

## FORENSIC MEDICAL ASSESSMENT OF ROAD ACCIDENTS

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**Abstract:** Over the past decade, the growth of vehicles and traffic volume on the country's roads has significantly complicated the task of ensuring road safety. Thanks to advances in the field of studying the mechano- and morphogenesis of damage in various types of transport trauma, as well as the introduction into practice of a number of diagnostic and research methods, the possibilities of forensic medical examination in cases of transport trauma have expanded significantly in recent years. This literature review focuses on the forensic assessment of road traffic accidents.

**Key words:** road traffic accidents, forensic medical examination, corpse, transport.

**Relevance.** Automobile injuries occupy a significant place in the overall picture of injuries. An increase in the number of cars, an improvement in the quality of roads, an increase in the number of private car owners who often have insufficient driving skills or are intoxicated - these are not all the factors leading to an increase in the number of road accidents. According to a number of authors, fatal automobile injuries in the world account for 40-60% of all fatal injuries and rank first among all cases of violent death [1,2, 9, 3].

According to some data, among those involved in a traffic accident, fatal injuries to pedestrians are in first place (47-56%), in second place are drivers (18.9-25.6%) and in third place are passengers (about 7%). The high incidence of pedestrian injuries is explained by the absence or extremely poor condition of pedestrian paths and sidewalks, as well as the lack of illumination of the streets of cities and towns at night [5,6].

The constantly increasing number of motor vehicles, the increase in the speed of their movement, the complexity of the street situation in cities and other factors, as practice shows, lead to an increase in road injuries, and hence to an increase in the number of forensic medical examinations associated with this type of injury [8]. Due to the complexity of investigating road accidents, investigative authorities place increased demands on forensic medical examinations. This determines, on the one hand, the need to improve the quality of all types of examinations in cases of car accidents, and on the other, further study of car injuries [1,3,4].

Solving forensic medical problems based on a methodologically and organizationally correctly performed examination of the health status of the driver (living or deceased) makes it possible to identify variants of cause-and-effect relationships between the incident and the disease or other health disorder [10]. Based on a scientific assessment of the data obtained during the examination of a corpse or examination of the victim, forensic medical examination has the opportunity to establish certain facts relating to both the mechanism of the road traffic accident as a whole and its individual stages [7]. This is of significant importance for investigative authorities, as it helps them, based on scientific data, to reconstruct the picture of a road traffic accident in all its details.

Thanks to advances in the field of studying the mechano- and morphogenesis of damage in various types of transport trauma, as well as the introduction into practice of a number of diagnostic and research methods, the possibilities of forensic medical examination in cases of transport trauma have expanded significantly in recent years. The difficulties that occurred in the past have now been largely overcome, and now the results of forensic medical research make it possible to sufficiently solve many questions of law enforcement agencies regarding the mechanism and nature of injuries in specific types of transport trauma.

To implement the tasks set before the examination by the investigative authorities, the forensic expert must have sufficient theoretical knowledge, practical skills and certain experience. He must be able to examine victims, examine corpses, fully identify injuries on the body and clothing, correctly evaluate and describe them, carry out a set of laboratory tests, participate in inspections of accident sites and vehicles, and analyze case materials. Errors made when examining corpses are difficult and sometimes impossible to correct. This is often the reason for the need to order additional and repeated examinations, sometimes associated with the exhumation of the corpse.

Examination of the nature and mechanism of damage during a car injury is an urgent and complex problem of forensic medicine and expert practice. This problem is of particular relevance nowadays due to the sharp increase in the number of cars, changes in their design features and the increasing number of cases of road accidents with human casualties.

