

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 755 (23.12.2015).
755 Journal of Education, Health and Sport eISSN 2391-8306 7
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The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 15.07.2016. Revised 25.07.2016. Accepted: 12.08.2016.

UDC 616 – 001.4/.6 – 036.88 – 079.6

PECULIARITIES OF FORENSIC-MEDICAL AND RELATED RESEARCHES IN THE CASE OF MOVING VEHICLE AND BICYCLIST CONTACT

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Abstract

Forensic-medical examiners face with the cases of car and bicyclist contact in their practice. The main goal of examination is to determine the variant of car, bicycle and bicyclist's body contact, that's why it is necessary to determine the mechanism of bodily injuries forming, taking to consideration various trace-forming objects, which can contribute to injuries' forming on the bicyclist's body. It is possible to classify the type of traffic accidents according to the types and quantity of the traumatic objects for the bicyclist's body and according to the sequence of contacting of the vehicle, bicycle and bicyclist's body. Not all questions could be solved by forensic-medical examiner (on example, questions about sequence and phases of bodily injuries forming), that's why in such cases it is necessary to perform complex forensic-medical and transport-trasological examination with obligatory studying of the vehicle, which participated in traffic accident, bicycle, driven by the injured person, clothes and shoes of the injured bicyclist, bicyclist's bodily injuries and results of the scene of incident inspection. All bicyclist's bodily injuries could be divided on three large groups: bodily injuries, which have formed in the result of primary contact of the bicyclist's body and parts of the car; bodily injuries, which have formed in the result of body's throw on the defined parts of the car; bodily injuries, which have formed in the result of bicyclist's

contact with the road. Algorithm of research in the case of forensic-medical examination of injured bicyclist was created, which predicts cooperation of forensic-medical and transport-trasological examiners and gives a possibility for more effective solving of forensic tasks.

Key words: forensic-medical examination, bicyclist's injury, algorithm of complex examination, types of car and bicycle contact.

Introduction. Cases of car and bicyclist contact (from here and now we consider that a bicyclist is a person who rides a bicycle or sits on the bicycle) in forensic-medical practice are common.

Despite this, the bicyclist's injury is not so discussed as the injury of the pedestrian by the moving vehicle and injury inside the vehicle's saloon – up to attempts to determine the vehicle's speed at the moment of contact with pedestrian's body [1-6].

It should be mentioned, that along with the moving bicyclist's injury, there are situations, when the person moves like a pedestrian with the bicycle next; in this case another mechanisms of the person's injuring by a car predominate.

The specificity of such traffic accident is related with variety of possible contacting variants of the car, bicyclist's body and bicycle.

The following trace-forming (traumatic) objects contribute to injuries' forming on the bicyclist's body:

1. Exterior parts of the car;
2. Parts of the bicycle;
3. Road and other objects

Various types of vehicle, bicyclist's body and parts of the bicycle contact cause various combination of the traumatic effects and various mechanism of bodily injuries forming (scheme # 1).

