A user's guide to skin and nail conditions in diabetes

The inspection of the skin and nails is a routine part of screening and assessment. There are many skin and nail conditions that are innocuous but there are some that require recognition, intervention or explanation to concerned patients. This article is by no means exhaustive but gives an account of the most common presenting conditions that may present to an everyday clinician.

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Skin and nail conditions related to diabetes within the lower limb are common. These vary substantially in both their pathophysiology and clinical presentations and may range from subtle soft tissue and joint changes through to full thickness ulceration, overt gangrene and gross deformity. Although good clinicians must be able to use screening tools, they must also have good clinical observational, and history taking skills, supported by a thorough knowledge base. It is, therefore, important that all individuals involved in screening, assessment, health education and treatment for people with diabetic foot problems are appropriately educated and trained, working within clearly defined guidelines and well supported infrastructures.

Encouraging patients to be responsible for their own diabetes, including basic foot care, is essential; but many patients are unable to perform foot inspections/monitoring due to poor eyesight and reduced mobility (Masson et al, 1989; Thomson et al, 1992; McInnes et al, 2011, Chin and Huang, 2013). Therefore, maintaining regular contact between foot healthcare professionals and these patients is important (Edmonds et al, 1996). Additionally, regular monitoring and screening by healthcare professionals provides an ideal opportunity to reinforce messages of self-care (Boulton and Malik, 1998) and its importance.

Our previous article gave an overview of diabetic foot screening and foot ulcer risk stratification, in which we concentrated on the process and detecting loss of protective sensation and possible arterial deficits (Muzaini and Baker, 2017). It also included other qualifying risk factors, briefly mentioning callus and deformity. In this article, we will expand on these a little more but also discuss other skin, nail and joint conditions that are associated with diabetes *per se*, some of which are ulcer risk factors but many that are not. The aim of this series is to cover several aspects of diabetic foot conditions and an overview of their management to help clinicians in their daily practice.

Skin

Skin disorders are usually neglected and frequently underdiagnosed among diabetic patients, they are common complications and vary widely, e.g. cutaneous infection, dry skin, pruritus.

Some are highly associated with increased risk of important outcomes, such as ulceration, infection and potential amputation (Oe et al, 2012). They are associated with many factors, including hyperglycemia and advanced glycation end products (AGE) (Hsu et al, 2007; Chao et al, 2011; Sun et al, 2011; Jan et al, 2013). Although diabetic skin disorders are consistent in the literature, there is limited data regarding early-stage skin disorders in Diabetes Mellitus (DM) patients (de Macedo et al, 2016). Thus, better understanding of the burden of skin disorders in DM patients may raise awareness on prevention and management.

The skin on the plantar surface of the feet is highly specialised and subject to high levels of repetitive shear, compressive and frictional forces during walking and standing. Its biomechanical properties are beginning to be better understood and appreciated as are the effects of diabetes on these. Its unique viscoelastic nature and structure maintains its integrity whereby protecting against potential detrimental forces (Ryder et al, 1986; Sun et

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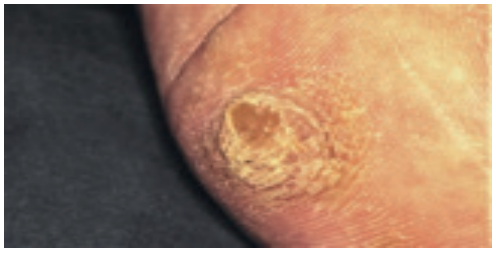

Figure 1. Callus – plantar callus over the 1st metatarsal head area.

Figure 2. Xerosis and skin fissures.

al, 2011; Jan et al, 2013). Alterations to the biomechanical properties of the skin are often overlooked but very important if serious complications, such as ulceration, are to be prevented. An appreciation of how AGE alters collagen properties, decreasing flexibility, solubility and increasing skins' rigidity, is essential (Hsu et al, 2007; Chao et al, 2011; Sun et al, 2011; Jan et al, 2013).

