

THE MANAGEMENT OF THE TREATMENT OF CHILDREN WITH ASSOCIATED TRAUMA

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Abstract

Pediatric multiple trauma victims present a unique set of problems to the emergency physician, pediatrician, or surgeon. Children rarely sustain lethal injury; however, delayed recognition and inappropriate management of the common problems encountered in the pediatric trauma patient can lead to a poor outcome. This study was designed as a retrospective descriptive study, using reviews of medical records of 289 injured children. All children aged from 1 to 15 years, who were admitted to the Republican Research Center of Emergency Medicine (RRCCEM) and its branches in the 2000-2009 years. Caring for pediatric trauma patients requires an understanding of the distinct anatomy and pathophysiology of the pediatric population. Initial evaluation, management, and resuscitation require a multidisciplinary approach including trauma surgeons, anesthesiologists, and pediatric intensive care physicians.

Key words: Polytrauma management, Pediatric, Multiple trauma, Associated trauma, Pediatric trauma, emergency medical service (EMS)

Introduction

Trauma is still the most common cause of mortality in children, even in countries with the most advanced medical services. Severe head injury carries a high morbidity and mortality, whether isolated or in association with other trauma. However, a fatal outcome is usually the consequence of combinations of injuries. We define “real” polytrauma as two or more system injuries, involved at the same time endangering life as a result of one single or a combination of several injuries. Multiple trauma is always more than the sum of the single injuries; it should be considered as a systemic disease. Orthopaedic injuries account for a high proportion of the damage incurred by the polytraumatized child but are rarely life-threatening in their own right [3].

Pediatric multiple trauma victims present a unique set of problems to the emergency physician, pediatrician, or surgeon. Children rarely sustain lethal injury; however, delayed recognition and inappropriate management of the common problems encountered in the pediatric trauma patient can lead to a poor outcome. [7, 8, 10]

There are some effective models of emergency service in the world. Current guidelines of these models for polytrauma management are only partially applicable to the pediatric population. Associated trauma is one of the leading

causes of death and disability in children and adolescents in Uzbekistan region. Therefore Ministry of Health of the Republic Uzbekistan supports our national emergency model development.

The emergency medical service (EMS) structure consist of the head center in Tashkent - the Republican Research Center. The government program of public health services reforming in Republic of the Uzbekistan is defined by the Decree of President - 2107 from 10.11.2008, by a basic principle puts in of Emergency Medicine (RRCCEM) – Trauma center 1-st level, in each of 13 region there are regional branches – Trauma center 2-nd level, in 175 settlements of the country at regional medical associations locate RRCCEM's subbranches - emergency medical units – Trauma center 3-rd level. These hospitals are the only hospitals in the region designated as a regional pediatric trauma center with 24-h emergency service, surgical service and intensive care, including burn and neurointensive care.

The aim of this study was to describe emergency service for the pediatric patients with associated trauma admitted in the RRCCEM and its regional branches in Uzbekistan region during 2000-2009 periods.

Materials and Methods

This study was designed as a retrospective descriptive study, using reviews of medical records of 289 injured children. All children aged from 1 to 15 years, who were admitted to the Republican Research Center of Emergency Medicine (RRCCEM) and its branches in the 2000-2009 years.

Definitions

The Abbreviated Injury Scale (AIS) system [1,4] classifies injuries according to body region, type anatomical structure, specific structure and level, and assigns severity in an ordinal scale from 1 to 6, where 6 is lethal. The Injury Severity Score (ISS) system [2,6] allocates the AIS scores into six body regions and calculates the highest AIS score from the three most severity injured ISS body regions to assigned the ISS score in an ordinal scale from 1 to 75, where 75 is lethal.

Statistical analysis was performed using Microsoft Excel 2007. Total numbers, percentages, and means±standart deviations are given.

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Results and discussion

Initial management of the pediatric trauma victim is similar to that of the adult trauma victim. However, it requires sufficient knowledge of the physiologic and anatomic differences between children and adults. Successful management requires adequate assessment and control of the airway, breathing, and circulation. Evaluation of the ABCs is a dynamic process that requires simultaneous assessment and resuscitation, as well as persistent reassessment until the child is hemodynamically stabilized.

