Severe traumatic brain injury - clinical course and prognostic factors

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Akademisk avhandling

som med vederbörligt tillstånd av Rektor vid Umeå universitet för avläggande av medicine doktorsexamen framläggs till offentligt försvar i sal E04 Umeå Universitetssjukhus, fredagen den 27 maj, kl. 13:00. Avhandlingen kommer att försvaras på svenska.

Fakultetsopponent: Professor, Jan Lexell, Institutionen för hälsovetenskaper, forskargruppen Rehabiliteringsmedicin Lunds universitet, Lund, Sverige.
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Abstract

Traumatic brain injury (TBI) constitutes a major health problem and is a leading cause of long-term disability and death. Patients with severe traumatic brain injury, S-TBI, comprise a heterogeneous group with varying complexity and prognosis. The primary aim of this thesis was to increase knowledge about clinical course and outcome with regard to prognostic factors. Papers I, II and III were based on data from a prospective multicentre observational study from six neurotrauma centers (NCs) in Sweden and Iceland of patients (n=103-114), 18-65 years with S-TBI requiring neurosurgical intensive care or collaborative care with a neurosurgeon (the “PROBRAIN” study). Paper IV and V were performed on a regional subset (n=37). In Paper I, patients with posttraumatic disorders of consciousness (DOC) were assessed as regards relationship between conscious state at 3 weeks and outcomes at 1 year. The number of patients who emerged from minimally conscious state (EMCS) 1 year after injury according to status at 3 weeks were: coma (0/6), unresponsive wakeful syndrome (UWS) (9/17), minimally conscious state (MCS) (13/13), anaesthetized (9/11). Outcome at 1 year was good (Glasgow Outcome Scale Extended (GOSE>4) in half of the patients in MCS (or anaesthetized) at 3 weeks, but not for any of the patients in coma or UWS. In Paper II, the relationships between clinical care descriptors and outcome at 1 year were assessed. A longer length of stay in intensive care, and longer time between discharge from intensive care and admission to inpatient rehabilitation, were both associated with a worse outcome on the GOSE. The number of intervening care units between intensive care and rehabilitation, was not significantly associated with outcome at 1 year. In Paper III, the clinical course of cognitive and emotional impairments as reflected in the Barrow Neurological Institute Screen for Higher Cerebral Functions (BNIS) and the Hospital Anxiety and Depression Scale (HADS) were assessed from 3 weeks to 1 year together with associations with outcomes GOSE and Rancho Los Amigos Cognitive Scale-Revised (RLAS-R) at 1 year. Cognition improved over time and appeared to be stable from 3 months to 1 year. In Paper IV, clinical parameters, the clinical pathways from injury to 3 months after discharge from the NC in relation to outcomes 3 months post-injury. Ratings on the RLAS-R improved significantly over time. Acute transfers to the one regional NC was direct and swift, transfers for postacute rehabilitation scattered patients to many hospitals/hospital departments, not seldom by several transitional stages. In Paper V, an initial computerized tomography of the brain (CTi) and a further posttraumatic brain CT after 24 hours (CT24) were evaluated according to protocols for standardized assessment, the Marshall and Rotterdam classifications. The CT scores only correlated with clinical outcome measures (GOSE and RLAS-R) at 3 months, but failed to yield prognostic information regarding outcome at 1 year. A prognostic model was also implemented, based on acute data (CRASH model). This model predicted unfavourable outcomes for 81% of patients with bad outcome and for 85% of patients with favourable outcome according to GOSE at 1 year. When assessing outcomes per se, both GOSE and RLAS-R improved significantly from 3 months to 1 year. The papers in this study point both to the generally favourable outcomes that result from active and aggressive management of S-TBI, while also underscore our current lack of reliable instruments for outcome prediction. In the absence of an ability to select patients based on prognostication, the overall favourable prognosis lends support for providing active rehabilitation to all patients with S-TBI. The results of these studies should be considered in conjunction with the prognosis of long-term outcomes and the planning of rehabilitation and care pathways. The results demonstrate the importance of a combination of active, acute neurotrauma care and intensive specialized neurorehabilitation with follow-up for these severely injured patients.

Keywords

Severe traumatic brain injury, outcome, rehabilitation, prognosis