

A role for instrumented motor assessment in clinical assessment and outcome prediction after mild head injury

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Based on earlier findings that instrumented motor assessment after mild closed head injury (CHI) can provide sensitive markers of cerebral dysfunction, this study examined whether a functional sample of the injured brain using such motor assessment can provide an early indication of outcome after mild CHI.

At 1 week following mild CHI, we assessed 37 mild CHI patients on measures of saccades, oculomotor smooth pursuit, upper-limb visuomotor function, and psychometric status. At 3 months, we re-examined the patients and identified cases who met the WHO diagnostic criteria for postconcussion syndrome (PCS). We then determined whether this PCS-group could be identified based on their motor performance at 1 week post-injury.

At 1 week, the PCS-group (n=8) did not differ from the remaining patients on age, gender, education, trauma severity, or neuropsychological assessment. Conversely, the PCS-group performed worse on several motor measures compared to non-PCS patients, showing fewer self-paced saccades, decreased saccadic velocities, longer correction times for directional errors, and differences in memory-guided saccade accuracy. Motor performance at 1 week correlated with later levels of outcome, both in PCS and non-PCS patients. In particular, motor functions that are beyond conscious control but sensitive to the presence and depth of neural injury showed strong associations with outcome. Using discriminant function analysis, these results were combined into a motor-based model for the early identification of PCS cases. In the above patient sample, this model identifies potential PCS-patients with a sensitivity and specificity of 100%.

These results suggest that computerized motor testing can contribute considerably to improved patient assessment and better outcome prediction after mild CHI. Motor testing may assist in the better targeting of early health care intervention and help decrease head-trauma-related morbidity and rehabilitation costs.