

Lower limb complications

Come on, feel the noise



Matthew Young,
Consultant
Physician,
Edinburgh
Royal Infirmary

The more musically literate of the regular readers of this section will recognise a theme emerging in the titles and first paragraphs. I make no apologies for this. Music and medicine are such common associates, almost every Senior House Officer I interview these

days seems to have grade VII this or that instrument. Perhaps this has to do with medicine being the interface between art and science? However, an end to idle speculation, I must move on to the body of this quarter's editorial. My first featured paper is on the use of mechanical noise to enhance peripheral sensation (Khaodhiar et al, 2003). The second, a timely revisiting of those sometimes almost unbelievable outcomes from US revascularisation procedures (Goshima et al, 2004).

Khaodhiar and colleagues working in Aristidis Veves's prolific unit in Boston describe the use of low level mechanical noise stimulation to enhance vibration and pressure perception. Combined tests and clinical examination scoring are better overall predictors, but pressure and vibration perception loss are the two most predictive single modalities for foot ulceration.

As drug therapies have proved to be uniformly ineffective perhaps enhancing these modalities may provide a way to attenuate the risks of early neuropathy in people with diabetes.

The 1990s saw a series of increasingly wonderful papers emerging, mainly from the US, on the use of distal bypass procedures and limb salvage in people with diabetes. I am sure that I am not the only diabetologist who has questioned why our local vascular surgeons and I, working in three centres of excellence over this time, never quite matched these results or never had the right patients to attempt them. Goshima and colleagues may, bravely, have some of the answers. It will come as no surprise to learn that in order to achieve figures close to the gold standards requires multiple operations (49%), prolonged hospital stays and/or readmission (49% of patients readmitted as a result of the original operation plus 17% for other problems). The authors point out the high mortality in these patients over a relatively short period of time. In my clinic it is 50% within 3.5 years. They therefore advocate that quality of life should be considered when deciding optimal care, a sentiment that will be shared by us all.

DIABETES CARE



Mechanical noise stimulation improves sensation

Readability	✓✓
Applicability to practice	✓✓
WOW! factor	✓✓✓

1 This study examined the effect of stochastic resonance (SR) on vibratory and tactile sensation in patients with moderate to severe diabetic peripheral neuropathy.

2 A total of 20 people with diabetes (10 type 1 and 10 type 2) were included in the study.

3 The vibration perception threshold (VPT) and the Semmes-Weinstein filament (SWF) threshold at the plantar surface of the left foot and the big toe were determined under two mechanical noise stimulus conditions: null (no noise) and 10% lower than each participant's mechanical noise threshold of perception.

4 Baseline values (mean ± SD) were: Neuropathy Symptom Score (NSS) 502 ± 2.5, Neuropathy Disability Score (NDS) 5.0 ± 2.1, VPT 24 ± 11 V and SWF threshold 5.6 ± 0.8 at the plantar surface of the foot and 5.3 ± 0.9 at the big toe.

5 The VPT improved significantly from 24 ± 11 under null conditions to 19 ± 10V with mechanical noise.

6 The number of detections of the SWF at the plantar surface of the foot was also significantly increased by mechanical noise but not at the big toe.

7 Mechanical noise stimulation improves vibration and tactile perception in people with diabetes with moderate to severe neuropathy.

Khaodhiar L, Niemi JB, Earnest R et al (2003) Enhancing sensation in diabetic neuropathic foot with mechanical noise. *Diabetes Care* **26**(12): 3280-83

JOURNAL OF VASCULAR SURGERY

IIBS for limb salvage is complicated by long recovery

Readability	✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓✓✓

1 This study aimed to quantify the efforts needed to achieve limb salvage by assessing three non-traditional outcomes: index limb reoperation in 3 months; hospital readmission rate in the first 6 months after infrainguinal bypass surgery (IIBS); and wound healing time.

2 A total of 318 IIBSs performed at a single institution were retrospectively analysed.

3 Seventy-two percent of people had IIBS for critical limb ischaemia (CLI), and 84% had below-knee popliteal or distal bypasses.

4 Of those who had IIBS for CLI, 48.9% needed at least one reoperation within 3 months.

5 Within 6 months, 49.3% of patients needed hospital readmission; time to heal exceeded 3 months in 54%.

6 A multivariate analysis indicated that tissue loss and minority status were significant risk factors for reoperation within 3 months.

7 Tissue loss and renal failure increased the odds for readmission within 6 months. The sole risk factor for prolonged wound healing was diabetes.

8 IIBS for limb salvage is often complicated by prolonged recovery and multiple reoperations and readmissions, which should be reflected in traditional reporting standards for limb salvage operations.

Goshima KR, Mills J, Hughes JD (2004) A new look at outcomes after infrainguinal bypass surgery: traditional reporting standards systematically underestimate the expenditure of effort required to attain limb salvage. *Journal of Vascular Surgery* **39**: 330-35

‘The anti-inflammatory action of the honey helped to reduce the level of pain, and the antibacterial activity had a deodorising effect on the wound.’

