Beyond the wound: A multidisciplinary success story of limb preservation complicated by complex multimorbidity

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Article points

1. Exploring the use of motivational interviewing techniques within podiatry care has potential to enhance patient behavioural change and reduce risks associated with diabetic foot disease
2. Podiatrists are well placed to serve as change agents with the frequency and duration of podiatry wound management care.
3. It may be beneficial for multidisciplinary foot clinics to consider broader input when managing patients with heart failure.

Key words

comorbidity
ischaemia
limb reservation
multidisciplinary

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This paper examines the clinical challenges associated with wound healing and limb preservation in patients with chronic limb-threatening ischemia, highlighting the influence of multimorbidity and therapeutic limitations on patient prognosis. This case report details the management of a 64-year-old man with an infected, gangrenous toe, necessitating emergency admission. The patient had significant comorbidities, including poorly controlled diabetes, cardiovascular disease, peripheral neuropathy, nephropathy, and chronic heart failure. Arterial angioplasty of three lower limb vessels successfully restored perfusion, facilitating both wound healing and limb preservation. However, the patient experienced substantial post-surgical complications. This case underscores the need for an integrated care approach when managing patients with complex multimorbidity. It remains uncertain whether an alternative treatment strategy would have resulted in a more favourable outcome. The findings suggest that a review of current vascular surgical outcomes with a closer examination of postoperative quality of life may be beneficial for optimising patient care.

Chronic limb-threatening ischaemia (CLTI) is characterised by rest pain, gangrene, or lower limb ulceration, on a background of underlying peripheral arterial disease (PAD; Conte et al, 2020). PAD occurs when atherosclerosis narrows or blocks peripheral arteries, leading to ischaemia, through reduced blood flow to peripheral tissue (Nordanstig et al, 2023). If perfusion is lost entirely, tissue necrosis can develop, with resultant gangrene. CLTI has a worse prognosis than many cancers (Robbins et al, 2008).

Peripheral arterial disease (PAD) is strongly associated with diabetes, with prevalence estimates ranging from 20% to 50% (Stoberock et al, 2021; Sartipy et al, 2022). Cardiovascular disease is the principal cause of mortality in individuals with type 2 diabetes, predominantly attributable to the high co-prevalence of coronary artery disease and cerebrovascular disease, due to the widespread manifestations of atherosclerosis (Lacroix et al, 2007; Wong and Satter, 2023). In Scotland, approximately 85% of major lower-limb amputations are attributable to diabetes and/or PAD (Carr et al, 2023).

Multimorbidity is defined as the coexistence of two or more long-term health conditions (National Institute for Health and Care Excellence [NICE], 2023). Its impact varies between individuals, as each condition contributes a distinct degree of health burden (Pati et al, 2023). The recognition of complex multimorbidity may facilitate the prioritisation of care; however, in the absence of a standardised definition, the concept remains open to interpretation ((Alvarez-Galvez and Vegas, 2022; Pati et al, 2023). Multimorbidity is associated with reduced life expectancy and diminished quality of life (NICE Clinical Knowledge Summaries, 2023). Furthermore, it often results in fragmented care, which may contribute to suboptimal treatment outcomes, and imposes substantial costs on healthcare systems (Prior et al, 2023; Gatome-Munyua et al, 2025).

Case report

Mr Jones (name changed to protect confidentiality) is a 64 year old man who is known to podiatry services. He presented with a traumatic wound to his left foot



Figure 1. Ulcer at first visit



Figure 2. Left foot at week 4 showing infected necrotic third toe.

