APPENDIX 1

ANALYSIS OF THE SECTIONS IN MEDICAL RESEARCH ARTICLES

Each text has been analyzed for moves and lexicogrammar. Only five examples from each section are included in this Appendix due to the length and bulk of the whole corpus. The complete Appendix with all the twenty-four articles examined in this thesis is available upon request.

Key:
S=Subject, F=Finite, P=Predicator, C=Complement
/Attributive Complement, C-S=Complement in Subject position
Ac=Circumstantial Adjunct, Am=Mood Adjunct, Aco=Comment Adjunct, Aj=Conjunctive Adjunct
Pm=material process, Pr=relational process, Pv=verbal process, Pmen=mental process, Pe=existential process
Theme is underlined

ABSTRACTS

1. Intraoperative thrombolysis (C-S) was (F) attempted (P)(Pm) in 31 acutely ischaemic legs (Ac) after (Aj) operative arteriography (S) had (F) demonstrated (P) (Pm) residual distal thrombus or occlusion following balloon-catheter thromboembolectomy (C).

There (S) were (F) (Pr) 30 patients, 16 (S) men (C) and (Aj) 14 (S) women (C), [aged (P)(Pr) 43-82 (median 73) years (C)] (C). The indication for operation (S) was (F) (Pr) severe ischaemia with sensorimotor loss in 25 limbs, failed percutaneous thrombolysis in three and acute graft occlusion in three (C). A total of 21 per-femoral, 11 perpopliteal and four graft embolectomies (C-S) were (F) initially (Ac) performed (P)(Pm). Following arteriography (Ac), 100 000 units streptokinase (C-S) was (F) infused (P) (Pm) down the isolated distal arterial tree (Ac) over 30 minutes (Ac) and (Aj) arteriography (C) repeated (P)(Pm). (MOVE 3)
Complete lysis (C-S) was (F) achieved (P) (Pm) in 11 legs (35 per cent) (Ac) and (Aj) partial lysis (C-S) in 12 (39 per cent) (Ac). (MOVE 4)

Additional procedures required (S) included (P)(Pr) six operative angioplasties and six bypass grafts (C). (MOVE 3)

After operation (Ac) pedal pulses (C-S) were (F) restored (P)(Pm) in 14 limbs (Ac) (45 per cent), with a viable leg in 23 cases (Ac) (74 per cent) at the time of patient discharge or death (Ac). There (S) were (F)(Pr) five wound haematomas but no evidence of systemic fibrinolysis (C). Four amputations were (F) required (P)(Pr), [none (C) in the group (Ac) undergoing (P)(Pm) successful lysis (C)] (C-S), and (Aj) there (S) were (F)(Pr) seven deaths (C), five (S) from cardiac disease (Ac). (MOVE 4)

Arteriography after balloon-catheter embolectomy (S) is (F)(Pr) essential (C) to detect (P)(Pm) residual thromboembolus (C) and (Aj) intraoperative streptokinase (S) appears (P)(Pr) to be (P)(Pr) a safe and effective way of removing this (C). (MOVE 5)

2. The importance of the patency of the contralateral carotid artery on the haemodynamic effect of a carotid stenosis (C-S) was (F) investigated (P)(Pm). (MOVE 1)

The breath-holding index (C-S) was (F) used (Pm) to estimate (Pm) cerebral perfusion reserve (C). The percentage rise in middle cerebral blood flow velocity (S), [measured (P)(Pm) by transcranial Doppler ultrasonography (Ac), occurring (P) during breath-holding (Ac)] (C-S) was (F) divided by (P)(Pm) the time of breath-holding (C). In study 1 (Ac), ten patients with no carotid stenosis, 13 with unilateral and eight with bilateral stenosis (C-S) were (F) studied (P)(Pm). (MOVE 3)

For unilateral stenosis (Ac) the breath-holding index (C) was (F) reduced (P)(Pm) on the stenosed side (Ac) compared with normal (0.85 versus 1.34 per cent s, P<0.05) (Ac). For bilateral disease, in the presence of severe stenosis on the side contralateral to that being examined (Ac), even (Aj) a moderate stenosis (30-50 per cent) (S) resulted in (P)(Pm) a much greater reduction (C) in the breath-holding index (Ac). (MOVE 4)

In study 2 (Ac), the breath-holding index (C-S) was (F) measured (P)(Pm) before and after carotid endarterectomy (Ac) in ten patients (Ac). (MOVE 3)

The index (S) increased (P)(Pm) significantly (Am) following operation (Ac), not only (Aj) on the operated
side (1.31 versus 0.79 per cent per s, P<0.01) (Ac), but also (Aj) on the contralateral side (1.23 versus 0.87 per cent s, P<0.05) (Ac). In three of four patients with contralateral stenosis >90 per cent or occlusion (Ac), operation (S) improved (P)(Pm) the breath-holding index (C) markedly (Am) (>90 per cent) on the non-operated side above the stenosis or occlusion (Ac). (MOVE 4)

These results (S) demonstrate (P)(Pm) the importance of patency of the contralateral carotid artery in determining the haemodynamic effect of a carotid stenosis (C). In addition (Aj), operating contralateral to an occlusion (S) may improve (P)(Pm) haemodynamic status above the occlusion (C). (MOVE 5)

Implications in selecting patients for carotid endarterectomy (C) are (F) discussed (P)(Pm). (MOVE 1)

3. Photoplethysmography (C-S) was (F) compared with (P)(Pm) clinical investigation combined with Doppler ultrasonography (Ac) in the diagnosis of superficial venous valvular competence of the lower limb (Ac). (MOVE 1)

In 268 consecutive patients (Ac), 536 limbs (C-S) were (F) investigated (P)(Pm). (MOVE 3)

A total of 22.1 per cent of the photoplethysmographic investigations (C) were (F)(Pr) uninterpretable (C) because (Aj) they (S) did not (F) allow (P)(Pm) reliable determination of the refilling time (C). Agreement between clinical investigation combined with Doppler ultrasonography and photoplethysmography (C-S) was (F) found (Pm) to be (Pr) poor (C) (0.30). (MOVE 4)

These results (S) suggest (P)(Pr) that (Aj) photoplethysmography (S) is not (F)(Pr) the noninvasive method of choice (C) for routine evaluation of superficial venous valvular incompetence of the leg (Ac). (MOVE 5)

4. Over a 7-month period (Ac) 50 patients (S) presented to (P)(Pm) the vascular unit (C) with ruptured or acute symptomatic abdominal aortic aneurysm (AAA) (Ac). Information regarding the 24 months before acute presentation (C-S) was (F) obtained (P) from (Pm) the patient, family doctor and relevant case records (Ac) to determine (P)(Pm) [whether (Aj) an asymptomatic aneurysm (C-S) had (F) previously been diagnosed (P)(Pm) but (Aj) the patient (C-S) not referred to (P)(Pm) the vascular service (C), or whether (Aj) the patient (S) had (F) undergone (P)(Pm) an examination (C) at which (Aj) an aneurysm (C-S) might (F) reasonably (Aco) have been expected (P)(Pmen) to be diagnosed (Pm)] (C). (MOVE 3)
Thirteen patients (26 per cent) (S) had (F) previously (Ac) had (P)(Pr) an AAA diagnosed (C) but (Aj) only five (C-S) had (F) been referred (P)(Pm). Thirteen patients (26 per cent) (S) had (F) had (P)(Pr) a total of 16 inpatient hospital admission (C) without an asymptomatic aneurysm being diagnosed (Ac). Six patients (12 per cent) (S) underwent (P)(Pm) abdominal examination (C) for an unrelated complaint (Ac) by the family doctor (Ac) without an asymptomatic aneurysm being diagnosed (Ac). (MOVE 4)

A significant impact on overall mortality from aortic aneurysm (C-S) may be made (P)(Pm) by increasing the number of patients undergoing elective aneurysm repair (Ac). All doctors (S) should assess (P)(Pm) aortic diameter (C) in all patients over 50 years of age [who (S) undergo (P)(Pm) abdominal examination for whatever reason] (Ac). All patients diagnosed as having an asymptomatic AAA (S) should be referred to (P)(Pm) a vascular surgeon (C) for assessment (Ac). (MOVE 5)

5. A group of 561 consecutive patients with proven symptomatic peripheral or cerebral arterial disease attending a vascular clinic (C-S) was (F) screened for (P)(Pm) abdominal aortic aneurysm (AAA) (Ac) using B-mode ultrasonography (Ac). (MOVE 1)

An aneurysm (C) was (F)(Pr) present (C) in 40 of 358 men (11.2 per cent) and 13 of 203 women (6.4 per cent), [a total of prevalence of 9.4 per cent (C)] (Ac). Thirty-three aneurysms (S) were (F)(Pr) 3-4 cm in diameter (C). The prevalence of AAA (S) was (F)(Pr) similar (C) in patients referred with lower-limb and with cerebral ischaemia (Ac). (MOVE 4)

Physical examination for AAA (C-S) was (F) performed (P)(Pm) in 200 patients (Ac) before ultrasonography (Ac). (MOVE 3)

The sensitivity of physical examination in the detection of aneurysm (S) was (F)(Pr) 43 per cent (C) (57 per cent for AAA >4 cm in diameter, 29 per cent for AAA <4 cm in diameter). (MOVE 4)

Physical examination (S) was (F)(Pr) an inadequate method of screening (C). Initial follow-up (S) showed (P)(Pm) a mean aneurysm expansion rate of 0.20 cm/year (C). Patients with arterial disease (S) have (F)(Pr) a high risk of AAA (C); routine ultrasonographic screening (C-S) should be considered (P)(Pm). (MOVE 5)
INTRODUCTIONS

1. Percutaneous intra-arterial thrombolysis (S) is (F)(Pr) now (Ac) well established (C) for the treatment of acute leg ischaemia (Ac). However (Aj), complete clot lysis (S) may take (P)(Pm) many hours (C) and so (Aj) the technique (S) is (F)(Pr) of little use (C) when (Aj) the limb (S) is (F)(Pr) ischaemic [to the extent that (Aj) immediate intervention (C-S) is (F) required (Pr) to save (P)(Pm) it (C)] (C). The treatment of choice (S) in such circumstances (Ac) remains (P)(Pr) thromboembolectomy using a balloon catheter (C). (MOVE 1)

Unfortunately (Aco), this procedure (S) fails (Pm) to reperfuse (Pm) the leg (C) in a significant proportion of cases (Ac), a failure (C) that (Aj) results in (P)(Pm) amputation or death (C). One reason for this (S) is (F)(Pr) incomplete clearance of thrombus (C); studies of intraoperative arteriography (S) have shown (P)(Pm) this (C) to occur (P)(Pm) in up to 30 per cent of patients (Ac). (MOVE 2)

A logical solution to this problem (S) is (F)(Pr) to combine surgical embolectomy with intraoperative thrombolysis (C). The aim of this prospective study (S) was (F)(Pr) to see (P)(Pmen) [whether (Aj) intraoperative streptokinase (S) could (F) lyse (P) thrombus remaining after thromboembolectomy (C)] (C). (MOVE 3)

2. Carotid endarterectomy (S) reduces (P)(Pm) the risk of stroke (C) in patients with a symptomatic carotid artery stenosis of >/ 70 per cent diameter (Ac). Current opinion (S) favours (P)(Pmen) embolism from the carotid lesion (C) as the major mechanism underlying stroke (Ac) in these patients (Aj). (MOVE 1)

