

H33 The Evolution of Safety Systems in Traumatic Deaths Due to Road Traffic Accidents: A Case Report and Review of the Literature

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Learning Overview: After attending this presentation, attendees will be more aware of safety systems in traumatic deaths due to road traffic accidents.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by underlining the role of new safety devices in the reduction of fatal events in impacts between motor vehicles.

In 2016, there were 175,791 road traffic accidents in Italy resulting in 3,283 deaths (i.e., dead within 30 days of the accident) and 249,175 injured victims.¹ According to the Italian National Institute of Statistics (ISTAT) data, the number of road traffic accidents overall has decreased. This decrease is likely attributable to new legislation on the reduction of the driving license score (i.e., a law introduced on July 1, 2003, in Italy), as well as the increased active and passive safety systems newer vehicles are equipped with. The role of seat belts has also been established, though more focus in scientific studies has recently been given to other security systems, such as airbags. The causes of road accidents are many, but major factors appear to be distraction, imprudence, and high speed. In a significant percentage of cases—particularly those involving young people—driving while under the influence of alcohol plays a major role.^{2,3} The injuries and consequences that occur as a result of road traffic accidents are diverse and depend on many variables. These may include bruises, fractures of the limbs, brain injuries, visceral ruptures, pulpification, cervical spinal injury (more frequently seen in motorcycle accidents), or other serious consequences leading to immediate death. The introduction of the new technology in road vehicle safety systems has allowed for a reduction in adverse outcomes secondary to road accidents, although some studies have noted that the use of seat belts can actually result in neck ecchymoses, carotid thrombosis, fracture of the aortic arch, clavicular or costal fractures, pneumothorax, and abdominopelvic lesions due to strong traction during an impact.

This presentation reports the case of an elderly man found dead inside an Ape Classic® vehicle due to a frontal motor vehicle collision. Scene investigation revealed that the other vehicle involved in the collision was a common modern car. Injuries to the elderly man, including an abdomen extensively lacerated by the mechanical components of the handlebar of the Ape Classic® that precluded easy removal of the body. The kinematic engineering consultancy showed that the Ape Classic® vehicle was traveling at a low speed. An autopsy was performed. External examination showed an abdominal wound about 18–20cm deep with jagged margins and an internal foreign body belonging to the handlebar of the Ape Classic®. In the lower limbs, there was a contused laceration of the knee with tibial and femoral fracture. On internal examination, there was a splenic laceration, massive traumatic hemoperitoneum, rupture of the rectum and inferior mesenteric intestinal loops with right-sided pelvic/sacral traumatic fractures due to the foreign body. Toxicological analysis was negative for alcohol and drugs in both the victim as well as the driver of the other car. A histopathologic assessment was performed. All collected data was reviewed in order to better understand the causes and the dynamics of the accident. Overall, it appeared the decisive element in the different evolution of the outcomes of the described incident was the intrinsic characteristics of the vehicles involved. The Ape Classic® was totally devoid of the common active and passive safety systems that were present in the other vehicle involved in the collision. As a result, the elderly man was mortally wounded by the impact; whereas, the driver of the other vehicle lived.

The frontal motor vehicle collision reported in this case confirms that the presence of airbags or the evolution of vehicle safety systems would have almost certainly prevented the deep abdominal wound caused by the impact on the steering wheel and the windshield, and ultimately the victim's death. In conclusion, the role safety belts play in the reduction of fatal events in the impacts between motor vehicles is emphasized. It is also noted that although most newer vehicles have safety systems, many of those that are often involved in road accidents are older and thus may have limited-to-no safety devices. An evolution of road regulations is needed in order to reduce fatal events due to the lack of vehicle safety systems.

Reference(s):

1. <https://www.istat.it/it/archivio/202802>.
2. Global status report on road safety 2015 World Health Organization. http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/.
3. Christophersen A.S., Mørland J., Stewart K., Gjerde H. 14. [International trends in alcohol and drug use among vehicle drivers](#). *Forensic Sci Rev.* 2016 Jan; 28(1):37-66.

Forensic Science, Road Traffic Accident, Autopsy