Leg Positioning in the Freestyle Track Start in Swimming

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1 Introduction

In swimming competitions the start is an important part of the race. Very close outcomes of a race are possible, a blink of an eye can decide between a medal or the 4th place (e.g. World Championships 2015: 50 freestyle Men 3rd place 21.55 s and 4th place 21.56 s). The start performance (defined as time to 15m) represents a high proportion of up to 26% of the overall race time [1]. The introduction of the OSB11 block in 2009 with an additional kickplate at the rear of the block leaded to changes in the starting technique. The contribution of the back leg became more important [2] and therefore also the best stance preference for the track start is likely to change. The relationship between footedness and the track start stance preference is still unclear [3].

The aim of the study was to investigate the leg positioning in the freestyle track start in swimming on the new block design (with kickplate) in order to optimize the start performance.

We wanted:
1. To compare the preferred track start using the normal limb configuration with the non-preferred track start (opposite limb configuration).
2. To identify the dominant leg and then to identify the preferential positioning of the dominant leg in the freestyle track start.
3. To compare the track start with the dominant leg in the front position against the dominant leg in rear position.

2 Method Overview

Fifteen high-level swimmers (13m + 2f, age: 20 ± 3 years, height: 1.85 ± 0.09 m, weight: 74 ± 11 kg, performance: 707 ± 88 FINA points) of the Swiss Swimming Training Base in Tenero performed in random order five preferred track starts and five non-preferred track starts. The starts were recorded with a prototype of the Performance Analysis System for Swimming (PAS-S) – an instrumented starting platform with two force platforms and instrumented starting grips and a corresponding vision system with four cameras (three underwater, one above). The PAS-S was developed by Kistler Instrumente AG and allows the kinetic and kinematic analysis of starts. After post-processing with Matlab and the PAS-S software 10 kinetic and kinematic parameters were analysed. The start performance was quantified with the time to 15m. The dominant leg was assessed using the peak power of one-legged countermovement jumps (Quattro Jump) and a footedness questionnaire. All statistical comparisons were undertaken in IBM SPSS Statistics (v22).

3 Results

The preferred start position showed better start performance in all parameters than the non-preferred start position. All subjects were faster to 15m with their preferred start position (6,87s ± 0,36s vs. 7,08s ± 0,36s). Almost every second athlete (47%) has a different peak power leg than the footedness test indicates. 10 of the fifteen athletes placed their stronger leg (based on the one-legged CMJ) in their preferred start in the front position. The peak forces and the momentum are higher for the back leg.

4 Discussion for practice

In conclusion and as consequences for the coach:
1. The preferred is always faster: a new technique has to be trained.
2. Identification of stronger leg: make an objective test to find the stronger leg.
3. Stronger leg in the back position for the track start (if possible from coordination level).

5 References