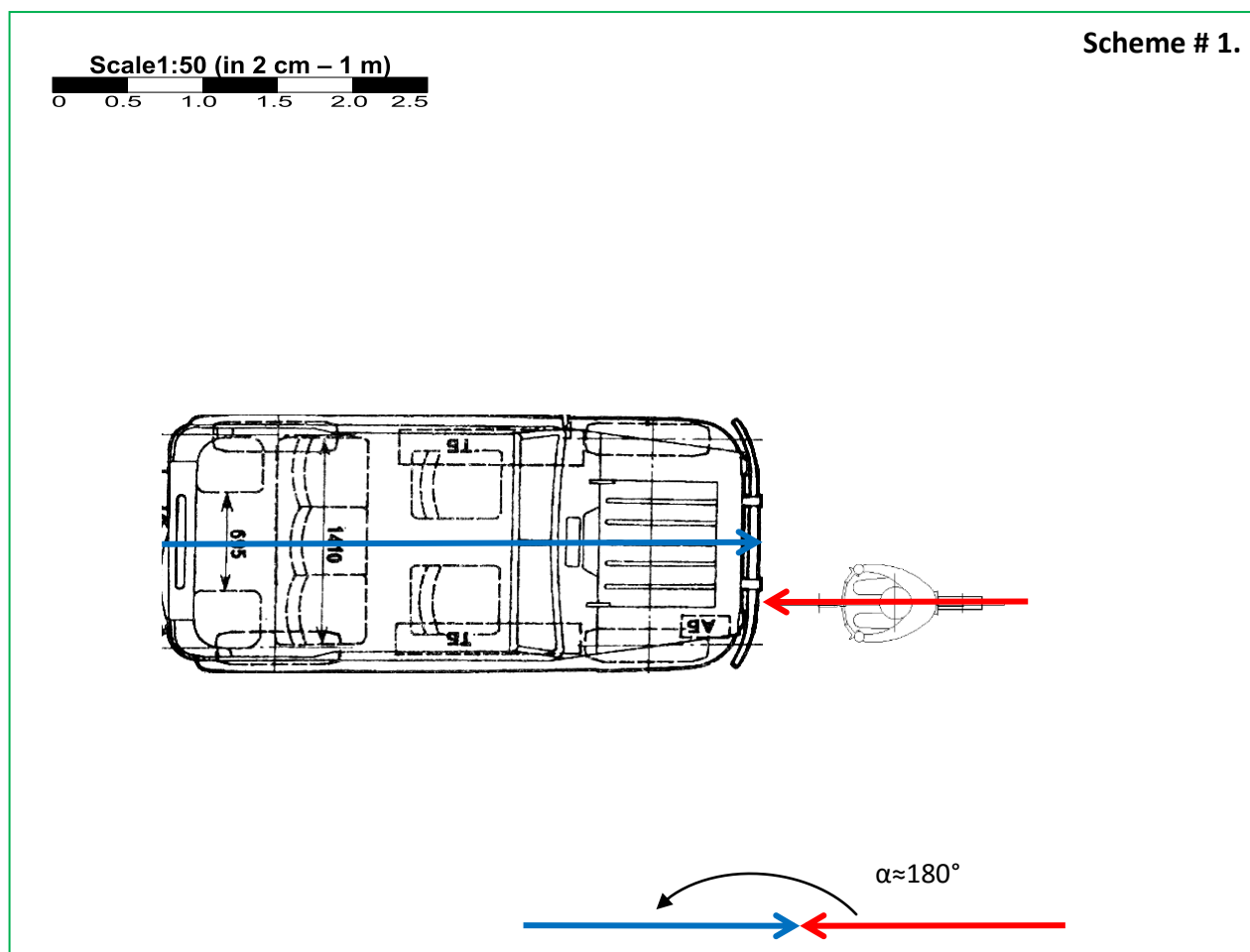


Figure # 1.

Such different types of vehicle, bicyclist's body and parts of the bicycle contact are to be categorized according to following signs:

1. According to the types and quantity of traumatic objects for the bicyclist's body;
2. According to the types of contact.

According to the types and quantity of traumatic for the bicyclist's body objects variants of contact could be divided on two large groups:

- effect of vehicle's exterior parts, parts of the bicycle and road and objects, which locate on it (naturally, body and road contact with located on it objects happens after the bicyclist falls down);

- effect of bicycle's parts and road and objects, which locate on it (situations, when the exterior parts of the vehicle do not primarily contact with the bicyclist's body and contact only with the part of the bicycle; in such case bicyclist's body is injured only by the bicycle's parts at the moment of contact with the vehicle and then receives additional injuries because of the body fall down on the road).

Both variants of the bicyclist's injury are common.

According to the sequence of contacting of the vehicle, bicycle and bicyclist's body we can differ the following variants:

- variant, when the vehicle primarily contacts with the bicyclist's body (in the case of traffic accidents with a passenger car it is a lower extremity; on this stage bicyclist receives bodily injuries both from car exterior parts and parts of the bicycle), then the bicyclist's body is thrown on the car, receiving additional injuries in the result of the contact with exterior car parts and finally the body falls down on the road and slides over it, what causes forming of another group of injuries;

- variant, when the vehicle primarily contacts with the bicyclist's body, however, there is no further throw of the body on the car, because the body together with the bicycle are thrown on the road (in this case on the first stage bicyclist receives bodily injuries both from the hit by exterior car parts and injuring of the body – as a rule, lower extremity, - by the parts of the bicycle; then the body falls down on the road and slides over it, what causes forming of additional injuries;