Inevitably, tissue damage occurs due to altered soft tissue mechanics together with an increased magnitude and/or duration of compressive, shear or frictional forces. A simple test to determine if the skin is inflexible or very easily gives way to light pressure will determine if intervention is required. This can be performed by simply gently pushing on the skin surface, if it resists deformation, it is inflexible; if it stays in dented, it is inelastic. This may include special foot orthoses and or modified footwear, regular inspection and general skin and nail care.

Dry skin (xeroderma)

Dryness of the skin (xeroderma) due to a decreased moisture and lipid content within the stratum corneum is a common finding with diabetes-related autonomic neuropathy leading to sweat gland denervation and is also considered to be concomitant with the normal skin ageing processes (Pigatto et al, 1996). Loss of moisture from the skin can result in functional deficits within both the dermis and epidermis, reducing its viscoelastic and anti-frictional qualities. Such functional losses can lead to callus formation *[Figure 1]*, which can lead to ulcer formation, and skin fissures exposing the dermis to potential pathogenic invasion, tissue loss and ulceration. The frequent and regular use of moisturisers can help address this problem (Baker and Rayman, 2008) and, additionally, reinforces the importance self-care and foot examination. The simple action of applying appropriate moisturisers once or twice daily is one of the best preventative treatments we have. This is perhaps even more pertinent in some cultural/religious settings where feet are constantly unshod or washed several times daily. A clinical rule of thumb is that when first treating xerosis (dry skin) frequent daily applications of a moisturiser may be required. Once the skin is hydrated, a once daily application may be sufficient to prevent xerosis recurring.

Skin fissures

Skin fissures (splits) are common in patients with diabetes, although there is a paucity of epidemiological data regarding prevalence (Oe et al, 2013). Clinically, they are most frequently seen on the heels' margins and predominately caused by inflexible skin *[Figure 2]*. They are more common in neuropathic patients due to decreased sweating as a result of autonomic dysfunction (Ryder et al, 1988). Fissures can deteriorate rapidly to ulceration and may become necrotic in patients with neuro-ischaemia. Preventative measures include regular foot inspection and once- or twice-daily application of moisturisers, ideally containing a humectant such as urea or glycerine as these have been shown to be more effective (Pham et al, 2002; Baker and Rayman, 2008; Federici et al, 2012; Martini et al, 2017). This is more effective when the superficial dry skin is gently and cautiously removed using a mild abrasive, i.e. an emery board type foot file. If callus is present surrounding or overlying a fissure, this should be removed by a podiatrist in order to allow the edges to knit together.

Hard skin/callus and corns

Hard skin/callus over weight-bearing parts of the foot, particularly the metatarsal head area and over the toe tips, is commonly seen in those with sensory neuropathy; however, the mechanism for this is still unknown (Arosi et al, 2016). It is generally quite thick, yellow, superficially dry and hard. In contrast, callus in the neuro-ischaemic or ischaemic foot is typically thin, dry, glassy and very hard. Anecdotally, it is more frequently located on the borders of the feet but may also be located over any weight-bearing area.

Figure 3. Soft corn between the 5th and 4th toes with moist fungal infection also present similar to T. mentagrophytes.

Figure 4. Onychogryphosis — thickened, distorted and discoloured 1st toenail.

The presence of plantar callus in neuropathic subjects has been shown to significantly increase peak plantar pressures and shear force (Young et al, 1992; Pitei et al, 1999; Hamatani et al, 2016), which are aetiopathic for ulceration, and that its removal reduces pressures by up to 23% (Young et al, 1992; Murray et al, 1996; Pitei et al, 1999). This is of prime importance as there is a very clear causal link between callus, high pressure, neuropathy and ulceration (Veves et al, 1992). Interestingly, plantar callus, and its removal in patients without diabetes, does not alter plantar pressures (Potter and Potter, 2000) and it is not associated with ulceration. This would suggest that callus in those with diabetic neuropathy becomes pathogenic. This may be due to sensory loss, masking the noxious stimulus of hard callus with unaltered gait and/or the altered soft tissue mechanics of the underlying and surrounding tissue, which is unable to cope with the applied increased shear, frictional and compressive forces. One hint towards the authors' theory of this latter explanation can be seen in a study that showed improved tissue mechanics following silicone injections at peak pressure sites (van Schie et al, 2002). However, more research is needed to confirm this theory.

