Objectification of early and late follow-up in heavy isolated craniocerebral injuries - brain

SUMMARY

Introduction
A large number of cranio-cerebral injuries causes that only some part of the patients is taken to the highly specialized hospital wards. Other victims are treated in departments of anaesthesiology and intensive care as well as in general surgery in hospitals located closest to the scene. Early and late results of treatment of patients with isolated severe cranio-cerebral injury are affected by many variables: patient characteristics, injury characteristics, characteristics of hospital and after hospital treatment and rehabilitation.

Objective of the thesis
The aim of the study was to obtain an objective assessment of the early (at the time of the completion of the hospital treatment) and distant (average 45 months after the event) consequences of heavy isolated cranio-cerebral injuries in case of the patients treated in the period between 2003 and 2007 in the Department of Anaesthesiology and Intensive Care in the Provincial Specialistic Hospital in Siedlce.

Materia and method
The studied group included 154 patients with heavy isolated cranio-cerebral injury. The average age of the patients was 49 ± 20 years old. There were 34 women and 120 men. The study consisted of two parts: a retrospective and prospective one. The retrospective part of the study consisted of collecting and analysis of 10 following pieces of information taken from the disease history of 154 patients:

- The result of neurological status test with admission to DAIC;
- sex;
- age;
- place of residence;
- the reason of the injury;
• state of sobriety at the time of admission to the ward;
• type of cranio-cerebral injury;
• applied method of treatment;
• result of treatment in DAIC;
• cause of death in case of the patients who died in hospital.

The prospective study was carried out by direct interview method using several testing tools, which means:
• original study protocol;
• GOS scale;
• Barthel scale;
  • Protocol of the test according to annex 6b for order no 53/2010 by President of National Health Fund „Disorder of cognitive behavioural functions and motor dysfunction in speech and swallowing after the acquired brain damages (neurology of adult patients)‟.

In the analytical part of the study:
• There was done a formal numerical analysis of the features of the tested patients group;
• It was examined statistically the relationship between some selected characteristics known as a result of the retrospective and prospective research.

Results summary
1. Cranio-cerebral injuries are one of the most common reason of admission to the Provincial Specialised Hospital in Siedlce:
   a) They are almost 1% of all admissions (1 per 120 admissions);
   b) In this group ¼ (28%, 1 per 400 admissions) is a heavy cranio-cerebral injury;
   c) In this group about 70% (1 per 600 admissions) is a heavy isolated cranio-cerebral injury;
   d) In the group of the patients with heavy isolated cranio-cerebral injury 25% (1 per 3000 admissions) are patients with brain stem dysfunction.
2. The most common reasons of heavy isolated cranio-cerebral injuries are road accidents and falls, which are totally 75% of all cases.
3. Among patients after heavy isolated cranio-cerebral injury 1/3 are drunk people.
4. Subdural and epidural hematoma are the most common kinds of the heavy isolated cranio-cerebral injury (they are totally 56% of the whole group), and brain contusion and open cranio-cerebral injury – are the rarest (they are totally 9% of such injuries).

5. Subdural hematoma is a dominant (p < 0.0005) type of heavy injury in the old age population (average 59 year old), and brain contusion in younger age (average 27 years old) with average age of the tested population which is 49 years old.

6. Neurological conditions of patients at the moment of admission to GCS:
   a) It is not affected by gender (p = 0.3), age (p = 0.712) and injury reasons (p > 0.05);
   b) it's significantly worse (3 - 4 pt. GCS compared to 5 - 8 pt. GCS):
      - In case of drunk patients (p < 0.03);
      - In case of patients with open cranio-cerebral injury and generalized swelling of the brain (p < 0.0001) (the two kinds of injury are relatively rare, 23% of all cases, but they apply more younger population of patients, the average age is 47 and 27 years old).

7. Surgical treatment was applied in the majority (70%) of patients, other 30% of patients were treated conservatively:
   a) A method of treating was independent of the neurological condition of patients (p > 0.05);
   b) a method of treatment, however, was dependent on:
      - kind of injury; significantly more often (p < 0.001) an operation was done in case of people with sub- and over-dural hematomas as well as with an open cranio-cerebral injury;
      - patients age; the age of the operated people was in 52 years old and it was significantly higher (p < 0.006) than the age of the people who were treated conservatively and it was in average 42 years old (older people were more often treated surgically, probably due to the dominant in this age type of injury, which means subdural hematoma).

