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# VASCULAR UPDATE

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## DEEP VEIN THROMBOSIS is often undertreated

The long-term outcome of patients with iliofemoral deep vein thrombosis receiving anti-coagulation alone is often disappointing. Anticoagulation, whilst preventing clot propagation and pulmonary embolism does virtually nothing to the deep vein thrombosis itself. Fewer than 50% of patients with iliofemoral DVT will achieve complete clot lysis spontaneously with over 25% experiencing significant long term symptoms such as swelling, pain, secondary varicose veins, venous claudication or the fully developed post-phlebitic syndrome, risking extensive skin changes and venous ulceration.

Several trials have demonstrated that rapid removal of thrombus may be rewarded by improved short and long-term outcomes when compared to a more conservative approach relying on spontaneous clot lysis, during a prolonged period of anti-coagulation. This is true both of surgical venous thrombectomy and catheter-directed thrombolysis.

Venous thrombectomy is usually performed under general anaesthesia and involves surgical extraction of thrombus from the iliac system via a femoral incision using a modified balloon catheter followed by removal of clot from below the groin using a combination of massage and firm application of a rubber Esmarch bandage. Mortality rates and the risk of pulmonary embolism are negligible.

The effectiveness of thrombolytic drugs in this context is well known. Complication rates (particularly intra-cranial bleeding) have been limited considerably by reducing the dose of the thrombolytic drug and administering it directly into the thrombus via an angiographic catheter. This technique has been limited by the long treatment times necessary (24-72 hours) and the need for intensive care monitoring.

A newer approach combines thrombloysis with the use of specialized mechanical thrombectomy catheters introduced percutaneously under local anaesthetic. The Angiojet is such a catheter. A high-speed saline jet creates almost a perfect vacuum and entrains the thrombus into the side channels of the catheter as it is removed. The angiojet permits rapid removal of the thrombus in a single session using a minimally-invasive approach. This catheter has already proven itself in the management of coronary thrombosis and acute arterial occlusion in the lower limb and is now being successfully applied to the problem of deep vein thrombosis.

The vascular specialists at the Kingsbury Vascular Unit in Claremont, Cape Town have a special interest in improving outcomes of DVT patients using a more aggressive but minimally invasive approach. A combination of thrombolysis and percutaneous thrombectomy using the Angiojet is used. Complete clot clearance is possible during a single 30-minute treatment. Patients selected for this approach are generally younger, active patients with extensive thrombosis who otherwise face a high likelihood of developing the post-phlebitic syndrome. In situations where the extent of the thrombotic occlusion threatens the viability of the limb, the Angiojet can be immediately limb-saving.

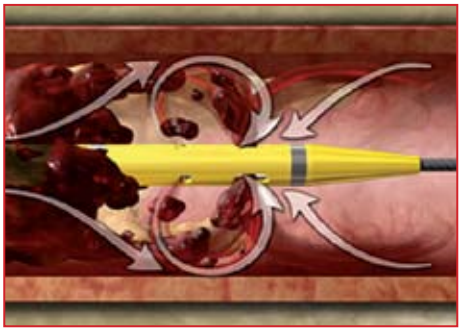


Fig 1: The AngioJet catheter in action

Older, less active patients with deep vein thrombus confined to the calf or thigh are usually still best treated by anticoagulation alone.

The age of the thrombus is an important determinant of success. The best results follow treatment of clot that is less than 24-48 hours old. Seldom will this treatment be considered where the clot has been present for more than one week.

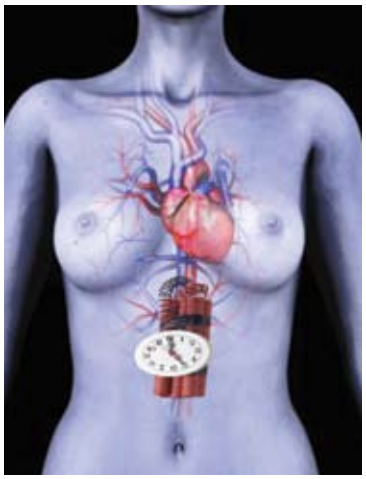
The introduction of the Angiojet has also changed the approach to arterial occlusion at Kingsbury. Many patients with peripheral ischaemia can now be treated using a combination of percutaneous mechanical thrombectomy with angioplasty or stenting of the underlying arterial lesion during a single treatment session under local anaesthetic. Most of these patients would previously have undergone bypass surgery.