The presence of bloodstained callus (looking like raspberry or blackcurrant jam under hard skin) is highly predictive of ulceration, with reportedly an 80% incidence following callus removal (Rosen et al, 1985; Harkless et al, 1987). At best this is a pre-ulcerative state and should be treated as a clinical emergency requiring a clear explanation to the patient of what is present and urgent referral (same day) to for callus removal and pressure relief.

Corns are simply compacted hard skin that occur over areas of concentrated high pressure, e.g. the metatarsal heads, over dorsal toe joints or between the toes. In the latter position, they are called 'soft corns' *[Figure 3]*. They are said to have a nucleus, which in reality means that the compacted hard skin is conical in shape with its apex towards the dermo-epidermal junction. They are best treated by sharp enucleation — removing them with a scalpel, which should be undertaken by a podiatrist. If left untreated, they can ulcerate at the apex due to sustained pressure on the immediate dermal tissue.

Nail conditions

Nail plate disorders can be diagnostic of several systemic pathologies, e.g. psoriasis, pulmonary and cardiac disorders. However, it falls outside the remit of this paper to explore these. Nevertheless, some common nail pathologies are important and need to be described. Often perceived as fairly minor, some nail conditions can lead to significant problems if not addressed appropriately.

Thickened nails — onychogryphosis/ onychochauxis

Characteristically, the nail plate is generally thickened, frequently ridged, hard and can be distorted (onychogryphosis) or without distortion; i.e. normal shape (onychauxis). It is not uncommon clinically to note the nail plate separated from the nail bed especially in the distal margins with accumulated/compacted dry skin *[Figure 4]*. Commonly, the nail may appear discoloured, ranging from dark brown to yellow, in these cases the nail can be confused with that of fungal nail infection. It may affect an individual nail, usually the big toenail, or multiple nails. This condition is most commonly caused by either a single major trauma, e.g. dropping something heavy on it or repeated minor injuries, such as toes stubbing against the end of the shoes.

Figure 5. Onychomycosis — fungal infection of the 1st toenail.

Figure 6. Onychocryptosis — in-growing toenail

It is important to regularly reduce the thickness of the nail plate using a nail drill and gently remove any compacted dry skin. Failure to do so may lead to tissue breakdown or ulceration of the nail bed due to constant pressure (pressure injury). This can be disastrous as there is very little tissue between the nail bed and underlying bone, which, if exposed, can quickly lead to osteomyelitis. This is especially true in patients with absent sensation, poor blood supply or those with renal failure.

- Checking inside the shoe toe-box will quickly determine if it is too shallow, as a hole in the lining will be felt.
- Hyperextension of the distal phalanx associated with reduced dorsiflexion at the metatarso-phalangeal joint.
- Wearing short or slip on shoes.

The nail-plate can easily be reduced in thickness, using a nail drill by someone who is appropriately trained in their use.

Onychomycosis

This is a fungal (dermatophyte), yeast or mold infection of the toenail and may vary in its appearance *[Figure 5]*. The infection starts at the leading edge of the nail plate and spreads proximally to the root matrix. It generally causes the nail plate to become friable, thickened and discoloured (yellow/orange, brown, white or black) and may have a 'musty' smell.

The causative pathogens of onychomycosis are all in the fungal kingdom and include dermatopyhtes, candida (yeasts) and non-dermatophyte molds (Westerberg and Voyack, 2013). Dermatophytes are the fungi most commonly responsible for onychomycosis in the temperate western countries; while candida and non-dermatophyte molds are more frequently involved in the tropics and subtropics with a hot and humid climate (Chi et al, 2005).