To reduce mortality and optimize functional outcome in pediatric patients with severe head injury, it is necessary to minimize the progression or the effects of secondary injury and thereby maximize the potential for recovery. Successful management of severe pediatric head injury requires complete and rapid physiologic resuscitation, which begins with aggressive and organized resuscitation in the field; avoidance of hypotension and hypoxia; prompt diagnosis and removal of intracranial mass lesions; aggressive treatment of intracranial hypertension; and maintenance of normal physiologic parameters, such as cerebral perfusion, in order to facilitate adequate delivery of oxygen and metabolic substrates to the brain.

The group of physicians immediately responsible for the care of an injured child is made up of the surgical specialties. Pediatric general surgery includes within its training the care of the injured child. The pediatric surgical team must include a leader of that team whose responsibility it is to organize the team. In the ED, this trauma team is expected to meet the patient on arrival. Once the patient has been placed in the resuscitation room, the team begins its work. Hopefully, the ED has been notified by the pre-hospital personnel of the cause of the injury, e.g., motor vehicle crash, gunshot wound, stab wound, fall, and is prepared to start the resuscitation phase. Occurring simultaneously with the resuscitation phase is the diagnostic phase. However, the team should be trained to the important fact that the diagnosis is less important than saving the life of the injured child. Thus, the team should be aware that the lack of a diagnosis should never impede the application of an indicated treatment.

The composition of the team, in addition to the leader, is generally two other surgeons, an anesthesiologist or emergency medicine physician, and at least two nurses, one of who acts as the scribe. Absolute responsibility for the patient rests with the team leader. The team leader will have assigned specific duties to other members of the team Fig. 1.

