

Test-retest reliability of two-dimensional video analysis of single-leg drop vertical jumps

Bart Dingenen¹, Sofie Hawinkel¹, Tine Petr ¹, Alli Gokeler²

¹ Rehabilitation Research Centre, Biomedical Research Institute, Faculty of Medicine and Life Sciences, UHasselt, Agoralaan Gebouw A, 3590 Diepenbeek, Belgium.

² University of Groningen, University Medical Center Groningen, Center for Human Movement Sciences, Antonius Deusinglaan 1, 9713 AV Groningen, The Netherlands.



Introduction

Two-dimensional video analysis can be used to assess multi-segmental kinematics during jump-landing tasks in daily clinical practice. The aim of this study was to examine the test-retest reliability of two-dimensional measured frontal and sagittal plane kinematics during single-leg drop vertical jumps.

Materials and Methods

A total of 15 recreational athletes (8 females, 7 males; mean 22.2 ± 1.8 years) participated in the study. All athletes performed 4 repetitions of a single-leg drop vertical jump and were tested twice with a one-week interval. Both legs were tested. Digital videos were recorded in the frontal and sagittal plane with 2 iPads (120 Hz). The outcome measures were lateral trunk motion, knee valgus, the sum of knee valgus and lateral trunk motion in the frontal plane, and hip flexion and knee flexion in the sagittal plane (Figure 1, Figure 2). All angles were drawn using freely available motion analysis software (Kinovea) during the deepest position of the initial landing. Intraclass correlation coefficients (ICC's), standard errors of measurement (SEM) and smallest detectable differences (SDD) were calculated (Table 1).