8. General results of the hospital treatment of the patients after heavy isolated cranio-cerebral injury were bad:
   a) hospital death rate was high (55%), small percentage (20.9%) of the patients left hospital in neurologically satisfactory condition (GOS early 4 pkt.), No one left the hospital in a fully good condition;
   b) the most common causes of death (39%) were intracranial injury consequences;
c) gender of patients had no effect on the results of hospital treatment (p > 0.4);

d) factors which were improving hospital treatment were:

- young age of patients (p < 0.001), people who left the hospital with a satisfactory result were in the average age of 37 years old when the average age in the whole group was 49 years old;
- Higher output rating of neurological status with (GCS 5 and more points), (p < 0.001),
- Kind of injury as brain contusion (p < 0.001),

e) factors which were making worse the results of hospital treatment were:

- older age of patients, people who died in hospital were in the average age of 54 years old (comparing to the average age of the total tested patients population which was 49 years old);
- very low output assessment of neurological condition (all people died with 3 - 4 points according to GCS),
- kind of injury as in the form of an open cranio-cerebral injury (all persons with such injury died), generalized cerebral edema and intracerebral hematoma.

9. The early post-hospital rehabilitation was attended by the majority (64%) of patients, who left hospital, 36% had not taken any improving treatments.

a) in the early post-hospital rehabilitation significantly more involved were:

- people who left the hospital in a vegetative state (2 pt. early GOS) (p < 0.002);
- city inhabitants (p < 0.002).

b) early rehabilitation didn’t depend either on gender (p > 0.999) or age (p > 0.453).

10. Late rehabilitation was attended by 38% of patients, who left hospital (58% among patients who were living in further observation);

a) gender (p > 0.264) and age of patients (p > 0.05) didn’t have any influence on lack of participation in late rehabilitation;

b) significantly more often in the rehabilitation participated:

- city inhabitants (p < 0.01),
- patients who left hospital with a satisfactory result (4 pt. early GOS), in turn, the patients who were discharged from the hospital in poor neurological condition participated in the late rehabilitation the least because they died, (p < 0.002),
people who were subjected to the early post-hospital rehabilitation (p=0.001) and were alive on the day of long-term observation;

patients whose condition in the time of long-term were evaluated in GOS scale for 3 or 4 points (severe disability and a satisfactory result) comparing to the people in a fully operational persons, (p < 0.001).

c) the most common cause of failure of late rehabilitation (not taking into account deaths happened during post-hospital period) were: lack of motivation (it concerned mainly fully operational patients) and alcohol dependence syndrome (it concerned mainly heavy disable patients and with a satisfying result ), (p < 0.001);

d) the most common types of late rehabilitation were:

- kinesitherapy - mainly in patients who are at a remote observation period and in a satisfactory neurological condition and fully operational (long-term GOS 4 - 5 pt.), (p < 0.001);
- Analgesic physiotherapy and speech therapy exercises - mainly in patients in a vegetative state and severe disability, (p < 0.001).

e) places of late rehabilitation were:

- rehabilitation clinics and sanatoriums, it concerned only the people with a satisfactory result and fully operational;
- hospitals (with the continuation of the rehabilitation proceedings at home), in the majority it involved patients in a vegetative state and severe disability.

11. Long-term results of patients treatment (long-term GOS) were also bad;

a) 3.7 years after injury 29% of patients were alive among all tested ones (65% among the patients who left hospital),

b) 71% of the full study population 154 patients had died by the remote observation; 3% of patients were in vegetative state, 6% had a heavy disability, 16% had a satisfactory result and 4% were fully good condition;

c) factors that were improving long-term results of treatment were:

- the young age of the patients (p < 0.05), the average age of people who returned to full efficiency was 27 years in comparison to the average which was 39 years old for the whole group of patients,
- type of injury: patients with brain contusion were the only group of patients who achieved a very good result (p < 0.001),
higher assessment of neurological condition reached at check out from hospital according to early GOS (p < 0.001): excellent treatment result was achieved by persons (single ones) rated at discharge on 4 points.

d) factors that worsened the results of treatment were:
- older age of patients (the average age of the people with severe disabilities was 47 years old),
- kind of injury: all patients with an open cranio-cerebral injury and generalized cerebral edema and ¾ patients with intracerebral and subdural hematoma;
- low score of neurological condition at the time of admission: until the distant observation all patients evaluated at 3-4 points by GCS had died, the death rate of the group rated on a 5-8 points, (though very high in itself, 61%) it was lower in reality (p < 0,001)
- low score of neurological condition reached at check out from hospital: patients died during post-hospital period were lower assessed according to Bu GOS early scale (2-3 points).

12. Neurologic status of the majority (55%) of patients in the remote observation period does not change significantly compared to neurological condition on hospital check out, and in case of 35% it is worse. Improvement did not concern patients checked out in a vegetative state and with severe disability. Only a small percentage (10%) of all patients, and only with the group of patients who left the hospital with a satisfactory result (24% of patients in this group) there was some improvement in neurological condition.

