

A preliminary investigation of the use of inertial sensing technology for the measurement of hip rotation asymmetry in horse riders

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An asymmetrical posture can have a significant effect on balance and stability, impeding performance and increasing the risk of injury to both horse and rider. The aim of this study was to investigate whether inertial sensing technology is a practical tool for the identification and measurement of asymmetries in the rider's position, using hip rotation as the marker.

12 horse/rider combinations were fitted with the XsensTM MVN motion capture suit. Each combination performed a traversal of a 30m straight runway, marked out with poles and a 15m circle, in rising trot on each rein, before resting and repeating. Post-processing isolated frames for 2 complete stride cycles for straight line captures and 10 complete stride cycles for trot circles.

Asymmetry (left v right) was revealed in mean hip external rotation of all riders, with values ranging from 1-27 degrees in a straight line and from 0-30 degrees on a circle. 83% showed greater external rotation of the right hip. A Pearson product-moment test showed strong correlation between the two captures for both trot rising on the left rein, $r(10)=.981$, $p<.01$; and trot rising on the right rein, $r(10)=.961$, $p<.01$, indicating good intra-rater repeatability of the methodology. Wireless range was found to be reliable within a 20 x 40m area. The XsensTM suit enabled quick changeover between participants and the development of scripts for the R statistical package automated the analysis process.

This study represents novel use of inertial sensing technology in its application to the measurement of rider motion patterns. The technique is non-invasive and capable of recording rider hip rotation asymmetry whilst performing a range of movements unhindered. It was found to be efficient and practical, with potential to further advance the analysis of horse and rider interactions.

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