White superficial onychomycosis (WSO) is caused by fungal invasion of the superficial layers of the nail plate to form 'white islands' on the plate. WSO is a misdiagnosis of 'keratin granulations', which are not a fungus but a reaction to nail polish that can cause the nails to have a chalky white appearance (Baran et al, 2007). A laboratory test should be performed to confirm or refute the presence of dermatophyte infection.

Fungal nail infections are much more difficult to treat topically than skin infections and generally require systemic anti-fungal therapies often in conjunction with topical nail lacquers. This is in part due to poor nail penetration, insufficient and sustained concentrations of topically applied treatments. They are only indicated for dermatophyte infections that have not spread to the root matrix More recently the use of LASER and Infra-Red Light has been used with promising results (Bristow, 2014). Diagnosis is dependent on clinical findings and confirmation by microscopy. However, laboratory microscopy is often negative even when clinically the nail appears infected. This may be due to poor techniques in obtaining nail clippings samples, incorrect sample transport methods and delayed transportation to the testing laboratory. The incidence of fungal infection in the nail plate are poorly reported and vary considerably with reported rates of between 2.8% (Perea et al, 2000), 11% (Sigurgeirsson and Steingrimsson, 2004) and 26% (Saunte et al, 2006) respectively.

However, one multicentre study found an incidence of 26% in patients with diabetes confirmed by positive microscopy. Interestingly, the incidence of nails that clinically appeared infected was much higher 46% but were not confirmed by microscopy (Saunte et al, 2006). However, a new bedside testing kit has

Figure 7. Onychorrhexis — longitudinal ridging of the nail plate.

Figure 8. Involuted nail.

Figure 9. Long unkempt nails.

been developed that reports 84.8% positive predictive value (Tsunemi et al, 2014). Similar to onychogryphosis/onychochauxis, the nail should be thinned and accumulated skin debris gently removed, a dust extraction drill should be used to thin the thickened nail plate.

Onychocryptosis (ingrowing toenails)

These are often caused by incorrect nail cutting or toe stubbing injuries leading to a spicule of nail penetrating the skin in the nail groove (sulcus) *[Figure 6]*. This results in a wound and frequently the formation of hypergranulation tissue around the nail spicule. Frequently, these lesions become infected. Thus, the common clinical picture is one of a red, hot, swollen toe with hypergranulation tissue in the nail sulcus which often extends over the immediate nail plate. This condition will require the spike/spicule of nail to be removed and possibly the hypergranulation tissue to be removed; although this frequently resolves when the offending section of nail has been removed. Antibiotics alone will not usually resolve this condition but are often required.

Paronychia

This is inflammation around the nail plate and may be infected or non-infected. It is due to several causes but most commonly repetitive stubbing injuries, single trauma, chemical burns, or soft tissue infection. Determining the cause will direct the treatment. It may be painful or pain free and may appear as slight redness in the skin immediately surrounding the nail plate to very red hot, swollen and sometimes with blistering or pus.

Onychorrhexis

This is longitudinal ridging of the nail plate which also may be thin and brittle *[Figure 7]*. The ridging may be subtle or appear as white lines. It is considered part of the normal aging process and is due to slow restricted atrophy of the nail root matrix. In general, this condition gives no rise to concern.

Involuted/convoluted nails

Involuted nails is characterised by excessive longitudinal curvature of either the whole nail plate or the section of the nail plate next to the sulcus *[Figure 8]*. Often this condition is termed an 'ingrown' nail. It may be painful or pain free and requires meticulous nail care to prevent an onychocryptosis (ingrowing nail). If this causes persistent discomfort partial or total nail resections may be required.

Convoluted nails are an excessive form of involution where the nail plate is so excessively curved it is almost circular. As above treatment requires careful nailcare or nail avulsion if persistently problematic.

Suggested nail care would include not cutting the nail short, or down the sides. Gently freeing the leading edge of the nail with a blunt probe prior to cutting and gently removing any debris or loose skin in the nail grooves.

The aetiology of both of these nail conditions is unclear but may be inherent, congenital, due to tight shoes or abnormal gait patterns.