- variant, when the vehicle does not primarily contact with the bicyclist's body, and contacts only with the bicycle's parts, however, in the result of such car and bicycle contact bicyclist's body receives acceleration and is thrown on the car and then falls down on the road. In such case of traffic accident bicyclist receives at first injuries from the parts of the bicycle, which accelerated after the car hit, then receives additional bodily injuries because of the throw on the car and further contact with its exterior parts and, finally, - in the result of fall on the road;

- variant, when the direct contact of car and bicyclist's body is absent. In such case the primary contact of car and bicycle's part occurs, in the result of what the bicyclist's body is thrown on the road. In this type of car and bicycle contact bicyclist receives bodily injuries in the result of two traumatic objects' effect: parts of the bicycle and road;

- variant, when the car runs over the bicyclist's body (after car and bicycle contact and further fall of the bicyclist on the road). Such type of traffic accident is very complex, because the bodily injuries the bicyclist has received during the previous phases of the traffic accident could be completely "masked" by the rough bodily injuries, which have formed on the injured person's body on the final stage of the accident (when the car runs over the body).

Such variety of possible ways of bicyclist's injuring in the result of traffic accidents from one hand and large number of traumatic objects (exterior parts of the car, bicycle, road) from another hand complicate performing of forensic medical examinations of the dead body

or living person. It is obvious, that taking to consideration only localization and character of bicyclist's bodily injuries is impossible to "reconstruct" the road accident scene.

According to the mentioned above, forensic-medical examiner not having any exact data about circumstances of the bicyclist's injuring should refuse to give an answer on the inquiry's questions, related to sequence and phases of bicyclist's bodily injuries' forming. Forensic-medical examiner can only solve the questions, related to the bodily injuries character, general mechanisms and prescription of their forming, degree of their gravity, and if the injured person died – cause of the death. If the questions about sequence and phases of bodily injuries forming have arisen, examiner in the conclusion should mention, that such questions could not be solved only in forensic-medical examination of the corpse (living person), and are to be solved only in complex forensic-medical and transport-trasological examination with necessary studying of the following objects:

1. Vehicle, which participated in traffic accident;
2. Bicycle, which was driven by the injured person;
3. Clothes and shoes of the injured bicyclist;
4. Character and mechanism of bicyclist's bodily injuries forming
5. Results of the scene of incident inspection (presence of "trace information" as a signs of braking, particles of glass, blood traces and other biological objects and so on)

It is obvious, that to create a picture of the incident (mechanism of traffic accident, types and sequence of the phases and sequence and exact mechanism of bicyclist's bodily injuries forming) is possible only if compare all mentioned above sources of information. It is possible only in the result of collective work of forensic-medical examiners (both tanatologist and medical criminalist), transport trasologists and sometimes forensic chemists and criminalists.

Materials and methods. Analysis of results of forensic-medical examinations of the bicyclists, injured in traffic accident (21 cases) and complex forensic-medical and transport-trasological examinations (7 cases) has shown the necessity to systematize different types of car and bicyclist contact.

Results and discussion. Studying the forensic-medical examinations of bicyclist's bodily injuries, received during the traffic accidents, it has become possible to create the following classification.

1. Situations, when primarily the body of the bicyclist contacts with the car. Such situations commonly happen when the car and bicycle longitudinal axes localize at an angle nearly 90 degrees and car contact with the left or right side of the bicycle or bicyclist. Such

situation is also possible if the angle of contact is different, but the necessary condition is that some region of the bicyclist's body (often lower extremities) is in zone of primary contact with the car.

There are such subspecies of such cases:

1.1 Contact of the left or right part of bicyclist's body with defined part of car's exterior:

1.1.1 with front part of the car;

1.1.2 with side part of the car;

1.1.3. with back part of the car.

In its turn each of the mentioned above variants of car and bicyclist's body contact can be divided on the following subspecies:

- A. With bicyclist's body throw on the car and further fall on the road;
- B. Contact, which is accompanied with bicyclist's fall on the road without throw of the body on the car.

2. Situations, when the car and bicycle (as a rule front or back wheel of the bicycle) primarily contact with each other. Such situation is possible when the car and bicycle move in the same or opposite courses. Such situations can have the following subspecies:

2.1 Situations with the body throw on the front part of the car (bonnet, windscreen, roof, trunk) and following fall on the road;

2.2 Situations with the body fall on the road without throw of the body on the car.

Such variety of different situations of bicyclist injuring by the car assumes various informative importance of the detected bodily injuries.

