

Assessment and Decision-Making in Complex Limb Fracture Management: Limb Salvage Versus Primary Amputation

Adele Zacken, Kayaththery Varathan, Yasmin A Sheikey, Uzair Khan, Diana Sabbagh, Ayman El-Zanaty
Department of Trauma and Orthopaedics, Royal London Hospital, Whitechapel Road, London, UK

Abstract

Background: Complex limb injuries present a major challenge in trauma and orthopaedic practice due to the severity of tissue damage and the complexity of treatment decisions. Determining whether limb salvage or primary amputation provides the optimal outcome remains controversial.

Methods: A structured narrative review was conducted using PubMed, Embase, and Scopus, including studies published between 2008 and 2026, with the literature search performed between October 2025 and February 2026. Keywords included “limb salvage,” “primary amputation,” “mangled extremity,” and “MESS.” Studies evaluating injury severity scoring systems and clinical outcomes were included.

Results: Injury severity scoring systems demonstrated limited predictive accuracy, with MESS sensitivity ranging from 46–72% and specificity between 70–84%. The Lower Extremity Assessment Project (LEAP) study reported comparable functional outcomes between limb salvage and amputation at two-year follow-up. Both approaches were associated with high complication rates, with limb salvage often requiring multiple procedures and prolonged recovery.

Conclusion: Injury severity scoring systems should not be used in isolation. Decision-making should prioritise functional outcomes, multidisciplinary assessment, and patient-centred factors within the context of modern reconstructive and rehabilitation advances.

Keywords: limb salvage, trauma, amputation, LEAP study, MESS