Thin brittle nails

These are generally caused by either poor blood supply to the nail root matrix or malnutrition they can also be seen in patients undergoing chemotherapy. The nails appear thin lack lustre and easily split or break. Regular nail filing prevents damage to the skin of adjacent toes from split or roughened nail edges rubbing against them.

Long nails

If toe nails are left to get too long, the results can be devastating especially in those with reduced sensation as damaged caused by a long toenail penetrating a neighbouring toe may go unnoticed for some time *[Figure 9]*.

Subungual ulceration

This is ulceration occurring under the nail plate. The most common causes of this is either low grade pressure plus time, i.e. a thick nail plate constantly pressing on the nail bed leading to avascular necrosis — pressure sore. Or hyperextension of the distal phalanx; most commonly the great toe, leading to persistent pressure from the shoe toe-box area. It can also be caused by repetitive toe stubbing especially when running. In all of these the presence of sensory loss or peripheral arterial disease furthers these lesions. Clinically, there may be evidence of inflammation surrounding the nail plate, discolouration or blood staining visible in the nail bed or blistering visibly evident under the nail. Additionally, there may be evidence of oozing at the free edges of the nail and the nail may appear quite loose. It is important that the nail plate is cut back or removed (if loose) to expose the ulcer and allow drainage and monitoring. Failure to do so may result in deepening of the ulcer to bone and infection.

Fungal skin infections

Athlete's foot, known as Tinea Pedis is a fungal

Figure 10. Tinea Pedis — dry scaling between the toes, similar to T. Rubrum.

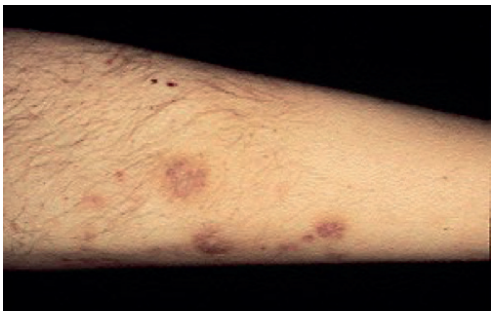

Figure 11. Diabetic dermopathy on the shin.

or yeast infection of the skin in the foot that can cause considerable discomfort and distress *[Figure 10]*. It has a reported global prevalence of 15% of the general population (Havlickova et al, 2008; Bell-Syer et al, 2012) the precise prevalence in the diabetic population is not known. However, two studies from Brazil reported incidence rates of 29.2% and 35% respectively (Foss et al, 2005; Wambier et al, 2014). Signs and symptoms often include itching, flaking, inter-digital fissuring, redness and vesicular eruptions.

Usually, diagnosis is made based on signs and symptoms; however, it can be confirmed either by culture and microscopy, however, often culture results return as negative. Athlete's foot occurs most often inter-digitally, with the space between the 4th an 5th toe most commonly afflicted (Hirschmann and Raugi, 2000; Hainer, 2003; Al Hasan et al, 2004). Inter-digital athlete's foot caused by Trichophyton rubrum symptoms range from itching, the skin between the toes may appear red, scaly, flaky, with soft and white macerated skin (Likness, 2011). An acute ulcerative variant of interdigital athlete's foot caused by *T. mentagrophytes* is characterized by pain, skin maceration, erosion, fissuring, crusting of the skin and an odor due to secondary bacterial infection (Tiougan et al, 2011). Plantar athlete's foot (moccasin foot) is also caused by *T. rubrum*, which typically causes asymptomatic, slightly erythematous plaques forming on the plantar surface often covered by fine, powdery hyperkeratotic scales; this can often be confused with Xerosis (Tiougan et al, 2011; Bell-Syer et al, 2012). The vesicular type of athlete's foot is less common and is usually caused by *T. mentagrophytes* and is characterized by a sudden outbreak of itchy blisters and vesicles on an erythematous base (Moriarty et al, 2012), usually appearing on the sole of the foot. This subtype of athlete's foot is often complicated by secondary bacterial infection by *Streptococcus pyogenes* or *Staphlococcus aureus* (Tiougan et al, 2011).