However (Aj), an interesting point to emerge from carotid endarterectomy trials (S) was (F)(Pr) [that (Aj), in medically treated patients (Ac), there (S) was (F)(Pr) a steadily increasing stroke rate with increasing degree of carotid stenosis, even above 70 per cent (C)] (C). This (S) suggests (P)(Pr) that (Aj) haemodynamic factors (S) may be (P)(Pr) important (C). The haemodynamic effect of a carotid stenosis (S) depends (P..) not only (Aj) on (..P)(Pr) the degree of stenosis (C), but also (Aj) on (..P)(Pr) collateral supply (C). This (S) includes (P)(Pr) the supply via the circle of Willis from the contralateral internal carotid artery (C). Collateral supply from the contralateral side (S) will be (P)(Pr) important (C) in determining the effect of any temporary reduction in flow above a carotid
artery (Ac). Therefore (Aj), it (S) is (F)(Pr) likely (Am) that (Aj) the risk of stroke associated with carotid stenosis (C) will (F) be increased (P)(Pm) in the presence of contralateral carotid disease (Ac). (MOVE 2)

One method of assessing cerebral haemodynamic status (S) is (F)(Pr) to measure (P)(Pm) cerebrovascular reserve (C). In normal individuals (Ac) a fall in perfusion pressure (C-S) is (F) counterbalanced (P)(Pm) by vasodilatation of cerebral arterioles (Ac); under normal conditions (Ac) this mechanism (S) maintains (P)(Pm) adequate cerebral blood flow (C). This cerebrovascular reserve (C-S) can (F) be estimated (P)(Pm) by measuring the change in cerebral blood flow that occurs in response to the vasodilator carbon dioxide (Ac). A proportion of individuals with occlusive carotid artery disease (S) show (P)(Pm) reduced cerebrovascular reactivity (C) as measured by this technique (Ac). It is (F) believed (P)(Pmen) that (Aj) haemodynamically compromised tissue (C-S) is supplied (P)(Pm) by maximally, or near maximally, dilated arterioles (Ac), [which (S) are (F) therefore (Aj) unable to dilate (P)(Pm) much further (Ac) in response to additional vasodilatory stimuli (Ac)] (Ac). Changes in cerebral blood flow (C-S) can (F) be estimated (P) by (Pm) using transcranial Doppler ultrasonography (Ac) to measure (Pm) changes in mean middle cerebral artery blood flow velocity (C). (MOVE 1)

In this study (Ac) cerebral reactivity measurements (C-S) have (F) been used (P)(Pm) to assess (Pmen) the effect of contralateral carotid occlusive disease on the haemodynamic effect of a carotid stenosis (C). This technique (C-S) has (F) also (Aj) been used (P)(Pm) to assess (P)(Pm) the haemodynamic changes [that (Aj) follow (P)(Pm) carotid endarterectomy (C)] (C). (MOVE 3)

3. Since the report by Abramowitz et. al. in 1979, [in which (Aj) photoplethysmography (C-S) was (F) compared (P) with (Pm) venous pressure measurements in the diagnosis of deep venous valvular incompetence (Ac)] (Ac), photoplethysmography (C-S) has (F) been described (P)(Pv) in various publications (Ac) as a quantitative, reliable, rapid, reproducible and non-invasive method of testing the venous system (Ac). Consequently (Aj), this technique (S) has (F) found (P)(Pm) widespread use (C) in the diagnosis of venous disorders of the leg (Ac). (MOVE 1)

However (Aj), various authors (S) have (F) questioned (P)(Pv) the criteria for interpretation of the results of photoplethysmography as well as its reproducibility (C). (MOVE 2)

In contrast to the allegedly quantitative photo-
plethysmography (Ac), Doppler ultrasonography (S) is (F)(Pr) a qualitative method (C). It (S) provides (P)(Pm) information on the presence of venous valvular incompetence with a high degree of sensitivity and specificity (C). Recently (Ac), quantitative aspects of venous (duplex) Doppler ultrasonographic studies (C-S) have (F) also (Aj) been published (P)(Pm). In modern clinical practice (Ac) Doppler ultrasonography (S) is (F)(Pr) among the techniques most used to complement clinical examination (C) in the diagnosis of superficial venous valvular incompetence (Ac).

A study (C-S) was (F) undertaken (P)(Pm) to compare (P)(Pm) the value of photoplethysmography with that of the combination of clinical examination and Doppler ultrasonography (C) in the diagnosis of superficial venous valvular incompetence of the lower limb (Ac).

(MOVE 3)

4. Rupture of an abdominal aortic aneurysm (AAA) (S) is (F)(Pr) responsible (C) for 1.7 per cent of all deaths in men aged 64-75 years (Ac). The annual incidence of ruptured AAA (S) has (F) increased to (P)(Pm) 17 per 100 000 population (C) and (Aj) there (S) has (F) been (P)(Pr) a corresponding increase in both elective and emergency aneurysm surgery (C). Approximately (Am) 5.4 per cent of men aged between 55 and 75 years (S) have (F)(Pr) an asymptomatic AAA (C) and (Aj), once (Ac) dilatation (S) has occurred (P)(Pm), the aorta (S) can be expected (P)(Pmen) to continue (Pm) to expand (Pm). Rupture (S) can, however (Aj), occur (P)(Pm) while (Aj) the aneurysm (S) is (Pr) still small (Ac). After rupture (Ac) more than half the patients (S) will die (P)(Pm) before reaching hospital (Ac); the overall rate (C-S) has (F) been estimated (P)(Pm) to be (Pr) as low as 14 per cent (Ac). (MOVE 1)

There (S) is (F)(Pr) a significant difference (C) in operative mortality rate between elective (4.3 per cent) and emergency (36 per cent) aneurysm surgery (Ac), leading to (Pm) calls for increased rates of referral of patients with asymptomatic lesions (C). Screening for small AAAs (C-S) has also (Aj) been advocated (P)(Pm). (MOVE 2)

The aim of this study (S) was (F)(Pr) to determine (P)(Pm) how many patients with acute symptomatic or ruptured AAA (C-S) had (F) passed (P) through (Pm) the hands of the medical profession (Ac) in the 24 months before acute presentation (Ac) and (Aj) who (S), therefore (Aj), might have undergone (P)(Pm) elective surgery (C) if (Aj) their condition (C-S) had (F) been diagnosed (P)(Pm) and (Aj) they (C-S) had (F) been referred (P) for (Pm) early vascular surgical assessment (Ac).
5. Abdominal aortic aneurysm (AAA) (S) is (F)(Pr) an increasingly common condition (C). Rupture (S) carries (P)(Pm) an overall mortality rate of 84-94 per cent (C) and (Aj) many patients (S) die (P)(Pm) before reaching hospital (Ac). In contrast (Aj), the mortality rate for elective repair in many centres (S) is (F)(Pr) < 5 per cent (C). As (Aj) rupture (S) is (F) frequently (Am) the presenting feature of AAA (C), screening programmes (C-S) have (F) been advocated (P)(Pm) to detect (P)(Pm) asymptomatic aneurysms (C) to allow (Pm) elective repair (C). (MOVE 1)

This study (C-S) was (F) undertaken (P)(Pm) to determine (Pm) the prevalence and size distribution of AAA in defined groups of patients with arterial disease (C), to compare (Pm) physical examination with B-mode ultrasonography as a screening technique (C), to determine (P)(Pm) [whether (Aj) the prevalence of AAA (S) differed (P) (Pr) according to presenting symptoms (Ac)] (C), and (Aj) to measure (Pm) the rate of growth of detected aneurysms (C). (MOVE 3)

METHODS

1. Over a 3-year period (Ac), intraoperative thrombolysis (C-S) was (F) performed (P)(Pm) on 31 acutely ischaemic legs (Ac) when (Aj) intraoperative arteriography (S) had (F) demonstrated (P) (Pm) persistent occlusion after balloon-catheter thromboembolectomy (C). Figures for the total number of patients with acute leg ischaemia treated by embolectomy during this time (S) are not (F)(Pr) available (AC) because (Aj) not all surgeons (S) at the relevant hospitals (Ac) contributed to (P)(Pm) the study (C). However (Aj), operative arteriography (S) was (F) employed (P)(Pm) routinely (Am) by the participating surgeon (Ac) and (Aj) revealed (P)(Pm) persistent distal thrombus or occlusion in over one-third of patients (C). (MOVE 2)

There (S) were (F)(Pr) 30 patients, 16 men and 14 women, aged 43-82 (median 73) years (C). The indication for operation (S) was (F)(Pr) severe ischaemia with sensorimotor loss in 25 limbs, failed percutaneous thrombolysis in three and acute graft occlusion [where (Aj) the graft (S) was not (F) accessible (C) for percutaneous thrombolysis in three (Ac)] (C). Preoperative arteriography (C-S) was (F) performed (P)(Pm) in only 16 patients (Ac).
The cause of ischaemia (S) was (F)(Pr) probable primary embolism in nine legs (eight of cardiac origin), one from an aortic aneurysm, probable thrombosis in 11 (including two popliteal aneurysm), graft occlusion in five (one femorofemoral, one iliopopliteal, three femoropopliteal) and iatrogenic embolism in six (five following percutaneous angioplasty, one after aortic surgery) (C). (MOVE 1)

The distinction between primary embolism and thrombosis (C-S) was (F) made (P)(Pm) on the basis of preoperative risk factors (electrocardiographic evidence of arrhythmia or myocardial infarction, history of claudication, presence of contralateral pulses) and arteriographic, operative, histological and autopsy findings (Ac). A total of 21 perifemoral, 11 peropopliteal and four graft embolectomies (C-S) were (F) performed (P)(Pm). The balloon catheters (2-4 Fr) (C-S) were (F) repeatedly (Am) passed (P)(Pm) diatally (Ac) until (Aj) no further thromboembolic material (C) could be retrieved (P)(Pm).

Operative arteriography (C-S) was (F) then (Ac) performed (P)(Pm) by placing a film cassette under the leg and infusing 10-20 ml contrast medium (usually Omnipaque; Nycomed, Birmingham, UK) via a Tibbs cannula or plastic catheter inserted into the arteriotomy and held in position with a Silastic (Dow Corning, Reading, UK) sling (Ac). After femoral exploration (Ac), the cannula (C-S) was (F) usually (Am) passed (P)(Pm) into the origin of the superficial femoral artery (Ac), but (Aj) if (Aj) this (S) was (F) occluded (P)(Pm) by existing atheroma (Ac) then (Aj) the arteriogram (C-S) was (F) obtained (P)(Pm) via the profunda femoris artery (Ac).

Once (Ac) persistent distal thrombus or occlusion (S) had been demonstrated (P), intraoperative thrombolysis (C-S) was (F) attempted (P)(Pm). Streptokinase, 100 000 units in 100 ml normal saline (C-S) was (F) infused (P)(Pm) over 30 minutes (Ac) down the superficial femoral artery via the cannula used for the arteriogram (Ac). Thrombolysis after popliteal exploration (C-S) was (F) performed (P)(Pm) by infusing streptokinase into the distal popliteal artery or by divided doses down the tibial branches (Ac). No attempt (C-S) was (F) made (P)(Pm) to embed (P)(Pm) the catheter in the thrombus (C). Repeated arteriography (C-S) was (F) then (Aj) performed (P)(Pm) to assess (P)(Pm) the degree of clot lysis (C). If (Aj) this (S) demonstrated (P)(Pm) incomplete lysis (C) then (Aj) a further attempt at embolectomy (C-S) was (F) made (P)(Pm) and (Aj) another arteriogram (C-S) obtained (P)(Pm) if (Aj) more thrombus (C-S) was (F) retrieved (P)(Pm).