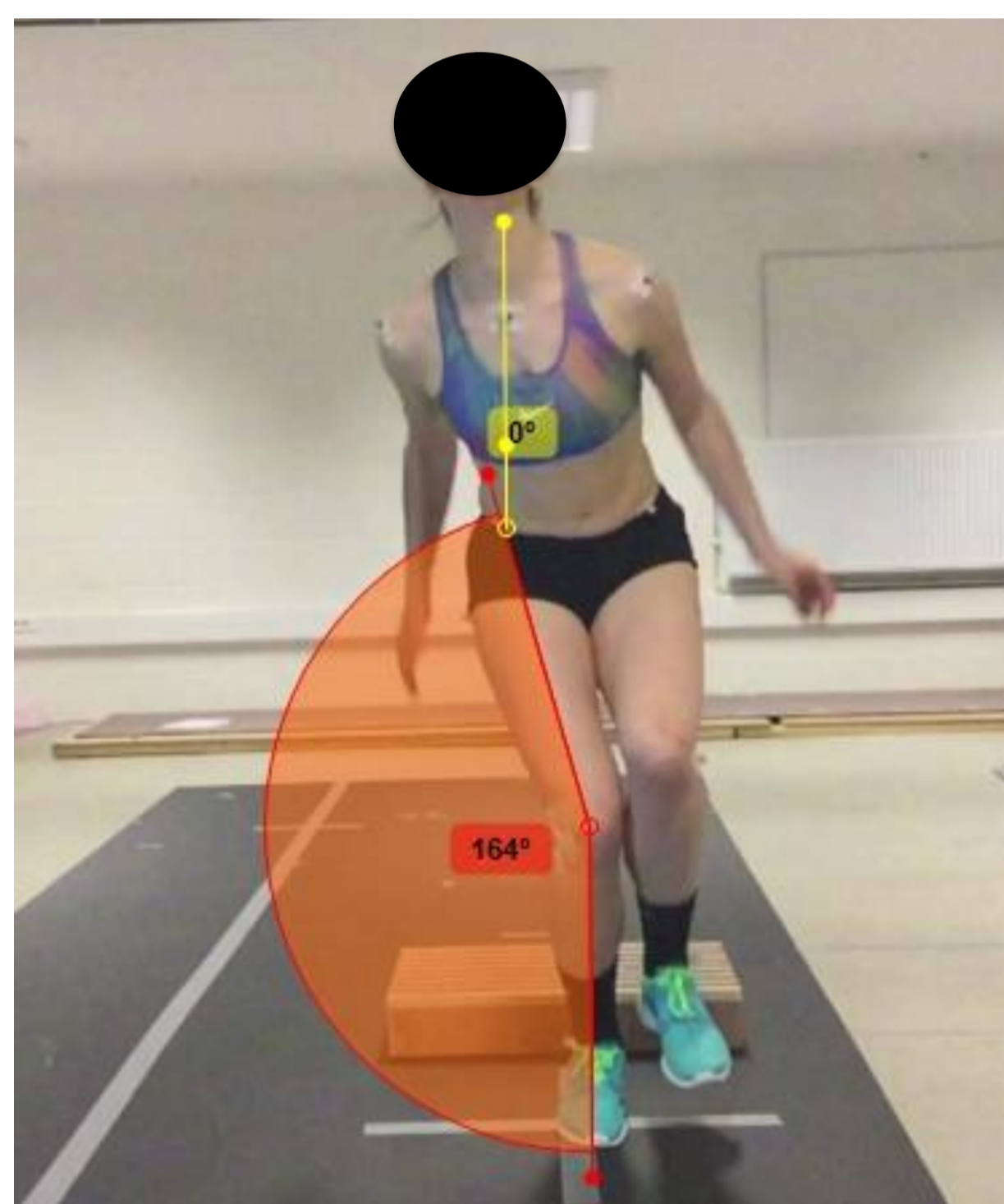


Figure 1.

An example of the two-dimensional measurement of lateral trunk motion and knee valgus.

