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The role of emergency venography in the diagnosis and management of deep venous thrombosis

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SUMMARY

A retrospective study of patients who had undergone venography for suspected deep venous thrombosis during a six month period was undertaken to assess the influence of the examination on the subsequent management. Of these patients 38·6% had evidence of thrombus confirmed by the examination. This figure is comparable with other published results and did not bear out the impression that too many negative venograms were being obtained. Objective diagnosis of deep venous thrombosis is essential to ensure safe and cost-effective management. Other techniques have been advocated for the diagnosis of this condition but all have significant disadvantages compared with venography.

INTRODUCTION

The clinical diagnosis of deep venous thrombosis is highly inaccurate: thrombi are present in only half of the patients in whom the diagnosis is suggested by signs and symptoms,[1-3] while up to two-thirds of thrombi are clinically silent.[1,3] Some objective method of investigation is therefore necessary to ensure accurate diagnosis and permit appropriate management in this common but potentially life-threatening condition.[2] Venography is now generally regarded as the "gold standard" in the diagnosis of deep venous thrombosis.

This results in a large number of requests for emergency venograms, a high proportion of which reveal no abnormality, and many radiologists feel that too many such requests are made.[4] We therefore decided to review our experience of venography in the investigation and subsequent management of clinically suspected deep venous thrombosis over a six month period.

MATERIALS AND METHODS

The names and radiological reports of all patients who underwent venography in our department during the six months June to November 1987 were retrieved from the computerised departmental reporting system. All venograms were obtained by injection of water-soluble contrast into one of the dorsal veins of the foot.[5] The case notes (if available) were reviewed for each case and those patients who had undergone venography for indications other than suspected acute deep venous thrombosis were excluded from the study. Age, sex, referral source,

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interval between request and examination, result of venography and subsequent management were obtained.

RESULTS

During the six months 140 venograms were performed on 137 patients (three repeat examinations); the case notes were available for 119 patients. Of these 119 patients, 88 had presented with a suspected deep venous thrombosis. The remaining 31 patients (6 males, 25 females) had undergone venography for other indications such as varicose veins or the post-thrombotic syndrome. There were 41 males and 47 females, age range 12 to 92 years, (average 56·2 years). Evidence of acute thrombosis was reported in 34 patients (23 males, 11 females), 38·6% of the study group. The venogram was considered to be normal in the remaining 54 patients (18 males, 36 females). The hospital department from which each case was referred and the results of venography are recorded in the Table.

TABLE

Venograms performed for suspected deep venous thrombosis from different hospital departments

	Accident and Emergency	*Surgical in-patients*	*Surgical out-patients*	*Medical in-patients*	*Medical out-patients*	*Total*
Positive	2	14	1	17	0	34
Negative	20	15	0	18	1	54
Total	22	29	1	35	1	88

Of the 54 patients with no radiological evidence of thrombus, 21 were attending either the casualty or out-patient departments. Of these 21 patients, 20 were not admitted following venography, only one being admitted for bed rest and elevation of the swollen leg. A further two in-patients were discharged once a thrombosis had been excluded. In seven patients, anticoagulation had been commenced prior to venography and was ceased as consequence of the result. Four patients with negative venograms were considered to be at high risk and were commenced on prophylactic anticoagulation, and two were given a therapeutic course of anticoagulation despite a negative venogram — one of these patients had fractures of the tibia, fibula and femur, and while no thrombus was evident on venography there was compression of the popliteal vein and extravasation of contrast — the other patient had had two previous episodes of thromboembolism.

Positive venograms were obtained in two out-patients who were subsequently admitted for anticoagulation. Of 32 in-patients with positive venograms, eight had been commenced on anticoagulation prior to venography and this was continued after the examination. In a further 22 patients anticoagulation was commenced as a consequence of the venographic findings and in addition two patients had inferior vena cava filters inserted following episodes of pulmonary embolism. Fifty patients (56·8%) underwent venography on the day it was requested and a further 19 (21·6%) the day after the request. A delay of two to seven days occurred between request and venography in 14 patients. In five cases the date of the request had not been satisfactorily recorded in the notes. None of the patients had any complications attributable to the examination recorded in their case notes.