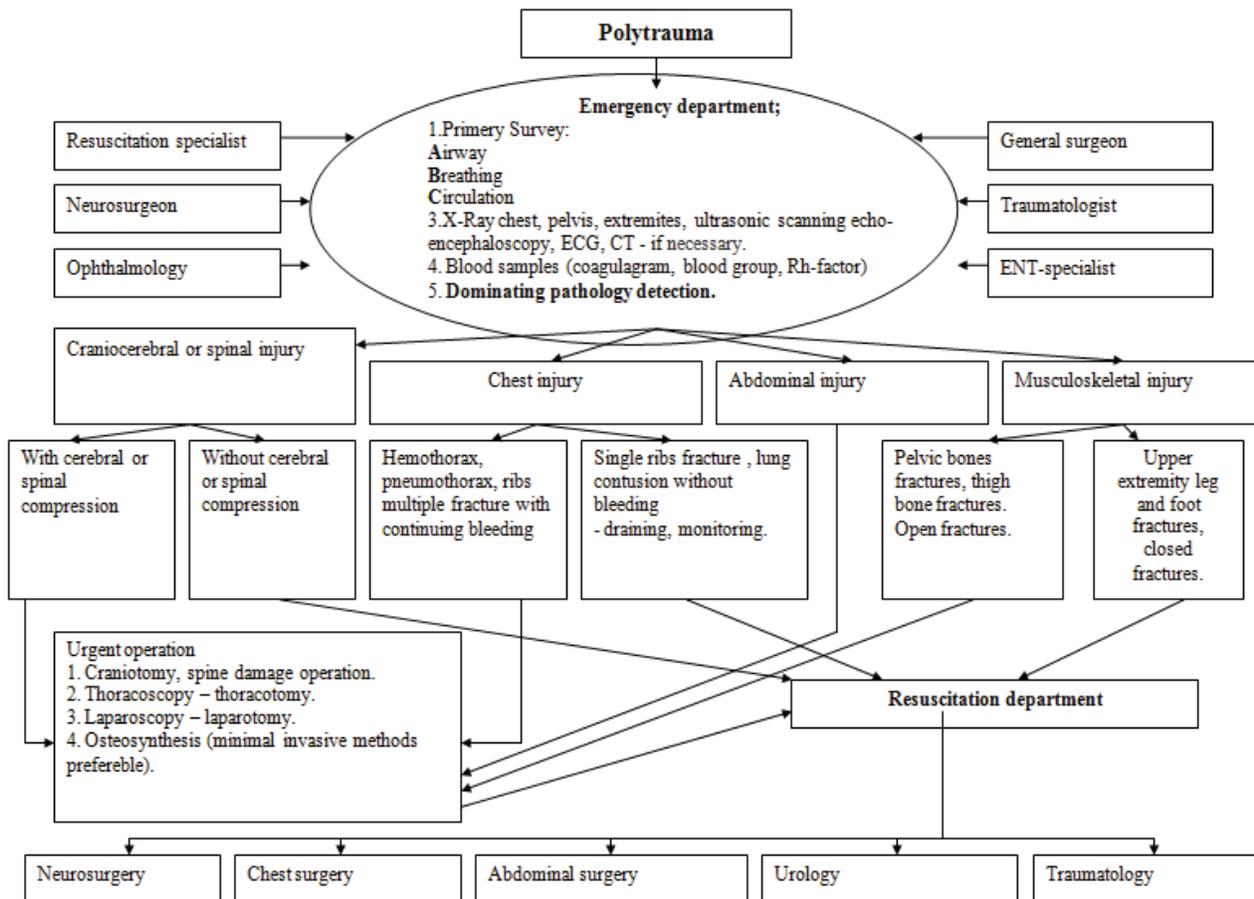


Fig.1. Polytrauma management.

Other physicians is part of the trauma team but not necessarily part of the physician group who initially responds upon the patient's arrival. Clearly, Orthopedic Surgery and Neurosurgery must be included in this group. Also, Plastic Surgery, Ear Nose Throat, Urology, and Ophthalmology will be required in specific cases. These individuals must be available on short notice at the behest of the trauma team leader. Nonsurgical physicians are also included in the requirements. Pediatric emergency medicine and pediatric intensive care physicians are included in this group, as are radiologists.

The ultimate common pathway leading to death in the injured child is profound shock: the inadequate delivery of oxygen to the tissues. It is therefore the goal of the initial phase of resuscitation to rapidly evaluate and treat any immediate life-threatening injuries that compromise tissue oxygenation. This is known in Advanced Trauma Life Support (ATLS) courses as the primary survey or the ABCs of trauma: airway, breathing, and circulation. Appropriate management of the ABCs is necessary for optimal outcome in pediatric trauma, regardless of whether it is managed in an adult or pediatric trauma center.

Patients with the dangerous body damages, being in traumatic shock condition or without consciousness, hospitalised in intensive care unit. Associated damage complicates diagnostics, both brain damages, and bone fractures. Carrying out of emergency reanimation actions was accompanied by diagnostic researches: craniography in two dimensions, roentgenography of locomotorium damages, ultrasonic examination of abdominal organs.

Diagnostics, first of all, should be referred on definition of the pathology demanding urgent operative intervention; bleedings of various localisation; a prelum of a brain with hematoma or osteal fragments; it is necessary to consider possibilities of development of a coma owing to a shock, hemorrhages, serious hypoxia, a hypo-hyperglycaemia which aggravate craniocerebral injures gravity, mask focal semiology.

It is important to estimate gravity of a cerebral coma on Glasgow scale. After carrying out of clinico-neurologic diagnostics all available agents arsenal involved: echoencephalography, a computer tomography, an axial computer tomography, ultrasonic research, modern noninvasive methods of a brain visualisation.

At a choice of a method of treatment of victims with a polytrauma we were guided by gravity of a condition of

patients, degree of a traumatic shock, hemorrhage volume, other disturbances of vital functions of an organism and age, and then treatment tactics was defined. Treatment should begin in extremely early terms, that as shows our experience, essentially reduces number of lethal outcomes, both from immediate complications of a trauma, and from serious complications in the post shock period.

Further if the acute surgical pathology detected the patient translate in surgical resuscitation unit where the intensive cares proceed. In case of detecting of an acute surgical pathology the patient translate in operational, for emergency surgical intervention.

