

Head and Neck Injuries in Fatal Motorcycle Collisions as Determined by Detailed Autopsy - Abstract

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Abstract

Detailed layer-by-layer autopsy of the head and neck was performed on a prospective series of 73 fatally injured motorcyclists in order to identify occult injuries, particularly soft tissue neck injuries such as hemorrhage of vertebral and carotid arteries. The fatal cases were gathered as part of a larger study of 1,082 on-scene in-depth motorcycle crash investigations in Thailand. Detailed neck dissection was done on nearly all fatal cases. Injuries were coded using the 1990 revision of the Abbreviated Injury Scale (AIS 90) and an Injury Severity Score (ISS) was determined for each case. Additional AIS codes are proposed for neck injuries that were often identified during the detailed autopsy procedures, but which are not listed explicitly among existing AIS codes. Helmet use was determined based on analysis of injury patterns and helmet damage with consideration also given to witness statements. Both helmeted and unhelmeted motorcyclists showed a high frequency of occult neck injuries such as hemorrhages in the carotid sheath or surrounding the vertebral arteries, phrenic nerve, or brachial plexus. These soft tissue neck injuries sometimes accompanied more obvious injuries to cervical vertebrae or spinal cord, but about one-third of riders had no obvious injury to suggest the presence of occult neck injury. Twenty-eight motorcyclists had been wearing a helmet at the start of the collision sequence, but only nine helmets remained in place through the entire collision event. Helmeted riders showed more severe somatic (below-the-neck) injuries than unhelmeted riders, suggesting helmeted riders are less likely to die in low-threat accidents with somatic injuries below AIS-3. The most significant finding of this study was the identification of serious internal neck injuries despite the absence of external physical evidence of trauma to the neck. Virtually all riders with significant head injuries showed some of these soft tissue neck injuries. Approximately one-third of the critically injured riders who survived at least a few hours before death showed serious occult soft tissue neck injuries.