Age features of concomitant severe craniocerebral trauma

Muhitdinova Hura Nuritdinovna

Doctor of Medical Sciences, Full Professor

Center for the Development of Professional Qualifications of Medical Workers

Abstract. It was revealed that in the most severe injuries caused by combined severe traumatic brain injury in patients of group 1 on the ISS scale (50.2 ± 5.6 points), the severity of the condition and impaired consciousness did not differ significantly from those in groups 2 and 3. A direct correlation was found between the depth of the coma and the overall severity of the initial state in the injured group 3. A negative effect of excess body weight on the effectiveness of treatment, an increase in the duration of mechanical respiratory support (MRS) (0.59), intensive therapy (0.76) and the total duration of treatment (0.77) in the hospital in patients over 61 years old was revealed.

Keywords: combined severe craniocerebral trauma, age.

Relevance. The growth of injuries increases not only the frequency, but also the severity of traumatic brain injury (TBI), which is 50–70% associated with extracranial injuries. The mortality rate from concomitant traumatic brain injury (CTBI) ranges from 12 to 69%. In the general structure of peacetime injuries, the proportion of combined and multiple injuries ranges from 5 to 12%, and among the most severe - up to 40%. An almost constant component of severe associated injuries is TBI, which occurs in such cases with a frequency of 50-72 to 80-82%. The limbs are injured in 22.9% of cases, the chest - in 31%, the abdomen - in 25-29%. Multiple extracranial injuries in combination with TBI occur in 15% of cases [1-6]. Due to the lack of information in the literature on the age characteristics of injuries associated with severe traumatic brain injury (STBI), we tried to identify the distinctive characteristics, especially in different age groups, on the basis of a retrospective analysis. The division into groups was dictated by the well-known features inherent in each age group, described in detail in the literature.

Purpose of the work: to study and assess the age-related characteristics of combined severe craniocerebral injuries.

Material and research methods. The indicators of a comprehensive examination of 27 patients with concomitant severe craniocerebral trauma (STBI) who were admitted to the ICU of the CDPQMW neurosurgical department in the first hours after an accident - 25,

catatrauma of 2 patients were studied. According to the indications, 26 patients on admission started invasive mechanical respiratory support (MRS), 1 patient, due to the lack of direct indications for (mechanical lung ventilation) MLV, intensive therapy was carried out with spontaneous breathing. Monitoring was carried out by complex hourly registration of parameters of body temperature, hemodynamics, respiration. Mechanical respiratory support was initiated by mechanical ventilation (MLV) for a short time followed by transfer to SIMV. The assessment of the severity of the condition was made by scoring methods according to the scales for assessing the severity of concomitant injuries - the GPAMS scale (1982 S.P. Gormican). Interpretation of the CRAMS scale: when, in the total assessment of the patient, he gains 10 points, then his condition is assessed as satisfactory, from 9 to 6 points - a state of moderate severity, less than 6 points - a serious condition, with a mortality rate of up to 90%. Injury Severity Score (ISS) assessment scale. Analysis of the severity of injuries on the ISS scale: 1-9 points - mild injury; 10-15 points - moderate severity; 16-24 points - heavy; over 24 is extremely heavy. At admission, impaired consciousness in 26 injured patients was assessed on the Glasgow Coma Scale (GS) (GCS - Teasdale G., Jennett B., 1974) 8 points or less. Patients were considered in three age groups: group 1 - 19-40 years old, group 2 - 41-60 years old, 3 - 61-84 years old. After recovery from shock, anesthetic, anti-inflammatory, antibacterial, infusion therapy, correction of violations of protein, water-electrolyte balance, surgical early correction, as far as possible, syndromic, symptomatic therapy were carried out.

Results and discussion.

