

Long-Term Health Outcomes of Limb Salvage Versus Amputation for Combat-Related Trauma

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Purpose: There are sparse long-term health data, particularly in terms of body composition and development of metabolic syndromes, to help surgeons guide the decision in favor of limb salvage versus amputation in patients with limb-threatening trauma. The purpose of this study is to compare the difference in long-term health outcomes after high-energy lower extremity trauma between patients who underwent attempted flap-based limb salvage followed by limb preservation versus amputation.

Methods: We performed a retrospective review of all servicemembers who underwent flap-based limb salvage after combat-related lower extremity trauma between 2007 and 2011. Patients were divided into limb salvage/preservation and amputation cohorts. Patient demographics, injury characteristics, procedures, and health outcomes including body mass index (BMI) and development of metabolic disease (eg, hyperlipidemia, hypertension, heart disease, and diabetes) were analyzed. Adjusted BMIs were calculated for the amputation cohort to account for lost body mass. Patients had minimum 10-year follow-up. Bilateral amputations and amputations occurring over 2 years after injury were excluded. Odds ratios (ORs) were calculated to determine risks of obesity and development of metabolic disease in each cohort.

Results: 72 patients had long-term follow-up, with 39 undergoing limb salvage and 33 undergoing unilateral amputation. The amputation cohort consisted of 23 transtibial amputations, 8 transfemoral amputations, and 2 knee disarticulations. All amputations occurred within 2 years of injury. BMI at the time of injury was 26.3 in the amputation group and 25.0 in the limb salvage group ($P = 0.24$). After adjusting BMI to account for limb loss, the amputation cohort had significantly higher BMIs at 1 year (29.2 vs 27.1, $P = 0.05$), 3 years (32.3 vs 27.6, $P = 0.001$), 5 years (31.9 vs 28.9, $P = 0.04$), 8 years (32.8 vs 29.3, $P < 0.03$), and 10 years (33.8 vs 29.5, $P = 0.02$) after amputation. 11 of 33 amputees (33.3%) versus 12 of 39 limb salvage patients (30.8%) developed hyperlipidemia (OR = 1.13, 0.42-3.04). 8 of 33 amputees (24.2%) developed hypertension versus 6 of 39 (15.4%) (OR = 1.76, 0.54-5.72) in the limb salvage group. Two patients in the amputation group developed diabetes (OR = 6.27, 0.29-135.38). There were no significant differences in weight classification or the development of metabolic disease between a failed limb salvage group ($n = 11$) and acute amputations ($n = 22$).

Conclusion: Although amputations may decrease pain, improve mobility, and expedite the return to activity, limb loss may negatively impact metabolic regulation and may not substantially improve long-term function compared to lower extremity salvage after limb-threatening injuries. There may be substantial long-term health benefits to durable limb preservation surgery focused on restoring function and diminishing pain.