Additional procedures (S) depended (P..) largely (Am) on (..P)(Pr) the degree of clot lysis on repeated arteriography (C). Nothing further (C-S) was (F) performed (P)(Pm) in 13 limbs (Ac) and (Aj) embolectomy (C-S) was
(F) successfully (Aco) repeated (P)(Pm) on three occasions (Ac). Operative transluminal balloon angioplasty of an underlying stenosis (C-S) was (F) performed (P)(Pm) in six cases (Ac). Two femoropopliteal below-knee vein grafts (S) were (F)(Pr) necessary (C) for persistent occlusion of the superficial femoral and popliteal arteries (Ac) and (Aj) one (S) for a thrombosed popliteal aneurysm following a popliteal embolectomy (Ac). Two femoral grafts and one iliopopliteal crossover reconstruction (C-S) were (F) required (P)(Pr) because of poor inflow (Ac). Anterior and posterior compartment fasciotomy of fascia and skin from knee to ankle (C-S) was (F) performed (P)(Pm) in three patients (Ac).

After operation (Ac) all patients (S) underwent (P)(Pm) anticoagulation with a heparin infusion according to the activated partial thromboplastin time (APTT) (C). Preoperative coagulation profiles (C-S) were not (F) routinely (Am) obtained (P)(Pm). Wound haematomas and other bleeding problems (C-S) were (F) recorded (P)(Pm). A successful outcome (C-S) was (F) defined as (P)(Pmen) complete or partial clot lysis on operative arteriography, restoration of pedal pulses and a viable leg at discharge or death (C). Preoperative and postoperative Doppler ankle artery pressure indices (C-S) were (F) obtained (P)(Pm) in 25 patients (Ac).  

2. Patients and methods
Cerebral blood velocity (C-S) was (F) measured (P)(Pm) using a transcranial Doppler ultrasonographic velocimeter TC2-64B (EME, Uberlingen, Germany) fitted with a 2-MHz probe. The middle cerebral artery (C-S) was (F) insonated (P)(Pm) via the transtemporal window (Ac) at a depth of 50 or 55 mm (Ac). The probe (C-S) was (F) held (P)(Pm) in place (Ac) by an elasticated strap (Ac). The stimulus used to induce vasodilatation (S) was (F)(Pr) breath-holding, [which (Aj) results in (P)(Pm) a rise in the arterial pressure of carbon dioxide (C)] (C). Reactivity assessed by this method (C) has (F) been shown (P)(Pm) to correlate with (Pr) [that (S) measured (P)(Pm) using the administration of carbon dioxide (Ac)](C). Subjects (C-S) were (F) instructed (P)(Pv) to hold (P)(Pm) their breath (C) and the rise in V (C-S) was (F) recorded (P)(Pm). A deep breath (C-S) was (F) avoided (P)(Pm) as (Aj) this (S) induces (P)(Pm) a Valsalva effect [which (S) reduces (P) V (C)] ; in contrast (Aj), breath-holding after a normal inspiratory breath (S) results in (P)(Pm) neither a Valsalva effect nor an initial drop in arterial pressure and cerebral blood flow velocity (C). The percentage rise in V occurring during breath-holding (C-S) was (F) divided (P)(Pm) by the time of breath-holding in seconds (Ac) to obtain (P)(Pm) the breath-holding index (C). Two measurements (C-S) were (F) made (P)(Pm), separated (P) by 2 minutes
(Ac) and (Aj) the mean (C) taken (P)(Pm).

(MOVE 2)

Study 1

Patients (C-S) were (F) studied (P)(Pm) [who (S) presented with (P) symptoms or signs (C) suggestive of carotid territory ischaemia (C), and (Aj) who (S) had (F) undergone (P) high-resolution intravenous digital subtraction angiography of the carotid arteries] (C). They (C-S) were (F) divided into (P)(Pm) three groups according to the degree of ipsilateral and contralateral carotid stenosis: (1) no stenosis on either side; (2) unilateral stenosis (>30 per cent diameter) with normal contralateral carotid artery; and (3) bilateral stenosis (90 per cent) or occlusion on the contralateral side (C).

The breath-holding index (C-S) was (F) measured (P)(Pm) on both sides in each subject (Ac).

Study 2

Patients who underwent carotid endarterectomy (C-S) were (F) studied (P)(Pm). The breath-holding index (C-S) was (F) measured (P)(Pm) in the week before and 1 month after, the operation (Ac).

(MOVE 1)

Statistics

Comparisons between groups (C-S) were (F) made (P)(Pm) using Student's t test (Ac). $P < 0.05$ (C-S) was (F) considered (P)(Pmen) significant (AC). (MOVE 3)

3. Patients and methods

The study (S) included (P)(Pr) 268 consecutive patients (201 women, 67 men) [consulting (P) the surgical department (C) for the first time (Ac) for varicosities of the lower limbs (Ac)] (C). The mean age (S) was (F)(Pr) 44 (range 17-76) years (C). A total of 536 limbs (C-S) were (F) examined (P)(Pm) with photoplethysmography, clinical investigation and Doppler ultrasonography (Ac). A control group of five healthy men and six healthy women (total 22 limbs) without clinical manifestations of venous insufficiency (S) underwent (P)(Pm) the same examinations (C). The mean age of the controls (S) was (F)(Pr) 32 (range 25-50) years (AC). Photoplethysmography (C-S) was (F) performed (P)(Pm) twice (C) in the controls (Ac) to study (P)(Pm) the reproducibility of the measurement (C). (MOVE 1)

Photoplethysmography

A photoplethysmograph (S) consists of (P)(Pr) a transducer, an amplifier and a recorder (C). The transducer (S) emits (P)(Pm) infra-red light into the underlying tissues (C). The backscattered light (C-S) is (F) re-
ceived (P)(Pm) by a photodetector (Ac) and (Aj) the resulting signal (C) displayed (P)(Pm) on a stripchart recorder (Ac). The shift from the baseline (S) reflects (P)(Pm) the degree of filling of the cutaneous capillary-venous plexus (C); it (S) reflects (P)(Pm) the combination of arterial inflow, venous outflow and venous reflux in the limb (C). The transducer (EC4 plethysmograph; Hewlett-Packard, Andover, Massachusetts, USA) (C-S) was (F) fixed to (P)(Pm) the skin near the medial malleolus (C), taking (Pm) care (C) not to place (P)(Pm) it (C) directly over the long saphenous vein (LSV) (Ac). Recordings (C) were (F) obtained (P)(Pm) with the patient sitting with feet in a non-weight bearing position (Ac). When (Aj) a stable baseline (C) was (F) obtained (P)(Pm) at rest (Ac), the patient (C-S) was (F) instructed (P)(Pv) to perform (Pm) dorsiflexion of the foot at the rate of one movement per second (C). During dorsiflexion (Ac) the subcutaneous plexus (C-S) is (F) emptied (P)(Pm), which (S) deflects (P)(Pm) the photo-plethysmographic signal from the baseline (C). Ideally (Aco) this deflection will (Am) return to (P)(Pm) the original baseline (C) after cessation of exercise (Ac). The time needed for this return (C-S) is (F) known (P)(Pmen) as the venous refilling time (Ac). A time >20s(C) is (F) generally (Ac) considered (P)(Pmen) normal (C) and (Aj) one <20s (C) abnormal and indicative of venous reflux (AC). By repeating the test with a tourniquet or cuff with a pressure greater than the local venous pressure applied above the knee, below the knee and at calf level (Ac), further differentiation of the nature of the valvular incompetence (S) is (F)(Pr) possible (C). In this study (Ac), sphygmomanometer cuffs (C-S) were used (P)(Pm). Limbs with deep venous insufficiency (S) had (F)(Pr) refilling times (C) (with cuffs) <15s s, whereas (Aj) those with superficial venous valvular incompetence (S) had (F)(Pr) times (C) (with cuffs) >15s and <20s.

Four different outcomes of photoplethysmography (C-S) may be obtained (P)(Pm):
1. Normal result while testing without the cuff, indicative of a haemodynamically normal venous system without valvular incompetence (C).
2. Abnormal result that normalizes after placement of a high thigh cuff occluding the LSV, indicative of isolated valvular incompetence of the LSV (C).
3. Abnormal result that does not normalize after placement of a high thigh cuff occluding the LSV, considered to be an indication of a more complex venous valvular incompetence, such as valvular incompetence of the short saphenous vein (SSV), deep venous valvular incompetence, valvular incompetence of perforator veins, or combinations of these or without LSV valvular incompetence (C).
4. A non-interpretable recording obtained with or without the cuff, making categorization in one of the
above three groups impossible (C).

Non-interpretable photoplethysmographic curves (S) consisted of (P)(Pr) two types (C): either (Aj) the deflection from the baseline (S) did (F) not return to (P)(Pm) the baseline position after cessation of muscle activity, or (Aj) the curves (S) showed (P)(Pm) continued drifting away from the baseline after exercise (Ac). In an attempt to reduce the problem of non-interpretability (Ac), two other parameters from the recordings (C-S) were (F) used (P)(Pm) (Figure 1). First (Ac), the venous half-refilling time (t), [defined as (P)(Pv)] the time necessary for the baseline shift to return to 50 per cent of its maximal deflection from baseline (C)] (C-S) was (F) calculated (P)(Pm). Normal values for t (C-S) are (F) reported (P)(Pv) as >9s (Ac). Second (Ac), the tangent of the first part of the recovery slope (C-S) was (F) drawn (P)(Pm) and (Aj) the calculated venous refilling time (C-S) taken (P)(Pm) as the time from the point of maximum deflection to the intercept of this tangent with the original baseline (Ac). The reported normal value for this time (S) is (F)(Pr) >20s (AC). (MOVE 2)

Clinical investigation

All clinical investigations (C-S) were (F) performed (P)(Pm) by two vascular surgeons (Ac) and (Aj) consisted of (P)(Pr) inspection, palpation of varicosities and tourniquet tests (C). Tourniquet testing (C-S) was (F) aimed at (P)(Pm) finding (P)(Pm) LSV valvular incompetence (C) by observing varicose veins being prevented from filling by a high tourniquet and filling retrogradely on release of the tourniquet (Ac). In a similar way (Ac), saphenopopliteal and perforator vein valvular incompetence (C-S) was (F) sought (P)(Pm) with below-knee tourniquets (Ac). Based on these examinations (Ac) all legs (C-S) were (F) classified (P)(Pm) according to presence or absence of LSV valvular incompetence (Ac). (MOVE 2)

