

DR. CAINE AND PARTNERS

VASCULAR UPDATE

Vol: 2 : No. 1
MARCH 1997

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A GUIDE TO THE SWOLLEN LEG

Part One: Assessment and Diagnosis

THE REDISTRIBUTION OF FLUID FROM THE ARTERIAL END OF THE CAPILLARY TO THE VENOUS END (STARLING'S LAW) IS THE MECHANISM UNDERLYING ALMOST ALL CASES OF LIMB OEDEMA.

This redistribution occurs with venous hypertension (due to obstruction, venous reflux or cardiac failure), reduced plasma oncotic pressure (especially hypoproteinaemia), increased capillary permeability (trauma, allergy, infection) or when lymphatic insufficiency results in accumulation of proteins and fluid in the tissues.

Venous return from the leg is largely dependent on the calf muscle pump. To work effectively this needs patent veins, competent valves, good nerve and muscle function and mobile joints. In addition to venous obstruction (from thrombosis or compression) or venous incompetence (a result of superficial or deep valvular reflux) oedema may be seen in a paralysed or arthritic limb with fixity of the ankle joint and after prolonged dependency (as during a prolonged flight or with chronic ischaemic rest pain).

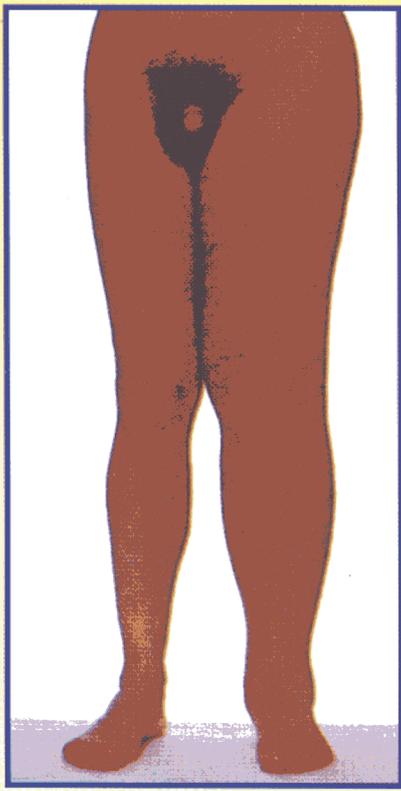
When general causes have been excluded, most causes of chronic leg swelling turn out to be due to venous or lymphatic insufficiency. If the oedema is maximal around the ankles with relative sparing of the feet the cause is more likely to be venous than lymphatic, particularly in the presence of local hyper-pigmentation, atrophic or ulcerated areas and secondary varicose veins. Swelling of the dorsum of the foot with the subsequent development of lichenified hypertrophic skin is the typical picture of lymphoedema.

The acutely swollen leg is frequently due to trauma (including minor muscle tears), allergy, cellulitis, snake or insect bites, rheumatological disorders or a ruptured Baker's cyst. However the cause that cannot be reliably diagnosed or excluded on clinical grounds is the most worrying -deep vein thrombosis. An urgent colour flow duplex scan should be performed in all cases of otherwise unexplained acute leg swelling.

Referral to the vascular studies unit will enable any venous component to be precisely defined. The mainstay is colour flow duplex to identify points of obstruction, thrombosis and reflux and to assess precisely venous valves and perforating veins. In addition plethysmography and venous pressure measurements can be used in selected cases. Conventional venography is very rarely indicated.

When general causes such as cardiac or renal failure and hypoproteinaemia (which tend to affect both legs) have

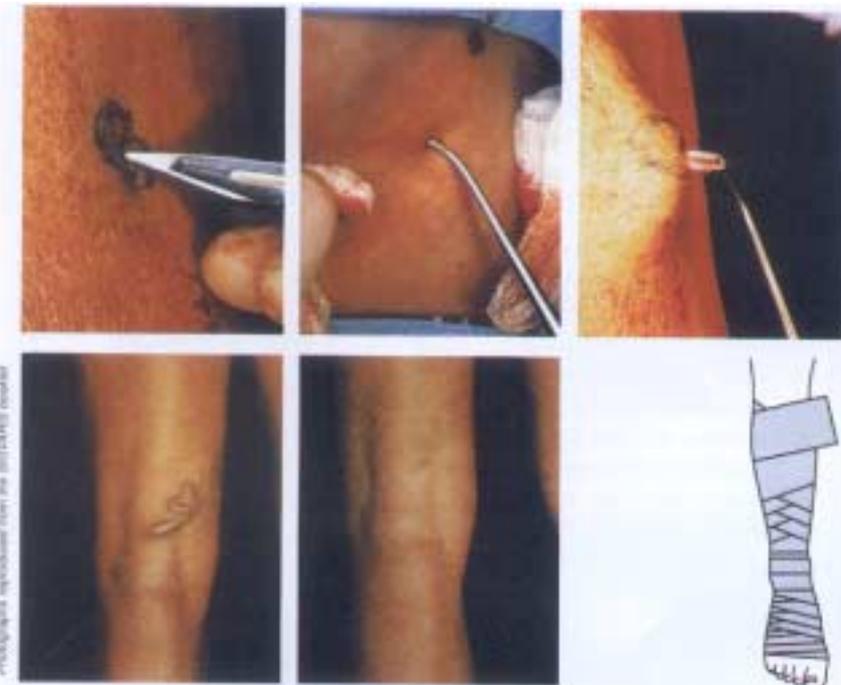
The diagnosis of lymphoedema is often made by exclusion. However, further investigation is required if the diagnosis remains in doubt, or if ilio-inguinal lymphatic obstruction is suspected. The investigation of choice is isotope lymphangiography. This employs high energy emitters bound to colloids which are taken up by the lymphatics, enabling an assessment of lymphatic anatomy as well as function by measuring the rate of clearance of the isotope and comparing this with the opposite leg. This test is now readily available in Cape Town.



