FIRST AID TO THE VICTIMS OF ROAD ACCIDENTS IN THE EVACUATION PROCESS

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Abstract: The statistics demonstrate that giving the qualified first aid at the scene before admission is significantly less frequently than would be expected. Medical care at the pre-hospital stage is of particular importance in cases of manifest circulatory and respiration disturbances, clinical death, bleeding, fractures, when a failure or delay to render assistance quickly leads to a significant deterioration of the body condition and even death. The majority of the victims die at the pre-hospital stage, resulting in high importance of qualified first aid in the first moments after injury.

KEYWORDS: ROAD TRAFFIC INJURIES, URGENT CONDITIONS, RESUSCITATION.

1. Introduction

The intensive development of transport communications has exacerbated the problem of conflict with human flows in modern society. Vehicles are distinguished by high power and speed. The dynamics that accompany this development had naturally led to a significant increase in trauma in people, the cause of which is a conflict with the traffic flows. In recent years, among the causes of mortality of people aged 5 to 45, road accidents ranked second [1].

In modern conditions, road accidents are characterized predominantly by pelvic fractures, in combination with head segments injuries and other bodily injuries. Soft-tissue damage and ligamentous apparatus injury are often overlooked; attention often is not paid to hidden injuries. In addition, the statistics demonstrate that giving the qualified first aid at the scene before admission is significantly less frequently than would be expected. For example, first-aid assistance is provided by employees of the road patrol service only in 1% of cases; assistance from the fellow travelers or from drivers and travelers of other vehicles is provided in 10% of cases. The reason for this is primarily a low level of skills of first medical aid to people found at the accident site.

Numerous researches and tests have revealed that at a frontal collision of the adapted bus, the angular speed and acceleration of head of a traveler with restricted mobility, which is much larger than that of a common traveler, causes closed trauma, while at a "collision from behind", cervical vertebrae are mostly damaged. Therefore, during such road accident, it is necessary to take into account the specificity of the mentioned injuries, as well as the administration of first aid.

In the evacuation process from the accident site, the rapid administration of first aid is of particular importance. In cases of manifest circulatory and respiration disturbances, clinical death, bleeding, open and closed fractures, thermal and chemical burns, delay to render assistance quickly leads to a significant deterioration of the body condition and even death.

Statistics confirm that the mortality rate in road accidents is as follows: 50% of victims die in the first seconds and minutes of accident, 30% of them lose their lives during the first two hours after the injury, and 20% of victims - 5 days after. From this data, it clearly appears that many victims of road accidents lose their lives at the pre-hospital stage. More than half of them die at the accident site before the arrival of a medical emergency team, which emphasizes the importance of medical assistance from the first moment after the injury.

According to the official statistics, more than 40 000 road accidents occurred in Georgia in 2018. More than half of those who lost their lives in road accidents are people of active working age from 22 to 40. More than 20% of the injured are maimed. 9047 people were injured in road accidents occurred in 2018, and 459 people lost their lives. Of these, 13 were children under the age of 7. According to the 2018 statistics, the number of road accidents increased by 6% compared to the previous year, followed by the increase in the number of the injured people.

The reasons for accidents with fatal consequences are as follows:
- 27% - of the rules for maneuvering;
- 26% - speeding;
- 19% - swerving into oncoming traffic;
- 9% - driving under the influence of alcohol;
- 19% - different violations.

The mortality rate among children in road accidents is 4-6 times higher in comparison with the Nordic and economically developed countries of Western Europe. According to expert estimates, a significant number of victims lose their lives because of incomplete and delayed medical care, although injuries sustained in road accident were not fatal [2]. Lethality of injuries sustained in road accidents largely depends on the level of preparation of specialists of an ambulance team, their skills to persons under life-threatening conditions, as well as on the proper organization of life-saving and anesthesiological treatment at the scene and in the evacuation process [3].

Experience gained in clinical practice in the world has clearly demonstrated the important parts of these problems that have not yet been resolved so far: belated diagnosis, imperfect assessment of the severity of injuries sustained in road accidents, high frequency of complications, high rates of injuries, the predominance of injuries among people of working age. Most of the severe consequences can be explained by belated and inadequate diagnosis. Experience has shown that in the case of polytrauma, the medical staff cannot reveal injuries in a timely manner, which leads to the post-complication development and prolonging the treatment duration, and often to patient's disability or fatal outcome. During polytrauma, there is a variety of the injuries localization and severities, as well as a multitude of their possible combinations for the victims.

