

## A CASE OF DEATH CAUSED BY WINDSHIELD WIPER

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### ABSTRACT

**Introduction:** A case of death of a car occupant, sitting in the front passenger seat next to the driver, without a seat belt, resulting from the isolated action of the front windshield wiper, in a frontal collision of the car. **Materials and methods:** Inspection of the scene. Full forensic examination. **Case Presentation:** During the inspection of the scene it was established that the car was "strung" from its front onto a roadside guardrail. The guardrail had passed directly between the driver and the passenger, without touching either of them. The driver was only mildly injured, protected by the airbag at the steering wheel. The passenger's body was found lying face down on the hood of the car, while his pelvis and lower limbs were held in the interior of the board panel. His seat belt was not fastened. The front passenger airbag was not open. The panoramic windscreen glass was broken into many fragments. The arm of the right wiper was bent and its adapter was broken. The wiper itself was found strongly deformed and buried deep inside the chest of the deceased; it protruded from his right collarbone. The autopsy revealed superficial cuts and injuries to the face and head, and heavy multi-component trauma of the neck, chest and thoracic organs: severing of the trachea, oesophagus, main blood vessels of the neck, injuries of the collarbone, sternum, ribs, right lung and spine in the chest region. The individual parts of the wiper were separated, bent, and driven into the right lung. **Discussion:** The cause of death was severe, multi-component neck, chest and spinal injury, resulting from the isolated stabbing and slashing action of the windshield wiper, under the action of the inertia of the victim's body. Failure to wear the seatbelt led to a series of fatal events provoked by the frontal collision: 1) The passenger was not held to his seat, so upon collision, his body moved with large momentum towards the board panel and windshield; 2) The vehicle was of such a type that not fastening the seat belt is perceived by the electronic system as a lack of passenger in the seat next to the driver. The victim broke the windshield with his head and the wiper penetrated his chest. **Conclusion:** The case is demonstrative example of the importance of wearing a seat belt - in an identical hypothetical situation, the passenger would have remained alive. This case study further shows how unique the course of each automobile accident is, and how particular the causes of traumatic injuries may be.

**Key words:** *unrestrained occupant; windshield wiper blade*

### INTRODUCTION:

Globally, road accidents are a major cause of disability and death, but also cause great damages (1, 2). Large number of doctors from all countries studied morphology, mechanisms and ways of getting injuries in road accidents. These studies serve as the basis for a huge number of scientists, engineers, specialists in automotive industry around the world to work to improve the cars, in order to reduce accidents and their harmful consequences. The nature and severity of injuries and their consequences are varied and are determined in each specific situation of the technological parameters of the car, the speed of the terrain and road conditions, driving skills, anatomical characteristics of victims and others (3). They built laboratory scale models or make computer dynamic simulators, which set a maximum number of manageable parameters - some constant, and other variables in order to simulate controlled, but most real situations that can be modeled, photographed and studied in details.

All experimental models and conducted crash tests using dolls ghost or human corpses have definitely shown that seat belts reduce deaths and injuries in crashes (4).

The experience accumulated by generations of forensic experts around the world shows that each car crash is unique in a way it occurs. Full repetition of a certain dynamic model is impossible.

There is an inbuilt integrated safety system in the car cabin of every modern vehicle. It is dedicated to ensure the safety of the occupants. The seat safety belts and the airbags are its two main components. During the trip the occupants are moving with the same speed and direction as the car. If the car suddenly stop or sharply reduce his speed (due to hitting an obstacle or braking) or abruptly change its direction of motion, the driver and passengers continue their movement with the same speed and in the same direction as before the change. Thus, they are at risk of strikes in various objects of automotive interior or from falling out of the car. Therefore, retention of occupants to the seats is important for their safety. Seat belts play just as a constraining factor (5, 6, 7). The airbags are filled with gas bags built into the steering wheel, instrument panel, doors, ceiling beams or car seats; they rapidly open in case of a frontal or side impact. The airbags provide a softened and wider contact surface, which is far less traumatic than a dashboard, steering wheel, windshield, or the other parts of the interior of the vehicle (8).