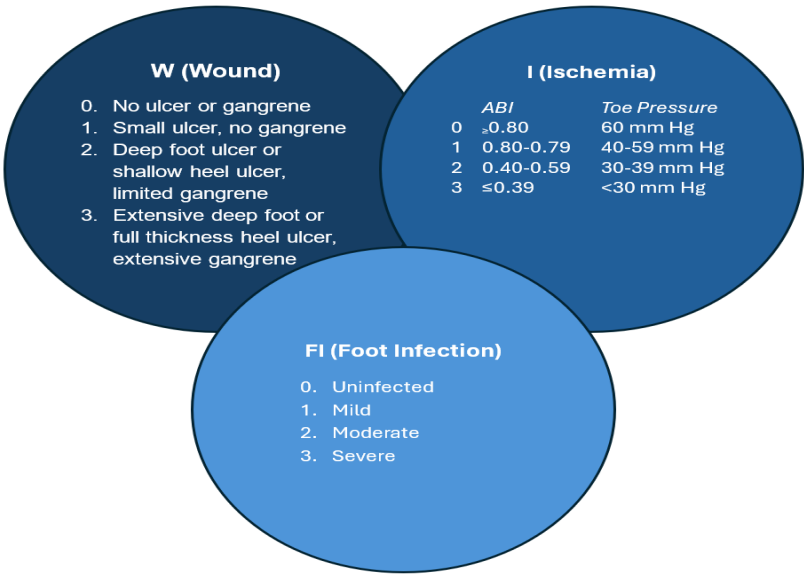


Figure 3. Adapted from Mills et al, 2013

Table 1. The patient's relevant medical history.

Diagnosis	Year diagnosed
Type 2 diabetes	1996
Essential hypertension	1999
Diabetic retinopathy (bilateral)	2013
Diabetic peripheral neuropathy	2013
Angina pectoris	2018
Chronic kidney disease (stage 3b) and nephropathy	2021
Chronic heart failure	2022
Right-sided chronic limb-threatening ischaemia	2023
Diabetic nephropathy	2023
Coronary angioplasty- left anterior descending artery	2024

(Figure 1). He had undergone coronary angioplasty 4 months earlier and he remained under the care of the cardiac rehabilitation team. His medical history and medications are shown in *Table 1*.

Wound examination and evaluation

At his first visit his left dorsalis pedis and posterior tibial pulses were non-palpable, visualising monophasic waveforms, but this deteriorated to stage 4 when he developed a gangrenous, infected toe (*Figure 2*), indicating threat to limb (Williams et al, 2022).

Severity of wound, ischaemia and infection can be scored using the WiFI scoring system (*Figure 3*), then classified as stage 1–4 utilising the Society for Vascular Surgery's WIFI calculator, which is available as a mobile phone app (Rosemont, 2020). The calculation quantifies the threat to limb by staging 1–4. Stage 4 indicates the highest risk of amputation (*Figure 4*) (Cook et al, 2024).

Emergency hospital admission was arranged for Mr Jones for IV antibiotics and urgent vascular input. The infection was treated with IV antibiotics in line with local antibiotic guidelines. Magnetic resonance angiography was performed, which identified significant stenotic disease in the superficial femoral,

popliteal and tibial arteries. Subsequent angioplasty was successful in the affected arteries and the third digit was amputated.

Complications

Mr Jones' cardiac rehabilitation was postponed at the point of this admission. He developed hospital-acquired pneumonia and acute kidney injury (AKI), requiring a short stay in intensive care. He was discharged home after 32 days in hospital.

He then developed acute decompensated heart failure (ADHF), a life-threatening condition with worsening heart failure symptoms (Lala et al, 2024). Mr Jones was admitted to hospital for IV diuretic therapy (NICE, 2014). His symptoms initially resolved, but recurred 6 weeks later, requiring a further admission, where he received IV antibiotics to treat a kidney infection, an IV diuretic to stabilise his ADHF and blood transfusions to manage severe anaemia. Daily folic acid 5 mg was added to his prescription. Three weeks later, he developed symptoms of confusion and fatigue, leading to a visit to the Emergency Department. On this occasion, he was treated with further blood transfusions as a hospital day case to treat recurring severe anaemia.

Multidisciplinary team management

His wound slowly improved, and he was on optimal medical therapy for long-term PAD management, clopidogrel 75 mg once daily and atorvastatin 80 mg once daily (NICE, 2020). He was advised that he was no longer medically fit for further revascularisation.

At multidisciplinary team review, the foot wound had deteriorated, with clinical signs of deep infection

Table 2. The patient's medication.

Medication	Drug class	Dose	Reason for medication
Gliclazide	Sulfonylurea	80 mg twice daily	Type 2 diabetes
Atorvastatin	HMG CoA reductase inhibitor	80 mg once daily	PAD
Bisoprolol fumerate	Beta-blocker	3.75 mg once daily	Hypertension, angina
Clopidogrel	Antiplatelet	7 5mg once daily	PAD
Paracetamol	Non-opioid analgesic	500 mg four times daily, as needed	Pain relief
Doxazosin	Alpha blocker	2 mg once daily	Hypertension
Frusemide	Loop diuretic	40 mg once daily, in-creasing to 80mg as needed	Hypertension
Glyceryl Trinitrate	Nitrate	400 µg, 1 spray when required	Angina
Isosorbide mononitrate	Nitrate	50mg once daily	Angina, heart failure
Amlodopine	Calcium channel blocker	10mg once daily	Hypertension
Lansoprazole	Proton pump inhibitor	15mg capsules once daily	Gastro-intestinal dis-turbance
Dapagliflozin	Sodium–glucose co-transporter-2 inhibitor	10mg once daily	Type 2 diabetes, chronic kidney dis-ease, heart failure
Eplerenone	Aldosterone-blocking agent	25mg once daily	Hypertension, Heart failure
Ramipril	Angiotensin-converting enzyme inhibitor.	10mg once daily	Hypertension