Doppler ultrasonography

The Doppler ultrasonography velocity detector (S) permits (P)(Pm) qualitative assessment of valvular incompetence in the deep, communicating and superficial veins of the lower limb (C). By placing the Doppler transducer directly on the vein and using distal compression (Ac), physiological flow (C-S) can be observed (P)(Pmen). During proximal compression (Ac), reflux (C-S) can be heard (P)(Pmen) if there is valvular incompetence (Ac). Occasionally (Am), a short refluxing signal (<1 s) (C) may be heard (P)(Pmen), which (S) is not (F) regarded as (P)(Pmen) pathological (C) (C). The Doppler ultrasonographic investigations for this study (C-S) were (F) performed (P)(Pm) [using (P)(Pm) a bidirectional continuous-wave device (C)] ((Vascular Doppler Medasonics, Mountain View, California, USA). The result-
ing signal (C-S) were (F) judged (P)(Pmen) acoustically (Ac) by two experienced vascular laboratory technicians (Ac). The patient (S) lay (P)(Pm) supine (Ac) during femoral vein and posterior tibial vein examination (Ac). The popliteal vein (C-S) was (F) tested (P)(Pm) with the patient in the prone position (Ac). The standing position (C-S) was (F) used (P)(Pm) for examination of the LSV at the saphenofemoral junction, for the LSV at below-knee level, and for the SSV (Ac). Reflux at the saphenofemoral junction (C-S) were (F) tested by (P)(Pm) the Valsalva manoeuvre (C). (MOVE 2)

Classification
The results of clinical investigations (C-S) were (F) combined with (P)(Pm) those of ultrasonography (C) to reach (P)(Pm) a final classification of the limbs (C) for comparison with the photoplethysmographic classification (Ac). Limbs (C-S) were (F) classified (P)(Pm) as normal, as having a complex pattern of incompetence of the SSV, perforating veins, deep veins or combinations of the three (Ac). (MOVE 2)

Statistical analysis
The mean values for the three measures of refilling times (C-S) were (F) compared (P)(Pm) by Student's t test (Ac); agreement between clinical-ultrasonographic and photoplethysmographic classification (C-S) was (F) expressed (P)(Pv) as a kappa (k) value (Ac). This measurement of agreement (S) has (F)(Pr) values in the range 0-1 (0 meaning no agreement at all and 1 complete agreement) (C). A clinically relevant test (S) should have (F)(Pr) k > 0.6 (C). (MOVE 3)

4. Fifty consecutive patients referred to the regional vascular surgical service with a diagnosis of acute symptomatic or ruptured AAA (C-S) were (F) entered (P)(Pm) into the study (Ac), including (P)(Pr) some who (S) did not (F) have (P)(Pr) an operation (C) for a variety of medical reasons (Ac)] (C). Information (C) was (F) gathered (P)(Pm) from the patient, relatives, family doctor and hospital records (Ac) regarding the 2-year period before the date of acute presentation (Ac) to determine (Pm) whether (Aj) the aneurysm (C-S) had (F) previously (Ac) been diagnosed (P)(Pm) and (Aj) the patient (C) appropriately (Ac) referred (P)(Pm), or (Aj) whether (Aj) the patient (S) had (F) undergone (P)(Pm) an examination (C) in either hospital or general practice [that (Aj) could (Am) reasonably (Aco) have (F) been expected (P)(Pmen) to discover (Pm) the lesion (C)] (Ac) while (Aj) it (S) was (F)(Pr) still (Aj) asymptomatic (C).

The 50 patients (C-S) were (F) recruited (P)(Pm) over a 7-month period commencing April 1991 (Ac). There (S) were (F)(Pr) 41 men and nine women (C), an unexpected
male predominance (C). The mean (s.d.) age (S) was (P)(Pr) 72 (6) (range 63-83) years (C). The mean (s.d.) maximum transverse diameter of the aneurysm at presentation (S) was (F)(Pr) 7.6 (1.9) cm (C); only five (S) were (F)(Pr) <5.5 cm (C). At the time of acute presentation (Ac) the size (C-S) was (F) measured (P)(Pm) directly (Ac) at operation (Ac), if (Aj) performed (P), or (Aj) by ultrasonography or computed tomography (Ac). (MOVE 1)

5. Patients and methods
Of 561 consecutive outpatients with arterial disease (Ac), 456 (C-S) were (F) referred (P)(Pm) with symptoms of lower-limb ischaemia (claudication, rest pain or gangrene) (Ac) and (Aj) 105 (C) with symptoms of cerebrovascular insufficiency (stroke, transient ischaemic attack or amaurosis fugax) (Ac). Individuals [referred (P) because of known or suspected AAA (Ac) who (S) had (F) undergone (P) previous aortic surgery (C)] (C-S) were (F) excluded (P)(Pm).

Patients [presenting with (P)(Pr) symptoms (C) suggesting (P)(Pr) lower-limb ischaemia] (C) (S) underwent (P)(Pm) Doppler measurement of the systolic ankle: brachial pressure index (ABPI) and a 1- minute exercise test (C). A positive diagnosis (C-S) was (F) made (P)(Pm) if (Aj) the resting ABPI (S) was (F)(Pr) <0.9 (C) or (Aj) if (Aj) there was (F)(Pr) a fall in ankle pressure (C) after exercise testing >30 mm Hg from the resting level (Ac).

The opinion of a neurologist (C-S) was (F) sought (P)(Pm) if (Aj) patients (S) presented with (P)(Pr) symptoms (C) suggesting (P)(Pr) cerebrovascular disease (C), and (Aj) carotid duplex scanning (C-S) was (F) undertaken (P)(Pm). Only if (Aj) the neurological opinion (S) supported (P) the diagnosis (C) and (Aj) duplex scanning (S) showed (P) carotid artery stenosis >25 per cent on the appropriate side (C) was (F) the patient (S) included (P)(Pr) in the study (Ac). (MOVE 1)

All patients (S) underwent (P)(Pm) measurement of the aortic diameter (C) using a 4.0- MHz ultrasonographic probe (Ac) (Sonolayer SAL32B; Toshiba, Crawley, UK). A maximum external anteroposterior diameter >3 cm (C) was (F) used (P)(Pm) to define (Pm) an aneurysm (C).

Technique of measurement
The abdominal aorta (C-S) was (F) first (Ac) imaged (P)(Pm) throughout its length (Ac) to allow (P)(Pm) the observer (C) to look (P)(Pmen) for areas of dilatation (Ac) and (Aj) to determine (P)(Pm) its lie and tortuosity (C). This (S) enabled (P)(Pm) the ultrasonographic probe (C) to be positioned (P)(Pm) at 90 to the long axis of the aorta (Ac), thus (Aj) measuring (P)(Pm) the true cross-sectional rather than the oblique diameter
(C). Any dilatation (C-S) was (F) imaged (P)(Pm) at its maximum anteroposterior extent (Ac). When (Aj) the optimal image (C) was obtained (P)(Pm) it (S) was (F) frozen (P)(Pm) at the moment of maximum diameter (Ac) to minimize (P)(Pm) error (C) caused (P) by aortic pulsation (Ac). The external anteroposterior diameter (C-S) was (F) then (Aj) measured (P)(Pm). This process (C-S) was (F) repeated (P)(Pm) twice (Ac) and (Aj) the diameter (C-S) expressed (P)(Pv) as the mean of the three measurements (Ac).

An unselected series of 200 of these patients (S) underwent (P)(Pm) physical examination before ultrasonography (C) to determine (Pm) the sensitivity and specificity of such examination as a screening technique (C). As (Aj) clinical examination (S) is (F) known (P)(Pmen) to be (P)(Pr) an inaccurate means of sizing aneurysms (C), no attempt (C-S) was (F) made (P)(Pm) to do (Pm) this (C). Instead (Aj), each patient (C-S) was (F) examined (P)(Pm) by one of the authors (Ac) and (Aj) the aortic palpation (C-S) graded (P)(Pm) as normal or aneurysmal (Ac) (or the aorta was impalpable) before ultrasonography was performed (Ac). (MOVE 2)

RESULTS

1. Results

On the postembolectomy arteriography (Ac) the popliteal artery (S) was (F)(Pr) occluded (C) in 11 cases (Ac), the tibial arteries (S) in 14 (Ac), the superficial femoral artery (S) in four (Ac) and (Aj) the profunda femoris (S) in two cases [where (Aj) there was (F)(Pr) existing occlusion of the superficial femoral artery (C)] (Ac). In most instances (Ac) the level of occlusion (S) corresponded to (P)(Pr) the point [beyond which (Aj) the embolectomy catheter (C-S) could not (F) be passed (P)] (C). Occlusion of the popliteal or tibial arteries (C-S) was (F), however (Aj), found (P)(Pm) on eight occasions (Ac) when (Aj) the catheter (C-S) had (F) been passed to (P)(Pm) the ankle (C).

The arteriogram after streptokinase infusion (S) demonstrated (P)(Pm) complete lysis in 11 legs (35 per cent), partial lysis in another 12 (39 per cent) and no change in eight (26 per cent) (C). Of the eight that showed no change (Ac), the occlusion (C-S) was (F) found (P)(Pm) to result from (Pm) atherosclerosis of the run-off rather than thrombus (C) in five cases following popliteal exploration or autopsy (Ac). The other three (S) were (F)(Pr) unproven (C), but (Aj) there (S) was not (F)(Pr) a single case of proven thrombus [that (Aj) was not (F)(Pr) at least (Am) partially (Ac) lysed (P)(Pm) by streptokinase (Ac)] (C). After incomplete
lysis (Ac), repeat embolectomy (S) succeeded in (P)(Pm) clearing (P)(Pm) remaining thrombus from the popliteal artery on three occasions (C). After operation (Ac), at least one pedal pulse (C-S) was (F) restored (P)(Pm) in 14 limbs (Ac) (45 per cent), and (Aj) the leg (S) was (F)(Pr) viable (AC) in 23 cases (Ac) (74 per cent) at discharge or death (Ac). Doppler ankle pressure indices (S) rose (P)(Pm) from a median of 0 (range 0-0.04) to 0.75 (range 0-1.05) (Ac). There (S) was (F)(Pr) a significant association (Fisher's exact test) between successful lysis and restoration of pedal pulses (P=0.003) and a similar correlation with leg viability (P=0.014) (C).

The results subdivided according to the cause of ischaemia (C-S) are (F) summarized (P)(Pm) in Figure 1 (Ac). (MOVE 1)

The outcome for primary embolism (S) was (F)(Pr) excellent (C) with complete or partial lysis in all nine limbs (C), restoration of pedal pulses in eight (Ac) and (Aj) a viable leg in all cases (Ac) (Figure 2). The results for thrombosis or graft occlusion (S) were (F)(Pr) encouraging and much better (C) if (Aj) the problem (C-S) was not (F) caused (P)(Pm) by existing atherosclerosis of the run-off (Ac) (Figure 3). Patients with iatrogenic emboli (S), which (S) are (F) often (Am) composed of (P) atherosclerotic rather than thrombotic material (C)], fared (P)(Pr) badly (Ac). (MOVE 6)

Complete clot lysis (S) never (Am) occurred (P)(Pm) and viability (C) was (F) achieved (P)(Pm) in only three of six legs (Ac). Embolectomy (C-S) was (F) repeated (P)(Pm) in four legs (Ac) [that (S) rethrombosed (P)(Pm) due to poor run-off or atheromatous emboli (Ac)] (Ac), but (Aj) none (C) was (F) salvaged (P)(Pm).

There (S) were (F)(Pr) five wound haematoma (C) after operation (Ac) but (Aj) none (S) required (P)(Pr) exploration (C); it should be noted (P)(Pmen) that (Aj) all patients (S) received (P) postoperative heparin anticoagulation (C). There (S) were (F)(Pr) no bleeding problems (C) in the three legs [in which (Aj) open fasciotomy (C-S) had (F) been performed (P)(Pm)] (Ac).

Full coagulation profiles (C-S) were (F) obtained (P)(Pm) in three patients with haematoma (Ac) and (Aj) although (Aj) the APTT (C) was (F) raised (P)(Pm) there (S) was (F)(Pr) no reduction in fibrinogen or platelet levels (C).

