

The 'diabetic foot': role of vascular surgery

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'Diabetic foot' can be defined as the presence of infection, ulceration and/or destruction of deep tissues in the foot, associated with neurological abnormality and varying degrees of peripheral vascular disease in the lower limb. Foot ulcer prevention must be the aim of all health providers, from general practitioners and diabetic nurse educators to endocrinologists and vascular surgeons. Ulcers are a late sign that should prompt referral for vascular assessment, in case the ulcer has a remedial vascular component. More multidisciplinary foot clinics could reduce limb loss associated with diabetic foot ulcers.

Issues around vascular intervention

Diabetic foot leads to a high number of hospital admissions, is associated with enormous costs, can potentially result in limb loss and contributes to a significant loss in quality of life. From the vascular standpoint, this complex clinical situation frequently leads to delays in presentation, diagnosis and appropriate treatment.

Because 3-7% of the general population have diabetes mellitus that is associated with a 4-6 times higher prevalence of peripheral vascular disease (PVD), the number of patients presenting with vascular involvement is very high. Vascular surgeons have a role in minimising morbidity and mortality associated with the complex clinical entity of 'diabetic foot'.

This clinical complexity makes a multidisciplinary approach to diabetic foot management essential. Preventive measures, patient and staff education, multi-disciplinary treatment of foot ulcers and close monitoring can reduce amputation rates by 49-85%.

Vascularity and diabetic foot ulcers

Diabetic foot complications are all too common – more than 5% of diabetic patients will have a history of foot ulcers, while accumulative lifetime risk of foot ulceration may be as high as 25%.

It is important to correctly identify the aetiology of the ulcer: approximately 45-60% are purely neuropathic; 10% are purely ischaemic; and 25-45% have mixed neuro-ischaemic origin.

Amputation risk

There is 30-fold increase in the risk of major amputation in diabetics vs. non-diabetics. Moreover, during two year follow-up after amputation, 25% of patients require amputation of the contra-lateral limb.

As up to 85% of amputations are preceded by foot ulcers, it is safe to presume that any success in reducing foot ulcer incidence would be followed by a reduction in amputation rate and significant savings in health costs.

The concept of critical limb ischaemia (CLI) in diabetic patients is important in prompting

immediate referral to a vascular surgeon for further assessment, in an attempt to minimise the risk of limb loss. CLI is defined as rest pain or pedal necrosis with appropriate documentation of circulatory impairment.

Rest pain frequently presents as a burning dysaesthesia of the foot, aggravated by elevation and relieved with dependency (presumably due to an increase in arterial pressure from gravity in a limb with a non-functioning veno-arteriolar reflex due to ischaemia). Pedal necrosis includes ischemic ulcerations or gangrene after minor trauma or surgical incisions involving the foot. The Trans-Atlantic Inter-Society Consensus considered ankle pressure less than 50 mmHg or toe pressure less than 30 mmHg as confirming the presence of CLI.

Beware infection

The diabetic foot presents a complex array of pathologies, each requiring treatment, and this especially applies to foot infections.

Frequently, what appears to be "cellulitis" can prove to be deep space infection associated with extensive soft tissue loss that requires wide debridement followed by partial or major amputation.

Infection is potentially limb-threatening and requires urgent diagnostic and therapeutic attention (especially if there are systemic manifestations), aimed at establishing the severity of the infection and adequacy of arterial supply.

The vascular surgeon follows some specific 'rules' to maximise limb salvage:

- Débride and drain obvious infection promptly.
- Control systemic sepsis and glycaemia.
- Assess for atherosclerotic occlusive disease even when neuropathy or infection or both are present.
- Define the status of the arteries in the foot even when the tibial arteries are occluded.
- Restore maximal perfusion to the foot with distal reconstruction.
- Look for, drain, and débride any residual infection or necrosis.

Vascular procedures less invasive

Enormous progress in endovascular techniques now allows underlying ischaemia to be successfully managed without the mortality and morbidity associated with the older open vascular surgery of distal or pedal bypass.

Endovascular interventions are performed under local anaesthetic, involve short hospital stay, and have minimal impact on patient co-morbidities. (Patients with significant renal impairment require an appropriate renal protection protocol and minimal use of iodinated contrast.)

Below-the-knee peripheral angioplasty for tibial stenosis or recanalisation of occluded segments are routine procedures. Even if the vascular surgeon must proceed to open reconstructions, these are usually not compromised by a previous endoluminal attempt. ■



■ Fig 1. Diabetic Foot with deep space sepsis and gangrenous 3rd toe.



■ Fig 2. Healed foot after 2nd, 3rd and 4th Ray amputation.



■ Fig 3. Neuropathic foot ulcer.

Cornerstones of Diabetic Foot management

- Regular inspection and examination of the foot at risk.
- Identification of the foot at risk.
- Education of patient, family and healthcare providers.
- Appropriate footwear.
- Aggressive treatment of non-ulcerative pathology.

Risk Factors for Foot Ulcers in DM

- History of previous ulceration/amputation.
- Neuropathy (sensory, motor, autonomic or mixed).
- PVD (absent pulses, history of claudication, reduced Ankle-Brachial Index or Toe Pressures).
- Altered foot shape (frequently result of neuropathy).
- Absent ankle reflex.
- High foot pressures (presence of callus).
- Increasing age.
- Visual impairment.
- Living alone.