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DEPTH OF IMPAIRED CONSCIOUSNESS ON ADMISSION AND THE TRAJECTORY OF RECOVERY DURING THE FIRST WEEK AFTER OPEN TRAUMATIC BRAIN INJURY

Sharifbaev S. A.

Aleynik V. A.

Vasilevskiy E. A.

Dadabaev O. T.

Andijan State Medical Institute, Andijan, Republic of Uzbekistan

Institute of Immunology and Human Genomics, Tashkent, Republic of Uzbekistan

Background

The Glasgow Coma Scale has remained the principal clinical descriptor of traumatic brain injury for five decades [1], and management thresholds in current guidelines are anchored to the admission score [2]. Far less attention is paid to how the score changes over the following days, although the rate at which consciousness returns reflects the reversibility of the secondary injury cascade rather than the extent of the primary lesion [3]. In open injury, where the dura is breached and the wound tract is contaminated, the early course may differ from that of closed injury, but serial data are scarce.

Objective

To describe the depth of impaired consciousness and pupillary reactivity on admission in patients with open traumatic brain injury and to compare the trajectory of Glasgow Coma Scale recovery during the first week between severity groups.



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Methods

The study included 101 patients with open traumatic brain injury admitted during the acute period. The Glasgow Coma Scale was scored on admission and every 4 to 6 hours thereafter, always before administration of sedatives. Level of consciousness was recorded in clinical gradations (clear consciousness or stupor, sopor, coma) and pupillary light reaction was documented. Mean scores were calculated for days 1, 3 and 7. Moderate injury (9 to 12 points) was diagnosed in 45 patients and severe injury (3 to 8 points) in 56. Functional outcome was assessed at 6 months with the Extended Glasgow Outcome Scale using a structured interview [4, 5]. Quantitative data are presented as $M \pm SD$.

Results

On admission, coma was present in 51 patients (50.5%), sopor in 32 (31.7%) and clear consciousness or stupor in 18 (17.8%). The pupillary light reaction was preserved in 62 patients (61.4%) and absent in 39 (38.6%), so more than one third presented with signs pointing to brainstem involvement.

The mean score rose in both groups over the first week. In the moderate group it increased from 10.8 ± 1.3 on day 1 to 12.5 ± 1.4 on day 3 and 13.9 ± 1.2 on day 7, a gain of 3.1 points. In the severe group it rose from 6.5 ± 1.9 to 8.2 ± 2.0 and then to 9.8 ± 2.4 , a gain of 3.3 points. The absolute gain was therefore almost identical in the two groups, and the difference between them was determined by the starting point rather than by the rate of recovery. Patients with severe injury did not reach by day 7 the level at which the moderate group had presented on admission.

The standard deviation in the severe group widened from 1.9 on day 1 to 2.4 on day 7, whereas in the moderate group it remained stable and slightly decreased, from 1.3 to 1.2. Individual trajectories in the severe group therefore diverged during the week, while those in the moderate group converged. A favourable



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functional outcome at 6 months was achieved in 93.3% of patients with moderate and in 53.6% of those with severe injury.

Conclusions

1. Half of the patients with open traumatic brain injury present in coma and more than one third have no pupillary light reaction, which defines the clinical severity of this form of injury on admission.
2. The absolute gain in the Glasgow Coma Scale over the first week is similar in moderate and severe injury (3.1 and 3.3 points), so the two groups differ in their starting level rather than in the rate at which consciousness returns.
3. Individual trajectories diverge in the severe group during the first week, as shown by the widening standard deviation, while they converge in the moderate group; this suggests that the day 7 score may carry information not contained in the admission score.
4. The marked difference in favourable outcome at 6 months between the groups (93.3% and 53.6%) confirms that the admission level of consciousness remains the dominant clinical determinant of prognosis [6].

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