

DR. CAINE AND PARTNERS

VASCULAR UPDATE

Vol: 2 : No. 3
NOVEMBER 1997

EDITOR: PHILIP MATLEY
CONTRIBUTORS: PETER JEFFERY & JAMES TUNICLIFFE

CAROTID ENDARTERECTOMY

Carotid Endarterectomy, whereby the atherosclerotic plaque is removed from the carotid bifurcation, was first performed in the 1950s and now ranks second only to coronary artery bypass as the most commonly performed vascular operation in the USA.

Huge multicentre trials published in the early nineties established this procedure as the treatment of choice for patients with carotid stenoses of greater than 70% causing transient ischaemic attacks or mild completed strokes and demonstrated up to a ten-fold reduction in long term stroke risk when compared to best medical treatment including aspirin.

More recent studies have suggested that asymptomatic patients with high grade stenoses will also benefit as long as the procedure is performed by an experienced vascular surgeon with an acceptably low morbidity/mortality record.

Under general or local anaesthesia the carotid bifurcation is exposed and controlled (Fig 1). A longitudinal arteriotomy is used and a dissection plane established between the plaque and the external elastic lamina of the artery (Fig 2). The plaque is resected achieving a smooth "end point" (Fig 3) and removed (Fig 4). Occasionally an intra-luminal plastic shunt is required to maintain internal carotid flow during the procedure (Fig 5) and it is usual to close the artery with a prosthetic patch (Fig 6).

The combined operative mortality and stroke rate is less than 5%. This should be compared to the natural history following a single carotid TTA associated with a high grade stenosis where the 30 day stroke rate is 5% with 12-15% of patients stroking within one year and 7.5% per year thereafter.

It is no longer acceptable merely to treat patients presenting with TIAs or small strokes with aspirin alone. All such patients deserve a carotid duplex scan to identify the presence of a surgically correctable lesion. Serious consideration should also be given to investigating asymptomatic patients who have major risk factors for atherosclerosis or who have carotid bruits.



NEW THROMBOPHILIA DISORDER MAY BE THE COMMONEST CAUSE OF HYPER-COAGULABILITY

Activated protein C resistance or the factor V Leiden

Activated protein C resistance caused by factor V Leiden is an important thrombophilia disorder which predisposes to venous thromboembolism and is present in 3% of the general population. This results from an amino-acid substitution at the protein C cleavage site of factor v.

The resulting abnormal factor V is ten times less susceptible to the effects of the important natural anti-coagulant, protein C and results in a resistance to this protein in spite of there being normal levels of protein C in the blood.

This defect can be demonstrated in approximately 20% of individuals with otherwise unexplained venous thrombosis and accounts for 40% of familial thromboembolism. It has been suggested that this may be the most important factor in the increased risk of thromboembolism associated with oral contraceptive use and it is likely that in the future women will be required to undergo a screening test for this disorder before initiating oral contraception. Currently in Cape Town activated protein C resistance is offered as a routine test by local pathology laboratories and the factor V Leiden can be determined by PCR in Johannesburg by special request.

THE "BLUE TOE SYNDROME"

The problem of discoloured toes is common in General Practice, and can present a diagnostic dilemma. The "Blue Toe" syndrome is caused by microembolism of atheromatous debris from a proximal source into digital vessels and usually presents as a blue toe in an otherwise well perfused foot where the pulses are usually present. Recognition is important in order to prevent recurrence.

Common sources for micro emboli are aneurysms of the aorta or popliteal artery, and ulcerated plaques in any of the vessels from aorta to distal popliteal. The micro emboli are usually <1 mm in diameter and are largely composed of fibrin platelet debris.



Clinical diagnosis depends on a careful history and evaluation of all the limb pulses. The presence of a bruit is a very important indicator of a possible source of micro emboli. Doppler evaluation of the circulation may demonstrate abrupt occlusions within the plantar arch, or digital vessels. Duplex doppler is the investigation of choice for the detection of aneurysms or ulcerated plaque. The demonstration of continuity of the vessels, without occlusion, is further evidence for microembolism, and effectively rules out proximal occlusive disease as the cause of the toe ischaemia. Angiography may be useful in complex cases.

Multiple recurrences are the rule with each succeeding shower of emboli occluding more of the vascular bed, so leading to extensive tissue loss. The blue toe itself often recovers spontaneously but a recurrence may occur within hours.

Management consists of anti-platelet therapy with aspirin together with removal of the source of the emboli. This may involve surgical repair of an aneurysm, endarterectomy with patch angioplasty, or surgical bypass. Today endovascular techniques are frequently used with stenting usually being preferable to simple balloon dilatation in the presence of ulcerated stenosing plaques.

