

# Reconstruction Gets Patients Back on Their Feet

BY BRUCE K. DIXON  
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SCOTTSDALE, ARIZ. — Amputation of the diabetic foot can be prevented by surgical reconstruction using an anterolateral thigh perforator flap, according to a 4-year retrospective study reported by Dr. Joon Pio Hong at the annual meeting of the Wound Healing Society.

“Despite the fact that there is still controversy over whether to amputate or salvage the diabetic foot, anterolateral thigh perforator flaps can be used to achieve independent ambulation, and free microsurgical tissue transfer can be an alternative to amputation if the vascular supply is reliable,” said Dr. Hong, a professor of plastic and reconstructive surgery at the University of Ulsan College of Medicine, Seoul, Korea.

Between 2000 and 2004, 71 diabetic patients with infected foot ulcers underwent reconstruction with an anterolateral thigh perforator flap at Ulsan Hospital. Osteomyelitis was diagnosed in 36 of the patients using clinical, radiologic, and histologic findings. Five patients had undergone peripheral vascular surgery or intervention before reconstruction, and 35 patients had confirmed peripheral neuropathy. The 50 men and 21 women ranged in age from 33 to 72 years, with an average age of 51.

Prerequisites for surgery included strict blood glucose control, close monitoring of the patients’ general condition, and relative control of infection (level of bacteria  $<10^5$  cells/g of tissue). All patients required lower-extremity angiography, and patients suspected of having osteomyelitis underwent bone scanning, Dr. Hong said.

Transcutaneous oxygen measurements were greater than 30 mm Hg in patients before reconstruction. Through a multidisciplinary approach, a diabetic foot management protocol was applied according to each patient’s needs, he said. After eval-

uation, 216 patients’ feet were deemed nonsalvageable.

The operation included aggressive debridement of foot ulcers and necrotic tissues—including removal of nonviable bone tissue. The flap was harvested either as a perforator flap or in combination with the vastus lateralis muscle as a musculocutaneous flap.

The average length of stay in the plastic surgery department was 3.5 weeks, and additional hospitalization of 1-2 weeks was required for rehabilitation. The follow-up period ranged from 2 to 52 months, with an average of 11 months.

“Complete flap survival was noted in 66 cases, partial loss in 4 cases, and total loss in 1 case,” Dr. Hong said.

Three patients had what Dr. Hong de-

scribed as “minor complications.” Of those, two showed partial wound dehiscence of the flap margin, but healing occurred without surgical management. In one patient, dehiscence and infection of the donor site were noted. Debridement, irrigation, and repair were required to achieve wound healing.

Partial flap loss occurred in four cases; of those, three required secondary skin graft procedures and eventually healed, but the fourth required below-knee amputation because of exposure of vital structures of the distal foot, Dr. Hong said.

Partial weight bearing began an average of 3.5 weeks after the surgery and bipedal gait began at 6 weeks, Dr. Hong said.

Unassisted bipedal gait was noted in 68 cases. One patient with a previous below-knee amputation of the right leg achieved full weight bearing with the reconstructed left foot and prosthesis.

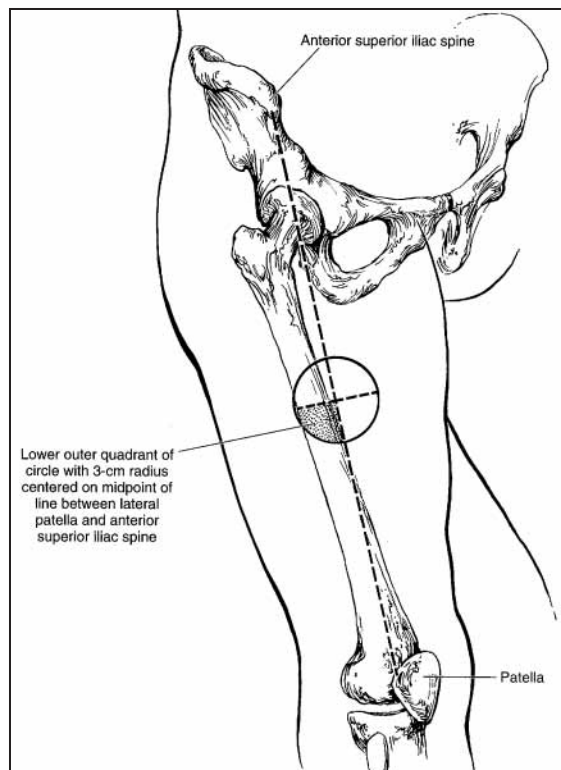
“In cases where sensation of the foot was normal, a sensate flap was used. In these patients, protective sensation was observed as early as 4 months,

with a positive response to the 5.07 Semmes-Weinstein monofilament test,” Dr. Hong said. Among the 34 patients who were employed, 25 returned to the same job and 5 found new jobs.