The presented case could be defined as an unusual case of death caused or facilitated by not wearing a seat belt (9). Many other factors are important for the serious consequences and fatal outcome. Some of these factors are largely random and unique.

#### **MATERIALS AND METHODS**

To determine the cause and mechanism of death from a technical and medical point of view, a detailed examination of the scene and the car was carried out, as well as a careful external and internal examination of the body, such as chemical and forensic analyses. All data were analyzed and compared.

#### **CASE PRESENTATION**

The incident occurred in the nighttime, a left turn of a third class suburban road. A passenger car driven by a 21 year old incapacitated driver was "strung" from its front onto a roadside guardrail at the right side of the road. No brake traces had been found before the crash site. The guardrail had passed directly through the radiator and engine compartment, between the driver and the passenger, without touching either of them. The driver was only mildly injured, protected by the seat safety belt on and the opened airbag at the steering wheel. Later it was proved 1,9 ‰ ethanol concentration in the driver's blood before the crash. The passenger's body was found lying face down on the hood of the car. His pelvis and lower limbs were held in the interior by the dash board panel. His seat belt was not fastened. The front passenger airbag was not open. The panoramic windscreen glass was gone ahead and broken into many fragments. The arm of the right wiper was bent and its adapter was broken. The wiper itself was found strongly deformed and buried deep inside the chest of the deceased; it protruded from his right collarbone. (Pic.1)

In the external examination of the body showed lacero-contused and small superficial incised injuries typical of the action of fragments of broken car glass, across the face and frontal area and also on the back of his right hand. A pronounced abnormal mobility of the neck was found. At the front low on the neck and upper chest area was found a large gaping "II"-shaped wound, with major a transverse portion between the neck and chest, and two vertical parts, starting downward from both ends to the transverse. (Pic.2) The limbs and walls of the wound were roughly unequal. At the top of the wound was seen completely severed carotid arteries, jugular veins, muscles in the front



Picture 1



Picture 2

and sides of the neck, trachea, esophagus, and debris from the sternum, right clavicle, spine and ribs. In the middle and the right side of the wound it was struck a deformed windshield wiper.

Internal research showed that traumatic injuries of the face and the head commit only superficial soft tissue, without any profound disabilities. Poured blood in an amount of 1300 ml, in the form of blood clots was found in both thoracic cavities. Metallic and rubber parts of the wiper blade were found in both thoracic cavities - separated and bent as wings of a propeller. One of the elastic steel rails were stuck deep in the parenchyma of the right lung, slicing upper and middle lobes. The trachea was completely transected just below the cricoid cartilage. The esophagus was transected at the same level. Right collarbone was transversally broken between inner and middle thirds. Left collarbone was ripped from the sternum. Sternum was transversally broken trough the manubrium. Bilateral rib fractures from 1-st to 3-rd were found, in their parasternal cartilage areas, and from 1-st to 6-th at their prehensile seats for the spine. (Pic.3 and 4)

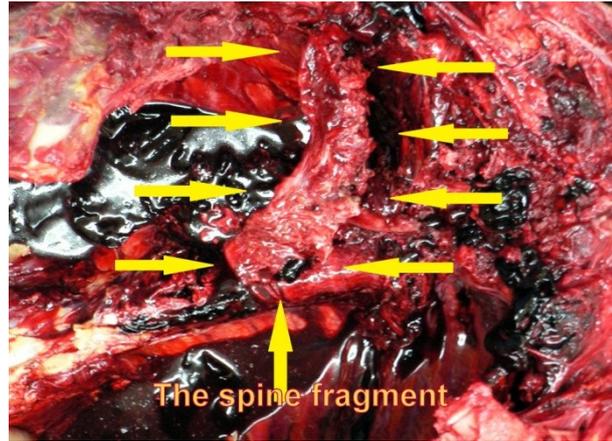


Picture 3



Picture 4

It was found longitudinally separated large fragment of the spine, including the front part of the body of the first thoracic vertebra and the whole bodies of the second to sixth thoracic vertebrae. The vertebral bodies all together were separated from their arcs, with the opening of the spinal canal and kneading of the spinal cord. (Pic.5) Separately, the body of the 10th thoracic vertebra found wedge shaped broken, with the tip pointing forward. Mediastinum was abundantly suffused. Aorta and heart were not affected. The spleen was granted, with wrinkled capsule. The corpse was bled. Blood and urine analyses revealed the presence of ethyl alcohol in a concentration as followed 1,50 ‰ and 1,60 ‰, and the presence of tetrahydrocannabinol (marijuana) in the urine.



