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DIAGNOSTIC AND THERAPEUTIC ASPECTS OF COMBINED CEREBRAL AND SPINE-SPINAL INJURIES

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Abstract: The aim of the research was to study effective ways of improving a scheme of medical aid to patients with combined cranial trauma in emergency departments. During 2014-to 2019 years 615 patients were admitted to the Division of Multitrauma, Neurosurgery, and Neuroresuscitation of the Andizhan branch of the Republican Emergency Center. All the patients had verified cranial trauma. Vehicle accident trauma was noted in 64%, home trauma in 26%, fall from a height in 6%, occupational accident in 1% of cases. Cranial trauma in combination with upper and lower extremity injuries was noted in 46%, with spinal trauma in 29%, thorax in 20%, and pelvic fracture in 5% of patients. Brain concussion was diagnosed in 43%, mild contusion in 29%, moderate contusion in 10%, severe contusion in 13%, and diffuses axonal injury in 5% of cases. Primary hospitalization of patients with combined cranial trauma in specialized institutions improves outcomes of treatment at a two-fold rate. Diagnostic measures and manipulations in severe combined cranial trauma are not frequently possible or difficult to perform due to multiple traumatic injuries. Operative interventions for progressing compression to the brain and spine should be performed in emergent cases including severe (but not terminal) patients
Keywords: combined cranial trauma; clinical-diagnostic and treatment aspects

Introduction. Interest in the study of concomitant traumatic brain injury (SCI) has increased over the past 10-15 years due to the increase in victims with these types of injury and the resulting high mortality. So, SCI occurs in 41.2-68% of all peacetime injuries [5, 7].

In the Hanover Trauma Center (Germany), out of 3606 patients with multiple traumas, concomitant TBI occurred in 68% [1]. The mortality rate among them was 32.0%.

In terms of the frequency of deaths, TBI ranks third. In the structure of mortality of multiple and concomitant injuries, the first place is taken by an equally severe injury of two or more cavities (69.2%), the second - by a complicated spinal concomitant injury, 53.3% [5].

The aim of work is to study effective ways to improve the new scheme of providing medical care to victims with traumatic brain injury in emergency departments.

Materials and methods.

For the period from 2014 to 2019, 615 injured 16-76 years old were hospitalized in the departments of multiple trauma, neurosurgery and neuroresuscitation of the Andijan branch of the Republican Scientific Center for Emergency Medical Aid, of which 375 (61%) were males. The age of 516 (84%)

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victims is from 17 to 55 years. The preliminary diagnosis of TBI was confirmed in all cases.

Road traffic injuries were established in 394 (64%) cases, domestic - in 160 (26%), falling from a height - in 37 (6%), industrial - in 18 (2%), sports - in 6 (1%) TBI in combination with injuries of the upper and lower extremities was noted in 283 (46%) patients, with spinal and spinal cord injuries - in 178 (29%), with chest injury - in 123 (20%), with pelvic bone injury - in 31 (%). Concussion was diagnosed in 264 (43%) patients, mild cerebral contusion - in 178 (29%), moderate - in 62 (19%), severe - in 80 (13%), diffuse axonal damage to the naked brain - in 31 (5%).

80 (13%) victims were in a state of alcoholic intoxication at the time of injury.

In order to optimize diagnostics, as well as to determine the priority of therapeutic measures for concomitant injuries, we developed on the basis of the Hanover and the classification of concomitant injuries at the N.N. Academician N.N.Burdenko. According to this systematization, grade IV TBIs are distinguished: I - mild TBI and mild extracranial injuries. II - mild TBI and severe extracranial injuries. III - severe TBI and mild extracranial injuries.

IV - severe TBI and severe extracranial injury.

Severe TBIs include moderate and severe cerebral contusions, cerebral compression, diffuse axonal injuries (DAP) of the brain, non-severe - concussions, mild cerebral contusion.

Severe injuries of the musculoskeletal system include fractures of the humerus, femur, tibia, pelvic bones, multiple fractures of the limb bones, stable and unstable fractures and dislocations of the vertebrae (with or without spinal cord injury), mild - closed fractures of the bones of the hand, feet, forearm, fibula, nose, unilateral fractures of the ribs, I-III ribs without damage to the pleura, bruises of the trunk, joints, limbs.