THE SWOLLEN LIMB

Part two: Management

The diagnosis of lymphoedema is usually a clinical one supplemented by *venous* function studies to exclude significant venous obstruction or incompetence, with or without isotope lymphangiography to precisely define the lymphatic problem. Once this diagnosis has been made the mainstay of treatment is elevation and a well fitted grade II -III elastic compression stocking. The prevention or rapid treatment episodes of cellulitis are of paramount importance as each episode further permanently damages lymphatic function. Occasionally patients require long term prophylactic antibiotics but usually advice to the patient to report promptly all inflammatory changes to his general practitioner suffices.

Lymphatic massage is helpful when administered by an enthusiast and may be supplemented by appropriate exercises. More resistant cases may be controlled by intermittent pneumatic compression devices such as the Lymphopress pump, which mechanically massage the oedema fluid away. These will usually involve hospital admission for a few days after which the patient continues with elastic support or buys his own Lymphopress pump for home use.

Surgery plays a very minor role in the modern treatment of lymphoedema. Various reduction and excision operations can be helpful in grotesquely enlarged legs but carry a high risk of morbidity and are seldom recommended.

Lymphatic bypasses using micro vascular techniques or using vascularised pedicles of isolated small intestine which are transplanted into the groin have occasionally been successful.

HOW IMPORTANT IS IT TO GET VASCULOPATHS TO STOP SMOKING AND WHAT CAN BE DONE?

Currently, smoking accounts for 434 000 deaths per annum in the USA (about one fifth of all deaths) that's more than the combined US military deaths of both world wars and Vietnam combined. A 25 year old who smokes one pack a day can expect an overall reduction in life span of 4.6 years. As a rule of thumb 5.5 minutes of life is lost for every cigarette smoked.

The Framingham study demonstrated a 0.65% annual incidence of PVD in non-smokers compared to 2.2% in smokers. A 5 year follow-up study of 520 claudicants at the Mayo Clinic demonstrated a zero amputation rate among patients who stopped smoking compared to an amputation rate of 11.5% in the smokers. Furthermore smokers have a 70% increase in the risk of coronary artery disease and a higher stroke incidence and mortality risk. Restenosis after carotid endarterectomy and graft occlusion following femoro- popliteal bypass are both significantly more common in smokers.

Stopping smoking is effective in reducing vascular morbidity: After stopping for one year the risk of a myocardial infarct has dropped by 50% and the risk approaches that of non-smokers after 15 years. Smokers with PVD who quit have been consistently observed to have improved claudication distances and increased doppler pressure ratios.

Punitive taxation and controls placed on tobacco advertising have been effective in curtailing smoking in developed countries. In 1965 40% of American males and 30% of American females smoked compared to 28% and 23% respectively today. Unfortunately unscrupulous tobacco companies are currently targeting Africa and Asia to boost cigarette sales. They need effective opposition.

Nicotine gum or skin patches have not been shown to be effective in lowering smoking rates if used in isolation and patients require behaviour therapy or other supportive modalities in addition. Constant support and re-enforcement from the patient's general practitioner or vascular surgeon is vital. There is no doubt that a good outcome in vascular disease demands that the patient stop smoking.

NEW MINIMALLY INVASIVE VASCULAR FACILITY AT KINGSBURY IS "STATE OF THE ART"

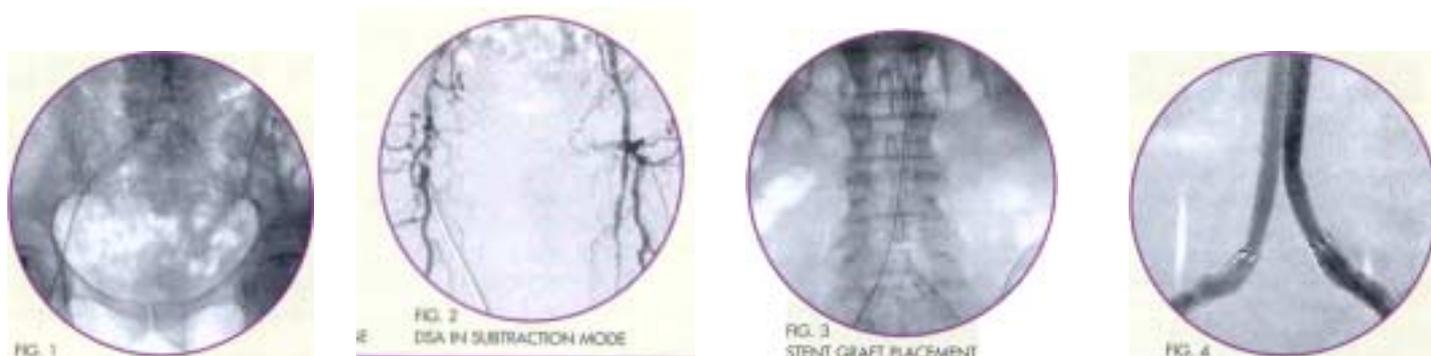
High quality digital subtraction angiographic (DSA) facilities are now a prerequisite for effective, safe endovascular procedures such as balloon angioplasty, intra-arterial and venous stenting, thrombolysis, suction catheter thrombectomy and therapeutic embolisation.



