

DR. CAINE AND PARTNERS

# VASCULAR UPDATE

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Raynaud's syndrome is a clinical diagnosis comprising characteristic colour changes in the fingers that are usually provoked by exposure to cold. These may be accompanied by parasthesia but pain is unusual. Finger ulceration occurs only in the severest of cases.

Vascular surgeons assess these patients using finger plethysmography and simple doppler ultrasound. Thermal entrainment measures changes in blood flow in one extremity while the other is exposed repeatedly to opposing thermal stimuli and is reproducible and reliable. The pathophysiological defect appears to be a failure to recover from a cold stimulus rather than an over-reaction to it and this can be objectively measured.

The distinction between primary and secondary Raynaud's has become increasingly blurred as it is now realised that both types have vasospastic and vaso-obstructive components. However, digital artery obstruction is associated with a worse prognosis. At least 5% of so called primary Raynaud's patients will go on to develop scleroderma over the following 10 years. Patients should be questioned about family history, drug taking, smoking and occupation (especially handling ice or vibrating machinery). A history of arthralgia, dysphagia or xerostomia indicates the presence of an underlying collagen disease. A search should be made for telangiectasia and for skin tightening, especially around the mouth and fingers.

The pulses in the upper limbs are carefully felt and auscultated (especially the supraclavicular fossa) and the blood pressure in both arms measured.



**RAYNAUD'S PHENOMENON**



**SCLERODERMA**

There is no cure for Raynaud's phenomenon. Advice to stop smoking, avoid cold and dress warmly is important and electrically heated gloves have been of great benefit to some patients in cold climates.

The mainstay of drug treatment is Nifedipine (Adalat) but Thymoxamine (Opilon) and Prazosin (Minipress) are also effective in severe cases, especially with associated ulceration. Reserpine or Guanethidine administered intraarterially or in the form of a Bier's block is usually effective. Prostaglandin infusions, prostacycline and plasmaphoresis are effective in some patients. There are few indications for sympathectomy in Raynaud's as the benefits are short lived. It may be occasionally warranted to heal an ulcerated digit or limited amputation.

Conditions with which Raynaud's phenomenon is associated.

Connective tissue disorders

*Scleroderma*

*SLE*

*Rheumatoid*

*Other disease*

*Buerger's disease*

Obstructive arterial disease

*Thoracic outlet syndrome*

*Arteriosclerosis*

*Arterial trauma*

*Arteritis*

Drugs

*Ergotamine*

*beta Blockers*

*Oral Contraceptives*

*Cytotoxics*

Miscellaneous

*Malignancy*

*Neurological*

*Endocrinological*

*Vibrating machinery*

*Cold exposure*

A bruit in the neck can be heard in at least 15% of patients over the age of 60. It does not necessarily indicate disease of the internal carotid artery. More importantly; the absence of a bruit does not exclude severe carotid disease. A bruit may merely be a flow murmur in hyperdynamic states or may be conducted up the carotid arteries from the aortic valve or from the innominate or subclavian arteries. In patients with carotid disease it may arise from the external carotid, the internal being either disease free or even occluded. When a stenosis exceeds 85% its bruit may disappear because flow through the stenosis starts to fall. It is not uncommon to find a bruit over the asymptomatic carotid but none over the symptomatic and severely stenosed side. A bruit anywhere in the neck should be taken as indicative of arterial disease and a duplex doppler ultrasound requested to further assess it.

## STENTS FOR ARTERIAL OCCLUSIVE DISEASE

Although percutaneous balloon angioplasty has become widely accepted for the treatment of arterial stenoses and short occlusions its most common shortcomings relate to elastic recoil within the arterial wall, intimal dissection caused by the balloon and a significant risk of recurrence. Intravascular stents have been developed as a possible mechanical solution to these problems.

Today the most widely used stents are introduced on balloon catheters and deployed by expansion of the balloon. Nitinol stents expand to a predetermined shape and size at body temperature and are introduced whilst still cold. Endothelium subsequently grows over the fibrin coated metal surface rendering it less thrombogenic.