Picture 5

### DISCUSSION

The death of the passenger is due to the heavy, multicomponent and incompatible with the life thoraco-cervical spinal injury. The autopsy shows that the impact of the head and face into the windshield had not caused life-threatening traumatic injuries. There are damages to the right lung, main blood vessels, air ways, nervous structures and elements of the musculoskeletal system. Injuries are the result of isolated stabbing and slashing action of the windshield wiper of the car. The consistent longitudinal cutting six thoracic vertebrae shows the great kinetic energy of that impact. This energy is obtained by adding up the momentum of the body that moves it forward and the opposing action of the spring in the wiper arm.

Failure to wear the seatbelt led to a series of fatal events provoked by the frontal collision: 1) The passenger was not held to his seat, so upon collision, his body moved with large momentum towards the board panel and windshield; 2) The vehicle was of such a type that not fastening the seat belt is perceived by the car sensors as a lack of passenger in the seat next to the driver. As a result As a result, the passenger airbag has not been triggered within the impact and has not prevented the passenger from moving forward.

### CONCLUSION

The case is demonstrative example of the importance of wearing a seat belt - in an identical hypothetical situation, the passenger would have remained alive.

This case study further shows how unique the course of each automobile accident is, and how particular the causes of traumatic injuries may be. Unlikely experimental model could predict and bet all the parameters of the represented case, so that the goal achieve a similar result to the realized. This shows the importance of detailed study of the real incidents, precisely because of their diversity and unpredictability.

### REFERENCES:

1. GBD 2013 Mortality and Causes of Death, Collaborators (17 December 2014). "Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013.". *Lancet*. doi:10.1016/S0140-6736(14)61682-2. PMID 25530442.
2. "Global status report on road safety 2013: Supporting a decade of action". Geneva, Switzerland: world health organization WHO. 2013. ISBN 978 92 4 156456 4. Retrieved 2014-10-03.
3. Harry Lum & Jerry A. Reagan (Winter 1995). "Interactive Highway Safety Design Model: Accident Predictive Module". *Public Roads Magazine*.

4. Serre, T., C. Masson, C. Perrin, S. Chalandon, M. Llari, M. Py, C. Cavallero, D. Cesari, 2006, "Real accidents involving vulnerable road users: in-depth investigation, numerical simulation and experimental reconstitution with PMHS", *International Journal of Crashworthiness*, 12:3 227-234, ICrash 2006, Athens Greece, 4th-7th July 2006
5. Chandler, C., J. Lane, K. Waxman, 1997, "Seatbelt sign following blunt trauma is associated with increased incidence of abdominal injury." *Am Surg.* Oct;63(10):885-8.
6. DEHNER, J., 1971, "Seatbelt injuries of the spine and abdomen.", *American Journal of Roentgenology*; 111: 833-843.
7. Greingor, J., MD, S. Lazarus, MD, 2006, "Chest and Abdominal Injuries Caused By Seat Belt Wearing", *South Med J.*; 99(4):534-535. \
8. Tosa, Y. and Mae, H., "Development of Prediction Method for Dynamic Strain on Windshield during Passenger Airbag Deployment," *SAE Technical Paper 2015-01-1330*, 2015, doi:10.4271/2015-01-1330.
9. Ichikawa, M., S. Nakahara, S. Wakai, 2002, "Mortality of front-seat occupants attributable to unbelted rear-seat passengers in car crashes." *The Lancet*, Volume 359, No. 9300, p43–44