13. Long-term results of treatment assessed by neurological condition (GOS distant) did not depend on participation in early rehabilitation (p = 0.31); Persons rehabilitated, early GOS) in the period up to distant observation, mostly had died (18 from 37, 73%), and the condition of other patients had not changed,
   a) they left the hospital with a satisfactory result (4 pt. early GOS) no change in the neurological status of the majority (15 of 17; 88%).

14. Participation in late rehabilitation clearly had not improved neurological condition of patients. (early GOS towards distant GOS) in comparison to non-rehabilitated group:
   a) rehabilitated persons who:
   - left hospital in the worst neurological condition which means 2 - 3 points according to early GOS still were in such a neurological condition (9 persons);
left the hospital in a satisfactory condition which means 4 points. Early GOS (17 patients) mostly (15 from 17) still left in such condition, only 2 of them were in a fully good condition;
b) persons who were not rehabilitated (19 persons) in most cases remained in the distant period in the same neurological condition as on the day of check out from hospital (14 patients), only 5 persons, which left hospital in satisfactory condition achieved fully good fitness.

15. Functional state (Barthel scale) for most of patients tested (71%) after heavy isolated cranio-cerebral injury was described as light (86 - 100 pt.BI), 20% of cases were average heavy and 9% - heavy (up to 20 pt. BI):
a) gender (p > 0,05), age (p > 0,14) and place of residence (p = 0,36) had no influence on the functional status of patients with isolated severe cranio-cerebral injury.
b) more independent in everyday life were people:
• with a brain contusion and intracerebral hematoma (p < 0,002) comparing to the people with other kinds of injuries;
• in better neurological condition (p < 0,001) which means higher evaluated according to distant GOS (4 - 5 pt.);
c) no influence of either early rehabilitation (p = 0,25), or late one (p > 0,2) for functional degree of efficiency.

16. Emotional and personality disorders in the remote period after the injury occur in the majority (76%) of tested patients, disorders of the execution system in case of 49%, and disorders in interpersonal communication in case of 34% of patients after heavy isolated cranio-cerebral injury:
a) gender (p > 0,05), patients age (p = 0,07), injury type (p > 0,02) had no influence on neuropsychological disorders;
b) there was no influence (p > 0,05) of late rehabilitation on neuropsychological disturbances in distant period after the injury;
c) cognitive disturbances (of the execution system and interpersonal communication) significantly more often (p <0.001) occurred in case of the patients who left the hospital in a worse neurological condition (early GOS 3 in comparison to the early GOS 4 points);
d) neurological condition of sick persons both on of certified excerpt from the hospital (GOS early), and in the distant period after grudge (GOS distant) didn't correlate with appearing of emotional-personality disorders in the distant period after injury (p > 0.05).

17. Most people before injury (78%) was active at work. The professional activity of patients who lived in the period of remote observation has undergone many changes: a) rate of people who have worked professionally decreased five times after injury (from 78% to 16%); returned to work:

- only (and all) persons in a very good neurological state (distant GOS 5 pt., p < 0,001);
- only (but not all) persons in a very good functional state (BI 86-100 pt., p < 0,001);
- only people without cognitive impairment (no person with such disorders has taken work, p < 0,001);
- women more often (p<0,01);
- more often people in younger age (average age of people who came back to work was 27 years old, with average age for the whole group which was 39 years old, p < 0,001);
- there was no effect of rehabilitation on the rate of return to work (p > 0,05);

b) ratio of people using the annuity has increased twenty times (from 2% to 44%),

- annuities often concerned men (p < 0,01);
- all persons who were in a vegetative state (distant GOS 2 pt.) received annuity;
- people with a satisfactory result (4 pt. according to distant GOS) received annuity more often (p < 0, 001) than people with severe disability (3 pt. according to distant GOS);
- annuities were more often (p < 0,0002) given to the rehabilitated people.

18. The majority (76%) of patients after severe cranio-cerebral injury required healthcare services;

a) it was not dependent on gender (p = 0,05), age (p > 0,18), or place of residence (p > 0,05);

b) worse neurological state in the long term period after injury (distant GOS 2 – 3 pt.) is connected with much greater demand (100% of patients) for healthcare service, which in case of the patients is more often (62%) provided by healthcare system (institutional care) than family (p < 0,001);
c) people in better neurologic condition (distant GOS 4 - 5 pt.) significantly less likely require healthcare (66% of patients), which are always done by family members, if only they have got enough place;

d) demand for family health care or the care of healthcare workers more often (p <0.04) applies to patients with cognitive than emotional-personality disturbances, including more patients with execution systems disorders than communication disorders;

e) patients with a remote period after the cognitive disorder of executive type significantly more often (p <0.001) benefited from the help of family, and the patients with interpersonal communication disorders and emotional and personality disorders received pension more often (p < 0.001);

f) participation in late rehabilitation had no effect on care demand (p > 0.05).