

Liquid crystal thermography as a screening test for deep vein thrombosis in patients with cerebral infarction

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Abstract. Pulmonary embolism secondary to deep vein thrombosis is a frequent cause of death in stroke patients. In a multicentre study of deep vein thrombosis prophylaxis, 112 patients with cerebral infarction and leg paresis were given aspirin 300 mg three times a day (t.d.s.) alone or with dipyridamole 100 mg t.d.s. To screen for deep vein thrombosis liquid crystal thermography of the legs was performed daily for 15 days on all patients. Those patients with positive thermography underwent immediate X-ray venography of the appropriate limb as the definitive investigation for venous thrombosis.

Twenty-two patients had positive thermograms, of whom 16 had confirmed deep vein thrombosis as demonstrated by X-ray venography. Only 8 of the 22 had clinical signs of deep vein thrombosis and 2 of those had a negative venogram. Of the 14 patients with positive thermography but negative clinical signs 10 had positive venograms. Difference in the incidence of deep vein thrombosis in the two treatment groups was not demonstrated.

It is concluded that occult deep venous thrombosis is common after ischaemic stroke and it can occur without clinical signs. Liquid crystal thermography is a simple, rapid and cheap screening test that will allow the detection of clinically unrecognized thrombosis.

Keywords. Deep vein thrombosis, stroke, thermography.

Introduction

Deep vein thrombosis of the legs is a major cause of morbidity and mortality in hospital patients. Establishing a correct diagnosis is essential, for underdiagnosis may lead to fatal pulmonary embolism which is responsible for approximately 10% of all hospital deaths [1], and for 50% of deaths after stroke [2]. Overdiagnosis exposes patients unnecessarily to the hazards of anti-coagulation. The incidence of venous thrombosis in acute stroke is estimated at 22.5%–75% [2–4]. Furthermore, 33% of patients in a rehabilitation

unit were found to have venous thrombosis at some stage after stroke [5]. Clinical diagnosis alone is notoriously unreliable [6] and its accuracy is not greater than 50% [7].

There is, therefore, a need for a screening test to identify those patients who should proceed to X-ray venography—the accepted 'gold standard' diagnostic test. Liquid crystal thermography as used in this study has been shown to have a negative predictive value of 96.5% in a general medical population clinically suspected of having deep vein thrombosis [8]. We have therefore investigated its use as a screening test in patients with cerebral infarction in a study of deep vein thrombosis prophylaxis.

Patients and methods

Patients

Patients who suffered paresis of a leg underwent computerised axial tomography within 72 h. Those with a radiodense area diagnostic of intracerebral haemorrhage were excluded from the study. One-hundred-and-eighty-three patients in four different centres with a diagnosis of cerebral infarction received either aspirin (300 mg t.d.s.) alone or with dipyridamole (100 mg t.d.s.) randomly for 15 days and underwent daily clinical examination (for tenderness in the legs, increase in calf diameter, presence of pitting ankle oedema and redness) and liquid crystal thermography. The mean time of beginning the study after stroke was 51.3 h.

Liquid crystal thermography

Equipment. The equipment has been fully described elsewhere [9]. Briefly, the portable apparatus consists of latex sheets impregnated with cholesterol crystals (Novamedix Ltd, Andover, UK), which selectively reflect polarized light in a narrow band of wavelength, emitting colours brown (cool) through yellow and green to blue (hot). These sheets are in hermetically sealed boxes (thermographic detector) with a clear face for viewing and inflatable by means of a hand pump and valve to make the sheets convex and allow 'moulding' around the legs. Each detector has a temperature range of 4°C. There are eight detectors measuring a mean of 22°C, 24°C, 26°C, 28°C, 30°C.

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