



A foot ulcer in a man with longstanding diabetes



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This section discusses the immediate management and investigation of an acute presentation in general practice. It is inspired by, but not based on, a real patient situation.

Don is 58 years old and has had type 2 diabetes for 17 years. You do not know him well but he is well known to your practice and attends a couple of times a year, mainly for prescriptions. He takes 2 g metformin extended release at night in addition to 60 mg gliclazide extended release, 40 mg atorvastatin, 5 mg perindopril (for hypertension) and 300 mg allopurinol, all taken in the morning.

Don has for some years declined a diabetes management plan for review by a diabetes educator, dietitian or podiatrist as he says he keeps a close eye on his weight, carbohydrate intake and foot care. He also has not enabled ready review of his feet, preferring to keep appointments brief. He has never seen an endocrinologist. He tells you that the proof is in his HbA_{1c} results, cholesterol levels and his lack of obvious organ damage. He looks fit and not overweight. He comes to see you today as he has had an ulcer for two months under his left first metatarsal head, which has not healed and is, by his history, worsening.

What would you like to ask Don about his problem?

Answer: Does he recall how the ulcer began or what might have contributed to it? Is it painful? Does he ever go outside without shoes? Has he changed his footwear recently? What exercise does he do and how often, has he taken up a new form of exercise in the past few months? Does he have normal sensation in his toes? Have his blood glucose levels been stable? Does he do capillary blood glucose self-monitoring? Does he ever forget to take, or run out of, his diabetes medications?

Don's HbA_{1c} levels, which are carried out twice a year (not three to four times a year as it should be, as a compromise your colleagues have sought with him), are usually below 7.0%, with his last level being 6.5%, and he has normal annual renal function (estimated glomerular filtration rate above 60 mL/min/1.73m²) with no albuminuria. He rarely runs out of medication and measures his capillary blood glucose levels

usually only if he is feeling unwell. He denies symptoms of any hypoglycaemia. He thinks the foot ulcer began after he had an episode of gout in his right big toe about three months ago. He could not walk on the right foot properly for a couple of weeks and when the gout resolved, he realised that he had developed callus over the ball of his left foot and this progressed over a few weeks to an ulcer. He always wears shoes outside the house. He otherwise denies any symptoms in his feet, except the ulcer was not initially sore but now some instability and general discomfort is causing him to avoid direct pressure on it. He has not jogged (his usual lunch time exercise) for more than a month – since he noted the ulcer over a month ago. He is disappointed the ulcer has not healed with his management (plus wearing soft shoes).

You ask Don's permission to examine him. What are you interested in?

Answer: You want to look at Don's shoes, both his feet, ankles and lower limbs. You are

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particularly interested in how his shoes fit, evidence of any peripheral neuropathy, the foot temperature bilaterally, arterial pulses, venous drainage, evidence of any foot deformity, including chronic gout or joint deformity from gout, trophic changes, cracks, rubbing, callouses, corns, fungal nail or skin infections, toe clawing and, of course, ulceration. You should test for sensation in the toes (ideally using a 10 g monofilament) and vibration sense at the first metatarsal joint. If foot pulses are not present and you have the ability to test ankle-brachial index then this should also be carried out. You also would like to ensure Don can flex his forefoot normally.

The left foot ulcer is 8 mm in maximal diameter, isolated, punched out over the head of the first metatarsal and there is yellow slough at its base. When cleaned with chlorhexidine and saline, the ulcer base is quite deep at 6 mm but bone is not visible. The ulcer site is 3°C hotter than the other foot, with extensive 3 cm of surrounding erythema, each consistent with localised infection. Oedema is absent and there are no major foot deformities, trophic changes or overt fungal infections, but there are fissures at the heels. Sensation with a 10 g Semmes-Weinstein 5.07 gauge monofilament is reduced over the first and fifth plantar aspect of the toes bilaterally and vibration sense is abnormal at the first metatarsophalangeal joints. The toes and forefeet feel cool and slightly pale and capillary return is slowed bilaterally despite the room temperature being warm. Proximal and peripheral limb arterial pulsation feels equal bilaterally and there is no venous disease.

What are you most concerned about at this point?

Answer: You are concerned that Don may have a deep bacterial infection, such as osteomyelitis or septic arthritis, from an infected diabetic foot ulcer. A foreign body is less likely if Don is correct when he says he never goes outside without shoes. A secondarily infected ulcerated gouty tophus is low on the differential diagnosis list given the position of the ulcer and the history. Don may also have some small vessel arterial disease but normal foot pulses provide some reassurance that major

large vessel arterial disease is unlikely. Overall, Don needs a multidisciplinary approach to his foot ulcer care.

What do you suggest to Don regarding immediate investigation and management at this point?

Answer: Don will need to be carefully assessed for osteomyelitis or septic arthritis and, if there is any doubt, be treated as having bone involvement of infection. This will involve a foot x-ray in the first instance to exclude bony destruction or a radio-opaque foreign body. In the meantime, Don should avoid or at least minimise weight bearing on the foot. Considering a clinical infection is present, antibiotic therapy should be commenced to cover the most common organism, *Staphylococcus aureus*. For example, 500 mg dicloxacillin four times daily, 150 mg clindamycin four times daily, 875/125 mg amoxicillin/clavulanate twice daily or 500 mg cephalexin four times daily, as tolerated. Antianaerobe antibiotic cover with 200 mg metronidazole three times daily may be added. Use of off-loading devices, limited debridement and dressings (plus advice on type and frequency) are best carried out by a podiatrist with community nursing support. Typically, a postoperative shoe is used for ulcer site pressure offloading, with a foam dressing applied about every three days. Considering the depth and duration of the ulcer, care by a multidisciplinary diabetes high-risk foot care service is indicated within the next 48 to 72 hours (if Don is prepared to attend). As only his left foot is involved, he can continue to drive his motor vehicle, which has automatic gears.

