

Particularities of Diagnostics and Treatment of the Combined Cranial - Cerebral Traumas in Children

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ABSTRACT

The case histories of 197 children with severe combined cranial-cerebral traumas (CCCT) were analyzed. The findings suggest that the choice of the adequate diagnostic-curative tactics in children with severe CCCT is linked to various conditions: complexity in reassuring the clinical-neurological diagnosis due to the presence of the extra cranial injuries; necessity for emergency interventions on correction of the respiratory and hemodynamic disturbances, as well as intracranial injury complications; limited opportunities to conduct a set of special neurosurgery interventions, absence of CT in many health facilities; oftentimes flow of the patients to the non-specialized facilities. Thus, the knowledge in peculiarities of CCCT in children inevitably makes in tense diagnostics, effectiveness of the treatment, early rehabilitation and the follow up, decrease in the prevalence rate of invalidity and unfavorable cases, much more approachable.

KEYWORDS: *combined cranial-cerebral traumas, traumatic shock, intracranial hematomas, extracerebral injuries*

According to the large evidence-based data - provided by different authors the combined injuries are being observed in 5- 25% of cases with cranial-cerebral traumas [3,6]. The management of this category of patients incorporates a large quantity of diagnostic, curative and tactical errors - mostly conditioned with difficulties in choice of an adequate therapeutic - diagnostic approach [4,5,8,11]. Moreover, the peculiarities of the childish organism with its local and general responses to the injury make selection of the right therapeutic tactic especially confusing [2,7].

The study is intended to assess the particularities of clinical manifestation and treatment of the combined cranial - cerebral trauma (CCCT) in children.

MATERIALS AND METHODS

The severe CCCT was identified in 197 children with heavy cranial-cerebral traumas, combined intracranial injuries of various localization and gravity - hospitalized at the non-profile and specialized units of Yerevan and district (regional) hospitals during the period of 1994 - 2001. 129 boys (65,5%) and 68 girls (34,5%) aged from 6 months to 15 years were observed. Based on the gravity of the cranial-cerebral traumas the following subgroups of the patients were formed: with moderate cerebral contusions - 85 (43,1%), severe contusions - 52 (26,4%), diffuse axonal cerebral injury - 3,0 (1,4%) with brain compression due to its contusion - 57 (28,9%) cases.

Only 45 (22,8%) of the patients were hospitalized within the first 3 hours after the trauma into the neurosurgery unit of the multiprofile inpatient pediatric center. The rest of the victims were initially hospitalized either into the city or regional health centers (53,5% and 23,7%, correspondingly), and after referred to the specialized centers during the different timeframes: within 12 hours (31 cases), 24 hours (61 cases), 3 days (54 cases), 7 days and more (6 cases).

Besides of the physical, neurological and general laboratory examinations, cranial ultrasound, cranial, chest, abdominal x-ray exams, as well as the x-ray for the extra abdominal organs and various sectors of the skeleton, and an ultrasound of the internal organs were performed. In some of the cases diagnostic surgery was performed: laparocentesis, insertion of diagnostic fresory orifices (FO) with further brain ultrasound.

RESULTS AND DISCUSSION

The CCCT with extra cranial injuries developed an effect of reciprocal complications: apart of the brain regulatory dysfunction a set of other pathological factors was stretched - related with the intracranial injuries, and rapidly worsening the health state. 133 (67,5%) patients developed a traumatic and/or hemorrhagic shock of different severity, mostly along with stupefy. 152 (76,8%) patients had a long-term stupefactions resembling a state of sopor-coma, with evidence of total and partial cerebral symptoms of subcortical, diencephal, mesencephal-bulbar injuries of the brain stem. Simultaneously diagnostic and curative interventions were performed - according the seriousness of the patients' state. In the acute stage of the trauma the main approaches of intensive and reanimation therapy were addressed to fix the respiratory and hemodynamic dysfunctions, to maintain a central analgesia, cerebral protection and antibacterial care, to immobilize the fractures, and to correct the water-mineral and acid-base disturbances. Such kind of symptomatic therapy was administered long before the obscure diagnosis of the combined trauma was confirmed.