DISCUSSION

Only 38·6% of patients presenting with a suspected deep venous thrombosis had evidence of thrombosis confirmed by venography, which is comparable with other published results: Charig and Fletcher[4] found an incidence of 45·8% (55 of 120) in a prospective study of patients referred for emergency venography while Hull et al[6] reported positive radiographic findings in 42% of patients (201 of 478) presenting with a first episode of clinically suspected deep venous thrombosis. Ramsay[2] reported an incidence of 31% in patients presenting to general physicians. Our results would tend not to bear out the impression that too many venograms were being performed.

Negative venograms were obtained in a relatively high proportion of patients referred directly from the accident and emergency department. This presumably reflects the tendency of casualty officers to admit those patients with more definite clinical evidence of deep venous thrombosis without first obtaining a venogram. The majority, if not all, of these patients would have subsequently undergone venography as medical in-patients.

This retrospective study confirms the central role of venography in the management of suspected deep venous thrombosis. In all but one case the subsequent management of the patient was significantly influenced by the result of the venogram. If the venogram was negative, the very considerable risks of a course of therapeutic anticoagulation[7-10] could be avoided. In addition the duration of some in-patients' stay in hospital could be dramatically shortened, and admission of out-patients avoided. One patient who had a previous history of thromboembolism received a course of therapeutic anticoagulation despite a negative venogram, but the reason for this decision was not recorded in the notes. Venography identifies at least 95% of clinically significant thrombi[2] and it is generally agreed that it is safe to withhold treatment if the venogram is negative.[1] In all cases where the venogram indicated the presence of thrombus, the appropriate treatment was promptly instituted. These results clearly demonstrate the benefits of venography both in terms of cost-effectiveness[6] and in avoiding the risks and inconvenience of an incorrect diagnosis.

Venography is not without its problems. The procedure can be unpleasant for the patient, is not without risk and can consume a considerable amount of the radiologist's time. Common complications include local discomfort and allergic reactions during the examination, and thrombosis[11] may subsequently develop. These risks may be reduced by the use of low osmolality contrast[12-13] but this adds significantly to the cost of the examination and is not used routinely in this department in the interests of economy.

Is there a satisfactory alternative to venography? Several other techniques have been advocated for the diagnosis of deep venous thrombosis. Liquid crystal thermography is a quick and non-invasive screening test which has a sensitivity of 97% and negative predictive value of 96·5%.[14] The specificity is however rather low at 62% and all patients with a positive thermogram must undergo venography to identify the false positives. Real time B mode ultrasound scanning is a sensitive technique for detecting thrombus in the femoro-popliteal segment but not in the calf or iliac veins.[15] Ultrasound does however have the advantage that it may demonstrate other conditions which mimic a deep venous thrombosis such as a ruptured Baker's cyst or haematoma.[16] The ^{99m}technetium venoscan is unable to detect thrombi above the mid-thigh where they are obscured by blood

in the large veins and radioactive urine in the bladder.[1] The technique is slow to produce a result, and it may be equivocal in a significant number of cases.[17] Impedance plethysmography lacks specificity[18] and is blind to calf thrombi.[19] Blood tests for products of coagulation or accompanying fibrinolysis also lack specificity.[1]

All of the alternative methods of investigation in suspected deep venous thrombosis may have significant disadvantages. Venography remains the "gold standard" and is clearly superior to all other techniques in demonstrating the exact anatomical extent of the thrombus. This being the case, is there any way to reduce the number of cases being referred for venography? Given the non-specific nature of the signs and symptoms, yet potentially life-threatening nature of the disease this seems improbable. It is reasonable to avoid venography in those patients whose subsequent management will not be influenced by the result. We would therefore suggest that venography should not be performed on those patients in whom the clinician would be unhappy to discontinue anti-coagulant therapy despite a negative venogram, or if the risk of treatment exceeds the risk of thromboembolism (for example in patients over 90 years of age who run a considerable risk of a cerebrovascular accident or haemorrhage from an occult neoplasm if anticoagulated).[4]

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