PELVIC LYMPHATIC OBSTRUCTION SHOWN CLINICALLY (LEFT) AND RADIOGRAPHICALLY (RIGHT) WITH A PROFUSION OF ABNORMAL LYMPHATICS RUNNING INTO INGUINAL LYMPH NODES BUT NO LYMPHATICS RUNNING INTO THE PELVIS.

Phlebectomy

Accurate and meticulous ligation of the points where abnormal reflux of blood from the deep to the superficial venous system occurs (usually the sapheno-femoral or sapheno-popliteal junction) is the most important aspect of varicose vein surgery. Stripping the long saphenous vein deals with most thigh perforating veins and reduces the risk of recurrence. However numerous varicose tributary veins need to be removed in addition to these procedures and in the absence of any major valvular incompetence simple removal of the varicosities (phlebectomy) may be all that is required. This latter procedure can be accomplished under local anaesthetic using a micro-puncture technique in which a small blunt hook is used to fish the varix out after which long segments are avulsed. No ligation is required. The puncture wounds are closed with a single steristrip or with nothing at all. Cosmetic results are excellent and are frequently superior to sclerotherapy.



CRITICAL LIMB ISCHAEMIA IN THE ELDERLY: AMPUTATION OR RECONSTRUCTION?

A frequent dilemma faced by vascular surgeons is whether to recommend primary amputation or a vascular reconstruction when elderly patients present with a threatened limb.

Epidemiological evidence suggests that with aggressive management of cardio-vascular disease in general, 3 year survival rates of patients with critical limb ischaemia approach 80%. Furthermore, primary amputation carries a high 30 day mortality risk. Frequently reconstruction can be undertaken far more safely. Following a successful bypass more than 80% of patients will walk independently outside of their homes, whereas less than a third of amputees will achieve this. A further third will be confined to a wheelchair or bed.

After 3 years 75% of vein grafts and 55% of prosthetic grafts performed for critical ischaemia are still patent. A further surgical procedure to maintain graft patency will be required in 15%. Detailed cost analyses in Great Britain have demonstrated that because of prolonged hospitalisation, community support, rehabilitation and prosthetics, major amputation is considerably more expensive than surgical bypass even when the effects of failed bypasses and subsequent amputations are taken into consideration.

Given most patients' undoubted objection to amputation we believe that revascularisation should be offered to almost all patients with limb threatening ischaemia unless the patient's quality of life would not be improved by saving the leg.

Toenails in Diabetics

Foot care is essential for all vasculopaths, but especially diabetics. One of the most important functions of the clinician who manages diabetics is to educate them about caring for their feet. Simple advice and assistance early on may save subsequent hospitalisation, amputation, or even untimely loss of life. The following are useful hints to give to patients who are diabetic, even if they have no foot problems at present.

THE "DON'TS" OF FOOT CARE

Walk barefoot.

Wear tight shoes, or those with damaged insoles.

Perform amateur chiropody.

Cut nails back into the nail fold. Draw blood while cutting nails.

Allow nails to become overgrown or long.

Delay in seeking vascular surgical advice if infection or necrosis occur:

Perform ANY foot surgery, however minor, if pulses are absent.

Interfere with a neuropathic foot.



THE "DO'S" OF FOOT CARE

Inspect the feet daily for cuts, abrasions or cracks.

Treat all foot infections aggressively and early (esp. tinea pedis & paronychia).

Wear comfortable, supportive footwear at all times.

Wash, dry, and powder the feet at least once a day especially between the toes.

Check inside shoes before wearing for foreign bodies or damaged areas.

Break in new shoes over a long period before wearing them for any length of time.

Seek early assistance if the foot is injured in any way.

