

# Eye movement and visuomotor arm movement deficits following mild closed head injury.

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### **Abstract**

Based on increasing evidence that even mild closed head injury (CHI) can cause considerable neural damage throughout the brain, we hypothesized that mild CHI will disrupt the complex cerebral networks concerned with oculomotor and upper-limb visuomotor control, resulting in impaired motor function. Within 10 days following mild CHI (Glasgow Coma Scale 13-15, alteration of consciousness <20 min), we compared 30 patients (15-37 years) and 30 matched controls on different types of saccades, oculomotor smooth pursuit (sine and random), upper-limb visuomotor performance and several neuropsychological tests known to be sensitive to head trauma. Simple reflexive saccades were not impaired, whereas, on the antisaccade task, the CHI group demonstrated prolonged saccadic latencies, a marginally higher number of directional errors and poorer spatial accuracy. The CHI group exhibited more directional errors and impaired motor accuracy on memory-guided sequences of saccades and produced fewer self-paced saccades within 30 s. Most measures of sinusoidal and random oculomotor smooth pursuit showed no deficits, with the exception of a prolonged lag on random smooth pursuit in the CHI group. While arm movement reaction time and arm steadiness were not impaired, the CHI group showed decreased arm movement speed and decreased upper-limb motor accuracy. Conversely, after controlling for IQ, the CHI group had few head trauma-related neuropsychological deficits. These results indicate that multiple motor systems can be impaired following mild CHI and that this can occur independently of neuropsychological impairment. Our study also indicates that quantitative tests of oculomotor and upper-limb visuomotor function may provide sensitive markers of cerebral dysfunction, suggesting the potential use of such tests to supplement patient assessment. To our knowledge, this study is the first to demonstrate the presence of oculomotor or visuomotor deficits following mild CHI.

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