	Group 1	Group 2	Group 3
	19-40 years	41-60 years	61-84 years
Number of patients	12	8	7
Open STBI	50% (6)	37% (3)	28% (2)
Closed STBI	50% (6)	62% (5)	56% (4)
Severe CC	100% (12)	71% (6)	85% (6)
Epidural hematoma	8% (1)	0	0
Intracerebral hematoma	25% (3)	15% (1)	28% (2)
Subdural hematoma	25% (3)	15% (1)	37% (3)
SAH	50% (6)	37% (3)	71% (5)
Fracture of the base of the skull	25% (3)	0	28% (2)
Dislocation syndrome	8% (1)	37% (3)	15% (1)
Operation resection-decompressive craniotomy	25% (3)	37% (3)	56% (4)
Removal of intracerebral hematoma	25% (3)	0	0
Spinal injury with partial dysfunction of the spinal cord	25% (3)	25% (2)	15% (1)
Spinal injury with complete dysfunction of the spinal cord	16% (2)	0	0
Fracture of limbs with	25% (3)	37% (3)	37% (3)

Characteristics of patients with concomitant severe traumatic brain injury

Table 1

displacement of bone fragments			
Damage to the abdominal organs	8% (1)	25% (2)	15% (1)
Fractured chest bones	25% (3)	15% (1)	30% (2)

As presented in table 1, the first group differed from the older 2 and 3 age groups by the prevalence of OSTBI cases, CC of severe degree was detected in 100% of patients, the number of patients with spinal injury with complete (16%) and partial in 25% of those injured with dysfunction of the spinal cord. In 25% of patients of the first group, an operation was performed to remove an intracerebral hematoma. In groups 2 and 3, there were slightly more patients with CSTBI by 12% and 6%, respectively. In the older two groups, there were 12% more fractures of the extremities with displacement of bone fragments, which required surgical correction. Operation resection-decompressive craniotomy was performed in 25% in group 1, in 37% in group 2, and in 56% in group 3. The latter characterizes the initial more pronounced severity of injury in patients over 61 years of age. In addition to the central mechanisms of acute respiratory failure, the severity of the condition was aggravated by the fracture of the bone skeleton of the chest in 25% in group 1, in 2-15% and in group 3 in 30% of patients, which significantly influenced not only the overall severity of the condition, but also the performance of mechanical respiratory support for adequate oxygenation of vital organs and the body as a whole.

Table 2

Assessment of the severity of the condition by age

Parameters	Group 1	Group 2	Group 3
age in years	29,5±4,3	51,6±4,8	72,3±9,1
CRAMS, points	4,5±0,6	4,4±0,8	4,8±0,6
ISS, points	50,2±5,6	43,3±7,1	46,2±9,1
GS, points	7,3±0,5	7,9±1,3	7,8±1,5

It was revealed that with the most severe injuries in patients of group 1 (50.2 ± 5.6 points), the severity of the condition and impaired consciousness did not differ significantly from those in groups 2 and 3 (tab. 2).

Table 3.

Duration of respiratory support

Parameters	Group 1	Group 2	Group 3
SIMV, number of days	8.6±3.9	11.8±5.5	17.8±16.9
BIPAP, number of days	4.5±5.3	3.2±1.7	1.4±1.7
CPAP, number of days	5.8±7.1	7.0±0.6	7.6±7.5
Number of mode switching	3.5±2.5	2.5±0.8	3.0±0.8
MRS, duration of respiratory support in days	14.7±8.2	16.5±5.1	26.8±16.5
Number of days in ICU	21.3±11.8	23.0±6.5	36.0±23.0
Total number of days in hospital	25.4±13.1	26.7±9.9	46.5±21.8

As presented in Table 3, in the absence of significant differences in the severity of injuries, the level of dysfunction of the central nervous system, the overall severity on admission, the most prolonged intensive therapy in the ICU (36.0±23.0 days) and the total number of days in the hospital (46, 5±21.8 days) in the oldest group 3 of patients. Also, this group underwent the longest MRS (26.8±16.5 days). The SIMV mode (17.8±16.9 days) turned out to be the most preferable due to its greater efficiency. It should be noted that in group 1, MRS was carried out for a longer period in the BIPAP mode (Biphasic positive airway pressure - ventilation of the lungs in two phases of positive pressure) in 7 patients (4.5±3.3 days).

