Executive function testing to assist identification of pitch-side concussion in elite rugby players

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Background

Current methods for assessing concussion during rugby matches rely on rudimentary behavioural assessment, focusing on balance and gross motor function. Cognitive testing with the Sports Concussion Assessment Tool has recently been included, but there are a paucity of normative and baseline data for this test. This study examined the utility of the Trail Making Test (TMT), which is a neuropsychological test of executive function in two parts (TMT-A and TMT-B), to assist identification of cognitive impairments caused by impacts during rugby games.

Methods

27 elite male rugby league players contracted to a professional rugby club were recruited towards the end of the season. Each player was tested on three occasions within a 2 week period with both TMT-A and TMT-B for baseline assessment. Each player was additionally assessed after full contact training on 2 consecutive days and during preseason training. Individual baseline data were calculated from the best of the baseline assessments, and time differences were examined with ANOVA.

Findings

No instances of concussion occurred during data collection. For TMT-A there was no significant difference ($F(3, 24)=2{\cdot}88$, $I2=0{\cdot}27$) between baseline (mean 13·79 s [SD 5·32], 95% CI 9·34–18·23), post-training day 1 (11·38 [2·63], 9·18–13·58), post-training day 2 (11·16 [1·94], 9·55–12·79), and preseason (11·79 [2·64], 9·58–13·99). For TMT-B there was no significant difference between baseline (31·50 [5·37], 27·01–35·99), post-training day 1 (28·07 [8·82], 20·70–35·44), post-training day 2 (26·18 [6·16], 21·03–31·33), and preseason (26·98 [4·89], 22·89–31·07).

Interpretation

These findings indicate that there were no significant differences in performance of these executive tasks from baseline to post-training (end of season and preseason). These data show stability of

TMT-A and TMT-B data across a competitive rugby league season. Importantly, use of measures of variation such as CIs for these tasks can provide a metric for calculating minimally important clinical differences within cognition.