**For more information on modern approaches to venous and arterial thrombosis at the Kingsbury Vascular Unit phone 021 670 4002. *PM***


Fig 2-4 Complete clearance of extensive DVT using the AngioJet

# ABDOMINAL AORTIC ANEURYSM

Abdominal aortic aneurysm (AAA) affects between 1.2% and 7.6% of the population over 50 years of age. The prevalence of AAA in men is approximately 3 x greater than in women, and the incidence increases with advancing age. The cause of AAA is unknown but its development is associated with many of the cardiovascular risk factors that predispose to atherosclerosis and arterial occlusive disease. Genetic factors are also important, as the risk of aneurysm development is significantly greater in relatives of those with a diagnosed AAA.



Unfortunately, many aneurysms progressively enlarge without symptoms, presenting only when the aneurysm ruptures. Despite improved surgical techniques and advances in intensive care support, ruptured AAA (RAAA) continues to confer an overall 35% to 80% mortality.

Recent randomised controlled trials have shown that mortality can be reduced by mass population ultrasound screening in men, with early detection and intervention preventing future rupture and aneurysm-related mortality. The risk of aneurysm rupture has been shown to be proportional to aneurysm size, with aneurysms measuring less than 5.4 cm having an annual rupture rate of approximately 1% whereas those greater than 7.0 cm in diameter have an annual rupture rate of 32.5%. The UK Small Aneurysm Trial has shown that in general, patients benefit from aneurysm repair when maximum aneurysm diameter exceeds 5.5 cm, at which stage the risk of spontaneous rupture exceeds the risks of conventional open surgical repair.

In the last two decades the traditional open approach to treatment of patients with AAA has been challenged by the arrival of a new minimally-invasive technique, endovascular aneurysm repair (EVAR). Modern aortic stent grafts are available in a range of sizes and can be custom designed. The addition of fenestrations and side-branches can adapt the stent to suit difficult anatomical variations encountered.

Two recent large prospective randomised controlled trials have compared EVAR with conventional open repair for the treatment of large abdominal aortic aneurysms, and have shown significant reductions in early complications and mortality (EVAR1,DREAM Trial). However, whilst endovascular repair for un-ruptured abdominal aortic aneurysm clearly has a role in "healthy" patients, these trials have also reinforced the knowledge that open repair is a successful technique and will remain a common form of treatment for over half of those patients presenting with a large abdominal aortic aneurysm for whom EVAR is unsuitable on anatomical grounds. Furthermore, it is now clear that those patients who are unfit for open surgical repair can expect such a high mortality rate from their co-morbid disease, that even successful EVAR of their aneurysm is unlikely to alter overall prognosis and life expectancy (EVAR2).

The high mortality associated with open repair has led many to look for alternative treatments for the management of Ruptured AAA. Several studies have confirmed that the use of EVAR, especially under local anaesthesia, reduces the physiological insult to the body as compared to conventional open surgical repair. Emergency endovascular aneurysm repair (eEVAR) has been successfully carried out using a variety of protocols and techniques and would appear to offer a feasible alternative to conventional open repair in selected patients. ***MF***

## Carotid Endarterectomy or Carotid Stenting – which one and why?

In 2008 carotid endarterectomy remains the "Gold Standard" for the treatment of carotid stenosis. Until about a year ago, there was little evidence available to assist the clinician in making a sensible choice between stenting or open surgery.

Early trials showed an unacceptably high number of peri-procedural strokes for stenting. The reason for the strokes was largely plaque embolisation from the site of the stenosis at the time of stent deployment. Recent studies have clarified the picture.

In 2004 Biasi showed that echolucent plaque (on duplex doppler) was associated with a significantly higher number of peri-procedural neurological events. Echolucent plaque consists of soft material (either fresh thrombus caused by an acute haemorrhage into a plaque, or cholesterol crystals in a plaque). Passing instruments, wires, or devices past such soft plaque has a risk of dislodging debris

In 2006, the EVA 3s and SPACE trials showed a benefit for open endarterectomy over stenting. These two trials were flawed as the operators in both studies had little endovascular experience, and were not limited to specific devices. The end result was an unacceptably high rate of neurological complications in the stent group. Operator experience was the ONLY significant predictor of poor outcomes with stenting.

So what is the best approach to be followed to ensure the best results for your patients with carotid disease?

Clinical assessment should be undertaken by a vascular surgeon who has the ability and experience to perform both stenting and/or endarterectomy safely. The choice of procedure depends on the anatomy of the access vessels and aortic arch, the plaque morphology, and the degree of stenosis. Obtaining this information often requires a combination of investigation modalities including carotid angiogram, CT angiogram, and good quality duplex doppler. ***JT***

# Going up in Smoke

Cigarette smoking is the single biggest avoidable cause of death and disability in developed countries and is increasing rapidly throughout the developing world. Encouraging smoking cessation is one of the most effective and cost effective things that doctors and other health professionals can do to improve health and prolong their patients' lives.