One patient (S) developed (P)(Pm) a myocardial infarction (C) twenty-four hours after operation (Ac). (MOVE 1)

It is (F)(Pr) possible (C) that (Aj) this (S) was (F)(Pr) an extension of a subendocardial infarction [that (S) was (F)(Pr) the original source of the embolus (C)] (C). (MOVE 5)
Two above-knee and two below-knee amputations (C-S) were (F) required (P)(Pr), but (Aj) none (S) was (F)(Pr) in the group with successful lysis (Ac). There (S) were (F)(Pr) seven deaths (C), five of which (S) were (F)(Pr) cardiac in origin (C) (three myocardial infarction, two heart failure). The other two (S) were (F)(Pr) from bronchopneumonia following an above-knee amputation and a cerebral infarction 10 days after surgery (Ac). (MOVE 1)

2. Study 1

There (S) were (F)(Pr) a total of 31 patients (C) in the three groups (Ac). Group 1 (S) consisted of (P)(Pr) ten patients (three women) with a mean (s.d.) age of 63.1 (10.3) years (C). The 13 patients (three women) in group 2 (S) had (F)(Pr) a mean (s.d.) age of 64.7 (9.4) years (C); on the affected side (Ac) the mean (s.d.) degree of carotid stenosis (S) was (P)(Pr) 70.0 (20.1) per cent (C). The eight patients in group 3 (S) were (F)(Pr) all men, with a mean (s.d.) age of 64.8 (10.0) years (C). On the severely stenosed side in six patients in group 3 (Ac) there (S) was (F)(Pr) complete occlusion (C); in two (Ac) there (S) was (F)(Pr) 90 per cent stenosis (C). On the less affected side (Ac) the mean (s.d.) degree of stenosis (S) was (F)(Pr) 58.0 (20.7) per cent (C).

The mean resting V and breath-holding indices in the three groups of patients (C-S) are (F) shown (P)(Pm) in Table 1 (Ac). Values for individual middle cerebral arteries (C-S) are (F) shown (P)(Pm) in Figure 1 (Ac). The breath-holding index (C) was (F) reduced (P)(Pm) by 37 per cent on the side of stenosis in unilateral disease (Ac) compared with normal (Ac) (P<0.05), while (Aj) on the non-stenosed side (Ac) it (S) was (F)(Pr) the same as normal (C). However (Aj), in bilateral disease (Ac), there (S) was (F)(Pr) a much greater reduction in the breath-holding index, both on the more stenosed side (73 per cent reduction versus normal, P<0.0001) and on the less stenosed side (56 per cent reduction versus normal, P< 0.005) (C). In contrast (Aj), the mean values of resting V (S) were (F)(Pr) similar (C) in all groups (Ac) except (Aj) on the severely stenosed side (Ac) in bilateral disease [where (Aj) it (S) was (F) reduced (P)(Pm) by 17 per cent compared with normal (P< 0.05) (Ac)] (Ac).

In the group with unilateral disease (Ac), five patients (S) had (F)(Pr) a carotid stenosis in the range of 35-50 per cent (C), while (Aj) in the group with bilateral disease (Ac) six (S) had (F)(Pr) a stenosis in this range on the less affected side. Comparison of the breath-holding index in these two subgroups (S) revealed (P)(Pm) that (Aj) it (S) was (F)(Pr) lower (C) in the group with bilateral disease (Ac) (0.61 versus 1.21 per
cent per s, P<0.05), while (Aij) the degree of carotid stenosis in the two groups (S) was (F)(Pr) similar (AC) (46.7 versus 48.0 per cent) (C). (MOVE 3)

Study 2
Ten patients (C-S) were (F) studied (P)(Pm) before and after carotid endarterectomy (Ac). The mean (s.d.) age (S) was (F)(Pr) 65.2 (8.5) years (C); all (S) were (F)(Pr) men (C). The mean degree of carotid stenosis (S) was (F)(Pr) 60 (range 45-90) per cent on the operated side and 43 (range 0-100) per cent on the contralateral side (C). Patency on the operated side (C-S) was (F) confirmed (P)(Pm) at 6 weeks to 1 year after surgery (Ac) in all patients (Ac) by intravenous DSA (Ac) in three (Ac), carotid duplex scanning (Ac) in six (Ac) and (Aij) autopsy (Ac) in one (Ac) who (S) died (P)(Pm) from myocardial infarction (Ac) 2 months after operation (Ac).

Measurement of cerebral reactivity one month after operation (S) demonstrated (P)(Pm) no significant change in resting V on either the operated side (48.7 versus 45.9 cm/s) or the contralateral side (42.8 versus 45.3 cm/s) (C). However (Aij), the mean (s.d.) breath-holding index (S) increased (P)(Pm) after operation (Ac) on both the operated side (0.79 (0.45) versus 1.31 (0.24) per cent per s, P<0.01) and the contralateral side (0.87 (0.63) versus 1.23 (0.49) per cent s, P<0.05) (Ac).

Values for individual patients (C-S) are shown (P)(Pm) in Figure 2 (Ac). Three patients (S) had (F)(Pr) a complete occlusion contralateral to the operated side (C) and (Aij) one (S) had (F)(Pr) an asymptomatic 90 per cent stenosis (C). Three of the four (S) showed (P)(Pm) marked (>90 per cent) improvement in breath-holding index after surgery (C) on the non-operated side (Ac), ie. above the occlusion or tight stenosis (Ac). The absolute values of the breath-holding index before and after operation respectively, for the three patients with occlusion and the one with 90 per cent stenosis (S) were (F)(Pr) 0.65, 1.22; 0.33, 0.47; 0.07, 1.29; and 0.21, 0.79 per cent per s (C). (MOVE 3)

3. Table 1 (S) compares (P)(Pm) clinical-ultrasonographic and photoplethysmographic classification (C). The total number of non-interpretable photoplethysmographic tests (S) was (F)(Pr) 118 (C) (22.1 per cent of the total). The final classification (S) divided (P)(Pm) them (C) into 53 with no venous valvular incompetence, 54 with isolated LSV valvular incompetence and 11 with complex valvular incompetence (Ac). The non-interpretable photoplethysmographic tests (C-S) were (F) equally (Ac) distributed (P)(Pm) over the three classifications (Ac). (MOVE 1)

The agreement between clinical-ultrasonographic and

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photoplethysmographic classification (S) was (F)(Pr) very poor (AC). (MOVE 6)

Excluding the non-interpretable photoplethysmographic classification (P), the K-value (as a measure of agreement) (S) was (F)(Pr) 0.30 (C). Including the non-interpretable results (P), the K value (S) was (F)(Pr) 0.21 (C). Table 2 (S) gives (P)(Pm) the various measures of refilling time for limbs with and without venous valvular incompetence and for those of healthy controls (C). For controls (Ac), the mean of two measurements (C-S) was (F) taken (P)(Pm). The mean refilling time, half-refilling time and calculated refilling time for the legs with and without any form of venous valvular incompetence (S) was (F)(Pr) significantly different (P<0.001) (C) but (Aj) the standard deviation (S) was (F)(Pr) so large (C) that (Aj) this difference (S) had (F)(Pr) no clinical relevance for the individual patient (C). The number of non-interpretable photoplethysmographic curves (S) was (F)(Pr) high (C); 95 for refilling time, 269 for half-refilling time and 124 for calculated refilling time (C).

Figure 2 (S) shows (P)(Pm) the correlation between the first and second measurements in healthy controls (C). In controls (Ac) the mean (s.d.) refilling time (S) was (F)(Pr) 29 (19) s for the first measurement and 34 (23) s for the second (C). The numbers of non-interpretable measurements in the controls (S) were (F)(Pr) five and two (C) respectively (Ac). (MOVE 1)

4. Results
Thirteen of the 50 patients (S) presented (P) acutely (Am) with (P)(Pr) an aneurysm [that (Aj) had (F) previously (Ac) been diagnosed (P)(Pm)] (C); eight of these 13 (C-S) had (F) never (Am) been referred to (P)(Pm) the vascular service following diagnosis of an asymptomatic AAA (C). These eight patients (S) presented (P)(Pr) acutely (Am) at a mean (s.d.) of 13 (11) months after diagnosis (Ac). The method of diagnosis and aneurysm size at diagnosis and presentation (C-S) are (F) shown (P)(Pm) in Table 1 (Ac). The other five patients [whose (S) aneurysm (C-S) had (F) previously (Ac) been diagnosed (P)(Pm)] (C-S) had (F) already (Ac) been referred (P) electively (Ac) to (P)(Pm) the vascular service (C). Three (C-S) had (F) been considered (P)(Pmen) unfit for elective aortic repair (C), one with a small aneurysm (4.5 cm in diameter) (C) was (F) being followed up (P)(Pm) by serial ultrasonography (Ac) at intervals of 6 months (Ac), and (Aj) the last (S) was (F) awaiting (P)(Pm) elective aneurysm repair (C).

Thirteen of the remaining 37 patients (S) had (F) had (P)(Pr) a total of 16 inpatient admissions (C) in the 24 months before acute presentation (Table 2). Six of these 13 patients (S) had (F) had (P)(Pr) a total of

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eight admissions for ischaemic heart surgery or hypertension (C), six (S) had (F) undergone (P)(Pm) recent surgery (C) and (Aj) one (S) had (F) had (P)(Pr) two admissions with pneumothorax (C). These patients (S) subsequently (Ac) presented (P..) acutely (Am) with (P)(Pr) the aneurysm (C) at a mean (s.d.) of 15 (6) months following inpatient admission (Ac).

Of the remaining 24 patients (Ac), six (C-S) had (F) been examined (P)(Pm) by their family doctor (Ac) in the 24 months before acute presentation (Ac) without a diagnosis of asymptomatic aneurysm being made (Ac) (Table 3). This (S) included (P)(Pr) two patients [who (S) subsequently (Ac) underwent (P)(Pm) surgery for an inguinal hernia (C)] (C).

It is (F)(Pr) apparent (C), therefore (Aj), that (Aj) only 18 (36 per cent) of the 50 patients with an acutely symptomatic or ruptured AAA (S) had (F) had (P)(Pr) little or no contact with the medical profession (C) in the 24 months before emergency admission to hospital (Ac); a further 27 (54 per cent) (C-S) had (F) either (Aj) been diagnosed (P)(Pm) in the asymptomatic state and not referred for assessment (Ac) or (Aj) had (F) been examined but not diagnosed (P)(Pm). All of these patients (C-S) were (F) considered (P)(Pmen) to have (P)(Pr) aneurysms that (S) were (F)(Pr) easily palpable (AC)] (C). (MOVE 4)

5. Results

An aneurysm (S) was (F)(Pr) present (C) in 40 of the 358 men (11.2 per cent) and 13 of the 203 women (6.4 per cent) (Ac), a total prevalence of 9.4 per cent (C). The prevalence of AAA in patients presenting with lower limb ischaemia (42 of 456; 9.2 per cent) (S) was (F)(Pr) similar to (AC) that (C) in those with cerebrovascular disease (11 of 105; 10.5 per cent) (Ac). The size distribution of AAAs in men and women (C-S) is shown (P)(Pm) in Figure 1 (Ac). Many aneurysms detected (33 or 53; 62 per cent) (S) were (F)(Pr) < 4 cm in size (C), the median diameter (S) being (Pr) 3.7 (range 3.0-6.1) cm (C). The sensitivity and specificity of physical examination in the detection of AAA (C-S) are (F) shown (P)(Pm) in Figure 2 (Ac). The overall sensitivity of physical examination (S) was (F)(Pr) 43 per cent (C). This (S) increased to (P)(Pm) 57 per cent (C) in those with aneurysms < 4 cm in size (Ac). The aorta (S) was (F) impalpable (C) in 35 of the 200 patients (17.5 per cent) (Ac).

