Kinematic Differences between Defended and Undefended Shots in Netball

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Introduction

Successful shooting in netball depends not only on achieving the correct angle, velocity, and height of release (Hay, 1993), but also on how well the shooter can adjust these factors when faced with a defender. However, few studies if any have analysed the difference between shots taken with a defender present and those without. Because only two players on a team can score goals (the Goal Shooter and Goal Attack), it is vital that these two particular players are successful.

Purpose

The purpose of the study was to examine the difference in kinematic variables between defended and undefended shots during high-level netball games.

Methods

The study was approved by the University's ethics committee and informed consent was given by eight elite netballers (Age mean 22.1, *s* = 2.3 years; stature 1.81, *s* = .08 m; mass 69.0, *s* = 8.7 kg). Each participant was filmed playing in a Netball Superleague game. Two stationary Canon DM-XL1 digital cameras were placed on a balcony overlooking the playing area. The sampling rate was 50 Hz, and the shutter speed 1/500 s. Two successful (scoring) shots per player were digitised and filtered using a Butterworth low-pass 2nd order filter. The two shots consisted of one successful defended shot, and one successful undefended shot (from a penalty awarded against the opposing team's defender). Statistical analysis consisted of dependent *t*-tests.

Results

The height of release was higher for defended shots (2.16 m, *s* = .28) than in undefended shots (1.93 m, *s* = .04). This was caused partially due to greater elbow extension during the shooting action. The maximum elbow angle for defended shots was 138° (± 25) and for undefended shots 108° (± 23). The significant difference found between these values (*P* = .049) was the only one found between the two shooting conditions. The angle of release at the shoulder was higher for defended shots (141°, *s* = 22) compared with undefended (133°, *s* = 7), as was the vertical velocity of the wrist at release (0.54 m·s^{-1}, *s* = .31 and 0.43 m·s^{-1}, *s* = .12 respectively).

