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Original Research Article

An Analysis of Internal Thoraco-Abdominal Injuries Seen in Fatal Motorized Two-Wheeler Accidents

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Abstract

There has been an inclination towards preventing deaths due to head injury in motorized two-wheeler accidents in recent years. Since the head injury is a major cause of death in such fatal accidents, thoraco-abdominal trauma is also responsible for the fatalities in such accidents. In this study, we analyzed the fatalities due to thoraco-abdominal trauma in motorized two-wheeler accidents and found that 4th to 6th ribs are more prone to fracture in such accidents. Among the abdominal organs, liver is the most common organ to be damaged, followed by spleen and kidney.

Key words: Motorized two-wheelers, accidents, thoraco-abdominal trauma.

Introduction

Over the past years, head trauma and the contribution of helmets to the reduction of both fatal and nonfatal brain injuries have dominated the medical and public health literature on motorcycle crash injuries. [1-6] While head injuries are the most common cause of death in motorcycle accidents, a significant number of victims also suffer severe injuries to their chest and abdomen. Nwadiaro et al reported that injuries to the chest and abdomen constituted 4.5% and 2.5% of injuries sustained in motorcycle accidents respectively. [7] According to Kraus et al., 32% of fatally wounded motorcyclists and pillion riders had chest injuries. [8] According to Oberoi et al., injuries to the chest and abdomen, which collectively accounted for 20% of fatal motorbike collision deaths in India, came in second behind head injuries.[9] In a study done by Sharma et al it is observed that Liver laceration (27.6%), splenic rupture (20.1%), kidney rupture (10.4%), and intestinal perforation (4.5%) were the abdominal injuries.[10] Rib fractures were among the prevalent intra-thoracic injuries, accounting for 45.9% of the thoracic injuries observed in fatal motorcycle accident patients, according to Kraus et al. [8] According to the same study, liver laceration was the most common type of intra-abdominal injury in fatal motorcycle crashes, accounting for 31.8% of all abdominal injuries; this was followed by splenic laceration (21.8%), kidney laceration and contusion (9.1% and 5.7%, respectively), and intestinal laceration/perforation (1.1%).26 22 The other injuries reported by Sharma et al, are fracture ribs (40.3%), haemothorax (12.7%), lung laceration/contusion (9.7%), myocardial contusion/tear (6.7%) and fracture sternum (3.7%).[8]

Material and Methods

The present study was conducted in the department of Forensic Medicine & Toxicology, Gandhi Medical College, Bhopal (M.P.), India. All the deaths pertaining to the fatal motorized two-wheeler accidents brought to the Gandhi Medical College Mortuary during this study period have been included. The history regarding the circumstances of the accidents and other relevant data was collected through the autopsy requisition form and through the detailed history taking from the police personnel, friends, relatives etc. Approval to perform this study was obtained from the Scientific and Ethics Committee, Gandhi Medical College, Bhopal (M.P). Material included a pre designed proforma containing relevant information about the cases. Information was derived from autopsy reports, autopsy registers, police reports and hospital (clinical) records, where necessary.

Results

Out of 4590 autopsies performed in the Department of Forensic Medicine & Toxicology, Gandhi

Medical College, Bhopal, over the study period, 878 cases of fatal motorized two-wheeler accidents were reported. Therefore, the proportion of deaths due to fatal motorized two-wheeler accidents is 19.13%.

Among the internal injuries of the thorax, rib fracture is the most common injury, the most common being 4th -6th ribs (n=169), followed by 1st -3rd ribs (n=132). Among the sternum fractures, middle 1/3rd of the sternum is seen fractured in 117 of the cases, followed by lower 1/3rd and upper 1/3rd (n=75 and 68 respectively). In the present study, the clavicle fracture was seen in 26 cases (2.96%). The liver is the most common intra-abdominal organ to get damaged (n=97), followed by spleen (n=91), kidney (n=50) and urinary bladder (n=42).

Discussion

The findings regarding the fracture of the ribs in the present study is in accordance with the findings of Christian Liebsch et al, who concluded that the number of rib fractures increased from rib level 1 to rib level 5 and decreased from rib level 5 to rib level 12, indicating a bell-shaped distribution of fractures on both sides of the rib cage. [11]

Most of the fractures of sternum observed were of the middle 1/3 which is in contrast to the study done by Sadullah Şimşek et al, according to which, the fracture was found exclusively in the manubrium in 59.3% cases, exclusively in the sternum body in 38.0%, and in both locations in 2.7%, but not in the xiphoid process.[12] The number of clavicle fractures observed are much lower than observed by Sean T. Burns et al who observed that the clavicle fractures were present in 8.79% of the cases. [13]But in the present study, it is observed that the number of cases with the clavicle fractures is much lower than that of the cases with ribs fracture and other long bone fractures. This finding is in accordance with the findings of the study done by Sean T. Burns et al. [13]

The finding regarding intra-abdominal organ damage is in accordance with the findings of Kraus et al, Sharma et al. [10] and Kaul et. al. [14]

Conclusion:

Many efforts have been made to reduce the severity of brain injury using contemporary technology and helmet laws, which emphasize the significance of brain injury attenuation secondary to motorcycle crash prevention. However, our data indicate that improvements in protective equipment to reduce spinal, thoracic, and abdominal injuries are equally important. In fact, because serious injuries in one anatomical area are often associated with serious injuries in other anatomical areas and because wearing a helmet can prevent fatal traumatic brain injury, patients can still die from fatal injuries to other anatomical areas. Therefore, strategies to design protective countermeasures for these other anatomical regions must be our next priority. In fact, taking steps to prevent motorcycle accidents can eliminate fatal injuries. However, efforts to reduce trunk injuries appear to have stalled after the accident. Some motorcyclists wear leather jackets and boots recognizing the importance of full body protection, but the impact of this clothing on reducing injuries has not been evaluated. Future research could measure the protective effectiveness of these parts as a means of secondary prevention of trunk injuries in crashes. Another method one might consider is to focus on preventing drivers from driving into an accident. Motorcycle "seat belts" are a problem because the design of the motorcycle does not provide a clear method for installing the safety device because it is not clear what protection it provides by restraining the rider to the motorcycle. Further research is required in this field to understand the gravity of the situation and formulating the action plan to counter this hurdle.

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