	Ischaemia - 0				Ischaemia - 1				H	Ischaemia - 2				Ischaemia - 3			
W-O	VL	VL	L	M	VL	L	M	H		L	L	M	H	L	M	M	H
W-1	VL	VL	L	M	VL	L	M	H		L	M	H	H	M	M	H	H
W-2	L	L	M	H	M	M	H	H		L	H	H	H	H	H	H	H
W-3	M	M	H	H	H	H	H	H		H	H	H	H	H	H	H	H
	FI-0	FI-1	FI-2	FI-3	FI-0	FI-1	FI-1	FI-3		FI-0	FI-1	FI-2	FI-3	FI-0	FI-1	FI-2	FI-3

Very Low = VL = Class or Clinical Stage 1
Low = L = Class or Clinical Stage 2
Moderate = M = Class or Clinical Stage 3
High = H = Class or Clinical Stage 4

Figure 4. Wifi - Risk estimate of amputation at 1 year for each combination (Mills et al, 2014)



Figure 5. New bone destruction evident at third and fourth metatarsal heads and fourth proximal phalanx, representing active osteomyelitis.

(International Working Group on the Diabetic Foot, 2023). Mr Jones was now walking with crutches for stability. Plain X-ray confirmed osteomyelitis (*Figure 5*) and deep tissue swabs were sent to microbiology.

As Mr Jones was systemically well, he was prescribed oral clindamycin 300 mg 8 hourly, in line with local antibiotic guidelines. His surgical wound resolved at week 34. A timeline of events is demonstrated in *Figure 6*.

Discussion

Vascular interventions

Minimally invasive endovascular interventions, avoiding general anaesthesia by using tailored sedation and analgesia, are now broadly available to older and multimorbid patients, as the physiological impact is reduced (Cornelis et al, 2019; Banaś et al 2021). Despite perfusion success, poor outcomes of morbidity or mortality often follow (Houghton et al, 2019; Li et al, 2024).

Vascular surgical outcomes tend to be based on health status, rather than quality of life impact, so it may be beneficial to develop an evidence base around quality-of-life factors before and after surgery, to ensure there is meaningful value to the patient following surgical intervention.

Tissue requires higher perfusion for healing than for maintaining structural integrity, so surgical interventions targeting specific angiosomes where tissue loss is apparent, may be enough to support healing and provide long-term benefits if further tissue loss can be avoided (Hou et al, 2022; Shi et al, 2023).

In this case, angioplasty was conducted in three arteries. It is not known if reduced intervention would have had a lower impact on his morbidity and been sufficient to support wound resolution and limb preservation.

Diabetes

Mr Jones has a long history of diabetes with persistent hyperglycaemia, both of which are associated with major amputation and cardiovascular events, due to progressive vascular injury within the arterial wall caused by glycaemia mechanisms which promote atherosclerosis (Zabala et al, 2020; Soyoye et al, 2021; Wang et al, 2024).

Heart failure

Pharmacotherapy is key in heart failure to reduce mortality, prevent hospitalisation, support daily activity and improve quality of life. Although prescribing rates are improving, management is often sub-optimal, contributing to disease burden and hospitalisation (Jones et al, 2017; McDonagh et al, 2022).

On cardiology review following his two episodes of ADHF, Mr Jone's dosing was increased to maximal medical therapy for management to stabilise his symptoms (NICE, 2018). This suggests it may be beneficial for MDT foot clinics to consider broader input when managing patients with heart failure.

Chronic kidney disease

Mr Jones developed CKD, secondary to diabetic nephropathy (Usman et al, 2021). His AKI was triggered by foot infection. In diabetes, as eGFR declines, mortality and amputation risk intensifies so eGFR should be considered when assessing and managing individuals with diabetic foot disease (Pourmoussa et al, 2025).

