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Modified Chapman Ball Control Test in Field Hockey using a Stick-mounted Accelerometer

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Stick speed and ball control are two essential skills in elite field hockey and often measured as a drill to track player development. The Chapman ball control test requires a player to move the ball back and forth in a relatively small area in front of the player (called the “control box”) at the highest possible speed. Three 15 second trials are required with one timer and one scorer-recorder, but this procedure is cumbersome and labour intensive. This paper presents the use of a stick mounted accelerometer as an alternative.

One group of players ($n=7$) was subjected to the test: adult males with less than one year of hockey experience using a previously developed tri-axial accelerometer platform located on the lower third of a hockey stick (Wixted et al, “Measurement of energy expenditure in elite athletes using MEMS-based triaxial accelerometers”, *IEEE Sensors* 7(4) pp 481-488). The subjects were asked to move the ball within the control box as fast as possible over a one minute period.

The ball strike is clearly evident as a significant event on the axis perpendicular to the face of the hockey stick. The median value of the inter-strike interval t_m was found to be the most suitable indicator and was used to determine the Chapman score ($=15/t_m$); the number of ball strikes for 15 seconds. It was found this method simplified the original Chapman test protocol by eliminating the need for three separate trials. For one of the tested subjects, their median value was 0.43 s (Chapman score 35) which is far greater than measurements from an elite player with an inter-hit median time of 0.33 s (Chapman score 45).

It is been demonstrated that a stick mounted accelerometer can be used to derive a modified Chapman score. The technique is convenient, reliable and the median value is thought to be a more reliable measure of ball control and stick speed when compared with three 15 second hit counts. Future work will seek to verify the modified Chapman score by gaining additional data from elite and sub-elite players.

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