The complications of polytrauma diagnosis caused in road accidents are caused by their pathogenesis, which often leads us to typical symptoms that ultimately translate into to diagnostic pitfalls. This is due to the fact that polytrauma sustained in road accident is characterized by a number of peculiarities: there is exhibited a syndrome of mutual complication of factors affecting the process; often the process preceded by the less severe symptoms, but with more pronounced pains. At this time, they eliminate the symptoms of the main damages, which call an urgent operational intervention. Many experts believe that there are distinctive features of polytrauma:
- Syndrome of mutual aggravation;
- Atypical symptoms that complicate diagnosis;
- High likelihood of the development of traumatic shock and massive loss of blood;
- Instability of the compensation mechanisms, and a large number of complications and fatalities.

Characteristic features of the assistance to the victims of road accidents are represented by the reconciliation of the diagnostic process and the immediate elimination of significant injuries. Among them, the priority is given to the emergence evacuation victims to hospital; the measures slowing the evacuation process are undertaken only in accordance with vital indications. In addition, it is necessary to strictly adhere the algorithm for action, which can lead to serious diagnostic errors. First of all, this is the assessment of the life-threatening disorders of the victim's respiratory and circulatory systems.

Decision on the time of transportation of victim is made in accordance with the life-threatening disorders, which is required for transferring patient the clinic. In case of the need for undertaking medical reanimation measures, transportation can only be possible after overcoming life-threatening situation [5].

2. Preconditions and means for resolving the problem

Primary medical examination (not more than three minutes):

1. Signs of respiratory distress: strongly-marked cyanosis, futile attempt to breath in, chaotic arrhythmic breathing, inclusion of auxiliary respiratory muscles.

Primary cause – full or partial obstruction of respiratory tract. In an examination, it is necessary to exclude severe breast damage through auscultation: open or pressure pneumothorax, hemothorax, breast damages.

2. Hemodynamic assessment: it is necessary to measure heart rate and blood pressure. The clinically significant tachycardia that requires therapeutic intervention, among under 1 year old children, is 220 bpm, among older children - more than 200 bpm, bradycardia among under 1 year old children - less than 60 bpm, among older children - less than 50 bpm.

Systolic pressure for children aged 1 year up can be calculated according to the formula: 90 + (2 in X age in years). Hypotension among under 1 year old children is considered to be a reduction in systolic pressure up to 70 Mmhg, and among children aged 1 to 10 - 70 + (2 in X age in years), for children aged 10 year up - less than 90. The pulse can be checked on a radial artery, if the blood pressure is greater than 80 Mmhg. On a femoral artery -> 70 Mmhg, on a carotid artery -> 60 Mmhg. For babies, it is recommended to check the pulse on a brachial artery, and for older children - on a carotid artery [3].

Bradycardia itself does not provide adequate perfusion, so the treatment of deep bradycardia should be carried out in the same way that treats asystolia.

1. Cardiopulmonary resuscitation

During the primary medical examination of the victims of road accidents, special attention is paid to the signs of clinical death and/or circulatory deficiency: pulselessness on the major veins, the absence of spontaneous breathing, status of pupils, the absence of heartbeats, considerable bradycardia (heart rate below 60 among under 1-year-old children, and below 50 bpm, among older children, in case of the presence of circulatory failures).

The first stage of cardiopulmonary resuscitation involves:
- unblocking airways;
- breathing management and lung ventilation;
- preservation of blood circulation and stopping bleeding.

These factors in the process of cardiopulmonary resuscitation are often denoted by the ABC abbreviation.

1.1. Airway breathing

In order to ensure airway breathing, it is necessary to open the victim’s mouth. If clotted blood or foreign body were lodged in the victim’s esophagus, it is necessary to clean up by means of the aspirator or napkin. If obstruction is caused by tongue, it is necessary to put the lower jaw forward. If the patient is unconscious, then it is possible to install the S-type air duct in his/her body. The dimension of this air duct should be adapted to the patient’s age. The triangular method of covering (pushing back the head, opening the mouth and putting the the lower jaw forward) is considered to be the best method of post-traumatic recovery of airway breathing [6] However, if there the reason to believe that the backbone neck section is injured, then the victim’s head should be pushed back not too far. In such a case, the head is pushed back moderately (by stabilizing the neck section).

