CLINICAL STUDY

The outcome, working ability and psychic changes after traumatic brain injury

Navratil O, Smrcka M, Hanak P

Department of Neurosurgery, University Hospital, Brno, Czech Republic. **ondras76@yahoo.co.uk**

Abstract

Introduction: **Severe traumatic brain injury belongs to diagnoses with unfavourable outcome. Almost half of patients die due to this diagnose and many survivals remain severely disabled.**
Material and methods: **In our follow-up file we evaluated 52 patients treated at neurosurgical department due to this diagnosis. The survivals were subsequently examined in order to determine the severity of their objective neurological and cognitive problems.**
Results: **Mortality rate in our group reached 56 %. The overall results show cognitive disorders (memory disorders, prolonged latency and concentration disorders). Out of 92 % of surviving patients, it was neurological impairment that was most frequently (65 %) involved.**
Conclusion: **Both cognitive disorders and neurological impairments are responsible for complicated resocialising including working ability which is very low after severe traumatic brain injury – in our group 26 %. Major obstacle can be seen in the psychological component of their over-all impaired quality of life *(Tab. 5, Ref. 6)*.**
Key words: Brain injury, working ability, psychological and neurological disorders, Glasgow Outcome Score.

Traumatic brain injury (TBI) affects mostly the young generation at age ranging between 25–45 years (2), which means that it refers to patients at productive age. The main causes of TBI in western countries are traffic accidents followed by working accidents and an increasing number in accidents during leisure activities (sports etc.) (1). Due to the increasing number of people, technologic advance, rising number of vehicles around the world, an increase in the number of TBI can be expected despite the trend of safety enhancement. In approximately 60 % of cases, multiple trauma cases are accompanied by head injuries. The facts mentioned above are supported by studies – mortality of TBI patients varies between 30–50 % according to various literature sources. Becker et al report mortality of 30 % 3 months after injury (4). In a multicentric study dealing with the period of 1984–1987 mortality was 36 % 6 months after injury (Marshall et al) (3). Additionally only a small percentage of patients are able to return to work – published studies vary between 25–46 % (1). Estimations of TBI costs in the U.S. range from 4–15 billion US dollars per year (2). A similar study focused on the quality of life of patients in Czech Republic has not been carried out yet.

The quality of life can be divided into four major parts: physical, psychological, social and cognitive.

1) Physical sphere – deficits that can be revealed by common neurological examinations – hemiparesis, fatique disorder, functional dependence and mobility etc.

2) Psychological sphere – involved are problems regarding personality and behavioural alterations, affective disorders, e.g. anxiety, depression, aggressiveness.

3) Social sphere – deficit in relation to family, friends, working ability.

4) Cognitive sphere – mental speed, orientation, perception, concentration, memory, executive functions.

Department of Neurosurgery, University Hospital, Brno, and Department of Psychiatry, University Hospital, Brno, Czech Republic

Address for correspondence: O. Navratil, MD, Dept of Neurosurgery, University Hospital Brno, Jihlavska 20, CZ-625 00 Brno, Czech Republic
Phone: +420.5.32232741, Fax: +420.5.32232190

Material and methods

During the period of 36 months 52 patients were evaluated – four quality of life components – physical, social and cognitive – were assessed. Patients included were admitted and treated at Neurosurgical Department at University Hospital Brno from September 2002 to September 2003 and suffered from severe traumatic brain injury (STBI), their Glasgow Coma Scale (GCS) at admission ≤8. At admission the patients were sedated, breathing was procured by means of respirator; all patients needed intensive treatment at intensive care unit (ICU). Their age was between 18–65 years, 44 were men (84 %) and only 8 of them were women (16 %), ratio 5.5:1. Median age was 41, arithmetic average 40.4. The diagnoses were often comples and we divided patients according to the diagnosis, which influenced the patient's state to the greatest extent. The most common diagnosis was traumatic intracerebral haematoma (TICH) and cerebral contusion 18 (35 %), followed by acute subdural haematoma 16 (31 %), traumatic cerebral oedema 10 (19 %) and epidural haematoma 8 (15 %). Cerebral contusion and traumatic intracerebral haematoma were grouped together because they represent similar forms of primary brain injury. The percentage is shown in Table 1.

During their stay at neurosurgery 35 patients (67 %) were operated acutely, 6 (12 %) patients underwent delayed operations, 7 (13 %) were treated conservatively and 4 (8 %) patients were not indicated for operative treatment because of their infaust state. After the lapse of time necessary for treatment and observation at neurosurgical department patients continued their treatment at anaesthesiology-resuscitation departments, surgical, neurological or internal ICUs, mainly in southern Moravia. After treatment the patients were discharged from hospital or subject to rehabilitation either at rehabilitation departments or as out-patients. When considering patients living in Brno recently, many of them stayed at our department until their physical state improved to such an extent that they could be discharged. Some of them returned to work or to their studies. In post-rehabilitation phase with follow-up of 1–2.5 years we invited the patients to the neurosurgical outpatient unit. The examination was particularly focused on findings as follows: hemiparesis, fatique disorder, eyesight disorders, furthermore working ability and the present working position. Additionally, patients were divided into groups according to assessed Glasgow Outcome Score: good recovery – return to normal life, insignificant physiological deteriorations of functions, moderate disability – neurological deficit, self-sufficient, working ability at specific conditions, severe disability – conscious, non-self-sufficient, dependent on permanent help, vegetative – state similar to coma vigile, death. Those able to fulfil psychological tests were invited to psychologist and underwent psychological examinations (in our group 12 patients) in order to reveal memory disorders (Wechsler Memory), prolonged latency, concentration (Bourdon) and intelligence quotient (Raven). The GOS has been dichotomised into favourable (good, moderate disability) and unfavourable (severe disability, vegetative state, death) outcomes.

