Does Carrying Golf Equipment Unilaterally or Bilaterally Influence Spatiotemporal Gait Parameters?

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ABSTRACT

Golf is a popular multimodal recreational physical activity and sport. Golf equipment transportation (GET) is a consistent demand in golf, with over 6 kilometers of walking distance and 10,000 steps accrued, on average, in an 18-hole round. Gait asymmetries, especially in step time and step length, are associated with decreased efficiency and increased metabolic cost. Thus, gait asymmetries in different GET methods may have implications for fatigue and golf performance. **PURPOSE:** To compare symmetry in gait spatiotemporal parameters of two GET methods with each other and unloaded walking over flat ground. We hypothesized that GET would result in asymmetric step length and step time, and that unilateral would be more asymmetric than bilateral. **METHODS:** 20 experienced, young adult golfers (11M/9F, Age: 26.4±4.5 yrs) participated in 3D motion capture of 3 GET walking tasks: 1) unloaded walking (UW), 2) unilateral single-strap carrying on the right shoulder (SS), and 3) bilateral double-strap carrying across both shoulders (DS); using an 11kg bag. In each condition, the mean of 9 total steps resulting from 3 successful walking trials was analyzed. Kinematic data were collected at 60Hz and filtered at 6Hz. Post-processing and statistical analysis were performed in Visual 3D and R. Symmetry was evaluated for step time and length using a symmetry index that calculates the ratio of kinematics between limbs. One-way ANOVA was performed to compare symmetry for step time and length across conditions. **RESULTS:** Step time ($F = 1.163$, $P = 0.32$) and step length ($F = 1.895$, $P = 0.16$) between-limb symmetry were not different across SS, DS, and UW. **CONCLUSION:** Despite carrying a load of 11kg in the SS and DS, symmetry in step length and step time was maintained, contrary to our hypothesis. Increases in lower limb joint moments may be required to account for the magnitude and position of the external load in SS and DS and to maintain symmetry in spatiotemporal gait parameters. Therefore, lower extremity joint and trunk biomechanics should be investigated in GET to better understand the mechanical demands required to maintain gait symmetry. Exploring the effects of different GET methods on uneven surfaces may be more ecologically important to understanding fatigue or golf performance due to GET method.