2. Pharmacological therapy

1 If there were signs of cardiac deficiency, the drug to be chosen is an adrenaline (epinephrine). It is injected intravenously or into the bone. The doses are shown in Table 1 [3].

It should be noted that in the resuscitation process, adrenaline can be administered in every 3 minutes before the heart rate is recovered.

After injecting any drug into the peripheral vein or bone, it is necessary to immediately introduce 5-10 ml of isotonic solution, in order to accelerate inclusion of drug into the central circulation [7].

If it is not possible to enter the venous or intrabone channel, and there is a need for injecting the drug externally, there is used the intratracheal method of drug instillation: into the endotracheal tube (if intubation was performed). At this time, the drug is doubled and dissolved in 1-2 ml of physiological solution. The total volume of one-time injected drugs can reach from 20 to 30 ml. Adrenaline intake in the heart is used only when it is impossible to treat by other methods.

In case of urgent need, prior to intravenous injection, we can apply the method of sublingual injection of drug (into the muscles of mouth cavity), which allows for urgent intravenous injecting of the required drug dose, since there is no time for venous puncture.

In this case, there is used the Three Deuces rule: the drug is injected 2 cm from the front of chin, by means of the intramuscular injection needle at a depth of 2 cm in sublingual muscles in the direction towards the crown, the total volume of which does not exceed 2 ml (1 ml for children of up to age three). The drug dose should be standard, without dilution.

The effectiveness of heart function for kids is mostly by frequency of the pulse, so during bradycardia, it is treated as in the case of asystolia. Along with adrenaline, there may also be selected the atropine. It is administered by intravenous, intraosseous or endotracheal injection at a dosage of 0.02 mg/kg, approximately 0.1 ml per year of child’s age, but no more than 0.6 milliliters. In endotracheal injection, this dose is doubled. In case of a low effectiveness, the repeat dose can be given to patient in 3 to 5 minutes. In the cases of prominent ventricular tachycardia or fibrillation, the drug to be selected is lidocaine on 1-2 mg/kg.

3. Infusion therapy

Severe trauma is always accompanied by a shock complication, so at the pre-hospital stage, it is necessary to provide intravenous or intrabone injection of liquid. For this purpose, there is mostly used by the Ringer’s balanced salt solution. At the initial stage, it is injected at a dose of 20 ml/kg. Infusion is also done at the rate of normal blood pressure.

The second bolus of infusion is repeated with the same dose, and if the first bolus does not improve signs of tissue
perfusion disorder: the light colored skin, capillary time ("white spot") increases over 2 seconds.

If in the case of detecting the symptoms of internal hemorrhage (suspicion of fracture of the pelvic and the long bones, for intraperitoneal hemorrhage, it is expedient to initiate infusion with colloidal solutions, among which the most recommended in the pediatrics is hydroxyethylated starch 130/0,4, which can be injected at a dose of 20 ml/kg. It has minimal side effects [3].

The next stage is a crystalloid infusion. There has been confirmed the prospect for the use of method of a low-volume infusion of the hypertonic solutions of sodium chloride at the victim evacuation stage. Also, there have been registered the drug of a mixed composition – Hyperhaese, which includes hydroxyethylated starch 2000/0,5 and a sodium chloride 7.2%-solution. The maximum volume of its injection dose is 4 ml/kg. The anesthesiologist- reanimatologists of the pediatric field have justified a high effectiveness of using Hyperhaese at the evacuation stage, when providing the first aid to children injured in road accident.