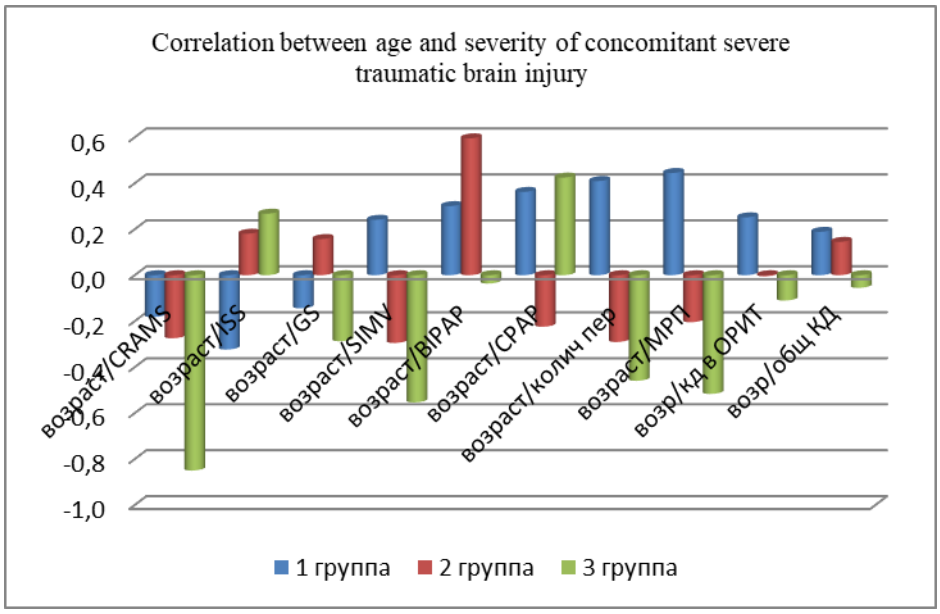

Fig.1

The revealed negative correlation between age and GPAMS level (-0.83) indicates that the older the age, the more difficult the initial state of the patients of group 3 was (fig. 1).

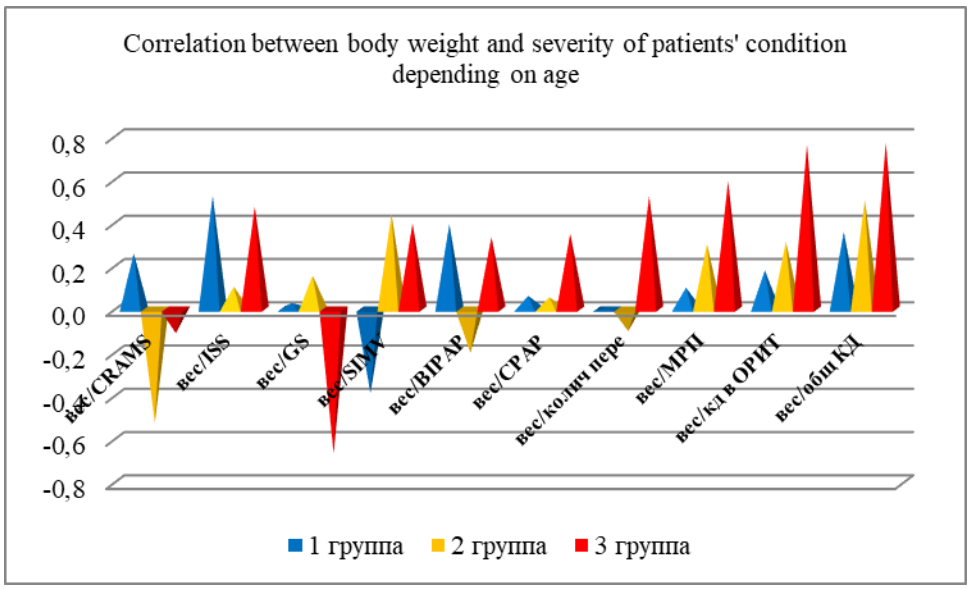

Fig.2

A negative effect of excess body weight on the effectiveness of treatment was revealed, increasing the duration of MRS (0.59), intensive therapy (0.76) and the total duration of treatment (0.77) in the hospital in group 3 (fig. 2). There was a correlation between the depth of a coma and an increase in body weight in patients over 61 years of age (-0.67).