Fungal skin infections are not a primary cause of foot ulceration, however, because they erode the epidermis exposing the dermis there is an increased risk for subsequent bacterial infections that can progress to ulceration Because the most common site for this to occur is between the toes it is important to examine between patients toes during foot screening. Fungal skin infections can be treated quite easily by the topical application of anti-fungal creams, e.g. terbinafine, with reported success (Crawford and Hollis, 2007).

Diabetic dermopathy

Diabetic dermopathy is a condition associated with the skin of diabetics *[Figure 11]*. It is a common cutaneous finding in diabetes, appearing in 11–50% of people with diabetes (James et al, 2006; Rapini et al, 2007; Ahmed et al, 2009; Patterson, 2010) it is also known as shin spots. These pigmented patches are frequently bilateral, multiple and hyper-pigmented macules on the pretibial areas. Lesions may also appear on the forearm, the side of the foot, and the anterior surface of the lower thigh.

The lesions are painless round or oval, reddish-brown, scaly papules and plaques, ranging in size from 0.5 to 1cm. The incidence of diabetic dermopathy has been shown to correlate with an increased glycosylated haemoglobin and duration of diabetes. They can occur at any time but tend to be seen more often whenever there has been some kind of trauma or injury to the area (Rapini et al, 2007; Patterson, 2010).

Due to the frequent location of the lesions over bony prominences, diabetic dermopathy may simply be a magnified response to trauma such as heat, cold, or blunt objects in people with diabetes. There may be a link between diabetic dermopathy and other complications of diabetes such as

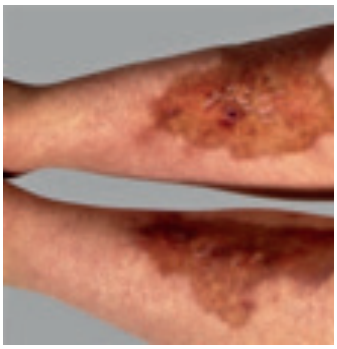

Figure 12. Necrobiosis lipoidica diabeticorum on both shins.

Figure 13. Granuloma annulare.

Figure 14. Bullosis diabeticorum – large extensive non-inflammatory blister.

Figure 15. Xanthomas around the heel.

microangiopathy and neuropathy (Kiziltan et al, 2006; Abdollahi et al, 2007; Brugler et al, 2011).

Thus, patients with diabetic dermopathy should be further evaluated for detection of other concomitant complications. To date, there is no effective treatment for diabetic dermopathy.

Necrobiosis lipoidica diabeticorum

Necrobiosis lipoidica diabeticorum (NLD) is one of the characteristically unique cutaneous conditions associated with diabetes *[Figure 12]*. It is a fairly uncommon condition, occurring in approximately 0.3% to 1.2% of people with diabetes; two thirds of whom have type 1 diabetes (Ahmed and Goldstein, 2006). NLD initially presents with well-circumscribed erythematous papules, which develop into large, irregularly delineated telangiectasic plaques with a waxy, yellow centre. Except when ulcerated, these lesions are asymptomatic but may cause distress to female patients due to their appearance when legs are exposed wearing dresses/skirts. NLD is more common in men (Bello and Phillips, 2001) than women and appears in young to middle adulthood (O'Toole et al, 1999), although some cases have been reported in childhood (De Silva et al, 1999).

The pathophysiology of NLD is not clearly understood with some lesions of NLD resolving spontaneously but often not. The use of 1–2% topical corticosteroids has been shown to have some benefit (Kelly et al, 1993) but should not be used for protracted periods of time unless guided by a dermatologist. Recently, a new therapeutic attempt has been reported, including topical PUVA photochemotherapy (Narbutt et al, 2006) after a mean of 47 sessions all 10 treated patients experienced almost complete remission of the skin lesions. On the other side, systemic therapies using corticosteroids and azathioprine could facilitate malignant transformation (Gudi et al, 2000). Squamous cell carcinomas have been reported to arise in areas of NLD and although not common it is clinically worth mentioning (Gudi et al, 2000).