Worldwide there are about an estimated 1.2 billion smokers. Half of these smokers will die prematurely of a disease caused by their smoking, losing an average of eight years of life; this currently represents four million smokers each year worldwide. Deaths from smoking are projected to increase to more than 10 million a year by 2030, by which time 70% of deaths will be in developing countries.

Smoking is a potent risk factor for developing symptomatic peripheral arterial disease and there is a strong dose-response relationship.

1. Intermittent claudication is 2-3 times more common in smokers compared to non-smokers. The prevalence of symptomatic PAD is higher in those patients that started before the age of 16.
2. Abdominal aortic aneurysms are 7 times more common in current smokers. Risk is related to duration of smoking with each year increasing the relative risk of AAA by 4 (2-5) %.
3. Continued smoking after lower limb bypass surgery results in a 3-fold increase in the risk of graft failure.

It is never too late to stop ! The excess risk of death from smoking falls soon after cessation and continues to do so for at least 10-15 years. Former smokers live longer than continuing smokers, no matter what age they stop smoking, though the impact of quitting on mortality is greatest at younger ages. For smokers who stop before age 35, survival is about the same as that for non-smokers.

The risk of heart disease decreases much more quickly after quitting smoking. Within a year the excess mortality due to smoking is halved, and within 15 years the absolute risk is almost the same as in people who have never smoked.

Patients with intermittent claudication who stop smoking have less progression to rest pain and critical limb ischaemia, require less arterial surgery and undergo fewer amputations. Stopping smoking restores graft patency to that of non-smokers, even if instigated after surgery. ***MF***

## RETIREMENT OF **PETER JEFFERY**

Peter Jeffery retired on 1 March 2008 after a long and distinguished career as both a general and vascular surgeon. He led what is the largest surgical partnership in this country for nearly 20 years. During this time he held office at various times as President of the Association of Surgeons of Southern Africa, President of the Association of International Vascular Surgeons as well as being part-time head of the Vascular Surgery department at the University of Cape Town and Groote Schuur Hospital.

Peter's skill as both a surgeon and administrator were well known. He was largely responsible for the introduction of the first duplex-based vascular laboratory in private practice in Cape Town and firmly established the practice as a leading academic vascular institution.

Whilst in private practice he published 14 articles in international peer-reviewed journals and was a regular speaker at both local and international congresses. Peter has been made an Honorary Member of the British Vascular Society and this will be awarded to him at their annual congress in November.

Peter has elected to retire from medicine altogether. After a four-month vacation in Europe and the USA he plans to develop his interests in farming in Stellenbosch and improve his golf game. We wish him well in his retirement. The partnership continues under the name "Dr Matley & Partners" with Philip Matley taking over as managing partner. With the addition of Dr Ian Lorimer as a partner in August 2008 we will once again be a partnership of 10 surgeons covering the entire spectrum of vascular, gastro-intestinal, oncology and general surgery. ***PM***

## ANGIOPLASTY OR SURGERY **for critical limb ischaemia ?**

Although there is an increasing trend towards using angioplasty or stenting rather than bypass surgery for patients with critical limb ischaemia (CLI), the precise roles of these two treatment modalities remains undefined.

The UK based BASIL trial randomised 452 patients with CLI to either an angioplasty first or a surgery first strategy. Results showed

- Amputation rates similar at 6 months
- Mortality similar in both groups (surprisingly)
- Overall survival poor: only 55% alive with no amputation at 1 year
- No difference in health adjusted quality of life
- Angioplasty cheaper with less morbidity
- Advantage for surgery in patients surviving > 2 years

In most clinical situations the choice of angioplasty versus surgery is clear. Where clinical equipoise exists, the BASIL trial suggests that either strategy will yield comparable results. ***PM***

Take Home Message:
In the clinical situation where either modality can be used:

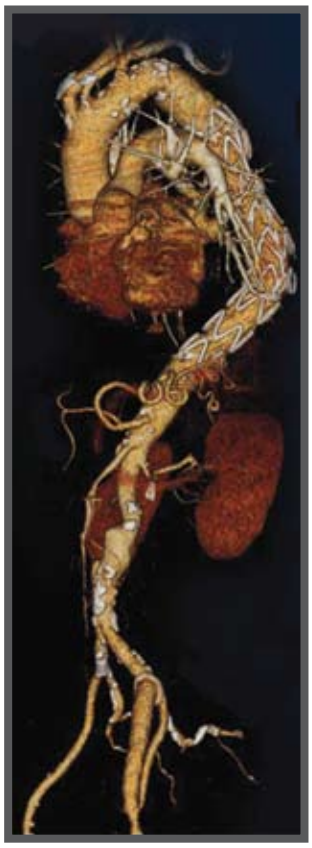
- Open surgery preferred in patients who are fit and have a good life expectancy
- Endovascular preferred in older, sicker patients

# THE CURRENT ROLE OF **THORACIC AORTIC ENDOGRAFTING**

The endovascular devices currently in use for the repair of abdominal aortic aneurysms are well developed, and allow the management of approximately half of all infra-renal aneurysms with a very low mortality and morbidity.

