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BRIEF NOTE

Asymmetry of lateral abdominal wall muscles in static and dynamic conditions: A preliminary study of professional basketball players

Asymétrie des muscles abdominaux antéro-latéraux en conditions statique et dynamique : étude préliminaire chez des basketteurs professionnels

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Summary
Objectives. — To establish right/left asymmetry in the lateral abdominal wall muscle group (LAM) and to determine whether this asymmetry is dependent on the motor task type (static/dynamic).
Summary of facts and results. — This was a cross-sectional study of ten men who had been playing basketball professionally for a minimum of 10 years. Asymmetry in the thickness of all the lateral abdominal wall muscles — transversus abdominis, internal oblique and external oblique — and with total LAM thickness were calculated. Thickness data were collected with M-mode ultrasound imaging during two conditions: static (in a static upright position) and dynamic (during rapid contralateral arm abduction). Thickness asymmetry of each muscle and the total LAM thickness was above 9% ($P < 0.01$) and was independent of the type of motor task ($P > 0.05$).
Conclusion. — LAM asymmetry in a group of basketball players is a stable and independent factor regardless of whether the motor task is static or dynamic.

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Basket-ball

Résumé
Objectives. — Établir la présence d'une asymétrie gauche-droite entre les groupes musculaires antéro-latéraux de l'abdomen et identifier l'asymétrie en fonction de l'activité motrice (statique ou dynamique).
Synthèse des faits et résultats. — Une étude transverse a été réalisée dans un groupe de dix hommes, joueurs professionnels du basket depuis au moins 10 ans. Les mesures ont inclus l'épaisseur des muscles abdominaux latéraux — muscles transverse et oblique : interne et externe, ainsi que l'épaisseur totale des groupes de muscles abdominaux antéro-latéraux et l'asymétrie gauche-droite. Les mesures ont été réalisées grâce à l'échographie mode M dans les conditions statiques (position debout statique) et les conditions dynamiques (abduction rapide des épaules en alternance). L'asymétrie d'épaisseur entre les muscles individuels et l'épaisseur des groupes des muscles latéraux de l'abdomen dépassait 9 % ($p < 0{,}01$) et n'est pas associée au type de mouvement ($p > 0{,}05$).
Conclusion. — L'asymétrie des muscles abdominaux antéro-latéraux est constante et indépendante des mouvements statiques ou dynamiques effectués par les joueurs de basket.

1. Introduction

Recent ultrasound imaging (US) study by Kim et al. [1] revealed that external perturbations can cause transversus abdominis muscle (TrA) asymmetry to be eliminated; this phenomenon may represent an effective strategy for avoiding spinal torsion. However, there is no evidence to suggest whether a similar mechanism is present in sporting populations, such as basketball players, who are exposed to static and dynamic loading in both upper and lower extremities.

Although Kim et al.'s findings [1] suggest that asymmetry may be an undesirable phenomenon resulting in lower-back pain, other studies revealed that asymmetry of the lateral abdominal wall muscle group (LAM) can be a physiological adaptation [4]. Furthermore, the 'point' at which LAM asymmetry becomes pathological is still unclear. A knowledge of the symmetrical/asymmetrical mechanisms of control of the LAM in different samples seems to be clinically important; for example, it may be used to restore them while dysfunction or pain is present.

The aim of this study is: to establish right-left asymmetry in the LAM and to determine whether this asymmetry is dependent on the motor task type (static or dynamic) with respect to basketball players.

2. Material and methods

2.1. Participants

Fourteen basketball players (mean age = 24.6 ± 2.7 years, mean height = 1.9 ± 0.1 m, mean weight = 85.9 ± 9.7 kg, left-handed $n = 2$) from a single team in the 3rd division of Poland's basketball league participated in this study. Participants were excluded from the study if:

- they were over 30 years old ($n = 1$);
- they reported pain in the musculoskeletal system during the previous three weeks or lower-back pain during the previous 6 months ($n = 2$);
- they had played basketball professionally for less than 10 years ($n = 1$).

All classified participants ($n = 10$) provided verbal and written consent to participation, in accordance with the Helsinki Declaration. The research was approved by the local bioethical committee (18/2007 dated 31st May 2007).

2.2. Study stages

The study structure included the three following stages: pilot, reliability and main stage. During the pilot stage, raters A and B completed a four-week training in the use of US, during which 10 subjects were examined. Rater C was trained to read data from received US images. During all three stages, the raters were always responsible for the same operations: rater A—transducer operator; rater B—measurement registration; rater C—data collection. The reliability stage included two series of measurements collected from a group of five healthy volunteers of a similar age to the target sample. Analysis revealed that the most reliable movement direction was abduction, therefore this movement was used in the main study.

2.3. Ultrasound measurements

The study was carried out using the US device Mindray DP 6600 with a linear array model 75L38EA and a frequency of 5 MHz [2]. The measurement procedure was divided into two phases. The first phase was performed by rater A, who instructed the participant and located the measurement area by US (B-mode) around the point of intersection of two lines, one vertical line running through the anterior superior iliac spine and one horizontal passing through the umbilicus [2].

During the location procedure, the participant stood looking straight ahead, back towards the US device and upper limbs hanging loosely. After finding the desired location on the randomised side of the LAM, rater A marked