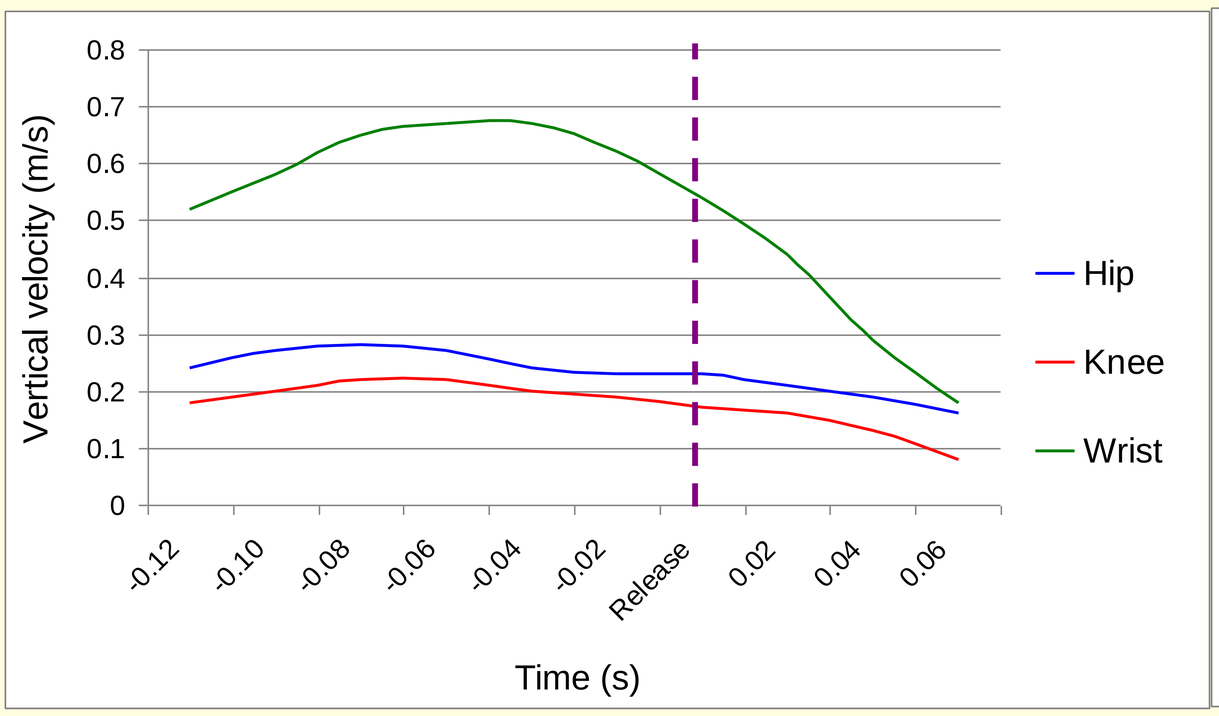

Figure 1. Vertical velocities in a defended netball shot

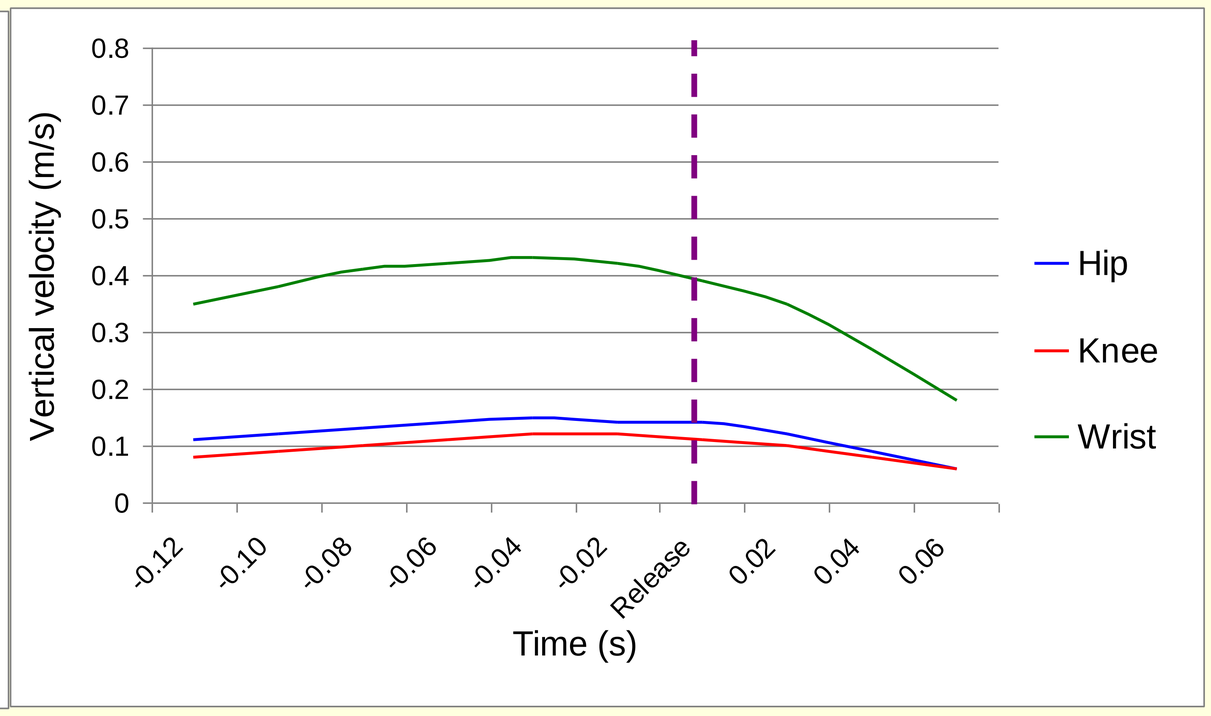

Figure 2. Vertical velocities in an undefended netball shot

Discussion

Several differences were found between shooting with and without a defender, although only one was found to be significant. Nonetheless, it was clear that shooting with a defender present required a greater height of release, and larger shooting arm joint angles. The lack of statistical differences does not mean that the small differences in shooting technique do not make a difference to the outcome of the shot. It is important for netball players and coaches to shoot with defenders present during training in order to practise the style of shooting required during a game. Further studies comparing successful with unsuccessful shots will improve understanding of this area.

References

Hay, J. G. (1993). *The Biomechanics of Sports Techniques (4th ed.)*