A large and encouraging experience with iliac and renal artery stenting has now been reported worldwide. However there is still no compelling evidence that stenting is superior to simple balloon angioplasty where the lesion is suitable for this and a technically satisfactory result has been achieved. Reports of stenting in the femoro-popliteal arteries have largely come from France where there is considerable enthusiasm for the technique.

With further technological developments and increasing experience it is likely that many patients who would previously have been offered aorto-femoral bypass will now be treated by the introduction of arterial stents or combinations of stents and intra luminal grafts.

At the Kingsbury Hospital in Claremont, more than 10 arterial stents have been successfully placed since the introduction of the technique in 1994.

### Conventional versus Endovascular surgical procedures

At first sight balloon angioplasty appears less costly and less traumatic than conventional open vascular surgery. This however may be changing with the development of very much more expensive endovascular techniques and devices and the increased prevalence of these procedures being performed, often without the direction of a vascular surgeon. Using more than one guide wire and balloon for

difficult procedures together with thrombolytic drugs and one or more stents is extremely expensive. In addition the failure rate for endovascular procedures is higher. Not only is there the possibility of the endovascular procedure needing to be repeated but open surgery may still be required.

The claimed lower costs need to be balanced against the increasing use of these procedures. In Maryland between 1979 and 1994 there was a 24 fold increase in the number of angioplasties performed with no reduction in the incidence of conventional surgery or in the amputation rate.

In reality, angioplasty and conventional surgery are not competitive as they are directed towards different types of lesions. Endovascular surgery has a lower mortality rate but a higher failure rate than conventional surgery. How do we choose between the two. This should be done according to the probability of success with endovascular surgery. If the probability of success is high then an endovascular procedure should be chosen but if the probability of success is low in a reasonable risk patient then conventional surgery is still preferred. Occasionally in a very high risk patient an endovascular procedure may be the only option.

## WHAT IS PULSE GENERATED RUNOFF?

In patients with peripheral vascular disease (particularly in diabetics), assessment of the calf and foot arteries has been a long recognised problem. These are frequently not visualised with conventional arteriography because of contrast dilution and sedimentation in the face of upstream disease and are frequently inaudible using conventional doppler techniques. Many patients have

been denied a potentially limb saving distal bypass because the available information has indicated that there is no patent "runoff" vessel in the calf in spite of the fact that such a patent vessel is actually present.

Pulse generated runoff (PGR) is a simple, inexpensive and non-invasive test that generates a pulsatile signal in a patent artery by sequentially inflating and deflating a compressed air driven cuff usually at 60 cycles per minute. The wave form so generated is analysed in detail to determine various characteristics of the vessel and the potential of the distal vascular bed to accept an arterial graft. The technique is superior to angiography in determining the ideal site for the distal anastomosis and is important prognostically as it can identify patients whose distal runoff is so compromised as to question the appropriateness of an arterial reconstruction.

This test has been available at the Harfield House Vascular Laboratory adjacent to Kingsbury Hospital since 199~ and is now used routinely where there is evidence of significant tibial artery disease.

## Thoraco-abdominal aortic aneurysm

More than 25% of hospital and community deaths that follow rupture of an aortic aneurysm are due to rupture of a thoracic or

thoracoabdominal aneurysm. The risk of rupture in these aneurysms is at least as great as in the more common infra-renal aneurysm and at least three quarters of those who refuse surgery die within 2 years of diagnosis.

Stanley Crawford demonstrated in 1974 that it is possible to repair these aneurysms with an acceptable mortality and morbidity rate and his "inlay grafting" technique remains the standard procedure today. However operative mortality continues at the 10-20% level and 10-15% are rendered permanently paraplegic or dependant on dialysis. The risks depend on the extent of the aneurysm, being greatest when it extends to the origin of the left subclavian artery.

