Thermography and plethysmography, a non-invasive alternative to venography in the diagnosis of deep vein thrombosis

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One plethysmographic and two thermographic methods were evaluated against venography in 102 patients with suspected deep vein thrombosis (DVT). Seventy-one patients had venographically verified DVT, which in 21 cases was restricted to the calf. Plethysmography (PG) gave a sensitivity and specificity of 63% and 94%, respectively. The former was influenced by a limited sensitivity of 14% in the sub-group with distal DVT. The sensitivity and specificity of temperature profiles (TP) were 87% and 39%, respectively, while the corresponding values for thermo-camera (TC) were 83% and 55%, respectively. Using a combined diagnostic approach of PG and TP, additional evaluation of posterior and lateral profiles and pattern recognition, 96% sensitivity and 81% specificity were reached. The combination of PG and TP will be an essential diagnostic complement when venography is not possible or inconclusive, as well as having a role in diagnostic screening in a large number of patients.

Keywords: deep venous thrombosis, plethysmography, temperature profiles, thermo-camera, thermography.

Introduction

The correct management of patients with clinical symptoms and signs indicative of acute DVT may be of vital importance, and must be based upon accurate diagnosis. When based upon clinical symptoms alone, the diagnosis has apparently been inaccurate in as many as 50% of cases with suspect symptoms [1].

Venography has been regarded as the most accurate diagnostic method currently available. Plethysmography (PG) and thermography entail a non-invasive approach to diagnostic selection. The diagnostic value of PG has been reported in several studies [2, 3], and particularly in combination with

\[^{131}I\]fibrinogen [1] or thermography [4, 5]. PG and thermography allow quantification of actual venous obstruction and thermoactive reaction. The investigations may be repeated without causing damage or significant discomfort to the patients.

The purpose of this study was to evaluate the sensitivity and specificity of PG and thermography in patients with clinical signs and symptoms indicative of acute DVT in the leg. One plethysmographic technique and two different thermographic methods were compared with venography.

Study population and methods

From the medical ward of Karolinska Hospital, Stockholm, Sweden. 122 consecutive patients in whom acute DVT was clinically suspected were

Abbreviations: DVT = deep vein thrombosis. PG = plethysmography. TP = temperature profile. TC = thermo-camera.