4. Analgo-sedation
Specific requirements are applied to analgetic and sedative methods and agents for the victims of road accidents. They should be distinguished by the technical simplicity, high effectiveness, fast pain medication, they should not have a depressing effect on the life-saving systems. Of these drugs, an ambulance team must have a non-narcotic metamizol (analgin), which must be injected into the vein or bone with a dose of with a dose of 1 mg/kg. If it is impossible to inject this drug into the vein or bone, it can be injected into the muscle at a dose of 4-5 mg/kg, but in this case its action will start 4-5 minutes later. For sedation, along with these analgesics, there are also injected into the vein (bone) diazepam (seduxen, rilanium) with a dose of 0.3 mg/kg, or into the muscle, at a dose of 0.5 mg/kg. Narcotic analgesics - morphine or promedol - are allowed for newborns with a dose of 0.1 ml/per year, but not more than 1 ml, phentanyl, at a dose of 2 ml/kg. The narcotic analgesics are used with analgin. A good effect is produced by the use of different blockings with local anesthetics.

5. Medical care in the process of evacuation of victims
Before we start the victims evacuation process from the accident site to the hospital, it is necessary:
- to undertake all preparatory and preliminary measures required for transportation (preparation of victim and vehicle, providing opportunities for injections, sanitation of the mouth cavity, esophagus and trachea, as well as conducting oxygenotherapy and so on);
- to maintain all conditions for proper transportation for a particular victim, in accordance with the severity level of his/her state, taking into account the major pathological syndromes (monitoring of vital functions of body, conducting the infusion therapy, readiness for cardiopulmonary resuscitation, providing artificial lung ventilation and so on);
- to pay special attention to the persons with restricted mobility in the adapted bus, since in road accident, they are mostly injured in the head and neck areas, which is not visible during the visual inspection. Therefore, their above mentioned organs must be fixed, so that their state won’t become even more severe in the transportation process.
- to determine the complex of those treatment measures that are necessary in the transportation process of the victims (infusion therapy, artificial lung ventilation, the use of medicines for the preservation of vital functions, and so on).

Prior to the start of transportation, the victims will be provided with additional rapid physical examination of:
1. Head - skull bones and tissues, facial skeleton, eye damage, hemorrhages, liquorrea;
2. Neck – subcutaneous emphysema, trachea and backbone neck section damage;
3. Breast bones – respiratory excursion, asymmetry, breast skeleton damage;
4. Abdomen – we need to remember that in case of injury caused by a sharp object, there are often damaged liver and kidney, which leads to intra-abdominal hemorrhage;
5. Extremities – to assess the voluntary movements;
6. Skin – damage detection;
7. Additional neurological examination.

When starting the transfer of victim and during the transportation process, it is necessary to maintain systolic blood pressure at 90 MmHg (80 MmHg for children of up to age three), and the pulse rate should be within the 10%-deviation limits, according to ages. Arterial hypertension should be eliminated as soon as possible. In the case of hypertension maintenance and intravenous or intra-bone active infusion therapy in the form of constant infusion, there are used injection of dopamine with an average dose of 6-8 mg/kg/min. For this, 0.5 ml of a 4%-dopamine solution is dissolved in 200 ml of physiological solution, and there is carried out drip titration under blood pressure control. If there is no dopamine, there is used adrenaline with a dose of 0.1 - 0.5 mg/kg/min. In this case, 1 ml of a 0.1%-adrenaline solution is dissolved in 200 ml of physiological solution, and titration is carried out in the same way as with dopamine.

3. Conclusion
A large number of complications and fatal consequences are associated with the belated delivery of the victims of road accidents to the hospital (the "golden hour" rule), insufficient fixation of fractures, belated diagnosis and operative treatment of all injuries, inconsistencies between the adequate rehabilitation and out-of-hospital care.

The inevitability of road traffic injury conditions the need for developing the uniform tactics of providing assistance to the victims. Under great pressure of time, one of the methods for excluding diagnostic and medicinal errors for the victims injured in road accidents is a reasonable use of the algorithm and treatment schemes for providing medical care. The right treatment-diagnostic tactics by an ambulance team, timely hospitalization of victims with providing the medical care at the accident site and during the transportation process, as well as continuous retraining of medical personnel for improving their practical skills, pertain to the reserves in combating the grave consequences of road accidents.

The use of the correct algorithm for providing medical care to the victims of road accidents, dynamic observation and continuity in the stages of treatment contribute to improving the health quality by general and individual criteria (physical strength, positive emotions, activity, workability, and fulfilling life in a social environment).

4. References

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