Somewhat surprisingly, the application of endovascular techniques to repair thoracic aortic aneurysms has lagged behind, and the development of suitable devices has been slow. The thoracic aorta lends itself well to the application of endovascular techniques, as the aorta is tubular, varies little in calibre, and has few important branches from the descending portion, where the majority of isolated thoracic aneurysms are found. The large diameter of the devices required to treat the thoracic aorta necessitates larger diameter delivery systems, however, and this may limit applicability because the access vessels may be too small to allow the devices to be inserted.

The Achilles heel of thoracic aneurysm treatment relates to the preservation of the carotid and subclavian vessels from the arch, and the visceral and renal vessels at the distal end. It is therefore clear that not all aneurysms of the thoracic aorta can be treated by endovascular means. The application of hybrid techniques, however, has expanded the indications for endografting.



Hybrid techniques involve a combined Open and Endovascular approach. An open operation is done to place a graft on the ascending aorta (for arch aneurysms) or the abdominal aorta (for thoraco-abdominal aneurysms). The limbs of these grafts are then joined to the respective vessels (carotid, subclavian, visceral or renals), and the aneurysm is then repaired by stent-grafting across the original origins of those vessels. This technique allows treatment of aortic arch aneurysms with low morbidity and mortality compared with open repair, which requires cardiac bypass and deep hypothermic cardiac arrest.

As a result of newer technology and techniques, the thoracic aorta is now firmly within reach of endovascular treatment. Aortic dissection (both acute and chronic), penetrating aortic ulcer and intramural haematoma (all acute thoracic aortic syndromes) can now be managed with endografts, with a dramatic reduction in morbidity and mortality compared with traditional open techniques.***JT***

# Vascular complications of **HIV**

HIV/AIDS is regarded as the worst epidemic in human history, with its epicentre currently in South Africa. Sub-Saharan Africa accounts for 23.3 million HIV/AIDS cases, with South Africa amongst the highest in seroprevalence. There are an estimated 5.4-5.6 million HIV-positive people (UNAIDS/WHO AIDS December 2006) in SA and it is the leading cause of death among young adults.

There is a well documented relationship between vascular disease and HIV infection. These patients may present with occlusive disease, aneurysms, spontaneous arterio-venous fistula or the complications of hypercoagulability. They may also, however, present with the normal spectrum of vascular disease such as atherosclerosis or trauma where HIV positivity is an incidental finding.

HIV-associated vascular disease is a specific disease entity that differs from atherosclerotic disease in various aspects.

- HIV positive patients are younger with an average age of 40 years in comparison to 55-74 years in patients with atherosclerotic disease.
- There is a lower incidence of typical risk factors.
- HIV-associated aneurysms are typically multiple and often occur in atypical locations with a predilection for the carotid and superficial femoral arteries.
- Young patients present with advanced limb ischemia. They usually have fibro-obliterative multilevel disease that is often not amenable to bypass surgery because of inadequate run-off.
- The incidence of DVT is 10x higher than in non-HIV-positive patients.

Although the precise pathogenesis of HIV-1 associated vascular disease is not clear, there have been advances in the understanding of the biochemistry and cell biology of these changes. Inflammation and endothelial dysfunction play important roles in atherosclerosis formation. HIV-1 has been shown to increase inflammatory cytokines resulting in increased endothelial permeability, increased monocyte adherence to, and transmigration across endothelial cells.

The basic principles of vascular surgery also apply to HIV-positive patients. In the emergency setting, vascular surgery is performed regardless of status. In the elective setting, patients with a reasonable life expectancy are offered surgery. Autogenous vein is the preferred conduit, and if vein is not available, PTFE or polyester grafts are used. The commercially available silver-impregnated grafts are used if there is a high suspicion of sepsis. Patients with full blown AIDS or severe co-morbidities are managed conservatively.

Various factors influence the operative outcome of surgery in HIV-positive patients, including immune status (CD4 T-cell count), opportunistic infections, WBC count, hematocrit, nutritional state (decreased albumin) and type of operation (emergency vs. elective; clean vs. contaminated). The peri-operative morbidity and mortality of aneurysm repair is generally high with a poor long-term survival. Aneurysm repair should be reserved for life- and limb-threatening conditions. Limb salvage rate also tends to be poor in patients presenting with critical limb ischemia due to occlusive disease. ***MF***