28th ECSS Anniversary Congress, Paris/France, 4-7 July 2023

Paralympic sport and sport-related concussion: a single case study

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INTRODUCTION:
Sport-related concussions are common in para sport and are associated with short-term effects on cognitive functions. Due to the heterogeneous impairments in para-sport, the circumstances of handling sport-related concussion are difficult to assess. We therefore investigated in a single-case study of a Paralympic swimmer several motoric, behavioral, and neuro-cognitive parameters (before and after head collisions) that have been previously reported to be of diagnostic value in the assessment of post-concussion deficits.
METHODS:
We investigated a nineteen-year-old Paralympic swimmer with dysmelia (resulting in pronounced deformities of the hands, arms, and legs). The investigations were conducted before and after four head collisions against the wall in a swimming pool (identical collisions as the swimmer regularly performs to end competitions). Head acceleration was recorded during each collision by an accelerometer and video analyses. Before and after the collision we assessed post-concussion symptoms, the positive and negative affect schedule (PANAS), cognitive functions (working memory (wm), King Devick), nonverbal hand movement behavior and brain oxygenation (by applying functional Near InfraRed Spectroscopy (fNIRS) above precentral cortices of both hemispheres during rest (for connectivity analyses) and during the working memory task).
RESULTS:
The average head acceleration during the four head collisions was 15 g ± 5.5. Preliminary results showed that post-concussion symptoms increased from before to after the four head collisions. The positive affect scores decreased. There were no differences in the King Devick. The athlete performed less nonverbal hand movements after the collision when compared to before the intervention. Working memory scores showed 22 percent less correct answers and 195 milliseconds longer reaction times for after the fours head collisions than before. Functional brain oxygenation during the wm task was reduced from before to after head collision. Brain connectivity was reduced from before to after the head collision.
CONCLUSION:
The present findings indicate that repeated head collisions in swimming are related to increased post-concussion symptoms that are accompanied by reduced cognitive and brain functions. Thus, Paralympic swimming with dysmelia may be affected from an increased risk of long-term effects similar to those of repeated concussive incidents. Although it is a challenge to manage sport-related concussions in paralympic disciplines because of the heterogeneous impairments, this issue ought to be considered in future research and the implementation of actual preventive actions.

Topic: Disabilities

Presentation Poster

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