The objective of primary significance was to appraise the gravity of cranial-cerebral component of the combined trauma, and to solve the essential problem, i.e. to identify the damaged substrata in cranial cavity - a subject requiring a neurosurgery intervention. Solving the mentioned problem based on the results of physical-neurological examinations was significantly hard, due to the lack and obscurity of the neurological signs of the intracranial injuries, condition of shock and the age of children, demanding supplementary methods of investigation.

Computer tomography (CT) is the leading instrumental diagnostic mean for the cranial-cerebral traumas in neurosurgery generally, and in pediatric neurotraumatology - particularly. CT is especially applicable in pediatric neurosurgery, since the structural changes in the brain tissue of the infants or toddlers have atypical manifestations with predominant total cerebral symptomatic - complicating the accurate and in tense diagnostics [1,9]. The explorative trepanation was performed in 6 patients in terminal state to determine the nature of the cranial-cerebral trauma.

46 patients were undergone the surgery interventions in different tense after hospitalization - based on the clinical stage, localization and expansion of the factors of compression. In 9 cases an emergency surgery with vital indications was performed (intracranial hematomas, compressed cranial fractures, severe brain contusions with growing syndrome of cerebral compression). In 37 children a reanimation-palliative surgery was performed due to the absence of the syndrome of compression-dislocation (cranial skull clenching fractures, injuries of facial soft tissues). According to our studies subacute manifestation of the cerebral compression syndrome in children is conditioned with the following factors: traumatic cerebral decompression at clenching multisplinter cranial fractures, non-complicated basic state of elevated intracranial pressure in overwhelming majority of children, relatively mild form of present extra cranial injuries. In the described above cases the delay in surgery was used for the shock therapy, advanced investigation emergency interventions for accompanying injuries, transferring the patients to pediatric specialized centers, and organizing multiprofile counseling for elaboration of comprehensive and optimal tactics for treatment.

In majority of cases a resection - trepanation of the cranial skull was performed. As for prevention of repetitious intracranial hematomas, a drenaging, circulation and aspiration systems of the wound floor were implicated after removing the intracranial hematomas and destructed sectors.

32 (16,2%) patients died at the inpatient unit. It is worth to mention that almost the half of the lethal cases were studied at the patients with multiple injuries especially with combinations of the cerebral-cranial and traumas and injuries of the internal organs. Usually, the death within the first hours after the trauma was caused by vitally uncouth injuries and further, the primary - presented causes were the shock and hemorrhage, and cardio-vassal failure; after the 3 days the main causes were as different infective complications, diagnostic and curative errors.

So, the findings of the clinical and therapy evaluation of the studied cases suggest that the choice of the adequate diagnostic-curative tactics in children with severe CCCT is linked to various conditions: complexity in reassuring the clinical-neurological diagnosis due to the presence of the extra cranial injuries; necessity for emergency interventions on correction of the respiratory and homodynamic disturbances, as well as intracranial injury complications; limited opportunities to conduct a set of special neurosurgery manipulations, absence of CT in many health facilities; oftentimes flow of the patients to the non-specialized facilities.

Thus, the knowledge in peculiarities of CCCT in children inevitably makes in tense diagnostics, effectiveness of the treatment, early rehabilitation and follow up, decrease in the prevalence rate of invalidity and unfavorable cases much more approachable.

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Особенности диагностики и лечения сочетанной черепно-мозговой травмы у детей

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РЕЗЮМЕ

В результате анализа истории болезни 197 пострадавших в возрасте от 6 месяцев до 15 лет с тяжелой черепно-мозговой травмой (ЧМТ), сочетанной с внечерепными повреждениями различной локализации и тяжести установлено, что сложность выбора адекватной лечебно-диагностической тактики при тяжелой сочетанной ЧМТ у детей обусловлена многими обстоятельствами. Наиболее значимы: трудности клинико-неврологической диагностики, необходимость проведения неотложных мероприятий по ликвидации витальных нарушений, ограничение возможностей применения ряда специальных нейрохирургических манипуляций, отсутствие КТ аппарата во многих лечебных учреждениях. Знание особенностей тяжелой СЧМТ у детей способствует своевременной диагностике, повышению эффективности лечения, ранней реабилитации и преемственности на этапах лечения, снижению уровня инвалидизации и числа неблагоприятных исходов.

КЛЮЧЕВЫЕ СЛОВА: *сочетанная черепно-мозговая травма, травматический шок, интракраниальная гематома, экстрацеребральные повреждения*