Nevertheless, we can combine all bodily injuries into three large groups:

1. Bodily injuries, which have formed in the result of primary contact of the bicyclist's body and parts of the car. More often these are the injuries of the bicyclist's lower extremities. Such injuries are worth informative for the detection of car's and bicyclist's interposition at the moment of primary contact. According to mentioned above classification, bodily injuries form, if the bicyclist's body contacts with the car first.

2. Bodily injuries, which formed in the result of body's throw on the defined parts of the car. These injuries, as a rule, are polymorphic and less informative from forensic-medical point of view – they cannot evidence about the exact car's and bicyclist's interposition at the moment of primary contact.

3. Bodily injuries, which have formed in the result of bicyclist's contact with the road. These injuries are also polymorphic; more often they are the massive abrasions in the result of

bicyclist's body sliding over the road. Importance of such injuries as an evidence of car's and bicyclist's interposition at the moment of their primary contact is the least.

Differential diagnosis is necessary if all mentioned above bodily injuries are present. Forensic-medical practice shows, that such differential diagnosis without taking to consideration correlation with appropriate parameters (using only character of the injuries without interrelation with damages and traces on the clothes and shoes of injured person, and traces and damages of the car and bicycle, which were damaged in the traffic accident) is impossible and should compose the minimal complex of research.

Summarizing all mentioned above, it has become possible to create the research algorithm in the case of forensic-medical examination of injured bicyclist:

1. Examination of bodily injuries of the person, suffered in the traffic accident (is committed by forensic-medical examiner);
2. Examination of traces and damages on the injured person's clothes and shoes (is performed by forensic-medical examiner in medical-criminalistic department);
3. Examination of traces and damages on the bicycle (is performed by forensic examiner – transport trasologist);
4. Examination of traces and damages on the car (is performed by forensic examiner – transport trasologist);
5. Collective analysis of all data, revealed during the examinations, according to their correlation; in such case comparison method is used.
6. If it is necessary, modeling of interposition of car and bicycle at the moment of their contact should be performed; this task belongs to forensic examiner – transport trasologist (as it is shown on figure # 2. Photo shows that in this case primary contact has occurred between bicycle and front part of the car; during this phase bicyclist's body has not contacted with the car)



Figure # 2.

7. Composing of collective conclusions.

It is considered, that such approach gives a possibility for effective solving of forensic tasks.

From all mentioned above it is possible to make the following **conclusions**:

1. Contact of bicyclist and moving car should be considered as an individual type of vehicular injury, which was missed earlier.

2. Such type of traffic injury is complex, - there are many variants of car and bicyclist contact. That's why the classification of such type of injury was created.

3. Taking to consideration complexity of bicyclist's injuring mechanisms by the car, all questions, which arise during the examination, should be solved in cooperation of forensic-medical and transport-trasological examiners. That's why an appropriate algorithm of collective work was developed.

References

1. Fetisov V.A., Smirenin S.A., Nesterov A.V., 2014. Aktual'nyie voprosy transportnoj travmy po materialam publikacij v zhurnale "Sudebno-medicinskaja jekspertiza" v period s 1958 po 2012 g. [Actual questions of vehicular injury, analyzing the publications in "Forensic-medical examination" magazine during 1958-2012 years]. Forensic-medical examination. 3, 56-62 (in Russian).

2. Korshakov I.K., 1988. Avtomobil i peshehod: analiz mehanizma naezda [Car and pedestrian: analysis of car hit]. Moscow, Transport.

3. Shevcov S.A., Dubonos K.V., 2003. Rassledovanie obstoyatelstv dorozhno-transportnih proissheshtvij [Investigation of car accidents conditions] Fakt, Harkov (in Russian).

4. Fedorov V.A., Gavrilov B. Ya., 2003. Rassledovanie dorozhno-transportnih proissheshtvij [Investigation of car accidents] Ekzamen, Moscow (in Russian).

5. Korshakov I.K., Chalkin P.P, Chubchenko A.L., 1992. Opredelenie skorosti avtomobilya v moment naezda na peshehoda [Determination of vehicle's speed at the moment of hit the pedestrian]. Moscow(in Russian).

6. Steshic V.K., 1976. Sudebno-medicinskaya jekspertiza pri dorozhno-transportnih proissheshtviyah [Forensic-medical examination in the case of car accidents]. Belarus, Minsk (in Russian).