Intramedullary rod fixation compared with blade-plate-and-screw fixation for tibiotalocalcaneal arthrodesis: a biomechanical investigation


Abstract: BACKGROUND: Achieving stable fixation when performing tibiotalocalcaneal arthrodesis can be challenging, especially in osteopenic bone. The purpose of the current investigation was to compare the stiffness and fatigue endurance of blade-plate-and-screw fixation with intramedullary rod fixation in a cadaveric model. METHODS: In ten matched pairs of fresh-frozen cadaveric legs, a tibiotalocalcaneal arthrodesis was performed with use of a blade-plate and a 6.5-mm sagittal screw in one leg and with use of an intramedullary rod in the contralateral leg. After an initial load-deformation curve was obtained, each specimen was loaded to 270 N through 250,000 cycles at a rate of 3 Hz. RESULTS: Blade-plate-and-screw fixation resulted in significantly higher mean initial and final stiffness and decreased plastic deformation than did intramedullary rod fixation. In addition, there was an inverse correlation between bone-mineral density and the difference in plastic deformation noted between the specimens of each pair. CONCLUSIONS: Blade-plate fixation is biomechanically superior to intramedullary fixation for tibiotalocalcaneal arthrodesis.