

THREE-DIMENSIONAL ASSESSMENT OF ON WATER ROWING TECHNIQUE: A METHODOLOGICAL STUDY

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INTRODUCTION: The analysis of rowing technique in training or competitive environments has been a challenge to biomechanists for some time now. Typically, two-dimensional assessments are carried out with fixed cameras mounted on-land next to a rowing course (Hay 1993) or by handheld cameras from an accompanying boat. Three-dimensional technique analysis were only presented for athletes rowing on an ergometer in a laboratory environment (Hofmijster et al. 2007). The purpose of this study was to develop and validate a system for three-dimensional kinematic analyses of on water rowing.

METHOD: A three-camera (Basler A602f, 30 Hz) video recording system (SimiMotion 7.0) was mounted on a large catamaran-type motor boat with cameras set at various heights and the most distant cameras about 14 m apart. This arrangement was calibrated prior to and when the boat was in the berth using a customised calibration procedure. Twenty-two reference points were used, covering a volume of approximately 4.5 x 3 x 2.5 m. A total of nine elite level athletes in various boat categories were analysed during training and race pace at Karapiro, New Zealand. Four trunk points and four reference points on the boat were marked up, while the remaining points of interest were digitized manually. Joint angles were calculated using Simi software.

A reference experiment was performed on a movable rowing ergometer (Concept 2) in the laboratory. A geometrically similar camera setup and calibration was created for the Basler cameras. Trials with one subject marked up using a 51 point full body marker (Ferdinands & Kersting, 2004) set were recorded using an 8-camera motion capture system (Vicon MX). Joint centre coordinates and joint angles were calculated from both systems and compared.

RESULTS: Joint centres showed differences in location of up to 3 cm while joint angles displayed very similar patterns with varying levels of agreement. Mean deviations were calculated over one full rowing stroke and varied from mean difference of less than 1 deg to 4.5 deg for the elbows.

CONCLUSION: This study demonstrated a suitable method for three-dimensional rowing technique assessment on water. With this more comprehensive rowing analyses are possible. However, there is a considerable technical and time effort included which may not be suitable for general training purposes. However, from a research point of view this is a promising methodology.

REFERENCES:

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