“However, controversy remains regarding which flap—muscle flap with skin grafts or fasciocutaneous flap—offers the optimal solution for reconstructing the foot, especially the weight-bearing surface,” he explained.

A consensus has developed supporting the thin fasciocutaneous flap as being advantageous for reducing shearing, providing a better contour, and increasing the chance for reinnervation. “However, clinical experience with fasciocutaneous flaps for reconstructing the foot has shown that the layer between the skin and the fascia may not be anatomically sufficient to prevent gliding of the skin when pressure is applied,” he said.

“Although a longer follow-up period should [confirm] the efficacy of the microvascular salvage procedure, a high degree of success can be achieved with strict patient selection and guidelines,” Dr. Hong concluded. ■



The flap is obtained between the anterior superior iliac spine and the lateral margin of the patella.



Anterolateral thigh flaps are ideal for foot reconstruction because they are thin with sufficient vascularity to fight infection and have reliable pedicles.

PHOTOS COURTESY DR. JOON PIO HONG

## Severity Score Helps With Prognosis of Diabetic Foot Ulcers

BY MARY ANN MOON  
Contributing Writer

A new system for scoring the severity of foot ulcers in diabetic patients helps clinicians predict the likelihood of healing, hospitalization, local surgery, and amputation, according to Dr. Stefan Beckert and his associates at the University of Tübingen (Germany).

Although other researchers have made attempts to establish classification systems that help gauge the severity of foot ulcers, most have been too complicated for widespread clinical application. Some systems required extensive diagnostic work-ups and complex grading schedules, and no simple severity scores have been adopted into routine clinical practice.

Dr. Beckert and his associates followed 1,000 consecutive diabetic patients with foot ulcers to develop such a score, which they termed the Diabetic Ulcer Severity Score (DUSS), and to test its practical use in predicting outcomes.

The median subject age was 69 years, and subjects were

followed for up to 1 year after presenting for outpatient foot ulcer care. Treatment was given by an interdisciplinary team of a general and vascular surgeon, a radiologist, a diabetologist, an orthotist, and a wound care nurse. It consisted of sharp debridement, advanced local surgery such as limited bone resections if necessary, moist wound therapy, and adequate pressure off-loading.

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Four factors—pedal pulses, bone involvement, site of ulceration, and number of ulcerations—were found to predict outcome, and a simple scoring system was developed to rate these factors, the investigators said (*Diabetes Care* 2006;29:988-92).

Absent pedal pulses were scored as 1, while present pedal pulses were scored as 0. Bone involvement, defined as the ability to probe the ulcer to the bone, was scored as a 1, while lack of bone involvement was scored as a 0. Ulceration was scored as a 0 if it involved only the toe and as a 1 if it involved the foot. And multiple wounds were scored as a 1 while single wounds were scored as a 0.

The overall DUSS was determined by adding these four components, so possible scores ranged from a minimum

of 0 to a maximum of 4. Patients with a DUSS of 0 had a 93% probability of healing. The probability of healing decreased steadily with increasing DUSS, to a low of 57% for scores of 4.

Local surgery was required for 9% of patients with a DUSS of 0, 17% of those with a DUSS of 1, 27% for those with a score of 2, 37% for those with a DUSS of 3, and 50% of those with a DUSS of 4. Similarly, hospitalization was required for 39% of patients with a DUSS of 0, 49% of those with a DUSS of 1, 63% of those with a DUSS of 2, 72% of those with a DUSS of 3, and 92% of those with a DUSS of 4.

The likelihood of amputation followed this same pattern for the most part. Patients with a DUSS of 0 had no risk of amputation, those with a DUSS of 1 had a 2% risk, those with a DUSS of 2 had an 8% risk, and those with a DUSS of 3 had an 11% risk. However, the pattern did not hold for patients with a DUSS of 4 (4% risk), most likely because of the small number of patients in this subgroup and the low number of amputations overall.

The DUSS proved to be a simple prognostic tool that “can be easily applied in daily clinical practice,” Dr. Beckert and his associates said. It also “may contribute to a better and realistic calculation of health care costs in patients with diabetic foot ulcers,” they said. ■