RSD from other pathology.

Setting: The study was conducted at the Rush Pain Center, a multidisciplinary outpatient pain clinic.

Patients: A series of 46 chronic pain patients referred for suspected sympathetically mediated pain.

Interventions: All patients underwent computerized thermographic examination under a baseline condition after acclimating to a climate-controlled room, immediately after a cold challenge was applied to the contralateral uninvolved extremity (4°C for 90 s) and 20 min after the cold challenge.

Outcome Measures: Temperature during the three experimental periods, degree of temperature asymmetry between affected and nonaffected limbs during the three periods, response to cold challenge, and recovery following cold challenge were measured.

Results: Temperature asymmetry accurately discriminated between RSD and non-RSD patients, with the most accurate asymmetry measures obtained at baseline. Responses to cold challenge and actual temperature values did not discriminate between RSD and non-RSD pain patients.

Conclusions: Thermography can be a useful component of RSD diagnosis. In situations where sensitivity and specificity are equally important, an asymmetry cutoff of 0.6°C appears optimal. If specificity (i.e., accurately ruling out non-RSD cases) is more important, a cutoff of 0.8°C or 1.0°C may be considered as well.

Key Words: Reflex sympathetic dystrophy—Complex regional pain syndrome—Cold Challenge—Diagnosis—Thermography—Temperature asymmetry.

The number of studies exploring the diagnosis, treatment, and pathophysiology of reflex sympathetic dystrophy (RSD) has increased substantially over the past 10 years. Despite the growing number of studies, several overviews of this literature (1,2) indicate that the overall quality of this research remains disappointing. Although some well-designed RSD studies have been published, the utility of the RSD literature as a whole for guiding diagnosis and treatment remains hampered by several methodological shortcomings. These shortcomings include lack of agreement regarding methods and criteria used for diagnosis, an overabundance of case studies,

Manuscript received January 12, 1996; revision received July 12, 1996; accepted for publication September 11, 1996.

Address correspondence and reprint requests to Dr. Stephen Bruehl, Room 477, Center for Pain Studies, Rehabilitation Institute of Chicago, 345 East Superior St., Chicago, IL, 60611, U.S.A.