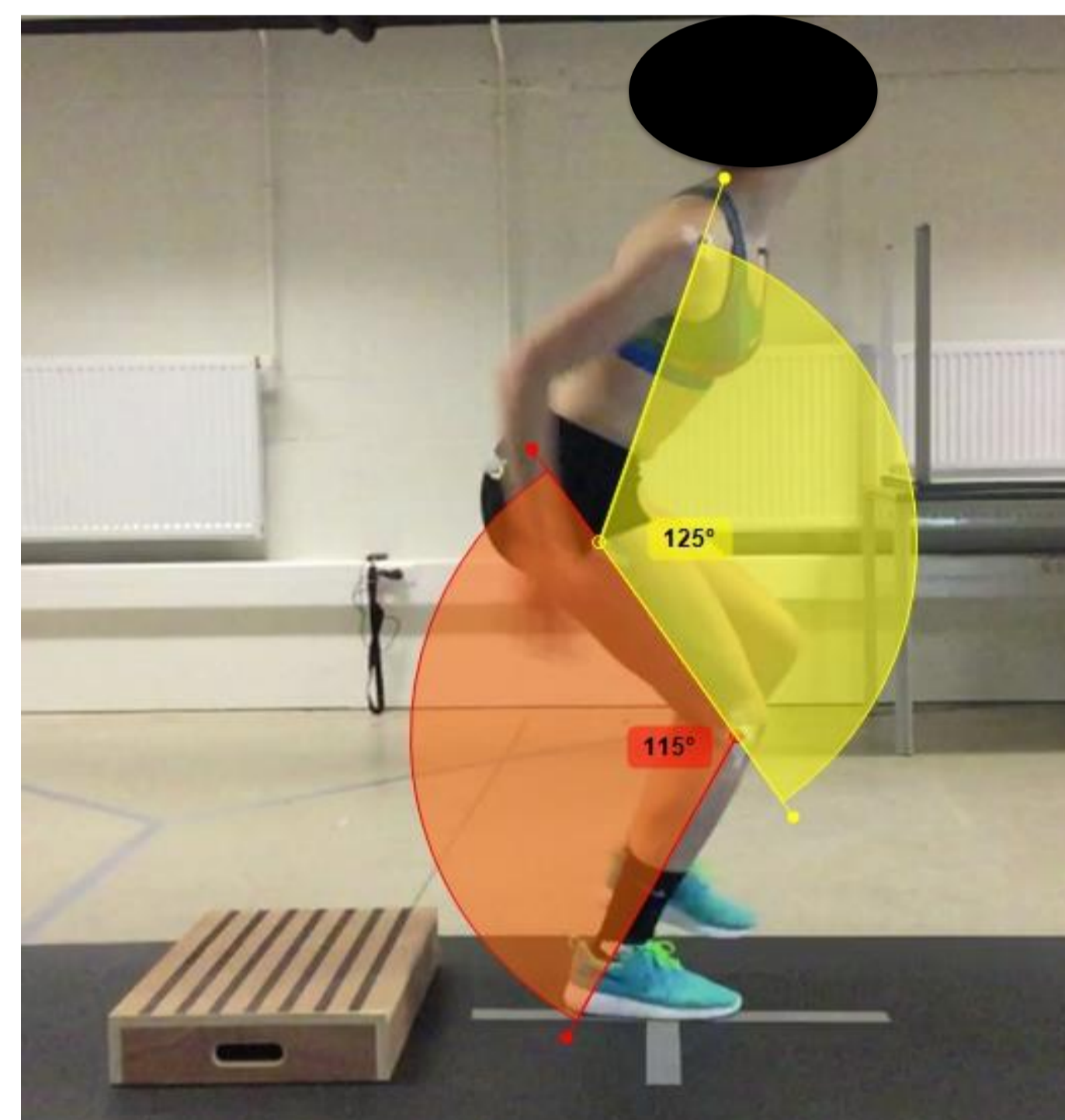


Figure 2.

An example of the two-dimensional measurement hip flexion and knee flexion.

Results

Table 1. Test-retest reliability of two-dimensional measured angles during single leg drop vertical jumps.

RIGHT LEG	Absolute difference between measures (°) (mean (SD))	ICC _{2,2} (95% CI)	SEM (°)	SDD (°)	SDD/range (%)
Lateral trunk motion	2.4 (1.9)	0.75 (0.25 – 0.92)	1.7	4.6	40.0
Knee valgus	3.6 (2.6)	0.91 (0.74 – 0.97)	2.3	6.3	21.2
KVLTM	4.1 (2.7)	0.92 (0.77 – 0.97)	2.5	6.8	20.3
Hip flexion	7.1 (5.4)	0.87 (0.63 – 0.96)	4.6	12.7	26.1
Knee flexion	5.6 (4.1)	0.75 (0.28 – 0.91)	3.8	10.5	34.4
LEFT LEG	Absolute difference between measures (°) (mean (SD))	ICC _{2,2} (95% CI)	SEM (°)	SDD (°)	SDD/range (%)
Lateral trunk motion	1.7 (1.6)	0.94 (0.68 – 0.98)	1.2	3.2	17.1
Knee valgus	2.7 (2.9)	0.92 (0.77 – 0.97)	2.0	5.5	22.4
KVLTM	3.0 (2.4)	0.94 (0.82 – 0.98)	1.9	5.3	21.0
Hip flexion	8.5 (5.1)	0.87 (0.30 – 0.97)	5.0	13.9	23.8
Knee flexion	5.5 (2.6)	0.79 (0.30 – 0.93)	3.2	8.9	34.9

KVLTM: sum of knee valgus and lateral trunk motion; ICC: intraclass correlation coefficients; CI: confidence interval; SEM: standard error of measurement; SDD: smallest detectable difference.

The range of ICC's, SEM and SDD of the frontal plane angles were respectively 0.75-0.94, 1.2°-2.5° and 3.2°-6.8°.

The range of ICC's, SEM and SDD of the sagittal plane angles were respectively 0.75-0.87, 3.2°-5.0° and 8.9°-13.9°.

Conclusion

- Good to excellent test-retest reliability was found when using two-dimensional video analysis during single-leg drop vertical jumps.
- The current results allow clinicians to make informed interpretations of changes in kinematics when retesting individual athletes.

Corresponding author:
bart.dingenen@uhasselt.be