Results

According to radiological methods, skull fractures were detected in 375 (62%) people, of which 70% had depressed fractures of the cranial vault.

As the study of the structure of intracranial lesions shows, subarachnoid hemorrhages dominate in 400 (654%) cases. 264 (43%) patients have intracranial traumatic hematomas, often combined with subarachnoid hemorrhage. Subdural hematomas were diagnosed in 105 (17%) patients, intraventricular hemorrhage - in 92 (15%), epidural hematomas - in 80 (13%). Closed TBI was diagnosed in 412 (67%) patients, and open TBI in 203 (33%) patients.

Based on the experience of a number of authors [1,3,5,7] and their own, we can assume that the ambulance doctor upon arrival at the scene will face the following tasks:

1) identification of vital disorders and their immediate elimination; 2) making a decision on hospitalization of the patient and choosing a place of hospitalization in accordance with the pathology profile.

Diagnosis and treatment of patients with traumatic brain injury are divided into 2 stages: prehospital and inpatient. During the first 3 hours after the injury, 504 (82%) patients were admitted to a specialized hospital, hospitalized in non-

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specialized hospitals, and then within 1-7 days were transferred to a specialized clinic -111 (18%).

The presence of fractures of the large bones of the extremities complicated the conduct of a full-fledged neurological examination, in particular, the determination of muscle tone, tendon reflexes, paresis, paralysis. The absence of complaints in patients with severe TBI, along with inadequate examination at the prehospital stage and in the admission department, was the reason for the later (on the 2-3rd day) diagnosis of fractures of the ankles, fibula, radial and small bones of the hand. At the initial stages of work, an objective diagnosis of intracranial injuries had to be based on Echo ES.

To carry out a complex of neurotraumatological examination and treatment, if an emergency operation on the brain and spinal cord was necessary, plaster casts or specially adapted splints were applied to the patients in the first hours. This made it possible in the future to continue performing diagnostic manipulations, in particular lumbar puncture, as well as to take early measures aimed at preventing pneumonia, bedsores, etc.

After an emergency neurotraumatological operation, depending on the general condition and consciousness, the patients underwent early placement of external fixation devices (18), intramedullary osteosynthesis (12) or skeletal traction with subsequent fixation of a plaster cast (23). Operations on the musculoskeletal system were mainly performed within the first 3-5 days. (40 observations).

Treatment of 338 (55%) patients with associated injuries and severe TBI was carried out in 3 stages. At the first stage, resuscitation measures were carried out, which were based on the restoration of airway patency, providing breathing and CPR, as well as anti-shock measures. At the second stage, emergency specialized care was provided, depending on the prevailing clinic of injuries. With the predominance of signs of brain damage, preference was given to an emergency neurosurgical operation. In all other cases, traumatological interventions were performed first. At stage III, interventions were performed for clinically less significant pathologies, as well as restorative treatment.

Treatment of 277 (455) patients with milder brain and spinal cord injuries in combination with limb injuries was carried out in 2 stages (since there was no need for resuscitation measures). The scope of assistance was limited to primary surgical treatment, the imposition of plaster casts, and the installation of devices for skeletal traction, reclination and traction for spinal injuries.

In 247 (65%) patients, mainly with vital disorders, extended resection trepanation was performed. Removal of hematomas was carried out through milling holes in 15 (4%) people, mainly in older and elderly people, as well as in chronic hematomas and post-traumatic hygromas. Osteoplastic trepanation, which has recently been preferred by us, was performed in 118 (31%) cases.

In 218 (57.4%) patients with vital disorders, after preliminary short-term (from 30 minutes to 1 hour) resuscitation and anesthetic preparation, emergency surgical interventions were performed, during which intensive therapy continued (for example, operations aimed at stopping bleeding and removing depressed bone fragments). In 90 (23.7%) patients without profuse bleeding and respiratory failure,

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early surgery was performed with stable hemodynamics within 2-6 hours after injury. In 72 (18.8%) people without signs of traumatic shock and bleeding, delayed surgery was performed (6 hours after admission to the hospital).