Traditionally these facilities have only been available in sophisticated radiology departments but the increasing use of these techniques in minimally invasive vascular operations demands that they be available within the sterile environment of the vascular operating theatre. Such a unit was established at Kingsbury Hospital in Claremont in April 1997 and this remains the only such facility in the Cape. DSA not only provides images of unsurpassed quality, it enables radiologists and vascular surgeons to "subtract out" the bony or soft tissue components of the image and acquire images with much smaller doses of contrast agents than has been previously possible. "Road mapping" enables the surgeon to visualise and monitor the intervention in real time superimposed on the "road map" of the original angiogram permitting precise placement of needles, guide wires catheters and stents and minimising the risk of arterial complications.

In addition to superior radiology capabilities the unit also has facilities for hysteroscope as well as endoscopic vascular procedures such as endoscopic saphenous vein harvesting for femoro-popliteal bypass, subfascial ligation of incompetent perforating veins and thoracoscopic sympathectomy for hyperhidrosis.

It is extremely expensive to duplicate such a sophisticated facility and thus it is unlikely that this will be available in more than one hospital in Cape Town with the result that increasing numbers of cases treated at Kingsbury will result in a further improvement in standards of care and expertise.



FEMORO-POPLITEAL BYPASS UNDER LOCAL ANAESTHESIA

Patients with critical limb ischaemia are frequently turned down for bypass surgery because the risk of anaesthesia is perceived to be too great.

Epidural and spinal anaesthetic techniques, whilst very attractive for peripheral revascularisation procedures are not always safer than general anaesthesia and may be associated with unpredictable and severe hypotension due to sympathetic blockade. Local anaesthesia using a combination of local infiltration and regional blocks of the femoral and sciatic nerves has been proven to provide adequate anaesthesia for femoro-popliteal bypass in these high risk patients.

A recent series from Birmingham reports a combination of a closed block of the femoral nerve and an open block of the sciatic via the popliteal incision supplemented by subcutaneous infiltration for harvesting of the saphenous vein in 46 patients with excellent results. Selective use of local anaesthetic techniques extends the benefits of limb salvage surgery to patients previously considered unfit for conventional anaesthesia. *British J Surgery* 1997.84 1096-1098

LEG ULCERS The importance of through investigation

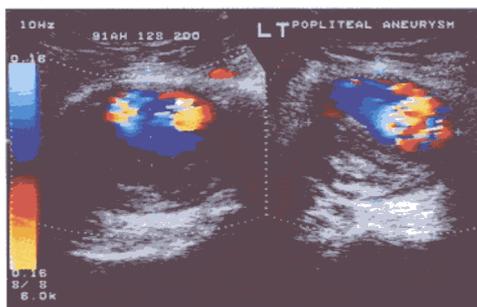
Recent advances in duplex ultrasound have enabled rapid non-invasive functional assessment of both the arterial and the venous systems of the lower limb. This offers particular advantages to patients with leg ulcers, not only because these can be due to both arterial and venous disease, but also because the clinical assessment of superficial venous reflux is so inaccurate. Without a duplex scan, many patients will be denied potentially curative superficial venous surgery such as sapheno-femoral or sapheno-popliteal ligation.

A recent review of duplex scanning in 104 patients presenting to a leg ulcer clinic demonstrated an arterial component in 14% of cases. More than half the patients had superficial venous incompetence and could have benefited from superficial venous surgery. 38% of the limbs with no previous history of DVT nevertheless had abnormal deep venous function.

All patients with leg ulcers deserve a single comprehensive non-invasive assessment in a vascular studies unit for logical planning of their management.

POPLITEAL ANEURYSM "a sinister harbinger of sudden catastrophe "

Popliteal aneurysms are the most commonly encountered peripheral atherosclerotic aneurysms and yet are seldom recognized by either patient or physician until limb-threatening complications have occurred. Careful palpation of the popliteal fossae should be routine in the clinical examination of all patients with significant risk factors for atherosclerosis, especially males. Complications include sudden thrombosis with severe ischaemia, embolisation resulting in the blue toe syndrome, rest threatening. Occasionally the branches of the sciatic nerve may be compressed causing pain.



