Diabetic foot complications comprise foot ulceration, Charcot neuroarthropathy (CN) and amputation. Foot complications are exceedingly common and it is estimated that more than 5% of diabetic patients will have a history of foot ulcers whilst the cumulative lifetime risk of foot ulceration may be as high as 25%. As up to 85% of all amputations are preceded by foot ulcers, it is safe to presume that any success in reducing foot ulcer incidence will be followed by a reduction in amputation. The economic consequences of diabetic foot lesions to the health-care providers are vast: a recent global review estimated that the annual cost of diabetic foot lesions to the health-care providers in the US is US$10.9 billion in 2001, with the equivalent figure for the UK being £252 million. This paper will therefore focus on the causation and potential for prevention of diabetic foot ulcers followed by a small note on Charcot neuroarthropathy which is much rarer than foot ulceration.

**Neuropathy**

The association between both somatic and autonomic neuropathy and foot ulceration has been recognised for many years. It is only in the last decade that prospective follow-up studies have confirmed this causative role of somatic neuropathy. Patients with sensory loss appear to have up to a seven-fold increased risk of developing foot ulcers compared with non-neuropathic diabetic individuals. Poor balance and instability are increasingly being recognised as troublesome symptoms of peripheral neuropathy, presumably secondary to proprioceptive loss.

Peripheral autonomic (sympathetic) dysfunction results in dry skin and, in the absence of peripheral vascular disease, a warm foot with distended dorsal foot veins. This may pose problems in terms of patient education as there is a strong lay belief that warm but pain-free feet are at significant risk of unperceived trauma and subsequent ulceration. When planning preventative educational programmes, it is essential to ensure that a careful explanation of neuropathy in understandable terms is provided.

In practice, peripheral neuropathy can easily be documented by simple clinical examination for evidence of neuropathy: the most important step is to remove the patient’s socks and shoes and look at the feet! Simple tools such as a neuropathy disability score and the monofilament may be used to document by simple clinical examination for evidence of neuropathy: the most important step is to remove the patient’s socks and shoes and look at the feet! Simple tools such as a neuropathy disability score and the monofilament may be used to help to identify the at risk neuropathic foot.

The identification of the high risk foot does not

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Diabetic Neuropathy & The Diabetic Foot

require detailed quantitative sensory testing or electrophysiology.

**Peripheral Vascular Disease**

Peripheral ischemia resulting from proximal arterial disease is recognised as a component cause in the pathway to ulceration in approximately a third of all cases. The ischemic foot is red, dry and often neuropathic: it is therefore susceptible to pressure from, for example, footwear.

**Other Risk Factors**

The presence of foot deformity, particularly claw toes and prominent metatarsal heads, is a proven risk factor for ulceration. Similarly, plantar callus accumulation was associated with a 77-fold increase in risk in one cross-sectional study, whereas in the follow-up of the same patients, plantar ulcers only occurred at sites of callus in neuropathic feet, representing an infinite increase in risk. Other risk factors include the presence of other microvascular complications, increasing duration of diabetes, increases in plantar foot pressures, peripheral edema and, most predictive of all, a past history of foot ulcers or amputation.

Prevention of foot ulcers amongst those identified with risk factors is critical if the high incidence of ulcers is to be reduced. There is a suggestion that education and regular podiatric care may result in earlier presentation when ulcers develop.

A few studies have assessed psychosocial factors in the pathway to ulceration. It appears that patients’ behavior is not driven by the abstract designation of being “at risk”: rather it is driven by the patients’ own perception of their risks. Thus if patients do not believe that a foot ulcer lies on the path from neuropathy to amputation, are they likely to follow educational advice on how to reduce ulcer risk? It is clear that research in this area is urgently required.

In summary, the most important aspect of diagnosing the foot at risk of ulceration is the regular removal of patients’ shoes and socks followed by a detailed examination of the foot for evidence of neuropathy, vascular disease, deformities, plantar callus, oedema, and other risk factors as noted above.

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