

# SKIN AND NAIL CONDITIONS AND THE DIABETIC FOOT

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Approximately 30% of all patients with diabetes will present with dermatological changes during the course of their disease (Ahmed and Goldstein, 2006). This article explores common skin and nail pathologies encountered on the diabetic foot to assist practitioners in recognising foot problems that could result in ulceration allowing prompt referral for appropriate management strategies.

Skin and nail changes occur due to the chronic complications of diabetes; high blood glucose levels (hyperglycaemia) can cause nerve dysfunction (neuropathy) and poor circulation to the feet (ischaemia).

Neuropathy and ischaemia can decrease the viability of the skin and nails and impair the normal immune response, thus increasing susceptibility to skin and nail infection. Furthermore, loss of protective sensation renders the foot more vulnerable to trauma and coupled with decreased tissue viability increases the likelihood of a breach in skin integrity and secondary infection.

Regular visual examination is essential to allow early identification of skin and nail problems that could predispose the patient with diabetes to foot ulceration, and allow timely intervention to prevent such problems occurring. This can be achieved by regular foot assessment by trained healthcare professionals and patient education. Practitioners should receive specific training that will allow them to identify skin and nail



Figure 1. Thickened toenails (onychosis).

problems and recognise the need for referral for treatment. Patients should also be encouraged to undertake daily inspections of their feet to promote and maintain their own foot health. If they are unable to undertake this task, carers or

relatives should be encouraged to assist.

## Common nail pathologies

Nail changes can arise for a number of reasons:

1. Poor circulation — a reduced



Figure 2. Fungal nail infections (onychomycosis).



Figure 3. Subungual ulceration.

blood supply to the foot can cause thickening or hypertrophy of toenails (onychauxis), as seen in *Figure 1*, and fungal nail infection (onychomycosis), illustrated in *Figure 2*.

2. Loss of sensation can mean minor repetitive trauma or a sudden trauma can go unnoticed — this can lead to thickening of toenails.
- 3) Diabetic patients are susceptible to fungal infection of the nails as high blood glucose levels can cause immunosuppression (Falanga, 2005).

Onychauxis and onychomycosis are aesthetically concerning for the individual; however, in diabetic patients, these nail conditions can give rise to further complications. Patients with ischaemia often develop ulceration under thickened toenails (subungual ulceration) which can go unnoticed, particularly if the patient has loss of sensation (Edmonds and Foster, 2006). *Figure 3* shows a subungual ulceration following trauma from ill-fitting shoes. Practitioners should examine toenails for signs of bruising, bleeding, discharge or other abnormalities.

Ingrowing toenails (onychocryptosis) are often encountered in clinical practice. Common causes of onychocryptosis include trauma, ill-fitting footwear and poor self-care, as seen in *Figure 4*.

In patients with diabetes, ingrowing toenails can lead to infection and delayed wound healing. Patients should be instructed on safe self-care; to cut nails straight across and to avoid cutting into the corners, as observed in *Figure 4*.



Nail conditions, including onychomycosis and onychia, are particularly common in the older population due to impaired circulation and systemic disease, such as diabetes (Singh et al, 2005). Regular podiatric care, including nail cutting and drilling, can reduce the likelihood of subungual ulceration and maintain patient comfort. All diabetic patients with nail pathologies should be referred for podiatric assessment and receive regular podiatry to minimise complications and maintain foot health.

### Common skin changes

Anhydrosis (dry skin) is often observed on the diabetic foot. This is usually due to poor circulation or neuropathy, specifically autonomic neuropathy. This can cause reduced sweating in the foot which subsequently leads to dry skin and increases the likelihood of callus formation or skin fissures (McIntosh and Newton, 2005).

Daily use of emollients can relieve dry skin and should be encouraged to prevent complications, such as fissures, occurring. However, emollients should not be applied between the toes as this can increase the risk of tinea pedis infection (athlete's foot). *Figure 5* shows severe anhydrosis of the foot with cracking of the skin.

Fungal skin infection is common in patients with diabetes. This most commonly presents as athlete's foot and is observed typically between the fourth and fifth toes. Tinea pedis often starts as an itchy, dry scaly rash before extending to the plantar aspect (sole) of the foot (Smoker, 1999). Patients should be advised to thoroughly dry between the toes after bathing

to minimise the risk of developing athlete's foot. In severe cases the risk of ulceration and contracting a bacterial infection is increased as the skin can peel and start to bleed (Smoker, 1999). Any break in the skin can provide a portal of entry for bacteria. Missoni et al (2006) also highlight the fact fungal infection is recognised as a risk factor for delayed healing in diabetic foot ulcers. *Figure 6* shows a diabetic foot ulcer on the great toe with surrounding skin showing signs of fungal infection.

Diabetic patients presenting with signs of fungal skin or nail infection should have nail clippings and/or a skin sample sent for mycological analysis so therapy can be tailored to address the infecting fungal spores. Referral to the patient's GP may be required for assessment and instigation of anti-fungal therapy.

### Conclusion

Skin and nail conditions can be aesthetically distressing for the individual, however, when they occur on the diabetic foot they can also increase the risk of infection and ulceration.

Healthcare professionals involved in assessing the diabetic foot should be able to recognise skin and nail problems, offer appropriate education to the patient to encourage them to maintain their own foot health and recognise the need for podiatry and GP referral for appropriate intervention to prevent complications occurring. **WE**

Ahmed I, Goldstein B (2006) Diabetes mellitus. *Clin Dermatol* **24(4)**: 237–46

Edmonds M, Foster AVM (2006) ABC of wound healing. Diabetic foot ulcers. *BMJ* **332**: 407–10



*Figure 4. Ingrowing toenail.*



*Figure 5. Severe anhydrosis of the foot with cracking of the skin.*



*Figure 6. Fungal skin and nail infection.*

Falanga V (2005a) Wound healing and its impairment in the diabetic foot. *Lancet* **366**: 1736–43

McIntosh C, Newton V (2005) Superficial diabetic foot ulcers. In: White R, ed. *Skin Care in Wound Management: Assessment, Prevention and Treatment*. Wounds UK publishing, Aberdeen: 47–73

Missoni EM, Kaleni S, Vukeli M et al (2006) Role of Yeasts in diabetic foot infection. *Acta Medica Croatia* **60(1)**: 43–50

Singh G, Haneef NS, Uday A (2005) Nail changes and disorders among the elderly Indian. *J Dermatol Venereol Leprol* **71(6)**: 386–92

Smoker A (1999) Fungal infections. *Nurs Standard* **13(17)**: 48–56