



## Lower limb amputation — still a challenging procedure

**To the Editor:** Contemporary care of critical limb ischaemia consists of near universal attempts at limb salvage using endovascular or open surgical procedures.<sup>1</sup> In the Vascular Unit at Chris Hani Baragwanath Hospital, Johannesburg, about 25% of our annual surgical activity involves limb amputations for complications of peripheral vascular disease (PVD) or diabetes mellitus (DM). In our situation such a high number of amputations is due to the late presentation of patients with PVD in whom there is extensive tissue loss, often with sepsis or advanced vascular disease excluding reconstructive surgery.

Over an 18-month period we performed about 89 lower extremity amputations. The data were collected retrospectively from the hospital records and theatre books. Primary closure of the stump was achieved in 60 procedures (68%), all of them elective. The level of amputation was carefully determined in each case by a specialist vascular surgeon on the basis of clinical findings (ischaemic skin lesions, diminished distal sensation, loss of motor function, loss of distal pulses, etc.), continuous-wave Doppler study with an ankle-brachial pressure index of 0.0 - 0.4 (mean 0.2), angiographic examination where indicated, and patients' socio-economic background. Surgery was carried out by the vascular unit staff, namely a vascular consultant and two registrars. There was no bias in the allocation of a consultant or registrar according to the severity of the case. After receiving training and performing amputations under supervision all registrars were allowed to operate on their own. All amputations were performed according to the vascular unit's protocol which comprises antibiotic prophylaxis, no use of diathermy during surgery, no bone wax, suction drain, subcuticular skin closure and postoperative treatment with low-molecular-weight heparin for 5 days. Four patients underwent forefoot amputation, 17 below-knee and 39 above-knee amputation. Thirty per cent of amputations (18/60) were carried out by a specialist vascular surgeon, 18% (11/60) by a surgical registrar under specialist supervision and the remaining 52% (31/60) by a registrar alone. There was a significant difference in outcome between procedures done by the specialist vascular surgeon, the registrar-under-supervision procedures, and the registrar-alone procedures.

Overall primary stump healing was achieved in 90% of cases in the specialist/specialist plus registrar (S/S+R) group ( $N = 26/29$ ) and in 48% of cases in the registrar-alone group ( $N = 15/31$ ). The groups were comparable in terms of gender and age of the patients, as well as history of arterial hypertension, smoking and chronic obstructive airways disease. There were 6 HIV-positive patients with mean CD4 T-cell counts of 290/ $\mu$ l, 4 in the S/S+R group and 2 in the registrar-alone group. Two wounds did not heal primarily in each group. In 17 patients with DM, 8 in the S/S+R group and 9 in registrar-alone group, primary healing was not achieved in 1 and 3 patients, respectively. Careful analysis revealed that complications in healing of the stump in the registrar group were mainly due to poor surgical technique. However, HIV/AIDS and severe DM were additional risk factors.

Modern amputation must be considered a plastic and reconstructive operation requiring proper stump formation, gentle handling of the tissues and careful wound management. Limb amputation is a definitive procedure in a number of cases of PVD, septic diabetic foot or extensive trauma to the bony structures or soft tissues. Although amputation is the 'last' curable procedure, many patients still find it extremely difficult to accept. Once it is offered to a patient it should be performed by an expert, the most senior surgeon in the unit, as many vascular textbooks advise.<sup>2,3</sup> Septic complications may therefore be avoided, as well as subsequent wound revisions or re-amputations at a higher level and deformities of the stump in preparation for fitting of an artificial limb. Primary healing of the stump greatly reduces the patient's pain and frustration, and decreases the cost of treatment. Unfortunately, the Vascular Unit at Chris Hani Baragwanath Hospital has only one specialist, so at present it is impossible to have all lower limb amputations performed by a vascular surgeon. It is not yet possible to define how many lower limb amputations ought to be performed by a trainee before s/he acquires satisfactory expertise in this field. However, some guidelines from the Vascular Association of Surgeons of Southern Africa (VASSA) may help senior staff in the training of surgical registrars. Lower limb amputation still remains a challenging procedure for both the surgical trainee and the trainer.

**Jarek Kowalczyk**

Vascular Unit  
Department of Surgery  
Chris Hani Baragwanath Hospital  
Johannesburg

1. Nehler MR, Hiatt WR, Taylor LM. Is revascularisation and limb salvage always the best treatment for critical limb ischaemia? *J Vasc Surg* 2003; 37: 704-708.
2. Haimovici H. Amputation of lower extremity. In: Haimovici H, Callow AD, DePalma RG, Ernst CB, Hollier LH, eds. *Haimovici's Vascular Surgery, Principles and Techniques*. 3rd ed. North Walk, Conn.: Appleton & Lange, 1989: 1021-1048.
3. Krupski W. Extremity amputation for vascular disease. In: Rutherford RB, Cronenwett JL, Gloviczki P, Johnston KW, Kempczinski RF, Krupski WC, eds. *Rutherford Vascular Surgery*. 5th ed. Philadelphia: WB Saunders, 2000: 2175-2266.

**Table I. Primary healing of the stump (N)**

Type of amputation	Specialist	Specialist plus registrar	Registrar
Foot ( $N = 4$ )	1/1	—	1/3
Below knee ( $N = 17$ )	6/8	1/1	1/8
Above knee ( $N = 39$ )	8/9	10/10	13/20