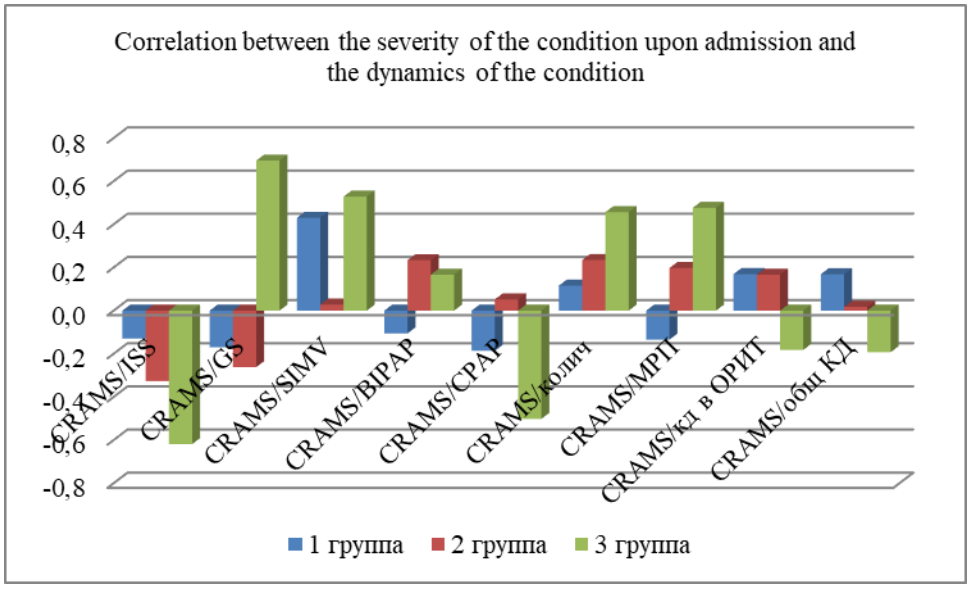

Fig.3

A direct correlation was found between the depths of the coma and the overall severity of the initial state in the injured group 3 (fig. 3).