Are there other investigations you think Don should have?

Answer: Don should have basic blood tests, including a full blood count and measurement of C-reactive protein, HbA_{1c}, electrolytes, urea, creatinine, liver enzymes and a random blood glucose level. He should also have arterial Doppler studies of the legs early in his presentation, given the early neuropathy and pallor of the forefeet (grossly normal peripheral arterial pulsations do not guarantee that the arterial Dopplers are also normal). If significant peripheral arterial disease is present then this

Practice points

- The risk of underlying osteomyelitis or septic arthritis should always be considered in patients with diabetic foot ulcers that have been present for some weeks and are not healing.
- An x-ray is the best imaging modality for possible bone or joint infection, although it lags behind the clinical picture by many weeks and careful clinical assessment of the foot and patient is always required.
- Patients with a diabetic foot ulcer should be assessed for all possible complications of their diabetes and a review of their management should take place. The annual cycle of care requires assessment for diabetes complications and this includes neuropathy, which, if present, should prompt referral for regular (every six weeks) podiatry care, offloading if required, and patient education in foot self-care.
- Patients with diabetes and peripheral neuropathy should not walk barefoot outside or at home so as to avoid foot trauma; they should not cut their own nails, and be encouraged to check their feet daily for unrecognised injury and to then report it to their doctor promptly.
- Patients with a diabetic foot ulcer should ideally be referred to a diabetes high-risk foot service if the ulcer is not healing, involves deep tissue such as tendon or bone, is infected clinically or has arterial disease involvement, or if the presentation is delayed by some weeks.
- For further information see the article on 'Management of diabetes-related foot ulcers: optimising outcomes' in the October 2013 of *Endocrinology Today*.

ACUTE PRESENTATIONS IN GENERAL PRACTICE CONTINUED

is important because it limits the degree of debridement that would be undertaken and creates an opportunity to aid ulcer healing by revascularisation. As the plain x-ray shows no abnormality, there is no immediate indication to assess for osteomyelitis by more extensive imaging (e.g. by CT or MRI scan). The clinical progress and x-rays every six weeks can help to assess for any bony changes.

Are there any other likely referrals that Don should be made aware of?

Answer: Don's glycaemic control is adequate at present. His blood LDL-cholesterol of 2.0 mmol/L is acceptable, his blood pressure is controlled at less than 130/80 mmHg and he does not smoke. Thus his reversible macrovascular risk factors are well controlled. If he attends a diabetes high-risk foot service then he may well be seen by an endocrinologist as well as podiatrist and nurse educator. At present, there is no clear indication for referral to an endocrinologist. As his diabetes is becoming complicated you may decide to nonurgently refer him to an endocrinologist because it is likely that the regimen to control his blood glucose will become increasingly complex although remarkably he has good HbA_{1c} levels while taking two oral agents alone and with such a long diabetes duration.

Don will ideally need to visit a high-risk foot clinic, or podiatrist specialising in high-risk feet, regularly from now on and will be supplied with an appropriate walking boot (such as a 'post-op' shoe). He will be given advice about

future footwear, debridement and review frequency and dressings. Typically he will initially be seen weekly by the service to help ensure the ulcer is objectively healing and the treatment plan is being followed.

For his general diabetes care, Don should be strongly advised to see a dietitian and a diabetes educator. Access to these allied health professionals (plus the podiatrist) may be arranged through a diabetes management plan (with a Medicare rebate). Don should be assessed by an optometrist or ophthalmologist if he has not done so in the past one to two years. Finally, if Don requires surgery for the foot ulcer, he should ideally have a cardiology review.

Don may feel that he does not need to see a dietitian or diabetes educator. What might you say to persuade Don to see these health professionals potentially annually from now on?

Answer: Don should be reminded that he is missing out on new information about appropriate nutrition and management of his diabetes. Research shows that people with diabetes remember more and have better diabetes control if they attend annual reviews with a dietitian and diabetes educator. In addition to this, now that Don is older with a longer diabetes duration, end-organ damage is developing and that makes it even more important to take advantage of all the support he can receive to help slow down and manage these complications.

It would also be wise to see if there is an underlying reason for Don's apparent denial of the need for regular help. He may have developed clinical depression although his medication and lifestyle adherence make this less likely, or he may have social/family problems or a personality trait that requires further review and management. It might be wise to ask Don if he would like to bring a close friend or family member to the next consultation for their support and education (especially when Don sees the dietitian if he does not do his own shopping and/or cooking).

Outcome: Don was referred to a diabetes high-risk foot service within one to two weeks of his presentation in general practice, which was five to six weeks after the onset of a clinically infected ulcer suspicious for osteomyelitis. Absence of clinically significant peripheral arterial large vessel disease was confirmed by normal range of ankle brachial pressure index and arterial ultrasound imaging. With ongoing pressure offloading, ulcer debridement and dressing, plus weekly to second weekly review and ongoing antibiotic therapy, the ulcer was clearly healing after three weeks from initial therapy. By week 16 after his initial presentation the ulcer had clearly healed. Serial plain x-rays every six weeks did not show features of osteomyelitis. Appropriate footwear and regular community podiatry review and care every six weeks were commenced, considering Don's risk of reulceration is, in general, high at 60% plus. **ET**