

Immediate stopping technique: the effect of a secondary netball-specific task

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Summary

Deceleration literature has typically focused on stopping technique without sport-specific secondary tasks. To investigate the effect of a sport-specific secondary task, 16 netballers were asked to complete three immediate stops with and without a ball catch. Kinematic and kinetic variables were captured using synchronized 3D motion capture and force plates. Greater lumbopelvic extension, lower hip flexion, lower horizontal loading rates, and higher peak vertical forces were observed in the immediate stop with the netball-specific task compared to without. These alterations while increasing the time to complete the secondary netball-specific task, delay the commencement of the primary stopping task and potentially increase the risk of the risk of anterior cruciate and lumbar bone stress injury. The effects of sport-specific tasks should be considered when investigating and training immediate stopping technique.

Introduction

Immediate stops are commonly seen within sports where rules or court restrictions cause a requirement to abruptly stop at high intensity. Netball has a high frequency of immediate stops due to player-specific court restrictions and footwork rules preventing further steps once they receive the ball [1]. Despite research on deceleration technique increasing, the majority has predominately analysed stopping without a secondary-sport specific task [2]. The effect of the secondary task in netball (catching the ball) on immediate stopping technique, therefore, remains unknown. This study aims to investigate the effect the completion of a secondary netball-specific task has on immediate stopping technique.

Methods

Three immediate stops (5m acceleration before stopping within 2 steps) with and without a secondary netball-specific task (catching a netball released from in front at shoulder height) were completed by sixteen female high performance netball players (age: 19.8 ± 1.6 years, height: 1.73 ± 0.08 m, mass: 71.2 ± 7.1 kg). Data was collected using a 12 camera (Oqus) Qualisys 3D motion capture system at 200Hz with 2 force plates at 1000Hz capturing penultimate foot contact (PFC) and final foot contact (FFC). Joint angle and ground reaction force parameters were determined using Visual3D at PFC and FFC for each trial. The outputs were averaged for each condition and differences compared using paired samples *t*-tests using a 0.05 alpha threshold. An alpha threshold adjustment for multiple comparisons was not performed due to the exploratory nature of the study.

Results and Discussion

Less hip flexion (PFC: $40.9 \pm 10.2^\circ$ vs. 48.1 ± 11.1 ; FFC: $46.2 \pm 9.7^\circ$ vs. 56.0 ± 11.1 , $p < 0.01$) and greater lumbopelvic

extension (PFC: $15.3 \pm 8.5^\circ$ vs. 7.3 ± 8.8 ; FFC: $10.2 \pm 9.2^\circ$ vs. 3.9 ± 8.8 , $p < 0.01$) was observed with a sport-specific secondary task compared to without (Figure 1). Greater horizontal loading times (0.046 ± 0.012 vs. 0.038 ± 0.013 s, $p = 0.04$), and lower vertical peak forces ($1473. \pm 352$ vs. 1650 ± 355 N, $p = 0.003$) were seen during FFC without a sport-specific task compared to with. All other joint angles and ground reaction force variables showed no statistically significant difference between conditions. These differences suggest that the addition of a netball-specific task delays the commencement of the immediate stop with athletes focusing on catching the ball during the penultimate step before focusing on stopping during the final step. To successfully catch the ball, athletes on average stood taller and leant further back to potentially increase the time available to perceive the trajectory and successfully complete the catch. Less hip flexion and greater lumbopelvic extension during final foot contact, however, has previously been implicated in the aetiology of anterior cruciate [3] and lumbar bone stress injuries [4].

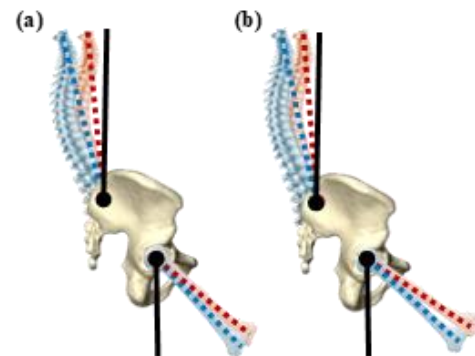


Figure 1: Mean hip and lower trunk angle differences during immediate stops with (blue) and without (red) a secondary task at (a) penultimate foot contact (PFC) and (b) final foot contact (FFC).

Conclusions

The inclusion of a secondary netball-specific task delays the commencement of the primary stopping task, to enhance the time to complete the secondary task. This, however, leads to alterations in hip and lumbopelvic joint angles may increase the risk of anterior cruciate and lumbar bone stress injury. Researchers and practitioners should consider the implications of sport-specific tasks when investigating and training immediate stopping technique.

References

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