TACSM Abstract

The Effect of External Ankle Support on Lower Extremity Biomechanics

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ABSTRACT

ACL injury risk has been related to abnormal frontal plane knee mechanics. It's not clear whether constraining another lower extremity joint with bracing or taping might contribute to this increased injury risk by altering knee movements. **PURPOSE**: To examine the effect of external ankle support on lower extremity kinematics during a drop landing. **METHODS**: Twenty-five participants (20.3 ± 1.2 years, 168.7 ± 32.9 cm, 78.0 ± 14.9 kg) performed drop landings from a height of 61 cm under three conditions; no ankle support, athletic tape, and a lace-up ankle brace. The subject performed three trials per condition. Sixteen reflective markers were placed on the lower extremity to produce a modified Helen Hayes lower-extremity model. The subject then completed a 3-minute walking trial at a self-selected speed prior to completing each set of trials for the three landing conditions. Three-dimensional ankle, knee, and hip kinematics were collected using the Vicon Nexus 2 System. Knee and hip angles in the frontal and sagittal plane upon landing were determined. Ankle movement during landing was computed as the range of motion of the ankle angle in the sagittal plane from initial ground contact to the lowest point achieved during the landing phase. **RESULTS**: Mean ± SD ankle movement within the sagittal plane in the ankle tape condition (13.7±6.0 degrees) was significantly less ($p<0.001$) than the no support condition (21.2±5.9 degrees) and the ankle brace condition (19.0±7.3 degrees) ($p=0.014$). No difference in ankle movement was observed between the no support and braced condition ($p=0.76$). Frontal plane knee angle at landing while wearing a lace-up ankle brace (0.9±11.0 degrees) was significantly less ($p<0.001$) than the no support condition (6.1±8.6 degrees) and the athletic ankle tape condition (7.7±12.9 degrees) ($p=0.003$). This indicates that the knee was more neutrally aligned at landing when wearing the lace-up ankle brace while the other conditions exhibited a varus alignment. There was no significant difference in hip within the frontal or sagittal plane, as well as the knee in the sagittal plane. **CONCLUSION**: This present study showed only the taped condition restricted ankle motion during the landing. However, the frontal plane knee motion was only affected when the ankle brace was used. While it is not clear why this occurred, it may be related to altering the proprioception of the ankle with the brace.