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VASCULAR UPDATE

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MINIMALLY INVASIVE **VENOUS SURGERY**

The "gold standard" for the surgical treatment of varicose veins has been high ligation and stripping of the great saphenous vein (GSV) or short saphenous vein ligation, combined with stab avulsion of peripheral varicosities. This is, however, not without its problems. The recurrence rate is 10-15% at 2 years and as high as 60-70% after 20 years. Approximately 25% of patients require further surgery and recurrent disease accounts for 20% of all varicose vein surgery.

Complications include cutaneous nerve injury (5-7%), haematoma (10%), DVT (<2%) and pulmonary embolism (0.2-0.5%), wound infection and pain. Patients require up to 2 weeks off work to recover. Many younger active patients do not receive treatment as the prolonged recovery time interferes with work and family, and older patients often do not receive treatment because of the risks of anaesthesia or the recovery is too arduous.

What Is the Ideal Treatment for Varicose Veins?

The ideal treatment should treat the symptoms and prevent the complications of venous hypertension due to superficial reflux. It should improve cosmesis, be minimally invasive and be associated with low morbidity.

The procedure should have a low recurrence rate and short recovery time, be cost effective and simple for the operator to use.

Endovascular techniques are changing the way venous surgery is practised. These techniques include radiofrequency ablation, endovenous laser, and foam injection sclerotherapy.

Radiofrequency Ablation (RFA)

Radiofrequency and laser ablation are alternatives to stripping of the GSV. Peripheral varicosities still need treatment with either hook phlebectomy or injection sclerotherapy. The great saphenous vein is punctured at the knee or ankle level and the probe is placed in the vein under ultrasound guidance. The vein wall is heated up to 120^0C which destroys the vein wall. Radiofrequency procedures are well tolerated under local anaesthetic and are usually performed as a day case and in some centres as office procedures.

Endovenous Laser

Although the technique of endovenous laser is almost identical to radiofrequency ablation, the mechanism of action is very different. The temperature at the tip of the laser fibre can exceed 1000^0C. This causes the blood in the vein to boil and the resulting steam causes the thermal damage to the vein wall.

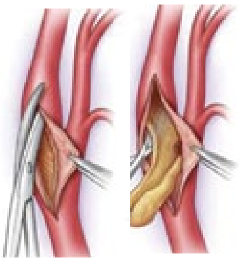
Foam Injection Sclerotherapy

Foam injection sclerotherapy can be used to treat truncal incompetence as well as peripheral varicosities. Sclerosant is mixed with air or CO_2 in a 1:3 or 1:4 ratio to form a mousse. When injected into the vein, the air displaces blood and this together with the larger surface area of the sclerosant in the wall of the air bubble results in greater endothelial exposure to the chemical, resulting in increased efficacy. Foam sclerotherapy is performed in the office.

Conclusion

These procedures have the advantages of being minimally invasive, and can be done under local anaesthetic as a hospital outpatient or in the consulting rooms. The medium to long term results are at least equivalent to open surgery. Randomized trials have shown that the main advantage over surgery is decreased post-operative pain and bruising, and decreased time to return to normal activities and decreased time to return to work.

The minimally invasive techniques as well as open surgery are offered at the Kingsbury Vascular Unit.



CAROTID INTERVENTION: WHO, WHEN, HOW?

Carotid Interventions are utilised in current vascular practice to prevent stroke caused by internal carotid artery stenosis.

Carotid Endarterectomy (CEA) was first performed in 1953. The operation involves removal of the plaque causing the internal carotid artery (ICA) stenosis.

Carotid Artery Stenting (CAS) was introduced in 1990 as an alternative to CEA. CAS treats the problem of ICA stenosis by dilating the plaque causing the stenosis, and restraining the plaque with a stent.

Carotid artery stenosis may be asymptomatic or symptomatic. Symptoms may be hemispheric – including Stroke, TIA (Transient Ischaemic Attack) and Amaurosis Fugax (transient retinal ischaemia)– or global. Asymptomatic disease is found incidentally during investigation of other conditions.

WHO ?

Currently, the indications for intervention are:

1. Symptomatic stenosis >50%

- > 70% stenosis: patients have greatest benefit with absolute risk reduction (ARR) 16%, meaning you need to treat 6 pts to prevent 1 stroke (NNT),
- 50-69% stenosis: ARR 4.6%, NNT 19
- <50% stenosis: no benefit over medical therapy

2. Asymptomatic stenosis >60%

- Controversial: absolute risk reduction is approximately 1% per annum

- Most patients are treated medically

All patients must be on "best medical therapy". This includes control of all vascular risk factors, stopping smoking, an antiplatelet agent and a statin. The degree of stenosis and characteristic of the plaque (echolucent, soft plaque vs echodense calcified plaque) is ascertained by duplex ultrasound.

