Commentary

Neuromuscular Thermography: An Analysis of Criticisms

Jack E. Hubbard, Ph.D., M.D.

Introduction

Technological assessments of the neuromuscular applications of thermography have been prepared recently by various organizations, including the American Medical Association (AMA), the Joint Council of State Neurosurgical Societies of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons, the Office of Health Technology Assessment of the U.S. Department of Health and Human Services, and the American Academy of Neurology (AAN). Several of these evaluations, in part or in total, have been critical of the medical usefulness of thermography. In addition, other published papers have unfavorably reviewed the clinical role of thermography.

In the light of the literature as well as my own clinical experience as a neurologist, I will examine the significant points and issues raised by this criticism, including clinical usefulness, abuse/misuse, published reports, and community acceptance of thermography. In addition, I will confront contradictions in the criticism of thermography as well as the role of political pressures in the assessment of thermography.

Clinical Usefulness

All discussions of thermography agree that the procedure is a non-invasive and safe method having no adverse biological effects. Further, most evaluations indicate that infrared thermal imaging is an accurate, sensitive method of displaying cutaneous temperature distribution.

In my clinical experience and as reported by others, thermal imaging of the cutaneous temperature distribution is an important aid in the diagnosis and management of various neuromuscular causes of pain, such as nerve root impingement,[1-3] reflex sympathetic dystrophy,[4-6] and other painful problems, such as myofascial injury[7] and stress fracture.[8] However, reports critical of thermography question the clinical value of the method. Critics consign thermography to a role as an adjunctive test or screening method, or cite its supposed nonspecific results and poor sensitivity.

Adjunctive Test

Some evaluations of thermography state that it is an "adjunctive test" requiring "other procedures . . . to reach a specific diagnosis."[9,27] The 1989 report[9] from the Office of Health Technology Assessment (OHTA) of the U.S. Department of Health and Human Services, for example, concludes that "most investigators recommend thermography only as a screening tool, as an adjunctive diagnostic device, and not as a primary diagnostic guide." The OHTA report raises a question about the difference between an "adjunctive test" versus a "primary diagnostic guide."

Ideally, a medical diagnostic test is designed to supply unique anatomical, physiological, or biochemical information regarding body functioning.

Therefore, it is difficult to separate an "adjunctive" from a "primary" test. The terms suggest that an "adjunctive" test is subordinate to a "primary" method, but such a differentiation may not be obvious or even valid. When an electromyographer performs a needle electrode examination, the resulting electrical signals indicate only the physiologic state of the muscles tested. If denervation potentials are recorded from specific muscle groups, such as the lumbar paraspinals, peroneous longus, anterior tibial, and posterior tibial muscles, the examiner makes certain assumptions and concludes the presence of an L5 radiculopathy. In this sense, the EMG is really an adjunctive test. The diagnosis is made by the clinical skills and acumen of the electromyographer, not by the EMG. A radiologist examining a head CT (computerized tomographic) scan observes a spherical, enhancing, well-contained mass with little edema, loosely attached to the inner table of the skull. A meningioma is diagnosed. The observations and conclusions are based solely upon examining film showing differences in cranial tissue density as revealed by multiple radiographic sections. The CT scan does not give a tissue diagnosis. Since a specific diagnosis can be made

From the Minneapolis Clinic of Neurology, Ltd., University of Minnesota School of Medicine.

© American Academy of Thermology