Of particular relevance is the issue of establishing the exact location of the victims in the car. When solving this issue, it is necessary to take into account the design features of passive safety equipment. Diagnosis of the location of victims in the vehicle during an accident is based, along with other factors, on the analysis of detected signs - damage. It should be noted that the damage that occurs in these situations is not equivalent in its diagnostic significance. It has been noted that the damage that occurs to victims in the passenger compartment of a car also differs in its mechanism of formation [11, 12]. The practice of accident investigations shows that when determining the mechanism of injury to victims inside the car and the related issue of establishing the location of the latter in the cabin, it is often not enough to study only damage to the body, clothing and shoes. To solve these issues, an integrated approach is required using data from an inspection of the scene of an incident, the results of an automotive technical examination, vector analysis, and other mathematical calculations [2, 4, 6, 7, 8, 9, 13]. The stages of a comprehensive investigation in case of an accident are as follows: 1) determining the presence, location and nature of injuries for each victim; 2) differentiation of identified injuries into direct (from contact with parts of the car interior) and indirect (from concussion, hyperesthesia, etc.); 3) identification, with the help of an auto technical expert and traffic police officers, of damage to control mechanisms and the interior of the vehicle; 4) drawing up diagrams of the topography of damage to the body, clothing and inside the car; 5) comparative analysis of topographical and morphological (including traceological) features of damage to the body and clothing, and inside the car; 6) assessment of direct damage to the body and clothing and damage to the vehicle interior, depending on the driver's possible posture at the time of the accident; 7) drawing up the main task (tasks) for specialists in the field of mechanics, physics, and mathematics [1, 10]. To resolve the issue of the location of persons in the car during an accident, morphological signs are mainly used (authors). Depending on the significance of these characteristics, they are divided into species-specific and characteristic. However, as forensic investigative expert practice shows, the number of such signs is very limited and they are not always found.

The nature, localization, frequency, and extent of injuries to a victim in the cabin of modern passenger cars in road traffic accidents are determined by a combination of a significant number of factors: the location of the victim in the vehicle cabin, the type of accident, the direction of the main dynamic impact on the car, the interior features of the passenger car, use of personal protective equipment.

The significance of the medical-traceological approach is determined by the fact that at the moment of a strong frontal impact, the objects in the cabin enter into trace-forming relationships with each other (the driver's head and chest with the steering wheel, his hands with the front panel, the passenger's right hand with the front interior parts, the elbow of the driver's left hand with the edging of the front door window, etc.). The significance of the medical-trasological approach for the formation of a specialized focus of the forensic medical examination of a car injury determines, among other things, the feasibility of a medical-forensic examination of the interior of the salon of an emergency vehicle to identify the introduction and detachment of human objects, blood stains, the presence of other biological substances, as well as formation in the cabin there are objects that can injure people or become embedded in human tissues and clothing.

The biomechanics of the displacement of the human body also has a certain influence on the nature of damage to the items of clothing that were on it. So, when you move your arms forward, the fabric of the outer jacket in the seam area connecting the sleeve to the back is subject to a certain tension. As a result, tears in the fabric threads and even ruptures may occur in this area. Since this sign can play a certain role in the expert's assessments, a thorough examination of outerwear using instrumental methods, in particular a stereoscopic microscope, is advisable. The category of signs caused by the presence of stable factors (design differences in the interior of the cabin, posture, possible actions, etc.) includes the following:

The driver has: wounds and abrasions on the dorsum of the hands and the first interdigital space, combined with a fracture-dislocation of the main phalanx of the first finger;

- Bruised left elbow;
- transverse fractures of the middle third of the humerus and femur;
- injuries and marks on clothing (shoes), explained by the professional actions of the driver (vigorous braking, changing gears, moving the steering wheel to the extreme position, etc.)

For the front seat passenger:

- rashes and abrasions at the base of the palm and the lower part of the forearm of the right hand;
- wounds and abrasions in the lower part of the chin;
- rupture of the cervical-occipital joint;
- damage to the toe part of the shoe and foot.

It must be emphasized that the greatest expert value in cases of automobile injury is the study of outer clothing, since they are the first to perceive the impacts to which a person is then exposed. Moreover, they are often the only carriers of various traces. In this regard, the question arises about the advisability of adding to the forensic medical examination reports markings of damage not only on the contours of the human body, but also on the contours of outer clothing.

In the differential forensic medical diagnosis of injuries to the driver and front seat passenger of modern passenger cars during various types of collisions, the starting position, which is used to analyze the mechanism of injuries and damage to persons who were in the passenger compartment at the time of the collision, can obviously be taken as the starting position driver and front seat passenger. It is obvious that in case of displacement forward, the head, limbs and torso of the victims come into contact with the front parts of the cabin interior and receive corresponding injuries and damage. Depending on the speed of displacement, these parts of the body absorb a certain amount of kinetic energy, which determines the severity of the damage. The ability to detect and select informative signs against the background of many injuries and damages allows one to reliably differentiate injuries to the driver and front seat passenger of a car in cases of road traffic accidents with a pronounced primary impact and thus resolve the expert question.

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