Should severely injured legs be saved or amputated?


Background: Recent surgical advances have enabled surgeons to develop reconstructive protocols to salvage severely injured legs. However, some investigators continue to advocate early limb amputation with prosthetic fitting to optimize functional outcome. To date, evidence in support of either treatment has been limited to anecdotal and retrospective case series.1,2

Question: Among patients with leg-threatening injuries, is there a difference in functional outcomes between those who undergo early amputation and prosthetic fitting and those who undergo limb reconstruction?

Design: This multicentre, prospective, observational study, conducted in the United States between March 1994 and June 1997, enrolled 601 patients aged 16–69 years with complicated fractures and other severe injuries below the distal femur. Exclusion criteria were decreased level of consciousness (Glasgow Coma Scale score < 15), spinal cord deficits, previous amputation, third-degree burns, psychiatric disorders, transfer to treatment centre more than 24 hours after injury, active military duty or inability to speak English or Spanish. The primary outcome measure was the Sickness Impact Profile (SIP) at 2 years. The SIP is a multidimensional measure of self-reported health status, consisting of 136 items in 12 domains of function; scores range from 0 to 100 points, with scores over 10 indicating severe disability. Secondary outcomes included readmission to hospital because of a major complication and return to work. Patient assignment to treatment group was based most often on the operating surgeon’s judgement. The SIP at 2 years was therefore adjusted for potentially important confounding variables, including 17 patient characteristics and 5 injury characteristics. Longitudinal multivariate regression analysis was used to assess associations between treatment and outcomes over 2 years, after adjustment for patient and injury characteristics.

Results: Of the 601 enrolled patients, 56 were excluded (24 were lost to follow up, and 32 had bilateral injuries). Of the remaining 545 patients, 161 underwent early amputation and 384 underwent limb reconstruction. Patients who had an amputation had significantly more severe injuries than those who had their limbs reconstructed. At 2 years, 460 patients completed the SIP questionnaires. The adjusted SIP scores did not differ significantly between the amputation and reconstruction groups (12.0 v. 11.7 respectively). However, patients who underwent reconstruction were significantly more likely than those who underwent amputation to be readmitted to hospital (47.6% v. 33.9%; \( p = 0.002 \)). The proportion of patients who had returned to work at 2 years did not differ significantly (53.0% in the amputation group and 49.4% in the reconstruction group; \( p = 0.48 \)). Predictors of a poorer SIP score included readmission to hospital because of a major complication, low education level, nonwhite race, poverty, lack of private health insurance, poor social support network, low self-efficacy (the patient’s confidence in being able to resume life activities), smoking and involvement in disability-compensation litigation.

Commentary: This is the first large, prospective study of outcomes following amputation or reconstruction in patients with severe limb injuries. At 2 years, functional outcomes after amputation were similar to those after reconstruction. Not surprisingly, patients who underwent reconstruction were more likely to be readmitted because of a major complication. These findings support those from earlier, smaller studies.1,2 The authors adjusted for the important differences in prognostic factors between the groups. However, statistical adjustment cannot transform quasi-experimental studies into randomized trials. Therefore, the inferences from the current study are limited by the same biases inherent to all observational studies. The generalizability of these results beyond level 1 trauma centres is also unknown. Limb reconstruction requires an experienced and dedicated team of physicians across multiple subspecialties, most often available in large, university-based settings. The authors reported nonsignificant differences between the treatment groups in the proportion of patients who had returned to work at 2 years; however, their analysis is underpowered if their a priori hypothesis that amputation would result in overall better outcomes is true.

Implications for practice: Evidence from this high-quality study suggests that outcomes following amputation are similar to those following reconstruction. Treatment decisions should therefore be based on factors such as the expertise of the surgical team, the available hospital infrastructure and the patients’ values and preferences. Clinicians should try to ensure that important decisions remain as consistent as possible with the values and preferences of informed patients.1

Mohit Bhandari
Department of Clinical Epidemiology and Biostatistics
Division of Orthopaedic Surgery
McMaster University
Hamilton, Ont.

References