Preliminary data on the growth rate of AAAs detected by screening (S) are (F)(Pr) available (C) for 38 of the 53 patients (Ac). Four (S) underwent (P)(Pm) elective repair on detection (C), three (S) died (P)(Pm), one (S) refused (P)(Pm) follow-up (C) and (Aj) seven (S) have not (F) yet (Ac) had (P)(Pr) a repeated scan (C). The mean growth rate (S) was (F)(Pr) 0.20 (range - 0.2 to
0.7) cm/year (C). The mean growth rate for AAAs >4 cm in size (S) was (F)(Pr) 0.27 cm/year (C), compared with 0.15 cm/year for those <4 cm (P not significant)(Ac). The mean duration of follow-up (S) was (F)(Pr) 16 (range 12-24) months (C).

Of the 53 patients with AAA identified (Ac), four (S) underwent (P)(Pm) early elective repair (C) and (Aj), to date (Ac), two (S) have (F) had (P)(Pr) subsequent elective repair (C) because of an increase in aneurysm size (Ac). (MOVE 4)

DISCUSSION

1. The technique of balloon-catheter embolectomy (S) has (F) changed(Pm)(P) little (C) since its introduction by Fogarty et. al. over 20 years ago (Ac). Although (Aj) it (S) is (F)(Pr) a relatively simple method of rapidly removing arterial thrombus (C), it (S) is not (F)(Pr) without problems (C). With the advancing age of the population (Ac), underlying atherosclerosis (S) may (F) complicate (P)(Pm) the situation (C) even if (Aj) the cause (S) is (F)(Pr) purely embolic (C), but (Aj) increasingly acute thrombosis (S) is (F)(Pr) the principal underlying problem (C). Arterial damage by the catheter (S) is (F)(Pr) more likely (Am) if (Aj) atherosclerosis (S) is (F)(Pr) present (C) and (Aj) this (S) may (F) also (Aj) prevent (P)(Pm) distal passage of the catheter (C). The latter (S) also (Aj) tends (P)(Pr) to enter (P)(Pm) the peroneal branch in preference to the anterior or posterior tibial artery (C). Embolectomy (C) is (F) commonly (Am) performed (P)(Pm) 'blind' without radiological control (C) despite several studies [that (Aj) have (F) reported (P)(Pv) incomplete clearance of distal thrombus in up to 30 per cent of cases (C)] (Ac). The results of embolectomy (S) are (F)(Pr) also (Aj) better (C) when (Aj) completion arteriography (C-S) is (F) performed (P)(Pm). The use of an end-hole balloon catheter passed over a guidewire (S) may (F) permit (P)(Pm) selective catheterization of the tibial arteries and repeated arteriography (C) and (Aj) repeated arteriography (S) is (F)(Pr) also (Aj) possible (AC). (MOVE 1)

There (S) have (F) been (P)(Pr) several previous reports of intraoperative thrombolytic artery (C) but (Aj) this series (S) is (F)(Pr) one of the largest yet reported and the first from the UK (C). (MOVE 2)

In 1988 (Ac), Norem et. al. (S) reported (P)(Pv) the intraoperative use of boluses of streptokinase or urokinase in 26 legs to lyse residual thrombus following femoral embolectomy (C). All(S) had (F)(Pr) angiographic evidence of clot lysis, with a viable leg in 85 per cent
Quinones-Baldrich and colleagues (S) reported (P)(Pv) the use of intraoperative infusion of streptokinase or urokinase in 23 legs with success in 74 per cent (C). Cohen et. al. (S) used (P)(Pm) streptokinase (C) in 11 legs (Ac) after passing a catheter down into the clot (Ac), with success in 64 per cent (Ac). More recently (Ac), the same group (S) has (F) reported (P)(Pv) improved results with tissue plasminogen activator (tPA) (C) and (Aj) this (C-S) has (F) also (Aj) been used (P)(Pm) successfully (Aco) on a small number of patients at St. George's Hospital, London (Ac). Comerota et. al. (S) have (F) described (P)(Pv) a technique of isolated limb perfusion using 10 6 units urokinase infused into the occluded arteries (C), accompanied (P)(Pr) by popliteal venous drainage (Ac) to reduce (P)(Pm) the systemic effect of such a high dose (C). (MOVE 3)

Streptokinase (C-S) was (F) chosen (P)(Pm) for the present study (Ac) as (Aj) it (S) was (F)(Pr) easily obtainable and inexpensive compared with urokinase or tPA (C). Lower clot lysis times (C) have (F) been reported (P)(Pv) for tPA than for streptokinase in percutaneous thrombolysis, but (Aj) overall lysis rates (S) are (F)(Pr) similar (C) and (Aj) the high cost of tPA (S) is (F)(Pr) difficult [to justify (P)(Pm) at present (Ac)] (C). There (S) is (F)(Pr) probably (Am) an indication for tPA in patients [who (S) have (F) received (P)(Pm) streptokinase (C) within the previous year (Ac)] (C) as (Aj) they (S) are (F) likely (Am) to have (P)(Pr) high antibody levels [that (S) will (F) inactivate (P)(Pm) further doses (C) and (Aj) may (F) cause (P)(Pm) anaphylaxis (C)] (C). The dose of 100 000 units (C) was (F) selected (P)(Pm) because (Aj) the literature (S) suggested (P)(Pr) that (Aj) this (S) was (F) unlikely (Am) to be associated with (P)(Pr) significant bleeding (C). (MOVE 9)

There (S) were (F)(Pr) no operative problems due to excessive bleeding (C), even after open fasciotomy (Ac). Although (Aj) there (S) were (F)(Pr) five wound haematoma (C), all patients (S) were (F) receiving (P)(Pm) heparin (C). In the three patients [for whom (S) coagulation profiles (C) were (F) obtained (P)(Pm)] (Ac), there (S) was (F)(Pr) no fall in fibrinogen or platelet levels [to suggest (P)(Pr) significant systemic fibrinolysis (C)] (C). (MOVE 4)

A 30-minute infusion (C-S) was (F) used (P)(Pm) because of (Aj) concern [that (Aj) a bolus (S) would (F) gradually (Am) leach out of (P)(Pm) the distal arterial tree (C) even though (Aj) it (S) was (F) isolated (P)(Pm)] (C). No attempt (C-S) was (F) made (P)(Pm) to embed (P)(Pm) the catheter in the clot (C) as (Aj) this (S) would (F) have increased (P)(Pm) the technical difficulty of the procedure (C). It was (F) in any case (Ac),
thought to be (P) unnecessary (C) because of the lack of blood flow (Ac). (MOVE 9)

Good lysis (C-S) was (F) obtained (P)(Pm) if (Aj) the distal occlusion (C-S) was (F) caused (P) by (Pm) thrombus or embolus of thrombotic origin (Ac). As might be expected (Ac), streptokinase (S) made (P)(Pm) little impact on poor run-off (C) due to existing atherosclerosis occlusion (Ac). However (Aj), arteriographic differentiation (S) was (F)(Pr) often (Am) difficult (C) and (Aj) the diagnosis (C-S) was (F) revealed (P)(Pm) only after (Aj) popliteal exploration (C-S) was (F) avoided (P)(Pm) in cases of successful lysis following femoral embolectomy (Ac). Popliteal embolectomy with exposure of the origin of all three calf vessels (S) is (F)(Pr) a technically demanding procedure [that (Aj) may (F) require (P)(Pr) conversion from local to general anaesthesia in the high-risk patient (C)] (C). (MOVE 5)

The disappointing results of lysis following iatrogenic embolism (C-S) were (F) probably (Am) caused (P)(Pm) by the atheromatous composition of the emboli (Ac). Streptokinase (S) was able to lyse (P)(Pm) the propagated thrombus (C) but (Aj) if cholesterol microembolism (S) had (F) occurred (P)(Pm), tissue perfusion (S) was not (F) improved (P)(Pr) and rethrombosis (S) supervened (P)(Pr). (MOVE 6)

Histological examination after skin biopsy, amputation or autopsy in three of the six cases (S) confirmed (P)(Pm) cholesterol embolism (C). Although (Aj) the overall limb salvage rate of 74 per cent (S) was (F)(Pr) encouraging (C), there (S) were (F)(Pr) five deaths of cardiac origin (C). All but one of these (S) was (F)(Pr) from exacerbation of a premorbid condition [that (Aj) was (F)(Pr) probably (Am) the original cause of the acute leg ischaemia (C)] (Ac). The high incidence of cardiac arrest (S) reflects (P)(Pm) the increasing incidence of ischaemic heart disease in these patients (C) and (Aj) is (F)(Pr) probably (Am) unavoidable (C). (MOVE 4)

What should now be avoidable (S), in most cases (Ac), is (F) (Pr) death or amputation resulting from inadequate reperfusion of an acutely ischaemic leg (C). (MOVE 9)

2. Discussion
The results of study 1 (S) demonstrate (P)(Pm) the importance of collateral supply, in this case, via the contralateral internal carotid artery (C), in determining the haemodynamic effect of a carotid stenosis (Ac). A contralateral carotid stenosis or occlusion (S) increases (P)(Pm) the likelihood [that (Aj) a stenosis (S)]
will (F) be associated with (P)(Pr) reduced cerebral perfusion reserve (C)) (C). By contrast (Aj), most patients with only a unilateral stenosis (S) show (P)(Pm) no reduction of cerebrovascular reactivity below the normal range (C). (MOVE 4)

These results (S) are (F) consistent with (P)(Pr) those found using alternative methods of measuring cerebral blood flow (C). Brown et. al. (S) studied (P)(Pm) unilateral carotid occlusion (C) using (Pm) the intravenous xenon-133 technique (C) to estimate (Pm) cerebral blood flow (C); carbon dioxide (S) was (F)(Pr) the vasodilatory stimulus (C). They (S) found (P)(Pm) that (Aj), although (Aj) mean values of hemisphere reactivity (C-S) were (F) reduced (P)(Pm) when (Aj) patients (C-S) were (F) compared (P)(Pm) as a group with a group of normal controls (Ac), in the majority of individuals (Ac) reactivity above an occlusion (S) was (F)(Pr) well preserved and within the normal range (C). However (Aj), the presence of contralateral carotid stenosis or occlusion (S) resulted in (P)(Pm) a much greater reduction in hemisphere reactivity (C). (MOVE 3)

Study 2 (S) demonstrates (P)(Pm) that (Aj) cerebral reactivity on the side of carotid endarterectomy (S) returns to (P)(Pm) normal following the operation (C). (MOVE 4)

This improvement in reactivity following carotid endarterectomy (C-S) has (F) previously (Ac) been reported (P)(Pv) by Takagi et. al. (Ac) using (P)(Pm) xenon (C) to measure (P)(Pm) cerebral blood flow (C). (MOVE 3)

However (Aj), the present results (S) demonstrate (P)(Pm) in addition (Aj) that (Aj) contralateral reactivity (S) also (Aj) improves (P)(Pr) in a number of patients following carotid endarterectomy (Ac). (MOVE 4)

This (S) suggests (P)(Pr) that (Aj) it (S) is (F)(Pr) possible (C) to improve (Pm) perfusion reserve (C) above an occluded carotid (Ac) by operating on a contralateral stenosis (Ac).