Non healing lesions, missing pulses or neuropathy require vascular consultation.

Document pulses, sensation and any deformity at every visit.

Consider early use of orthotics in the presence of deformity.

Careful attention to foot care will considerably reduce the risk of amputation. Avulsion of an ingrowing toenail in the absence of a palpable pulse is an invitation to disaster. Delay in referring diabetics with foot sepsis frequently leads to an amputation that could otherwise have been avoided.

ACUTE HAND ISCHAEMIA

Acute arterial occlusion in the arm presents with similar symptoms and signs as in the leg. The causes are cardiac emboli (thrombus, vegetations), emboli from other sources (especially the subclavian artery in patients with a cervical rib), thrombotic occlusion of a stenosis in the subclavian artery, vasculitis, trauma, dissection, severe forms of vasospastic disease and certain hyper-coagulable states. The early signs frequently improve over a short period as the arm is well supplied with collaterals. The diagnosis is made on history and examination. Typically the hand is cold, with impaired sensation and movement. The pulses in the arm are usually absent, and capillary filling time is prolonged. It is important to note that digital gangrene may occur in spite of palpable wrist pulses. In this event, a source of emboli must be looked for with care (especially subclavian aneurysm). A full cardiac assessment is essential.

Initial management of a non traumatic occlusion is by heparinisation and immediate referral to a vascular surgeon. Investigation starts with x-ray of the chest and cervical spine to exclude a cervical rib. If there are no signs of vasculitis, angiography is usually employed.

Thrombolysis is frequently successful but further endovascular procedures such as angioplasty or stenting, may be required to treat the underlying problem. Surgical intervention may be required to remove a cervical rib or subclavian aneurysm and carotid-subclavian bypass is the usual treatment for an occluded proximal subclavian artery. Emergency surgery is seldom required other than for brachial artery emboli with immediately threatened hands. Successful revascularisation carries an excellent prognosis if the underlying cause can be corrected, making early treatment highly desirable.



Superficial Thrombophlebitis

Superficial thrombophlebitis is a common problem in general practice. It is estimated that 123 000 Americans develop it annually. Little more than 50% occur in varicose veins and recurrence rates vary from 5-50%. It is notoriously persistent with more than 50% persisting beyond 30 days and many cases taking up to 3 months to resolve.

A recent study (Ascer 1995) has demonstrated that in patients with superficial thrombophlebitis involving the thigh or approaching the sapheno-femoral junction, 40% can be demonstrated to have associated deep vein thrombosis with colour flow doppler.

This deep vein thrombosis may be either contiguous (an extension of clot through the sapheno-femoral junction) or non-contiguous. High ligation of the saphenous vein has traditionally been recommended when the process extends to within 5cm of the SFJ but this may actually result in pulmonary embolism if the clot has already extended deeply.

Treatment usually consists of rest, analgesia, aspirin and careful reassessment. Topical anti-inflammatory gels and elastic support are helpful. Extensive thigh involvement demands anticoagulation and a colour duplex scan of the deep veins becomes very important in such cases. High ligation is seldom required. A proportion of cases are associated with underlying hyper-coagulable states (especially malignancy) and appropriate investigation is required in recurrent cases or when several areas of the body are affected (thrombophlebitis migrans).



THE COST OF COLOUR FLOW DUPLEX SCANNING

Colour flow duplex imaging has progressed to the extent that it has become the preferred modality for the initial investigation of venous and arterial pathology.

The major advantages of colour flow duplex over angiography or venography are that it is a rapid non-invasive investigation not requiring hospital admission

1. VENOUS FUNCTION STUDIES. R478 for both limbs.

Indicated in the presence of clinical venous stasis/hypertension to determine the contribution of deep to superficial incompetence to the pathology in order to determine the place of surgery.

2. LOWER LIMB PERIPHERAL VASCULAR DISEASE. R478 per limb studied. *Indicated in claudication particularly to differentiate between those patients suitable for balloon angioplasty so avoiding diagnostic angiography in critical ischaemia the need for surgery or angioplasty can be differentiated.*

3. RENAL AND MESENTERIC ARTERIES. R478

Indicated in suspected renal artery hypertension or mesenteric ischaemia.

4. CAROTID ARTERY STUDIES. R478 per carotid (includes vertebrals). *Indicated following any transient ischaemic attack or recovered stroke where the carotid arteries can be implicated as a possible source.*

5. DEEP VEIN THROMBOSIS. R478 per lower limb (ankle to the vena cava). *The investigation of choice for OVT*

6. VARICOSE VEINS. R291 -R478 depending on the complexity

Indicated in recurrent varicose veins where the sites of recurrent incompetence can often not be established clinically or with continuous wave doppler/: Indicated in certain cases of suspected sapheno-popliteal incompetence where the variable site of the junction needs to be identified.

which provides accurate information regarding flow as well as anatomy. Arterial stenoses can be graded according to the changes in velocity and accurate measurements of diameter can be obtained.