Colour duplex scanning provides excellent resolution and accurate information on the aneurysm's size and whether or not it contains thrombus. Arteriography is not able to determine this accurately but may be required to assess the distal run-off vessels. Half of the patients will be found to have a contra-lateral aneurysm and 40% have an associated abdominal aortic aneurysm pain or gangrene and compression of the adjacent popliteal vein with calf and foot oedema suggesting a possible DVT. Rupture is rare but may be life-

Long term follow-up studies indicate that asymptomatic aneurysms carry a high risk of complications. Acute thrombosis carries a 40% risk of limb loss. In contrast, elective repair is a safe and durable procedure. Surgical

repair is required for all symptomatic aneurysms and asymptomatic aneurysms that exceed 2cm in diameter or contain thrombus.

British J Surgery 1997.84 293-299

COLOUR FLOW DUPLEX IN PERIPHERAL ARTERIAL DISEASE - WHAT IS ITS PLACE?

During recent years there has been increasing speculation that due to the technological advances in doppler ultrasonography, this modality will be able to replace diagnostic angiography in the lower limb. A recent literature review by Pemberton & London concluded that there is now sufficient evidence to suggest that angiography should no longer be considered the gold standard.

In October 1997 we presented to the Vascular Association of SA, a study comparing the results of 124 lower limb duplex scans in 91 patients with the results of arteriograms performed in the same patients. The overall sensitivity and specificity of colour duplex was such that we suggested that colour flow duplex scanning can replace diagnostic angiography in the lower limbs as a management tool. It has done so in our practice for all but the most complex of cases.

It must be emphasised that colour flow duplex is not used to make a diagnosis of peripheral vascular disease in the lower limbs: this diagnosis is made on clinical grounds.

Duplex scanning has the same indications as diagnostic angiography, i.e. incapacitating claudication, rest pain or tissue necrosis. It is an investigation to plan intervention and should only be performed on the request of a surgeon.

British J Surgery 1997.84 912-919

SHOULD VARICOSE VEIN SURGERY BE PERFORMED WITHOUT PRE-OPERATIVE ULTRASOUND TESTS?

Recurrence rates of 6-60% following surgery for varicose veins have usually been attributed to inadequate surgery but this may largely be due to inadequate assessment.

Whereas simple clinical examination supplemented by tourniquet tests is accurate at determining whether sapheno-femoral reflux alone is present, it is very poor if both sapheno-femoral and sapheno-popliteal reflux co-exist. In a recent study from Sheffield clinical examination was compared with hand-held doppler and duplex doppler in 71 patients with varicose veins. Had the assessment been based on clinical examination alone 20% of patients would have undergone the wrong operation. Use of a hand-held doppler improved the accuracy but 13% of the patients would still have undergone inappropriate surgery. Reducing the risk of recurrence following varicose vein surgery demands accurate determination of the points of reflux preoperatively: colour flow duplex doppler is the "gold standard" varicose vein assessment and is mandatory for assessing reflux in the popliteal fossa.

British J Surgery 1997.84 801-802

HOW TO PRESCRIBE A COMPRESSION STOCKING

The ideal compression stocking comprises strength, durability and washability with accurate grading of the degree of compression (maximal at the ankle and progressively decreasing proximally). Elegance is provided by the type of fibre and knit and ideally a soft pliable knit will provide optimum comfort and effective compression. A non slip fabric will keep the stocking constantly in place and a 'breathable' fabric will provide maximum comfort in warm weather.

Compression stockings can be divided into the following categories.

Category 1: A compression of 20-30 mm Hg at the ankle. Prolonged standing causing aching and tiredness in patients with 'normal' legs e.g. theatre sisters; Prolonged car or air travel, especially in high risk patients; Mild varicosities; Mild lymphoedema; Pregnancy;

Category 2: A compression of 30-40 mm Hg at the ankle. Severe varicose veins not treated by surgery; Superficial thrombophlebitis; Chronic venous stasis syndrome;

Following varicose vein surgery; Following deep vein thrombosis; Lymphoedema.

Category 3: A compression of 40-50 mm Hg at the ankle. More severe venous stasis syndrome with healed ulceration; Significant intractable oedema after leg injury with calf muscle pump dysfunction; Severe lymphoedema which is still pitting.

Category 4: A compression of greater than 50 mm Hg. Very severe venous stasis syndrome; Fixed irreversible Lymphoedema.

Careful measurement of the leg is required to ensure correct fitting. A poorly fitted stocking results in discomfort for the patient, poor compression, poor results, poor compliance and a dissatisfied patient who has wasted money on an expensive item. The fitting should thus be in the hands of an experienced orthotist or practitioner with a knowledge of the advantages and disadvantages of various makes as well as to the length of stocking required. Stockings should not be purchased off the shelf without advice. Female patients requiring grade 1 stockings will often prefer a pantyhose style. Most patients with chronic venous stasis require below knee stockings only.