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Morphology and Risk Factors for Blunt Aortic Trauma in Car Accidents: An Autopsy Study

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Abstract : Background: Blunt aortic trauma (BAT) includes various morphological changes that occur during deceleration, acceleration and/or body compression in traffic accidents. The various forms of BAT, from limited laceration of the intima to complete transection of the aorta, depends on the force acting on the vessel wall and the tolerance of the aorta to injury. The force depends on the change in velocity, the dynamics of the accident and of the seating position in the car. Tolerance to aortic injury depends on the anatomy, histological structure and pathomorphological alterations due to aging or disease of the aortic wall.An overview of the literature and medical documentation reveals that different terms are used to describe certain forms of BAT, which can lead to misinterpretation of findings or diagnoses. We therefore, propose a classification that would enable uniform systematic screening of all forms of BAT. We have classified BAT into three morphologycal types: TYPE I (intramural), TYPE II (transmural) and TYPE III (multiple) aortic ruptures with appropriate subtypes. Methods: All car accident casualties examined at the Institute of Forensic Medicine from 2001 to 2009 were included in this retrospective study. Autopsy reports were used to determine the occurrence of each morphological type of BAT in deceased drivers, front seat passengers and other passengers in cars and to define the morphology of BAT in relation to the accident dynamics and the age of the fatalities. Results: A total of 391 fatalities in car accidents were included in the study. TYPE I, TYPE II and TYPE III BAT were observed in 10,9%, 55,6% and 33,5%, respectively. The incidence of BAT in drivers, front seat and other passengers was 36,7%, 43,1% and 28,6%, respectively. In frontal collisions, the incidence of BAT was 32,7%, in lateral collisions 54,2%, and in other traffic accidents 29,3%. The average age of fatalities with BAT was 42,8 years and of those without BAT 39,1 years. Conclusion: Identification and early recognition of the risk factors of BAT following a traffic accident is crucial for successful treatment of patients with BAT. Front seat passengers over 50 years of age who have been injured in a lateral collision are the most at risk of BAT.

Keywords : aorta, blunt trauma, car accidents, morphology, risk factors
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