These results (S) have (F)(Pr) two implications (C). First (Ac), if (Aj) haemodynamic factors (S) are (F)(Pr) indeed (Am) important in stroke (C), the risk of ipsilateral stroke from a carotid stenosis (S) is (F) likely (Am) to be increased (Pm) in the presence of contralateral carotid disease (Ac). (MOVE 7)

There (S) are (F)(Pr) few clinical data [that (Aj) address (P)(Pr) the natural history of carotid stenosis (C) in the presence and absence of contralateral stenosis (Ac)] (C), but (Aj) preliminary data (H.J. Barnett, unpublished results) from the medical arm of the North American Symptomatic Carotid Endarterectomy Trial (S)
have (F) demonstrated (P)(Pm) an increased risk of stroke (C) when (Aj) contralateral disease (S) is (F)(Pr) present (C), which (S) is (F) abolished (P)(Pm) following carotid endarterectomy (Ac). (MOVE 3)

This (S) implies (P)(Pmen) that (Aj) the degree of stenosis [at which (Aj) surgery (S) confers (P)(Pm) a prognostic benefit [[which current data suggest (P)(Pr) lies between 30 and 70 per cent (C)]] (S) may (F) be (P)(Pr) lower (C) in the presence of contralateral carotid stenosis (Ac) (C). The estimation of cerebral reactivity (S) may (F) be (P)(Pr) a useful determinant in the evaluation of patients for carotid endarterectomy (C). This (S) will (F) depend on (P)(Pr) whether (Aj) impaired reactivity (S) implies (P)(Pmen) an increased risk of subsequent stroke (C). (MOVE 7)

There (S) has (F) been (P)(Pr) little work [done (P)(Pm) on this aspect (Ac)] (C); neither of the two recent trials of carotid endarterectomy (S) included (P)(Pr) measurement of cerebrovascular reactivity in the preoperative evaluation (C). However (Aj), a recent prospective study (S) has (F) shown (P)(Pm) that (Aj) the risk of stroke ipsilateral to a carotid occlusion (S) is (F) significantly (Am) increased (P)(Pm) if (Aj) ipsilateral cerebrovascular reactivity (C) is (F) reduced (P)(Pm) compared with carotid occlusion with normal reactivity (Ac). (MOVE 3)

It is (F)(Pr) unlikely (Am) that (Aj) a similar situation (S) occurs (P)(Pm) above a tight carotid stenosis (Ac), (MOVE 7) but (Aj) further studies of the significance of impaired reactivity (C) are (F) required (P)(Pr) before (Aj) its measurement (C) can (F) be recommended (P)(Pv) as a routine part of preoperative evaluation (Ac). (MOVE 10)

The second implication of the present results (S) is (F)(Pr) that (Aj) operating contralateral to a carotid occlusion (S) will (F) improve (P)(Pm) perfusion reserve above the occlusion in a proportion of patients (C). In such circumstances (Ac) endarterectomy (S) may (F) provide (P)(Pm) a therapeutic benefit (C) by reducing low-flow symptoms above an occlusion (Ac). (MOVE 7)

Further clinical trials (C-S) are (F) required (P)(Pr) to determine (P)(Pm) whether (Aj) endarterectomy (S) produces (P)(Pm) a significant reduction in stroke above the occlusion (C). (MOVE 10)

3. The introduction of photoplethysmography by Barnes in 1973 and the observations by Abramowitz et. al. [in which (Aj) the technique (S) provided (P)(Pm) informa-
tion comparable to that obtained by venous pressure studies in deep venous insufficiency (C)(S) greatly (Am) encouraged (P)(Pm) the use of this method (C). (MOVE 3)

Although first described in the diagnosis of the post-phlebitic syndrome (Ac), there (S) was (F)(Pr) later (Ac) growing interest in its application for the detection of superficial venous valvular incompetence (C). The technique (S) provided (P)(Pm) the clinician (C) with a simple non-invasive method of studying venous haemodynamics and of documenting the effect of therapy (Ac). Invasive pressure measurements (C-S) have (F) been replaced (P)(Pm) by non-invasive methods such as photoplethysmography (Ac) over the past 10 years (Ac). Attempts to duplicate the favourable initial results (S) proved (P)(Pm) disappointing (C): in healthy limbs (Ac), refilling times (C-S) were (F) found (P)(Pm) within the abnormal range (Ac), and (Aj) minor exercise and clinical conditions associated with reactive hyperaemia (S) resulted in (P)(Pm) shortening of the refilling time below the criterion for normality (C). Measurements such as the half and calculated venous refilling times (C-S) were (F) introduced (P)(Pm) to make (Pm) photoplethysmography more accurate (C). Their reliability (S) varies (P)(Pr) according to different authors (Ac). Many explanations (C) have (F) been given (P)(Pm) for the variety of photoplethysmographic results (Ac). The technique (S) picks up (P)(Pm) a strong skin reflection [that (Aj) disturbs (P)(Pm) the recordings (C) substantially (Am)] (C). All photoplethysmographic devices (S) are (F)(Pr) sensitive to the illumination of the surroundings (C); a lighted lamp within 1m from the transducer (S) can (F) give (P)(Pm) a change in signal of a magnitude similar to that of the signal itself (C). The pressure with which the transducer is fixed to the skin (S) is (F)(Pr) important (C), because (Aj) different pressures (S) give (P) (Pm) substantially (Am) different recordings (C). Furthermore (Aj), photoplethysmographic recordings (S) are (F)(Pr) dependent on skin and room temperature, skin pigmentation and haematocrit (C). Although (Aj) the precise location of the sensor (C-S) was not (F) found (P)(Pm) to be (P)(Pr) critical (C), placement directly over the saphenous vein or a varix (C-S) should (F) be avoided (P)(Pm). (MOVE 9)

Recently published work (S) suggests (P)(Pr) that (Aj) photoplethysmographic refilling times (S) reflect (P)(Pm) regional haemodynamics rather than overall venous haemodynamics in the limb (C).

Review of the original articles reporting favourable results with the technique (S) reveals (P)(Pm) that (Aj) these (C-S) were (F) obtained (P)(Pm) by repeated studies (Ac) on the same limb (Ac). Divergent values (C-S) were (F) thus (Aj) readily (Ac) identified (P)(Pm), and
(Aj) by excluding them from the calculation or by averaging the refilling times for a given limb and thereby diminishing the effect of a single divergent value (Ac), favourable results (C-S) were (F) obtained (P)(Pm). The number of repeated measurements (S) varied (P)(Pr) from three to five (Ac). (MOVE 3)

In the present study (Ac), comparing photoplethysmography with clinical investigation combined with Doppler ultrasonography (S) gave (P)(Pm) disappointing results (C). The refilling time (C-S) was (F) found (P)(Pm) to have (P)(Pr) a poor correlation with clinical investigation and ultrasonography (C). The number of non-interpretable photoplethysmographic recordings (C) was (F) found (P)(Pm) to be (P)(Pr) unacceptably high (C). Non-interpretable photoplethysmographic recordings (S) had (F)(Pr) an equal distribution over the subgroups of venous valvular incompetence (C) and (Aj) do not (F) in themselves (Ac) have (P)(Pr) diagnostic meaning (C). Other approaches, such as the half and calculated venous refilling times (S), gave (P)(Pm) no better discrimination (C) and (Aj) led to (P)(Pm) an even higher proportion of non-interpretable recordings (C). (MOVE 5)

In conclusion (Aj), the present study (S) suggests (P)(Pr) that (Aj) photoplethysmography (S) is not (F)(Pr) the non-invasive method of choice in the routine evaluation of superficial venous valvular incompetence (C). (MOVE 8)

4. Discussion
The overall mortality associated with AAA (C-S) could (F) be reduced (P)(Pm) by increasing the proportion of patients undergoing elective as opposed to emergency aneurysm surgery (Ac). (MOVE 8)

Screening for asymptomatic aneurysm (C-S) has (F) been advocated (P)(Pm), although (Aj) the yield of previously unknown aneurysms >4 cm in diameter (S) is (F)(Pr) low (C) (approximately 2 per cent) in patients selected by age and sex alone (Ac); most aneurysms found (S) are (F)(Pr) <4 cm (C). (MOVE 1)

Better results (C-S) are (F) obtained (P)(Pm) by screening high-risk groups such as patients with hypertension (5.3 per cent), first-degree relatives of patients with aneurysms (3.9 per cent) and claudicants (Ac). Attendance rates for screening, [when offered (Ac)] (S), are (F)(Pr) about 50 per cent (AC). Unfortunately (Aco), most published series (S) continue (F)(Pm) to report (P)(Pv) a ratio of elective to emergency operation for aneurysm surgery close to 1.1 (C), despite calls for increased rates of referral (Ac). Referral for

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elective aneurysm surgery (C) is (F) too often (Am) thought (P)(Pmen) inappropriate (C) on the grounds of age (Ac) and (Aj) there is (F)(Pr) a poor perception of outcome (C), yet even (Aj) in patients over 80 years old (Ac), surgery (S) can (F)(Pr) be successful (C) with careful case selection (Ac). The overall incidence of rupture of an untreated asymptomatic aneurysm (S) is (F)(Pr) approximately (Am) 25 per cent per annum (C), rising to (P)(Pm) 50 per cent per annum (C) if (Aj) the lesion (S) is (F)(Pr) symptomatic (C). Referral of patients with small aneurysms (C-S) may (F) also (Aj) be considered (P)(Pmen) inappropriate (C), yet (Aj) 10 per cent of all ruptures (S) occur (P)(Pm) when (Aj) the aortic dilatation (S) is (F)(Pr) 5 cm (C). (MOVE 5)

It is (F)(Pr) unlikely (Am) that (Aj) a significant number of patients (16 per cent in the present study) (S) present (P)(Pr) acutely (Am) with a previously diagnosed, but unreferral, aneurysm (Ac) (C). (MOVE 7)

If (Aj) all such patients with aneurysm (C-S) were (F) referred to (P)(Pm) a vascular surgeon (C) for assessment (Ac), and (Aj) if (Aj) aortic size (C) were (F) routinely (Am) estimated (P)(Pmen) whenever (Aj) abdominal examination (C) was (F) performed (P)(Pm), the number of patients undergoing elective surgery (C-S) could (F) be increased (P)(Pm) even without screening programmes (Ac). (MOVE 9)

5. Discussion

The results of this study (S) confirm (P)(Pm) that (Aj) patients with arterial disease (S) are (F)(Pr) at high risk of AAA (Ac) and (Aj) are (F)(Pr) consistent (AC) with data from previous smaller series (Ac). (MOVE 8)

