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A Study of the Atlantoaxial Fracture or Dislocation in Motorcyclists with Helmet Accidents

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Abstract : Objective: To analyze the forensic autopsy data of known passengers and compare it with the National database of the autopsy report in 2017, and obtain the special patterned injuries, which can be used as the reference for the reconstruction of hit-and-run motor vehicle accidents. Methods: Analyze the items of the Motor Vehicle Accident Report, including Date of accident, Time occurred, Day, Acc. severity, Acc. Location, Acc. Class, Collision with Vehicle, Motorcyclists Codes, Safety equipment use, etc. Analyzed the items of the Autopsy Report included, including General Description, Clothing and Valuables, External Examination, Head and Neck Trauma, Trunk Trauma, Other Injuries, Internal Examination, Associated Items, Autopsy Determinations, etc. Materials: Case 1. The process of injury formation: the car was chased forward and collided with the scooter. The passenger wearing the helmet fell to the ground. The helmet crashed under the bottom of the sedan, and the bottom of the sedan was raised. Additionally, the sedan was hit on the left by the other sedan behind, resulting in the front sedan turning 180 degrees on the spot. The passenger's head was rotated, and the cervical spine was fractured. Injuries: 1. Fracture of atlantoaxial joint 2. Fracture of the left clavicle, scapula, and proximal humerus 3. Fracture of the 1-10 left ribs and 2-7 right ribs with lung contusion and hemothorax 4. Fracture of the transverse process of 2-5 lumbar vertebras 5. Comminuted fracture of the right femur 6. Suspected subarachnoid space and subdural hemorrhage 7. Laceration of the spleen. Case 2. The process of injury formation: The motorcyclist wearing the helmet fell to the left by himself, and his chest was crushed by the car going straight. Only his upper body was under the car and the helmet finally fell off. Injuries: 1. Dislocation of atlantoaxial joint 2. Laceration on the left posterior occipital 3. Laceration on the left frontal 4. Laceration on the left side of the chin 5. Strip bruising on the anterior neck 6. Open rib fracture of the right chest wall 7. Comminuted fracture of both 1-12 ribs 8. Fracture of the sternum 9. Rupture of the left lung 10. Rupture of the left and right atria, heart tip and several large vessels 11. The aortic root is nearly transected 12. Severe rupture of the liver. Results: The common features of the two cases were the fracture or dislocation of the atlantoaxial joint and both helmets that were crashed. There were no atlantoaxial fractures or dislocations in 27 pedestrians (without wearing a helmet) versus motor vehicle accidents in 2017 the National database of an autopsy report, but there were two atlantoaxial fracture or dislocation cases in the database, both of which were cases of falling from height. Conclusion: The cervical spine fracture injury of the motorcyclist, who was wearing a helmet, is very likely to be a patterned injury caused by his/her fall and rollover under the sedan. It could provide a reference for forensic peers.

Keywords : patterned injuries, atlantoaxial fracture or dislocation, accident reconstruction, motorcycle accident with helmet, forensic autopsy data
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