

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

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INTRODUCTION:

Lower extremity amputations carry devastating long-term effects on health, body composition, and development of comorbidities. However, there is little long-term health data to guide the decision between limb salvage and amputation in severely injured but potentially viable extremities. The purpose of this study is to compare the difference in body composition and long-term health outcomes after soft tissue flap salvage for high energy lower extremity trauma between patients who continued limb salvage versus those that underwent amputation.

METHODS: We performed a retrospective review of all servicemembers who underwent flap-based limb salvage after combat-related lower extremity trauma between 2005 and 2011. Patients were excluded if available duration of follow-up was less than ten years. Patients with bilateral amputations were also excluded. Patients were divided into two cohorts based on continuation of limb salvage and those who underwent amputation. 115 patients had available long-term follow-up from injury (58 continued limb salvage, 57 elective unilateral amputation after limb salvage). The amputation cohort consisted of 38 transtibial amputations, 17 transfemoral amputations, and two knee disarticulation amputations. Average follow up was 10.43 years. Patient demographics, injury characteristics, procedures, and health outcomes including BMI and development of metabolic disease (e.g. hyperlipidemia, hypertension, heart disease, and diabetes) were examined. Adjusted BMIs were calculated for the amputation cohort to account for lost body surface area. A univariate analysis was performed to evaluate for outcome associated with amputation versus limb preservation. A multiple logistic regression analysis was performed to determine if outcomes were significant when accounting for within-group differences.

RESULTS:

There was no difference in BMI before injury ($p=0.58$). On univariate analysis, the amputation cohort had higher BMIs at three, eight, and ten years after injury. There were no significant differences in BMI for different amputation levels. On multiple regression analysis, after controlling for the effects of age, amputation level, and injury severity, the amputation cohort also demonstrated increased likelihood of obesity ($BMI > 30$) at three, five, and eight years after injury. Timing of amputation did not appear to affect the likelihood of developing obesity. Twenty-three patients (40.4%) in the amputation cohort developed metabolic comorbidities compared to 27 (46.6%) patients in the limb salvage cohort developed metabolic comorbidities. Amputation presented no increased risk for the development of hypertension, hyperlipidemia, diabetes, heart disease, or any metabolic comorbidities compared to limb salvage.

DISCUSSION AND CONCLUSION: Although amputations may decrease pain, improve mobility, and expedite the return to activity, limb loss may negatively impact metabolic regulation and contribute to a higher risk of obesity compared to limb salvage procedures. There may be substantial long-term health benefits to durable limb preservation surgery focused on restoring function and diminishing pain.