WHEN ?

For Asymptomatic disease, the procedure can be performed when convenient. For Symptomatic lesions, it is now recognised that the procedure must be performed as soon as possible. The highest risk for recurrent events is within 24 hours of the index event, with an exponential tailing off thereafter. Maximum benefit and risk reduction from the procedure is thus only obtained when there is minimal delay between event and procedure. This is particularly true for women, who lose any benefit from intervention if there is a delay of more than 14 days. In men, benefit is only lost after a 3 month delay.

HOW ?

There is on-going controversy as to which procedure is best. When first introduced, CAS was proposed to be a safer option than CEA for patients. 2 recent studies, CREST (Carotid Revascularisation, Endarterectomy vs STenting) from the USA, and ICSS (International Carotid Stenting vs Surgery) have both shown that CEA carries a lower risk of procedure related stroke or TIA than does CAS, but at a very slightly increased risk of coronary events. There is a reduced risk of death following CEA than after CAS. However, the differences are small (although statistically significant). CAS should not be performed for asymptomatic disease except in VERY exceptional circumstances, as these differences in outcomes are most marked in this group.

SUMMARY

:: **In summary, CEA and CAS are both well established treatment options for Symptomatic Carotid Artery Disease, with CEA being safer and (probably) cheaper. For Asymptomatic disease, CEA is the only option that should be considered. ALL patients should ideally receive a full neurological assessment both before and after the procedure, and the procedure must be carried out by an experienced operator. The procedure should be carried out as soon as possible after the original neurological event in symptomatic patients.**

THROMBIN INJECTION
OF FEMORAL FALSE ANEURYSMS

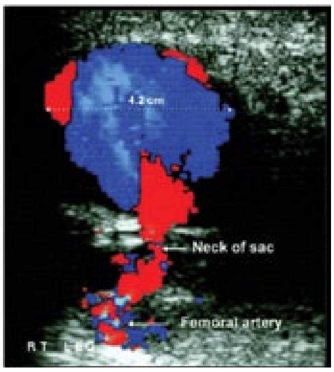


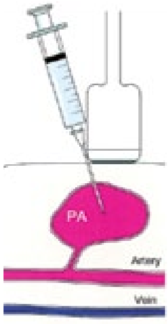
Fig 1: Duplex Doppler of femoral false aneurysm

Femoral artery false aneurysms complicate at least 1-4% of coronary or peripheral arterial interventions. They are particularly common if large amounts of anticoagulants or antiplatelet agents are used and are more common in obese patients. Most false aneurysms that are smaller than 2cm in diameter will resolve spontaneously by simple thrombosis but larger ones tend to continue to expand and may rupture or compress the femoral vein or nerve.

In recent years it has been possible to avoid surgery in many of these patients by injecting activated thrombin directly into the false aneurysm under ultrasound control and under local anaesthetic. The thrombin is commercially available and easily obtained. The result is very gratifying: instant thrombosis of the aneurysm with very little risk of recurrence. Following the procedure no compression is applied for fear of dislocating thrombus into the underlying femoral artery. The patient can be fully mobilized on the following day.

Continued anti-coagulation is not a contra-indication as injected thrombin bypasses the coagulation cascade and is the final pathway for clot formation. Not all false aneurysms are suitable and in general the aneurysm should be less than 6cm in diameter with a neck of less than 4mm diameter. Aneurysms that compress the nerve or vein and all infected aneurysms need surgical exploration.

Currently, the majority of femoral false aneurysms in our practice are handled in this way.



CRITICAL LIMB ISCHAEMIA:
DEFINITION AND NATURAL HISTORY

Critical Limb Ischaemia (CLI) describes the clinical scenario of a chronically ischaemic limb that will probably be amputated unless re-vascularised in the very near future. It refers to the end result of chronic vascular occlusive disease, and is an indication that the supply of blood (and hence oxygen and nutrients) is insufficient for the resting metabolic needs of the extremity.

Definition of CLI: an ischaemic limb with rest pain, or tissue loss (gangrene, non-healing ulcers or wounds), which has been present for at least 2 weeks. The Transatlantic Inter-Society Consensus (TASC) considers CLI to be present when ankle doppler pressures are <50 mmHg, toe pressures are <30 mmHg, or a transcutaneous oxygen level in the foot of <30 mmHg. This is different from acute limb ischaemia. CLI is associated with a high risk of limb loss, as well as other fatal and non-fatal vascular events – such as coronary events or stroke.

CLI may develop at any time in patients with peripheral vascular disease (PVD); it may have a fairly sudden presentation – 50% of patients with CLI have NO symptoms of PVD 6 months earlier.