When removing intracerebral hematomas, especially those localized in the motor zone, a catheter was often inserted into the hematoma bed to flush the cavity in order to more complete non-traumatic removal of blood clots. For this, elastic polyvinyl chloride double-lumen Y-shaped catheters connected to the flow-outflow system were used. The same catheters were installed in the cavity of the lateral ventricle to monitor intracranial pressure and dosed excretion of cerebrospinal fluid in intracranial hypertension (36 cases).

For the prevention of cerebral edema, furosemide was used for 3-5 days, in severe cases, osmotic diuretics.

Glucocorticosteroids were not used as a decongestant. However, they were prescribed according to the indications for hemodynamic correction.

For the prevention of infectious complications, cephalosporins of the 1st or 2nd generation were mainly used.

Discussion

When classifying multiple and concomitant injuries, multiple injuries, their severity, as well as the severity of damaged organs and systems should be taken into account. Attempts to develop such a classification have been made several times. The most common classifications are the abbreviated injury severity scale (AIS) and the injury severity scale (ISS) [2,4,6]. In the post-Soviet space, the classification of A.N. Fraerman et al. (1987), according to which multiple trauma is differentiated depending on the combination: 1) with damage to the facial skeleton; 2) with damage to the chest and its organs; 3) with damage to the abdominal organs; 4) with damage to the spine and spinal cord; 5) with damage to the limbs of the pelvis; 6) with multiple extracranial injuries. However, this classification does not provide for a numerical definition of the severity of damage.

In Russia, the most complete classification is recognized by E.K. Humanenko et al. [1,2]. It is acceptable for scientific and special development, but very difficult for everyday use in practical medicine.

In patients with isolated injuries, difficulties arising during diagnostic measures and manipulations or their impracticability are associated with the fact that with combined and multiple injuries, both the regulatory and executive systems of the body are affected. Therefore, we have identified the following diagnostically significant signs of TBI in concomitant and multiple injuries: the severity of the condition and a decrease in the level of consciousness, the degree of traumatic shock, assessed in comparison with the level of blood pressure; outward signs of head trauma and extracranial injury; neuro-ophthalmic symptoms; dynamics of the level of consciousness and focal symptoms in the process of resuscitation and anti-shock treatment, diagnostic manipulations and surgical aids.

The level of consciousness is directly related to the severity of the brain damage. For mild TBI, loss of consciousness is most typical for a short period (2 h), for severe brain injury - a decrease in the level of consciousness to stupor (17% of

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cases), for compression and DAP of the brain - to coma (185). At the same time, in patients with mild TBI, a decrease in blood pressure led to an aggravation of consciousness disorders (6%). In severe brain damage, the level of consciousness did not depend on blood pressure.

In neurological assessment, the preservation of pupillary photoreactions and corneal reflexes in patients with severe consciousness disorders or who were on artificial lung ventilation is of the greatest importance for excluding severe TBI (155). Severe contusion of the brain is evidenced by the presence of a large-sweeping spontaneous nystagmus against the background of a disorder of consciousness (12%).

In 107 patients, anisocoria associated with cerebral compression was pronounced and persistent (69), caused by extracranial injuries, disappeared with anesthesia or elimination of hypoxia (38)

During the period of unstable hemodynamics, the assessment of sensitivity, muscle tone, deep reflexes, and meningeal symptoms was of secondary importance.

Based on the study and literature data, we have developed the principles of diagnosis, prognosis and treatment of TBI in the acute period. The introduction of these developments into everyday practice, as well as the creation of conditions and organization of emergency medical care in the republic made it possible to improve the quality and effectiveness of treatment, to reduce the overall mortality rate in TBI from 34.4 to 14.9%.

Conclusions:

1. Primary hospitalization of patients with traumatic brain injury in specialized medical institutions more than doubles the results of treatment.

2. In severe traumatic brain injury, diagnostic measures and manipulations with isolated injuries are impossible or associated with a number of difficulties due to the combination and multiplicity of traumatic injuries.

3. Surgical intervention for increasing compression of the brain and spinal cord should be carried out urgently, including in patients in severe (but not terminal) condition.

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