Allardice et. al. (S) screened (P)(Pm) 100 patients with arterial disease (75 men, 25 women) [of whom (Aj) 95 per cent (S) presented with (P)(Pr) lower-limb ischaemia (C), 2 per cent (S) with (P) transient ischaemic attack (C) and (Aj) 3 per cent (S) with (P) 'other' aneurysms (C)] (C). An AAA (S) was (F)(Pr) present (C) in 14 per cent of men and 4 per cent of women (Ac), compared with 3 per cent and none respectively in a control group with bronchogenic carcinoma (Ac). Bengts-son et. al. (S) found (P)(Pm) an aneurysm (C) in 12.0 per cent of patients [who (S) had (F) undergone (P)(Pm) previous carotid endarterectomy (C)] (Ac) and (Aj) 11.8 per cent of those with intermittent claudication (Ac). Cabellon and colleagues (S) reported (P)(Pv) that (Aj) the prevalence of AAA (S) was (F)(Pr) 11 per cent (C) in 63 patients [who (S) presented with (P)(Pr) transient ischaemic attack (C)] (Ac) and (Aj) zero (C) in seven with lower-limb ischaemia (Ac). Shapira et. al. (S)
screened (P)(Pm) 101 patients, [of whom (Aj) 65 per cent (S) presented with (P)(Pr) lower-limb ischaemia (C) and (Aj) 36 (S) with (P) transient ischaemic attack (C)], (C), and (Aj) found (P)(Pm) AAA (C) in 6 per cent (Ac). From post-mortem studies (Ac), the expected prevalence in the population (S) is (F)(Pr) between 1.8 and 2.1 per cent (Ac). Community-based population screening programmes (S) found (P)(Pm) aneurysm >3.5 cm in diameter (C) in 2.7 per cent of people aged 65-85 years and 3.4 per cent of men aged 65-79 years (Ac). (MOVE 3)

Comparison between different studies (C-S) is (F) complicated (P)(Pm) by the lack of an agreed definition of AAA (Ac). Definitions used in the above studies (S) varied (P)(Pr) between >1.5 times the suprarenal aortic diameter, any increase in diameter in the distal aorta, aneurysm 'considered to be present' at post mortem, not stated, a diameter >0.5 cm larger than the proximal aorta or 3.0 cm, >3.0 cm, >3.0 cm diameter or more than twice the suprarenal diameter, and 4.0 cm or 0.5 cm larger than the suprarenal aorta (Ac). Ultrasonographic measurement of the suprarenal aortic diameter (S) is (F)(Pr) poorly reproducible (C); the most reproducible measurement (S) is (F)(Pr) the maximum infrarenal diameter measured in the anteroposterior plane (C). Definition of AAA (S) should (F) refer to (P)(Pm) this measurement (C), as in the present paper (Ac).

In the present study (Ac), palpation (S) was (F)(Pr) a poor method of detecting AAA (C), missing (Pm) over half (C). Although (Aj) it might (F) be argued (P)(Pr) that (Aj) missing a small (<4 cm) aneurysm (S) is not (F)(Pr) clinically (Ac) important (C), the detection rate for larger lesions (>4 cm), [which (S) might (F) be considered (P)(Pmen) at risk of rupture (Ac)] (C), was (F)(Pr) still (Am) only 57 per cent (C). (MOVE 5)

Other workers (S) have (F) found (P)(Pm) clinical examination [to be (P)(Pr) inadequate (C)](C). In a series of studies in which (Ac) physical examination (C) was (F) used (P)(Pm) for screening of AAA (Ac)] (Ac), sensitivity (S) ranged (P)(Pr) from zero to 50 per cent (Ac) and (Aj) specificity (S) from 84 to 97 per cent (Ac). (MOVE 3)

It is (F) probable (C) that (Aj) the sensitivity of examination [by a surgeon with vascular interest (Ac), looking (P)(Pmen) specifically (Am) for AAAs with the general knowledge that accuracy will be tested by ultrasonography (Ac)] (S) is (F)(Pr) greater than that of 'routine' abdominal examination (C). It (S) seems (P)(Pr) likely (Am), therefore (Aj), that (Aj) the detection rate in everyday clinical practice (S) will (F) be (P)(Pr) worse than the above (C). (MOVE 6) Screening by clinical examination (S) is (F)(Pr) too
(Am) insensitive (C) to provide (Pm) an accurate estimate of the prevalence of AAA (C). (MOVE 9)

The slow growth rate of AAAs detected by screening (S) is consistent with (P)(Pr) recent studies of growth rates of small aneurysms (C) although (Aj) there was (F)(Pr) considerable individual variation (C). (MOVE 4)

However (Aj), earlier studies using serial ultrasonography (S) reported (P)(Pv) higher mean expansion rates (C). Bernstein et. al (S) found (P)(Pm) a mean expansion rate of 0.4 cm/year in 110 patients (C). Cronenwett and colleagues (S) reported (P)(Pv) growth rates of 0-1.5 cm/year in 67 patients (C) and (Aj) Littooy et. al. (S) a mean rate of 0.79 cm/year in 149 (C). It is of interest (Ac) that (Aj), of a total of 326 AAAs [examined (P)(Pm)] (Ac) not one (S) underwent (P)(Pm) an apparent decrease in size (C). The variability of ultrasonographic measurement of aortic diameter (S) is (F)(Pr) such (Am) that (Aj) two successive measurements performed minutes apart (S) may (F) vary (P)(Pr) by an amount equivalent to the mean annual expansion rate (Ac). It (S) would (F), therefore (Aj), be expected (P)(Pmen) that (Aj) at least (Am) some AAAs (S) would (F) undergo (P)(Pm) an apparent decrease in size (C). If (Aj) this variability (S) is not (F) recognized (P)(Pmen), it would (F) be (P)(Pr) easy (C) to discount (Pm) an apparent decrease in size as an error (C) and (Aj) repeat (P)(Pm) the measurement (C), so (Aj) introducing (P)(Pm) a systematic bias (C) and (Aj) overestimating (P)(Pmen) mean expansion rate (C). (MOVE 3)

If (Aj) accurate data on the rate of growth of AAA (C) are (F) to be obtained (P)(Pm), it (S) is (F)(Pr) important (C) that (Aj) measurements (S) should not (F) be influenced (P)(Pm) by previous results (Ac).

If (Aj) further follow-up (S) confirms (P)(Pm) these preliminary results (C), frequent rescanning of small AAAs (S) may (F) prove (P)(Pr) unnecessary (C). However (Aj), until (Aj) more definitive data (S) become (P)(Pr) available (C), patients (S) will (F) continue (P)(Pr) to be (P)(Pr) closely monitored (Am) monitored (P)(Pm) by serial ultrasonography (Ac). To demonstrate the benefit of a screening programme (Ac) it (S) is (F)(Pr) necessary (AC) to know (P)(Pmen) the improvement in prognosis [that (Aj) follows (P)(Pm) earlier detection (C)] (C). Benefit (S) is (F) also (Aj) related to (P)(Pr) the resources required, the prevalence of the condition, the screening technique used and the population studied (C). (MOVE 9)

Although (Aj) the large difference in the mortality rate of elective repair compared with emergency aneurysm repair (S) provides (P)(Pm) compelling evidence
for the benefit of detection before rupture (C), it is not (F) known (P)(Pmen) how large an AAA must be before the risk of death from rupture outweighs the risk of death from elective repair (C). Until (Aj) such data (S) become (P)(Pr) available (C), the magnitude of survival benefit as a result of earlier detection of AAA (S) remains (P)(Pr) uncertain (C). (MOVE 3)

However (Aj), ultrasonography of the abdominal aorta (S) is (F)(Pr) a straightforward procedure [that (Aj) can (F) easily (Am) be learned (P)(Pm) by an interested clinician (Ac)] (C). The time required to scan the aorta (S) is (F)(Pr) comparable to that taken to measure the Doppler ABPI, a routine outpatient procedure (C). Appropriate patients (S) are (F) readily (Am) available to the vascular surgeon (C) and (Aj) a routine scan of new referrals (C-S) can (F) be achieved (P)(Pm) with relatively little additional burden (Ac). The yield (S) will (F) be (P)(Pr) considerably greater than from community screening programmes (C) and (Aj) cost (P)(Pr) less (C). For comparison (Ac), the yield from breast cancer prevalence screening (S) is (F)(Pr) 7 per 1000 (C). In addition to the detection of large AAAs requiring repair (Ac), the finding of an AAA (S) may (F) also (Aj) influence (P)(Pm) the choice of revascularization procedure (C). For example (Ac), aortobifemoral bypass (C-S) might (F) be considered (P)(Pmen) in preference to extra-anatomic reconstruction (Ac), allowing (P)(Pm) an AAA (C) to be repaired (P) at the same procedure (Ac). (MOVE 9)

It is (F) concluded (P)(Pmen) that (Aj), as most vascular surgeons (S) repair (P)(Pm) asymptomatic AAAs considered to be at high risk of rupture (C), it would (F) seem (P)(Pr) reasonable (C) in the present state of knowledge (Ac) to screen (P)(Pm) all patients presenting with peripheral vascular disease (C) because (Aj) many (S) have (F)(Pr) an unsuspected aneurysm (C). Most patients with small AAAs (S) require (P)(Pr) careful follow-up (C) and (Aj) a few with large aneurysms (S) should (F) undergo (P)(Pm) early repair (C). Screening (C-S) should (F) be performed (P)(Pm) by ultrasonography (Ac) as (Aj) physical examination (S) is (F)(Pr) unreliable (C). Which of the aneurysms detected by screening are repaired (S) will (F) depend on (P)(Pr) local policy (C) until (Aj) the results of future studies (S) become (P)(Pr) available (C). (MOVE 8)

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APPENDIX 2

QUESTIONNAIRE FOR INFORMANTS

As a writer of academic articles:

Which section do you find to be the hardest to write? Please rank them in order.

Title □ Results □
Abstract □ Discussion □
Introduction □ Conclusion □
Methods □

In which order do you usually write the article? Please indicate the order with a number.

Title □ Results □
Abstract □ Discussion □
Introduction □ Conclusion □
Methods □

Which do you consider the most important section? Please rank them in order.

Title □ Results □
Abstract □ Discussion □
Introduction □ Conclusion □
Methods □
INTRODUCTION

What does your introduction generally consist of?

What is given prominence in the Introduction?

What are the difficulties that you have come across in the writing of Introductions?
METHODS

Do you think it is important to describe the methods in great detail or give merely an outline?

Would replication be possible from the information that you give in this section?

Yes □ No □

In what instances do you include references to previous work in the Methods section?

With regard to language, do you consistently choose the passive voice (eg. Secular trends in rates of higher-order multiple births were examined within categories of maternal age and education.) or the active voice (eg. We examined secular trends in rates of higher-order multiple births within categories of maternal age and education.) in the Methods section?

Passive □ Active □
RESULTS

Are your results merely stated in this section or do you include interpretations and evaluations?

Do you justify methods used in this section?

Yes ☐ No ☐

Do you compare your results with those of previously established studies?

Yes ☐ No ☐

If unexpected results or discrepancies occur, do you attempt to explain them in this section?

Yes ☐ No ☐

Do you state the need for further research in this section?

Yes ☐ No ☐

Do you use graphic features to display data?

Yes ☐ No ☐
DISCUSSION

- Do you provide background information, such as theoretical information and technical information?
  Yes [ ] No [ ]

- Do you state the results in this section?
  Yes [ ] No [ ]

- Do you comment on whether the results are expected or not expected?
  Yes [ ] No [ ]

- In what instances do you include references to previous work?

- Do you provide an explanation for the results?
  Yes [ ] No [ ]

- Do you provide examples to support an explanation?
  Yes [ ] No [ ]

- Do you make a deduction or come up with a hypothesis from the results?
  Yes [ ] No [ ]

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Do you state the limitations of your research?

Yes ☐ No ☐

Do you recommend that further research be carried out?

Yes ☐ No ☐

Do you write your conclusions in the Discussion or do you have a separate section for your conclusions?

Do you find it more difficult to write the Introduction or the Conclusion? Please state your reason.