SHOULDER IS MORE HORIZONTALLY ABDUCTED DURING THE COCKING PHASE IN JUMP SHOT THAN IN STEP SHOT IN HANDBALL.

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Summary

This study aimed to describe kinematic characteristics of jump shot by comparing it with step shot in handball. Kinematic data for the two shots during the cocking phase were collected from 13 male handball players using a 3D motion analysis system. The maximum angles in dominant shoulder horizontal abduction and trunk (thoracic-pelvic) axial rotation angles to dominant side were significantly larger for jump shot than for step shot. Meanwhile, pelvis axial rotation angle was significantly smaller for jump shot than for step shot. These results suggest that the increased shoulder horizontal abduction angle is likely influenced by pelvic position.

Introduction

In handball, a high prevalence of shoulder problems has been reported (22 %) [1]. It is considered that overuse shoulder problems could be caused by shot [2]. Of all shots, the jump shot, a throwing motion performed in the air, constitutes 75 % [3]. Since both feet have no contact with the ground in the jump shot, the pelvis and trunk (thoracic-pelvic) may rotate together during the cocking phase. This may reduce trunk movement, thereby potentially increasing horizontal abduction for the take-back motion. However, studies on the kinematic differences between step and jump shots have been limited. The aim of this study was to clarify the kinematic differences between the two shots. We hypothesised that the shoulder horizontal abduction angle is larger, while the trunk and pelvis rotation angles are smaller in jump shot compared to step shot. Coupled with the fact that a more horizontally abducted shoulder during cocking contributes to internal impingement [4], proving this hypothesis would imply a higher risk of shoulder injury in the jump shot.

Methods

Thirteen male handball players (19.5 ± 1.2 years, 1.80 ± 0.07 m, 76.3 ± 7.5 kg) performed step and jump shots at maximal effort. We analysed three-dimensional angles of the shoulder, trunk, and pelvis during the cocking phases in step and jump shots. The cocking phase was defined as the period from 0.3 seconds before the instant of maximum external rotation (MER) of the dominant shoulder to MER.

Results and discussion

The maximal shoulder horizontal abduction angle was significantly greater in jump shot (-35 ± 16 degrees) than in step shot (-27 ± 15 degrees) ($p < 0.05$). The maximal trunk rotation angle was significantly greater in jump shot (-41 ± 8 degrees) than in step shot (-29 ± 11 degrees) ($p < 0.05$). The pelvis axial rotation angle was significantly smaller in jump shot (-81 ± 13 degrees) than in step shot (-103 ± 9 degrees) ($p < 0.05$), measured at 0.3 seconds before MER. These results indicate that jump shot involves the pelvis facing more toward the throwing direction compared to step shot. Therefore, the shoulder horizontal abduction angle might increase to perform the take-back motion, which refers to the backward movement of the dominant arm before ball release (Figure 1).

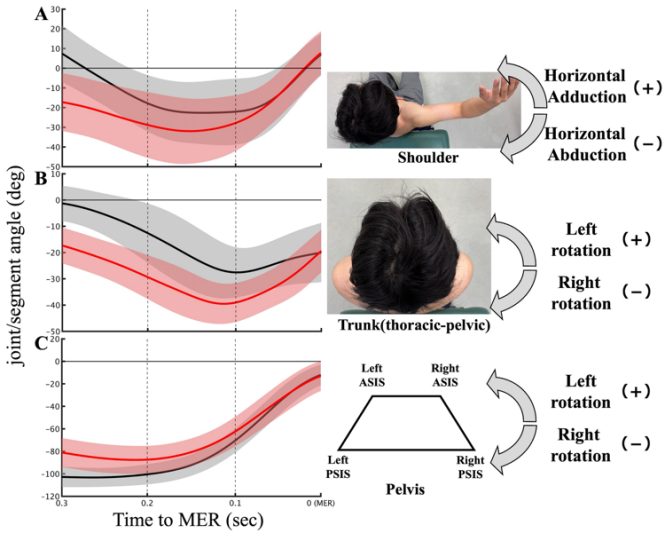

Figure 1: Angles of the two shots during cocking phase. Red line: jump shot, Black line: step shot.

Conclusions

We found that the shoulder horizontal abduction and trunk rotation angles were larger in jump shot than in step shot. These results suggest that jump shot increases the risk of internal impingement compared to step shot in handball.

References

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