As indications to an emergency surgical intervention considered intra-abdominal bleeding, breath disturbance in a consequence of pneumo or a hemothorax, brain compression with dislocation syndrome, open not stable fractures of extremities. Presence of these indications or suspicion to them were an occasion to transfer of patients in operation room where simultaneously with antishock actions inspection proceeds. If results of research do not give the basis for an urgent surgical intervention the patient translate in intensive care unit. In cases when urgent operative treatment concerning craniocerebral trauma was required or damages of internal organs, in parallel operative stabilizations of long bone and pelvic bone fractures execute, so-called simultaneous operations.

The most frequent trauma causes at 1-3 year kids were falling from low places: tables, chairs, sofas, beds. Domestic trauma were the most frequent trauma causes at 4-5 year childs. The TV involves with colour pictures and puts the most serious damages after the falling. The child cannot understand the threats proceeding from such subjects. To protect it from such mutilations - a parents duty. Serious traumas of a head because of fights on changes and in court yard of schools at 7-12 age adjoin to road accident. Not casually on a traffic sign «children» are represented running schoolboys. Also often there are combustions of respiratory tracts and eyes from fireworks, fractures on an athletic field and falling from a bicycle. Complicates a situation a combination of various damages to one case. At children after twelve years the probability of serious traumas as a result of employment by extreme sports sharply increases Fig.2.

The greatest quantity of severe associated traumas (high ISS) becomes perceptible at children of early school age Fig.3.

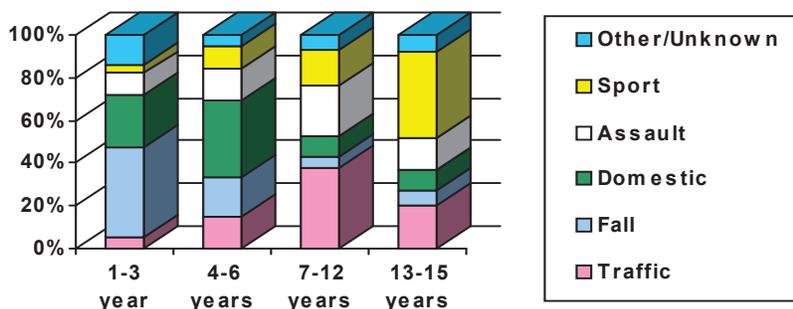


Fig 2. Injury mechanism.

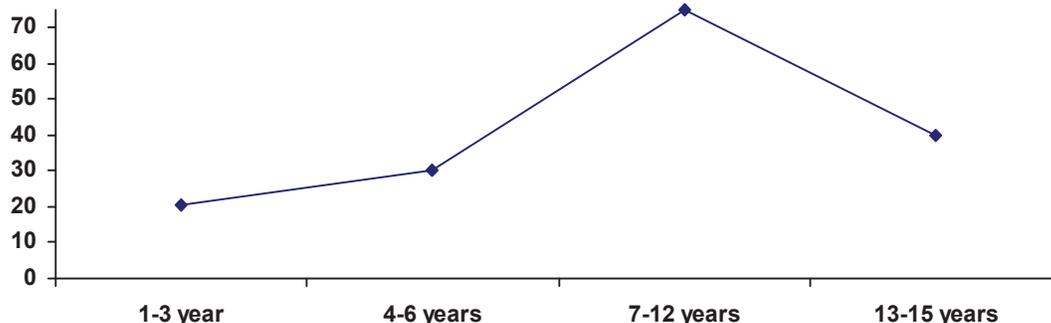


Fig. 3. ISS group.

Conclusion

Caring for pediatric trauma patients requires an understanding of the distinct anatomy and pathophysiology of the pediatric population. Initial evaluation, management, and resuscitation require a multidisciplinary approach including trauma surgeons, anesthesiologists, and pediatric intensive care physicians. Head injury severity is the

principal determinant of outcome and mortality in polytraumatized children.

Application of above mentioned actions algorithm allow avoiding diagnostic fault and decreasing evaluation term.

This study indicates effectiveness of generated emergency medical service for children with associated trauma in Uzbekistan.

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