Tab. 1. Percentage of the diseases.

Diagnosis	No of pts 52	Percentage
Cerebral contusion and traumatic intracerebral haematoma	18	35 %
Acute subdural haematoma	16	31 %
Traumatic cerebral oedema	10	19 %
Epidural haematoma	8	15 %

Tab. 2. Distribution to other GOS groups.

GOS	No of pts 52	Percentage
Good	6	12 %
Moderate disability	10	19 %
Severe disability	7	13 %
Vegetative state	0	0 %
Death	29	56 %

Tab. 3. Unfavorable group.

Unfavourable group - diagnoses	No of pts 36	Percentage
Acute subdural haematoma	12	33 %
TICH+cerebral contusion	12	33 %
Oedema	8	23 %
Epidural haematoma	4	11 %

Tab. 4. Favorable group.

Favourable group - diagnoses	No of pts 36	Percentage
TICH+cerebral contusion	6	37.5 %
Acute subdural haematoma	6	25 %
Epidural haematoma	4	25 %
Oedema		

Results

All patiens were distributed into GOS groups as shown in Table 2. Less than one third of patients made favourable outcome, the overall mortality rate was 56 %, and the distribution to other GOS groups is presented in Table 2.

When divided into groups according to the diagnosis it can be concluded that in the group with unfavourable outcome TICH and cerebral contusion with acute subdural haematoma form two thirds of all patients and they outnumber the groups with epidural haematomas and oedema, whereas the group with favourable outcome yielded a rising number of epidural haematomas as shown in Tables 3 and 4.

Tab. 4. Favorable group.

GOS group	Ra IQ
All examined	Median 114 Arithmetic average 107
Good recovery	Median 120-126 Arithmetic average 119,5
Moderate disability	Median 83 Arithmetic average 96

The presence of neurological disordes is described. We found out apparent hemiparesis in 7 patients (30 %), fatique disorder appeared in 11 out of 23 patients (48 %). The background of neurological disorders comprises posttraumatic epilepsy present in 5 patients (22 %), eyesight disorders in relation to injury in 6 cases (26 %). Neurological disorders appeared in 15 (65 %) survivals. Cognitive functions impairment was revealed in most of patients (92 %). Concentration disorders occurring in 10 (83.3 %) patients and prolonged latency found in 9 (75 %) patients were more frequent than memory disorders 5 (41.6 %.). Intelligence quotients (IQ) measured by Ravens test in the examined sample of patients with good working ability or moderate disability show that the working ability links with an increase in the intelligence quotient. Only a very low percentage of patients at follow-ups were previously able to return to work, in our group. Major part of patients depended on financial support (disability pension, old age pension) whereas five out of six patients returned to their previous studies or work and one patient changed his working position at the same firm. Dead people outnumbered survivals.

Conclusion and discussion

As to the outcome assessed by GOS, when compared with other studies we present higher mortality (in our survey 56 %) in comparable groups of patients – Becker reports 30 % and Marshall 36 % (3, 4). It may be due to the later follow-up and with this fact connected transfer from the vegetative state group into death group. We have not had any patient in vegetative state at follow-up. Less than one third of survivals in our group made a favourable outcome. Bad outcomes are usually connected with TICH, cerebral contusions and acute subdural haematomas whereas patients suffering from epidural haematomas have a possibly higher chance of favourable outcome. Premorbid mental state and activity expressed by intelligence quotient can play their roles in the final outcome as shown in Table 5. Members of good recovery group have higher IQs than those of moderate disability group. Altogether our results confirm a poor outcome in people with severe head injuries.

The presented working ability in 26 % of patients corresponds to 25 % of cases whose return to work was confirmed during the one-year follow-up published by Hawkins (6), but is lower than in Annoni's work whose patients were found to return to work in 45 % of cases in three years after their injuries (5). In our study all patients from the group of good recovery either regained their original employment or returned to their studies at their previously attended schools or universities within one to two years after their injuries.

The cases with ascertained cognitive deficits outnumbered those with neurological handicaps. Annoni (3) reports 53 % neurological impairments while our surviving group contains 65 % of people suffering from neurological deficits, 92 % people suffered from disorders in the cognitive sphere. Majority of people who had suffered severe head injuries are not able to return back to society to full extent due to their cognitive problems rather than because of neurological deficits.

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