BRITISH JOURNAL OF COMMUNITY NURSING

Honey alginate rapidly heals pressure ulcers

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓

- The use of a honey alginate was used on two elderly men from a nursing home who had pressure ulcers (one on the ankle and the other on the sacral region) to evaluate its effectiveness as a viable alternative to current wound management practices in nursing homes.
- The use of the honey alginate resulted in rapid and complete healing of both wounds. One ulcer was completely healed by week 11 and the other by week 8.
- The anti-inflammatory action of the honey helped to reduce the level of pain, and the antibacterial activity had a deodorising effect on the wound.
- Similar healing results were observed in other patients with pressure induced ulcers and as a result honey alginates are now used as the standard treatment of chronic wounds in the nursing home.
- GPs and nurses should promote honey alginate as a standard form of wound treatment as opposed to an alternative.

Van der Weyden EA (2003) The use of honey for the treatment of two patients with pressure ulcers. *British Journal of Community Nursing* 8(12): S14–20

THE AMERICAN JOURNAL OF MEDICINE

Developing a model to identify ulcers that will not heal

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

- This study aimed to develop a prognostic model for identifying ulcers that are not likely to heal.
- A cohort study of people with diabetic neuropathic foot ulcers was developed. Clinicians followed a standard

‘A simple prognostic model can be developed to identify ulcers that will not heal using prognostic factors that are already part of the wound care examination.’

EUROPEAN JOURNAL OF VASCULAR AND ENDOVASCULAR SURGERY

Temporary AV fistula and free flap provide stable wound coverage

Readability	✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓

- This article reviewed experience with a temporary arteriovenous (AV) fistula followed by free tissue transfer in the treatment of diabetic foot ulcers associated with peripheral arterial occlusion.
- A total of 15 lower extremities were operated on in 14 patients.
- An AV loop with its apex below the medial malleolus was created between the popliteal artery and saphenous system. After 3 weeks the loop was divided to provide an artery and a vein end.
- The foot defect was covered with latissimus dorsi muscle flap. This was followed by split thickness skin grafting.
- Fistulas were patent in 12 extremities and free tissue transfer was performed in 13 extremities.
- Free tissue transfer was successful in 11 of 12 extremities after patent temporary AV fistula.
- Overall extremity loss was 4 of 15 lower extremities in 14 patients. Overall mortality was 21% for the follow-up period.
- A temporary AV fistula and free flap may provide stable wound coverage and a high rate of limb salvage in the treatment of diabetic foot ulcers with large tissue loss.

Sunar H, Aygit CA, Afsar Y et al (2004) Arterial and venous reconstruction for free tissue transfer in diabetic ischaemic foot ulcers. *European Journal of Vascular and Endovascular Surgery* 27: 210–15

algorithm of good wound care, wound offloading and wound debridement.

- A total of 27 630 people with a diabetic neuropathic foot ulcer were studied; 12 983 (47%) healed by week 20 of care.
- The most simple model counted 1 point each if the wound was older than 2 months, larger than 2cm² or had a grade ≥3 (on a 6 point scale). The likelihood that a wound would not

JOURNAL OF THE AMERICAN PODIATRIC MEDICAL ASSOCIATION

Thickness of plantar tissue can predict high plantar pressure

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓

- The study evaluated whether high plantar foot pressures can be predicted from measurements of plantar soft-tissue thickness in the forefoot of people with diabetes who have neuropathy.
- A total of 157 people with diabetic neuropathy and at least one palpable foot pulse, but no history of foot ulceration, participated in the study.
- Plantar tissue thickness and receiver operating characteristic analysis was used to determine the plantar tissue thickness predictive of elevated peak plantar pressure.
- Tissue thickness cutoff values of 11.05, 7.85, 6.65, 6.55 and 5.05 mm for metatarsal heads 1–5, respectively, predict plantar pressure at each respective site greater than 700 kPa, with sensitivity between 73–97% and specificity between 52–84%.
- When tissue thickness was used to predict pressure greater than 1000 kPa, similar results were observed which indicated that high pressure at different levels could be predicted from similar tissue cutoff values.
- The results suggest that plantar pressure can be predicted from similar tissue thickness cutoff values.

Abouaeha F, van Schie CHM, Armstrong DG, Boulton AJM (2004) Plantar soft-tissue thickness predicts high peak plantar pressure in the diabetic foot. *Journal of the American Podiatric Medical Association* 94(1): 39–42

heal was 0.35 for a count of 0, 0.47 for a count of 1, 0.66 for a count of 2 and 0.81 for a count of 3 in the validation data set.

- A simple prognostic model can be developed using prognostic factors that are already part of the wound care examination.
- Margolis DJ, Allen Taylor L, Hoffstat O, Berlin JA (2003) Diabetic neuropathic foot ulcers: predicting which ones will not heal. *The American Journal of Medicine* 115: 627–31