# The Influence of Nerve Surgical Techniques at Time of Amputation on the Prevalence of Heterotopic Ossification in Transtibial Amputees

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INTRODUCTION: Heterotopic ossification (HO) can form after extremity amputation and may cause pain and functional impairment. We aimed to describe the prevalence of HO in a civilian population of transtibial amputees. Moreover, we hypothesized that amputees who underwent prophylactic active nerve surgery (Targeted muscle reinnervation or Regenerative Peripheral Nerve Interface) at time of amputation demonstrate a lower rate of HO formation.

METHODS: Adult patients undergoing transtibial amputation at a tertiary care center between 2000 and 2023 were included. Patient data were collected through chart review. The most recent post-amputation X-ray of the residual limb was assessed for HO presence, according to the Walter Reed classification, by two researchers. Additionally, a random subset of X-rays (10%) was assessed by five clinicians and two radiologists independently. Inter-rater reliability (IRR) was calculated using Cohen's kappa (κ). Multivariable logistic regression was conducted to identify factors associated with HO presence.

RESULTS: In total, 665 limbs of 632 patients were included. HO was identified in 326 X-rays (49.0%), which was contiguous HO in 92.9% of cases, and was commonly present on the distal residual tibia (68.1%) and fibula (69.0%). Passive (traditional) nerve surgery (OR=2.0, p=0.014) and the presence of a symptomatic neuroma (OR=2.3, p<0.001) were independently associated with a higher prevalence of HO, as well as a younger age (OR=1.7, p=0.002) and male gender (OR=1.5, p=0.018). The IRR of the two radiologists was κ=0.99, the overall IRR was κ=0.92.

DISCUSSION AND CONCLUSION: HO is a common finding in transtibial amputees. Avoiding symptomatic neuroma formation, using prophylactic nerve surgery during amputation, could aid in decreasing HO prevalence and should be considered. Recommendations for comprehensive patient care include implementing gender-specific rehabilitation protocols, preoperative screening for high-risk individuals and a multidisciplinary approach involving surgeons, endocrinologists, and pain management specialists.