Repair is accomplished without heparin or full cardiopulmonary bypass and involves placing a graft within the aneurysm and anastomosing the orifices of the mesenteric and renal arteries together with selected intercostals to holes cut in the graft. A number of techniques are used to reduce the risk of spinal cord damage including cerebrospinal fluid drainage and intrathecal administration of vasodilators. Auto transfusion is used routinely but haemorrhage remains a major cause of death.

### THE CRAWFORD INLAY OPERATION FOR REPAIR OF A THORACO-ABDOMINAL AORTIC ANEURYSM

We believe that repair is justified for the majority of patients whose lives are threatened by rupture of these complex aneurysms and deny surgery only to those with multiple risk factors or those with free rupture of particularly extensive aneurysms.

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THE CRAWFORD INLAY OPERATION FOR REPAIR OF A THORACO-ABDOMINAL AORTIC ANEURYSM

## HEPARIN INDUCED THROMBOCYTOPENIA

The ability of heparin to induce thrombocytopenia (HIT) has long been recognised and thromboembolic complications were first reported in 1958. Two types have been identified:

Type 1: This reflects the ability of heparin to increase the platelet response to aggregating stimuli. There is a rapid onset 1-5 days after starting heparin treatment. The platelet count seldom falls below 100,000/mm and typically returns to normal in 1-5 days in spite of continued heparin treatment. This occurs in 10-20% of cases treated.

Type 2: This is more serious and has an immune basis. It is frequently associated with limb and life threatening complications. The incidence is unknown but is probably about 3% with 10% of these developing thromboembolic complications. The onset is usually 6 days or more after the commencement of heparin therapy. If, however, the patient has been previously exposed to heparin therapy the onset may be within hours of starting treatment. The platelet count usually falls to less than 50,000/mm and recovers within about 6 days of stopping treatment.

Complications include lower limb arterial thrombosis, myocardial infarction, thromboembolic CVA, renal artery and vein thromboses, arterial graft thromboses and others. Extension of deep venous thrombosis with pulmonary embolism as well as extension to phlegmasia caerulea dolens and venous gangrene have been reported.

Bleeding complications are less common but serious bleeding may occur. Morbidity rates of 30-80% and mortality rates of 12-30% have been reported.

To prevent HIT, the duration of heparin therapy should be minimised where possible. If prolonged anticoagulation is required, oral anticoagulants should be commenced early. For prophylaxis, low molecular weight heparins may be safer. A platelet count should be obtained before starting heparin therapy and repeated every 3rd day. If an unexplained decline in the platelet count occurs a search for heparin antibodies should be requested. If found, heparin therapy must be discontinued,

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## THOMBECTOMY FOR DEEP VEIN THROMBOSIS

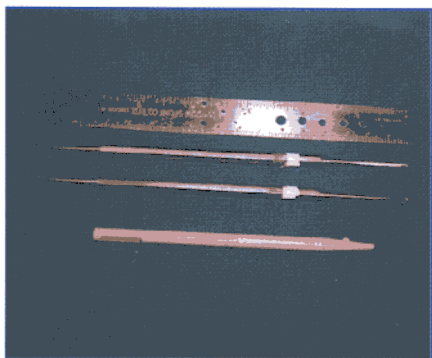
The role of thrombectomy in deep vein thrombosis (DVT) remains unclear. The majority of DVTs are amenable to treatment with anticoagulation alone with satisfactory outcomes but for larger proximal thromboses, thrombolysis or thrombectomy may have to be considered.

Any justification for venous thrombectomy would require a lower incidence of post-thrombotic venous stasis syndrome and a better longterm patency rate. Thrombectomy can only be performed on relatively fresh thrombus and postoperative patency rates may be improved with the construction of an arterio-venous fistula. There is a lack of properly controlled randomised studies addressing this problem, but there is some evidence from Sweden that long-term results are improved after thrombectomy when compared to thrombolytic therapy.

Thrombectomy should be considered in a young patient with extensive, fresh, occlusive ilio-femoral thrombosis particularly if thrombolysis is contra-indicated because of recent surgery or bleeding. Thrombolytic therapy is preferable in the presence of non-occlusive thrombus.