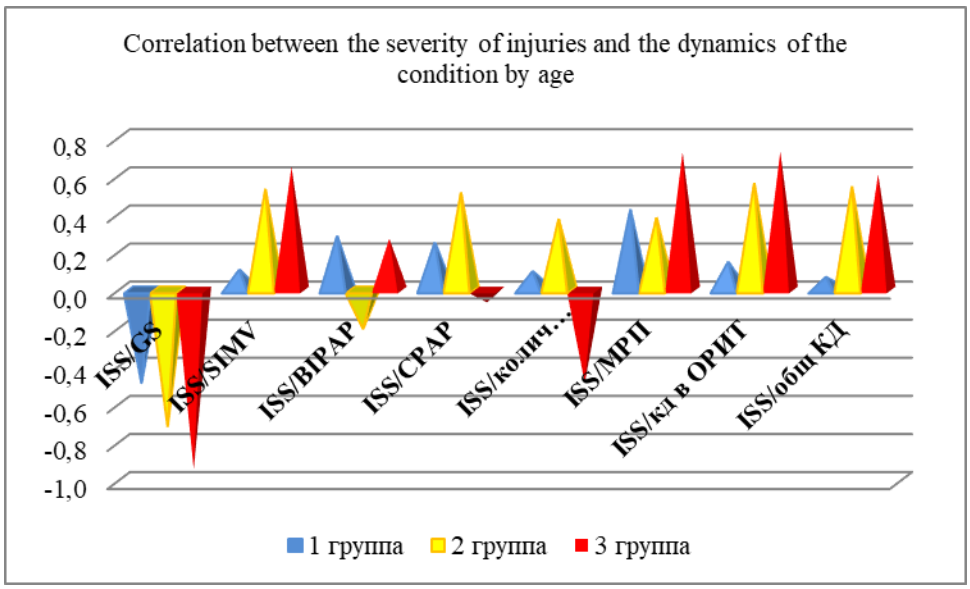

Fig.4

The more severe the traumatic injury, the more effective the use of MRS in the SIMV mode was (fig. 4).

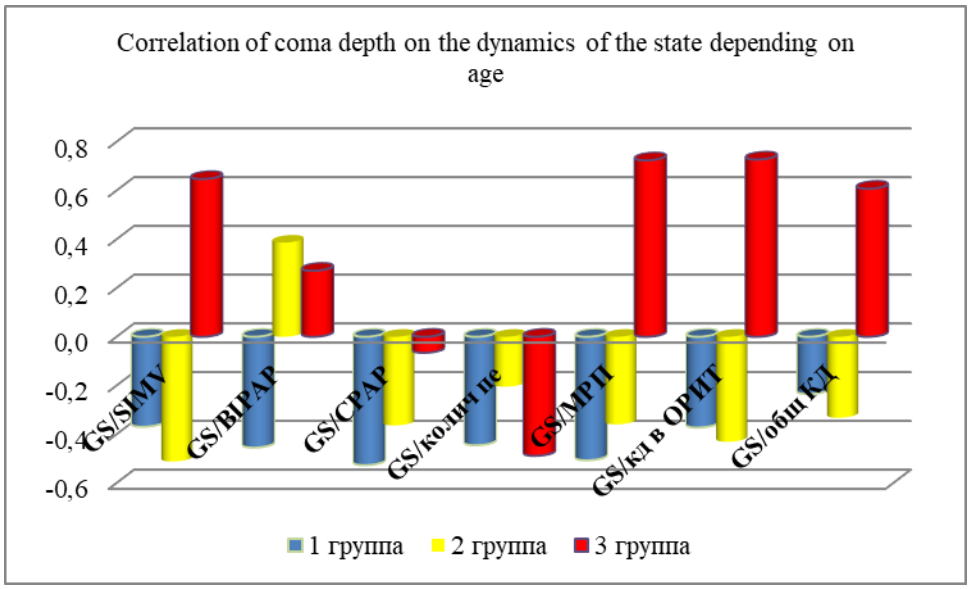

Fig.5

A direct correlation was found between the severity of CNS dysfunction and the duration of MRS in the SIMV mode, the duration of intensive care in the ICU and the duration of inpatient treatment in group 3.

Conclusion. It was found that with the most severe injuries in patients of group 1 (50.2 ± 5.6 points), the severity of the condition and impaired consciousness did not differ significantly from those in groups 2 and 3. A direct correlation was found between the depth of the coma and the overall severity of the initial state in the injured group 3. A negative effect of overweight on the

effectiveness of treatment was revealed, increasing the duration of MRS (0.59), intensive therapy (0.76) and the total duration of treatment (0.77) in the hospital in patients over 61 years of age.

References

1) http://www.stm-journal.ru/en/numbers/2010/4/685/pdf
2) ://newday-clinic.ru/posledstviya-cherepno-mozgovoj-travmy
3) https://www.mediasphera.ru/issues/zhurnal-nevrologii-i-psikhiatrii-im-s-s-korsakova/2018/11/1199772982018111093
4) https://diseases.medelement.com/disease
5) https://cyberleninka.ru/article/n/shkaly-otsenki-tyazhesti-i-prognozirovaniya-ishoda-travm
6) Kuldashev K.A.Acute combined craniocerebral trauma: complex diagnostics at the stages of medical care. The journal "Questions of neurosurgery" named after N.N. Burdenko. 2012;76(6):40-44.