Granuloma annulare

Granuloma annulare (GA) presents in many clinical forms, the most common, localized GA, occurs frequently in children and young adults and is not associated with diabetes mellitus. Less common forms include multiple, perforating, subcutaneous, and generalized GA. The generalized form (also called disseminated GA) is more prevalent than the other variants in diabetic patients. GA is identified by its characteristic annular plaques that begin as red, or reddish-brown papules symmetrically spread across the upper trunk, neck, arms, and occasionally the legs *[Figure 13]*.

The aetiology of GA remains unknown and the therapy recommendations remain empiric. Suggested treatments include topical and intralesional corticosteroids and ultraviolet A (PUVA).

Bullosis diabeticorum

Bullosis diabeticorum or diabetic blistering is a rare, distinct, noninflammatory, spontaneous blistering condition *[Figure 14]*. It has a reported prevalence is between 0.5%–2% with a male-to-female ratio of 2:1 (Mahajan et al, 2008). The blisters (bullae) appear on the dorsum of the foot, toes, hands and fingers. The blisters have a propensity to be large and often have an asymmetrical shape. They can be small approximately 0.5 cm ranging to very large ≥ cm, containing clear, sterile, viscous fluid.

The bullae can be intraepidermal or sub-epidermal. Intraepidermal bullae are clear, sterile, non-haemorrhagic blisters that generally heal on their own within two to five weeks without scarring or atrophy (Lipsky et al, 2000). Sub-epidermal bullae are the least common of the two types of bullosis diabeticorum. These blisters are similar to the intra-epidermal blisters except they occasionally are haemorrhagic and may heal with scarring and atrophy. *Bullosis diabeticorum* is usually self-limiting; however, bacterial infections can result in deep infections. Local care to avoid blister eruption and appropriate antibiotic treatment for secondary infection is recommended.

Xanthomas and xanthelasma

Diabetics often suffer from high lipid (cholesterol and triglycerides) levels in the blood *[Figure 15]*. This causes fats to be deposited in the skin and presents as xanthomas or xanthelasma.

Xanthomas are painless, yellow, firm nodules usually found over bony elbows, knees and heels. Sometimes, the appearance may be as pin-head sized yellow lumps, appearing in crops over the buttocks (eruptive xanthomas).

Xanthoma tendinosum (also tendon xanthoma or tendinous xanthoma) is clinically characterized by papules and nodules found in the tendons of the hands, feet and heels. It is also associated with familial hypercholesterolemia.

Xanthelasma is a sign of high cholesterol levels in the blood and presents as yellow

patches on the eyelids. Treatment is aimed at normalising the lipid levels by dietary restriction of saturated fats and if necessary, medical treatment with lipid lowering drugs.

Bacterial skin infection

It is not the remit of this article to fully discuss diabetic foot infections and the diabetic foot as this is a topic in itself, however, it is necessary to make a very brief comment on this important topic.

Foot infections are common in patients with diabetes and sometimes are the presenting feature of undiagnosed type 2 diabetes. It is important to note that the cardinal signs of infection, redness, heat, swelling, oedema, pus may be reduced and therefore are not as obvious as in those without diabetes. Unexplained raised blood sugars, sudden localised pain or discomfort in neuropathic ulcers can signify the onset of infection well before the presence of any clinical signs. Foot infections are serious and can progress very quickly, which if not managed correctly and aggressively can lead to lower limb amputations. Any infection that does not show signs of responding to antibiotic therapy after 3 days should be treated very seriously and referred to a specialist foot clinic.

Conclusion

Skin and nail conditions are very common in diabetes and this article gives a brief overview of some of the most common clinical presentations. It is not by any means an exhaustive text in reference to the array of skin and nail conditions that may be encountered in patients with diabetes. Equally, it is not a text that explores all treatment options for the conditions mentioned. Diabetic foot conditions are optimally managed by interdisciplinary team work and to this end the role of a dermatologist is perhaps underutilised and should be more integrated in this area. DFJME

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