There is a significant cost saving compared to arteriography and a smaller but meaningful saving compared to venography.

The time required for these studies varies from 15 mins for simple venous function tests for sapheno popliteal incompetence to 30-45 minutes for carotid studies. DVT scans usually take 30-60 minutes and 60-90 minutes are required for peripheral arterial studies.

COLOUR-CODED DUPLEX IMAGING CAN SAFELY REPLACE DIAGNOSTIC ARTERIOGRAPHY IN PATIENTS WITH LOWER-LIMB ARTERIAL DISEASE.

A recent article in the British Journal of Surgery (Dec 1996) analyses 467 consecutive duplex scans performed in 329 patients over a 12 month period. 437 (94%) were technically adequate.

Of the 467, 39 were managed conservatively, 230 underwent percutaneous transluminal angioplasty (PTA), 41 underwent surgical reconstruction and 12 a diagnostic angiogram only. Of those referred for PTA there were unexpected findings in 22. In those submitted for surgery there were no unexpected findings. The authors concluded that colour duplex can safely replace arteriography in the assessment of lower limb ischaemia.

We have recently analysed our own results in 51 colour-coded duplex scans performed for lower limb arterial disease in patients who subsequently underwent arteriography.

Of the 13 iliac segments studied, all agreed with the subsequent angiogram. In 49 superficial femoral segments, 2 duplex scans were incorrect (One occlusion was missed because of a large collateral mistaken for the femoral and one stenosis was called an occlusion).

Of 46 popliteal and tibio-peroneal trunk segments, 6 were incorrect (3 popliteal, 3 tibio-peroneal trunk). These results are very encouraging.

Our experience is growing and the results of the first 100 will be presented to the Vascular Society of Southern Africa in Cape Town in October 1997.

The role of Ultrasound to detect aneurysms in urological patients

In a study from Hull in the UK all men undergoing ultrasound examination of the urinary system had scans of the abdominal aorta performed.

Previously with excretory urograms being performed very few aortic aneurysms were noted. On ultrasound screening 9.5% of males between 65-80 years were noted to have aortic aneurysms.

The authors recommend routine aortic scanning as part of the urological ultra- sound scan.

EurJ Vasc Surg 72981993

James Tunicliffe



James Tunicliffe joined us as a vascular surgeon on 1 February 1997. He graduated from UCT in 1985 and trained as a surgeon at Groote Schuur. He completed his additional two years of vascular training to register with the SAMDC as a vascular surgeon in 1995 after which he spent two years as a senior registrar in vascular surgery in England. Until recently he was a senior consultant at Groote Schuur and will continue to be involved there on a part-time basis.

INTERMITTENT CLAUDICATION

A monitored trial of supervised exercise

Patients presenting with intermittent claudication in whom conservative management is deemed the treatment of choice, will be offered the opportunity to join a trial of controlled exercise. This co-operative study will be run by Peter Jeffery, Philip Matley and James Tunicliffe in conjunction with Professor Noakes and Drs Derman and Schwellnus of the Sports Science Institute of South Africa. Patients will be entered into the study and evaluated over a 6 month period. Exercise will be supervised three times a week over this period and progress and performance monitored monthly. All patients presenting with claudication will be considered for the programme. **For further information phone 6833898.**

A basic assessment of LEG ISCHAEMIA

Pain on walking is a very common problem. Many causes such as spinal pathology, arthritis, venous insufficiency, muscle trauma, tendon and ligament inflammation and trauma need to be accurately differentiated from leg ischaemia. This is especially difficult in the presence of only mild peripheral vascular disease when the typical evidence of peripheral ischaemia may be not be evident.

If the pulses are absent or weak then ischaemic disease is present. Non invasive studies are then indicated to assess the extent of the disease and the place of conservative or invasive treatment. If pulses are normal, doppler pressures after exercise provide an accurate indicator of the presence and degree of ischaemia. If the ankle pressures are raised or unchanged, ischaemia can be excluded preventing further expensive and unnecessary investigations.

The doppler pressures at the ankle give a very sensitive indicator of the severity of the disease. Pulses may feel normal with an ankle pressure of 120mm/Hg, but the simultaneous brachial pressure may be 180mm/Hg indicative of significant stenosis. With absent pulses a pressure of 80mm/Hg would indicate ischaemia with no immediate danger to the limb but at 30mm/Hg a more immediate danger.

The decision on conservative or operative management can usually be made on clinical and doppler pressure assessment. If there appears to be an indication for angioplasty or bypass surgery then colour flow duplex assessment is indicated to define the extent of the disease and the specific segments involved. This will also provide sufficient information for definitive angioplasty or surgery to be planned. Diagnostic angiography will only be indicated in about 5% of patients.