## VARICOSE VEIN SURGERY USING THE MICRO-PUNCTURE HOOK TECHNIQUE

The final cosmetic result is of obvious importance in varicose vein surgery. The incisions used to deal with incompetent sapheno-femoral and sapheno-popliteal junctions are usually placed in natural skin creases and heal without much visible scarring. The saphenous veins themselves are stripped subcutaneously through the primary incisions. However most of the varicosities arise in tributary veins and are not removed with standard stripping techniques. They must either be separately removed through multiple incisions or subsequently dealt with by injection sclerotherapy. We use the micropuncture hook technique to deal with the varicosities themselves. Tiny puncture wounds of no more than 1 mm are created with a special knife blade and a small blunt hook inserted around the varix which is then delivered through the puncture and avulsed by sustained traction using mosquito forceps. The puncture wounds require no sutures and heal with vastly superior cosmetic results.



### TINY KNIFE AND HOOKS USED IN THE MICROPUNCTURE TECHNIQUE

It is suitable for day case surgery and may be performed under local anaesthetic. Bandages are removed on the following day after which there are no restrictions on activities and an immediate return to work.

## SCREENING FOR A BYPERCOAGULABLE STATE AFTER AN EPISODE OF DEEP VENOUS THROMBOSIS.

Levels of natural anticoagulants, namely Antithrombin III, protein G, protein S, heparin cofactor and plasminogen will be found to be deficient in between 40-60% of young patients presenting with spontaneous arterial or venous thrombosis.

In 1993 a poor anticoagulant response to activated protein C was reported in several families. This abnormality has now been reported to occur in up to 21% of patients presenting with a first episode of deep vein thrombosis compared to about 5% in age matched healthy controls. An autosomal dominant pattern of inheritance has been confirmed.

The relatively high incidence in the normal population makes it unlikely that this factor alone is sufficient to cause thrombosis and that some additional factor or factors is required. Patients who are identified as deficient in one or more of these factors after the first episode of thrombosis require indefinite prophylaxis.

# PHLEGMASIA CAERULEA DOLENS

Venous gangrene preceded by phlegmasia caerulea dolens is a rare but serious condition often associated with malignancy or following a recent lesser lower limb deep vein thrombosis. The condition is caused by complete occlusive thrombosis of the deep veins of the affected limb but more significantly of the small collateral vessels.

The clinical condition needs to be recognised early if serious consequences are to be avoided. Urgent admission to hospital with immediate full heparinisation is required. There is some evidence that

thrombolytic therapy, if administered intra-arterially, may improve the outcome. Intravenous thrombolysis has been disappointing as the thrombolytic agent is unable to reach and lyse the occluded vessels.

## PHLEGMASIA CAERULIA DOLENS WITH VENOUS GANGRENE

Thrombectomy, although clearing clot from the major vessels, fails to address the occlusion of the microvasculature, though in combination with regional thrombolysis may improve the outcome.

It is now no longer acceptable to merely place patients who have had a transient ischaemic attack on aspirin without further investigation.

In the past, non-invasive diagnostic tests for carotid disease were complex and not widely available. Carotid angiography was expensive and carried a 3% risk of inducing at least a transient neurological deficit. Duplex scanning is now widely available, extremely accurate, inexpensive and without risk. It is essential that all patients experiencing transient focal neurological deficits be assessed.



## Is Investigating TIA's worthwhile?

Today it is recognised that many patients with classical carotid territory TIAs have important non-carotid causes. Following a single carotid TIA the 30 day risk of a completed stroke approaches 5% with 12% stroking within a year and an annual stroke rate of 5% thereafter. Carotid endarterectomy has been demonstrated to very significantly reduce the risks of stroke when compared to anti-platelet therapy alone in patients whose stenoses exceed 70% in severity and this remains the case even in patients whose age exceeds 80. Duplex scanning is essential to identify patients who will benefit from this operation.

It is likely that symptomatic carotid atherosclerosis is one of the most under-recognised clinical problems today and the available evidence suggests that many patients who present with stroke could have avoided this had their TIAs been investigated and appropriately managed.