Anaemia

As renal function declines, red blood cell production may become compromised with resultant anaemia. Mr Jones was treated with blood transfusions on two occasions, and oral folic acid. Management is crucial, as anaemia compromises tissue oxygenation, reducing healing potential and is predictive of higher rates of inpatient complications, limb amputation

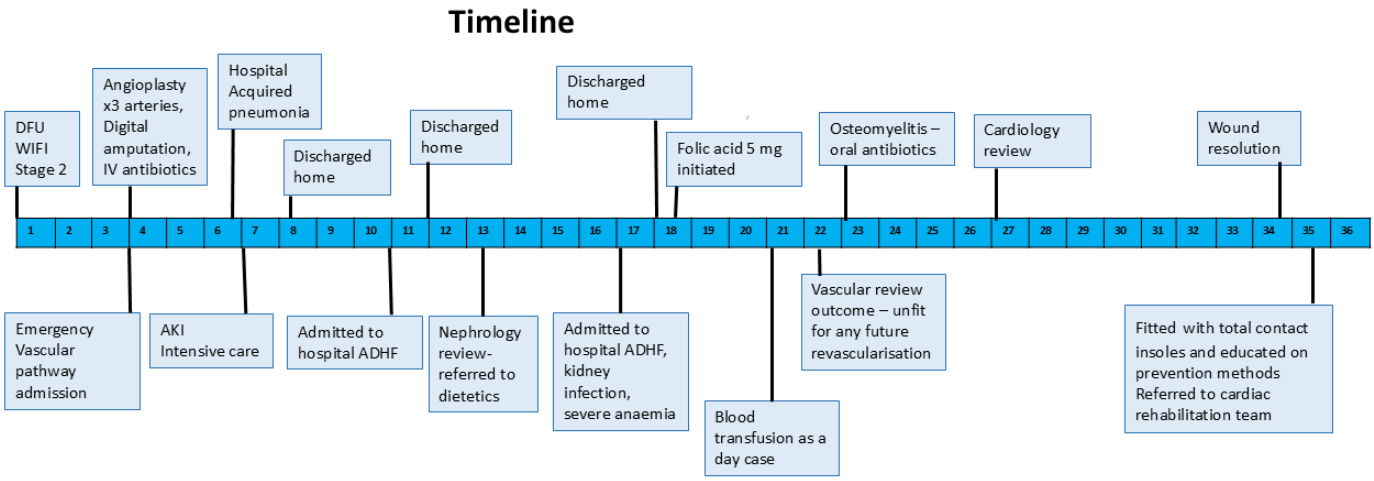


Figure 6. Timeline of events for Mr Jones (weeks).

and mortality (Wright et al, 2014; Lüders et al 2016). Most cases can be effectively be managed in primary care so a referral to the General Practitioner may be appropriate.

Clinical outcome

Mr Jones was clear, that he wanted to avoid major amputation at any cost, as he viewed that being the worst possible outcome for him, which is frequently the case, despite the significant associated mortality risk (Wukich et al, 2017). Wound resolution without major amputation was a satisfactory outcome to him.

After discussion, he recognised the substantial impact to his health and quality of life following intervention, and the efforts required for him to rehabilitate, which improved his understanding of being considered unfit for any future vascular intervention. He was advised that in the event of any further tissue loss, input from the palliative care team would be considered.

In Scotland, the Supportive and Palliative Care Indicators Tool (SPICT) has been developed to help clinicians identify adult individuals with deteriorating health due to one or more life-shortening conditions, who may benefit from future care planning. It is important to recognise that seeking input at the end-of-life stage is too late for effective, patient-centred care. Palliative care teams will integrate psychological, social and spiritual aspects into care planning with focus to improving quality of life, which can be invaluable to vascular patients where progression can be rapid (Cattermole et al, 2022).

Conclusion

Limb preservation was achieved in this case, despite significant multimorbidity. Although angioplasty was successful, his limb was preserved and the wound resolved, the physiological impact on Mr Jones following intervention was profound. Success was attributed to timely input at the MDT foot clinic and collaboration with the extended MDT, enabling a joined-up care approach to ensure each morbidity was optimally managed.

Podiatrists are well placed to serve as change agents with the frequency and duration of podiatry wound care, so ongoing structured, empathetic communication, paired with collaborative goal-setting can support patients to adopt and maintain health behaviour changes.

Tissue requires increased perfusion for healing than for maintaining structural integrity so there may be long-term benefits from angioplasty for Mr Jones if further tissue damage can be avoided. However, a palliative approach may be more suitable in the event of any further CLTI presentation with timely input from the palliative care team. ▯

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