The major risk factors for CLI are age, smoking, and diabetes. In patients with established PVD, continued smoking is very strongly associated with development of CLI. Amputations in patients with PVD are 10x more common in diabetics compared to non-diabetics. 70% of all major amputations occur in diabetics even though diabetes affects < 5% of western populations (probably closer to 10% in South Africa). Diabetics who smoke also tend to need their amputations at a younger age than non-diabetic smokers.

The natural history of CLI is dismal. 70% of patients will have an amputation in 1 year if not re-vascularized. The crude mortality rate for CLI is 25% at 1 year, and 44% at 5 years. Most deaths are due to coronary artery disease (50%) and stroke (10%). CLI itself may improve in a small number of patients treated conservatively, but these improvements usually reflect improvements in cardiac and circulatory performance. The numbers are small – less than half of these patients studied are alive at 6 months without major amputation. Survival appears to be inversely proportional to the degree of ischaemia at presentation, with below knee occlusions the most ominous.

TAKE HOME MESSAGE

:: Addressing vascular risk factors is of the utmost importance when treating patients with CLI

:: The mortality and the rate of limb loss is high

VASCULAR ACCESS FOR HAEMODIALYSIS

The fistula, conduit, or catheter through which blood is obtained for haemodialysis is referred to as a “dialysis access.” The placement of large needles (typically 15 gauge) is required to remove blood and to return it after it has passed through the dialyzer.

Although sustainable vascular access techniques to make long-term extracorporeal treatment feasible were developed more than 50 years ago, it remains the Achilles’ heel of haemodialysis (HD). Optimizing vascular access is a persistent challenge for the surgeon and nephrologist.

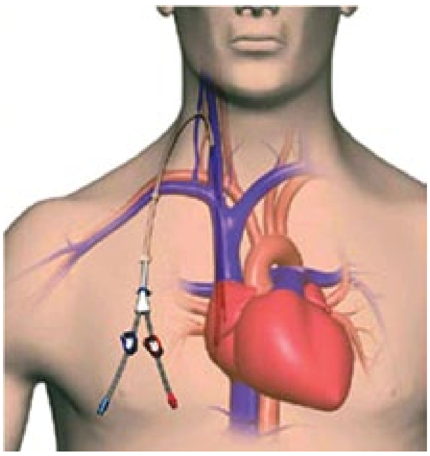
In many patients, the primary goal of haemodialysis vascular access is to keep the patient alive until a transplant is available. Some patients do not qualify for a transplant because of age and/or comorbid medical conditions. HD can be difficult to bear, with the recurrent threat of vascular access complications such as stenosis, infection, thrombus, and bleeding. Approximately 1 in 5 patients starting HD will die within the first year of dialysis, typically from cardiovascular or diabetes complications. In addition, an estimated 25% of all patients starting HD will die because of inadequate vascular access or complications related to vascular access

Vascular access options for HD currently include the placement of arteriovenous (AV) fistulas, AV grafts, and double-lumen, cuffed central vein catheters.

Native arteriovenous fistulas - anastomoses of forearm arteries and veins - yield the best outcomes and are generally recommended. Among otherwise similar patients, those with functioning dialysis fistulas live the longest and have the fewest infectious complications. The Cimino–Brescia fistula, in which the cephalic vein is anastomosed to the radial artery, is preferred because its two-year survival rate is higher than 75 percent. Many remain patent for several years.

However, they are not always the ideal choice for certain subsets of patients. For example, late referral of patients to nephrologists and surgeons limits their use. In addition, patients who are elderly or have diabetes mellitus may have a limited number of suitable sites for the formation of primary AV fistulas, which restricts their use. Such fistulas also need to mature for several weeks or months until they can accommodate the blood flow necessary for dialysis, and a significant number (30-50%) of av fistulas never mature sufficiently for adequate use.

An alternative in patients whose native vessels may not support a fistula, is the interposition of a synthetic vascular graft such as PTFE between an artery and a vein. These grafts can be used sooner than fistulas but carry higher risks of infection. These grafts have a two-year complication-free survival rate of 30 percent; however, surgical or radiologic intervention can increase the rate of patency to



60 percent at two years. These procedures are costly. The most common access-related complication is thrombosis due to intimal hyperplasia, which results in stenosis proximal to the venous anastomosis. Stenosis in a dialysis access can also cause recirculation of blood, which diminishes the effectiveness of the prescribed treatment. Other complications related to grafts include infection, the formation of aneurysms and pseudoaneurysms, and ischemia of the arm.

Least desirable of all the options is the implantation of a permanent, usually cuffed, central venous hemodialysis catheter. Although central hemodialysis catheters can be inserted quickly and are available for use immediately, they are associated with particularly high rates of infection, hospitalization, and death. Other problems linked to catheter use include increased luminal thrombosis, unreliable blood flows, central venous stenosis, and patient cosmetic concern. Most clinicians agree that the use of central venous hemodialysis catheters should be avoided whenever possible.