

CASE REPORT

RETURN TO RUNNING FOLLOWING A KNEE
DISARTICULATION AMPUTATION: A CASE REPORTAngela R. Diebal-Lee¹Robert S. Kuenzi²Christopher A. Rábago^{2,3}**ABSTRACT**

Background and Purpose: The evolution of running-specific prostheses has empowered athletes with lower extremity amputations to run farther and faster than previously thought possible; but running with proper mechanics is still paramount to an injury-free, active lifestyle. The purpose of this case report was to describe the successful alteration of intact limb mechanics from a Rearfoot Striking (RFS) to a Non-Rearfoot Striking (NRFS) pattern in an individual with a knee disarticulation amputation, the associated reduction in Average Vertical Loading Rate (AVLR), and the improvement in functional performance following the intervention.

Case description: A 30 year-old male with a traumatic right knee disarticulation amputation reported complaints of residual limb pain with running distances greater than 5 km, limiting his ability to train toward his goal of participating in triathlons. Qualitative assessment of his running mechanics revealed a RFS pattern with his intact limb and a NRFS pattern with his prosthetic limb. A full body kinematic and kinetic running analysis using 3D motion capture and force plates was performed. The average intact limb loading rate was four-times greater (112 body weights/s) than in his prosthetic limb which predisposed him to possible injury. He underwent a three week running intervention with a certified running specialist to learn a NRFS pattern with his intact limb.

Outcomes: Immediately following the running intervention, he was able to run distances of over 10 km without pain. On a two-mile fitness test, he decreased his run time from 19:54 min to 15:14 min. Additionally, the intact limb loading rate was dramatically reduced to 27 body weights/s, nearly identical to the prosthetic limb (24 body weights/s).

Discussion: This case report outlines a detailed return to run program that targets proprioceptive and neuromuscular components, injury prevention, and specificity of training strategies. The outcomes of this case report are promising as they may spur additional research toward understanding how to eliminate potential injury risk factors associated with running after limb loss.

Keywords: Amputation, running, limb loading rate

Level of Evidence: 4

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