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## Liver, spleen and associated organ injury in road traffic accidents: An autopsy study

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#### Abstract

Death from road traffic accidents (RTA) and in particular motor vehicle traffic accidents have been characterized worldwide as a hidden epidemic which affects all sectors of society. Blunt trauma to the abdominal region is one of the major causes of mortality and the liver and spleen are the most frequently damaged organs in these cases. This study involved the road traffic accidents cases that represented blunt trauma to liver, spleen and associated abdominal organs. The relatively fixed position of the liver and its large size makes it more prone for injury in blunt trauma of the abdomen. Liver has ligamentous attachment to diaphragm and posterior abdominal wall which act as sites of shearing force during deceleration injury. The liver and spleen trauma is followed by intestine, stomach, kidney, pelvic fractures and rupture of urinary bladder.

**Keywords:** Liver, spleen, urinary bladder

#### Introduction

India is a rapidly growing country in a phase of transition with increased urbanization industrialization and motorization, with such a rapid pace of progress, human population is becoming prone to accidents. The total number of deaths every year due to road accident has now passed 135,000 mark according to latest report of national crime records Bureau. Death from road traffic accidents (RTA) and in particular motor vehicle traffic accidents have been characterized worldwide as a hidden epidemic which affects all sectors of society.

The relatively fixed position of the liver and its large size make it more prone for injury in trauma of the abdomen. The large size of the liver, the friable parenchyma its thin capsule and its relatively fixed position make it prone to blunt injury. Right lobe is more often involved, owing to its larger size and proximity to the ribs. Liver trauma may result in subcapsular, intrahepatic hematomas, laceration, contusions, hepatic vascular injury and bile duct injury. Weaker connective tissue framework, relatively large size and incomplete maturation and more flexible ribs accounts for higher chance of liver injury in children as compared to adults.

This article comprises of a medico-legal autopsy study of the road traffic accident cases involving injury to liver, spleen, kidney, abdomen and the associated visceral organs, so as to associate their involvement in accidents with respect to nature of injury sustained.

#### Material and Methods

The current study is performed with help of dead bodies selected from accident cases brought for medico-legal postmortem examination to Forensic Medicine Department, Institute of Medical Sciences, Banaras Hindu University, from the police stations of Varanasi district. This study involved the road traffic accidents cases that represented blunt trauma to liver, spleen and associated abdominal organs.

The data of the materials were sourced from 150 road traffic accident cases. The information about the deceased, sequence of events leading to accident were sourced from the victim's family, relatives, witnesses and the investigating officer.

The essential documents such as inquest report from the police, treatment profile of the victim, the first information report and the death certificate, aided in the medico-legal post mortem examination.

These documents helped in the victim profiling on different parameters, which included age, sex, social, mental, economic and educational status of victim. The date and time, site of accident, type of road, vehicle involved, whether victim was vehicle rider or pedestrian,

approximate speed of vehicle etc., were recorded. The external examination of the body was performed thoroughly for presence of injuries or specific marks and each detail was recorded. The injuries present were observed carefully with proper documentation. The nature of injury, its location, length, width and the tissues/organs involved were noted. After the external observation, detailed internal examination of the parts involved, head, chest, abdominal and pelvic regions and extremities was performed.

**Observation and Result**

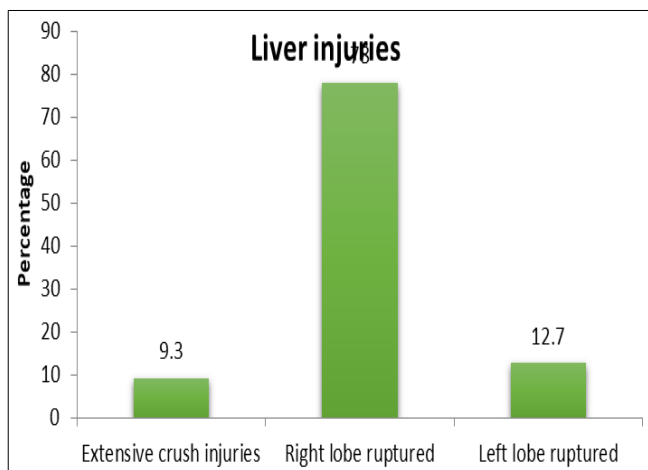
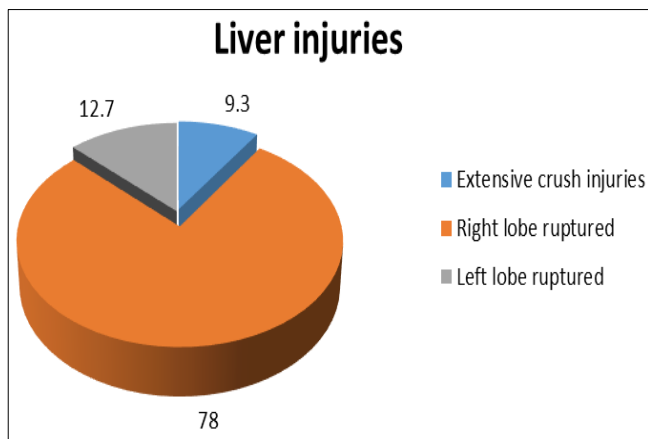
The present study includes a total of 150 cases from 1 January 2016 to 30 June 2017, representing blunt abdominal trauma caused by road traffic accidents in Varanasi district.

The details of injuries to liver, spleen, kidney and associated visceral organs have been incorporated and analyzed with respect to nature of injury sustained. The corresponding data obtained from above cases was compiled and statically analyzed using statistical package for social sciences

**Table 1:** Involvement of liver:

Liver injuries	Frequency	Percent
Extensive crush injuries	14	9.3
Right lobe ruptured	117	78.0
Left lobe ruptured	19	12.7
Total	150	100.0

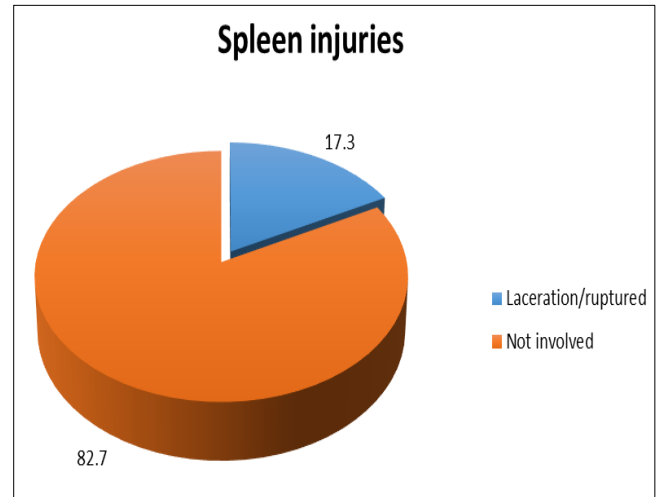
Involvement of liver in traffic accident victims has been summarized in table 1. Extensive crush injury of entire liver was seen in 14 (9.3%). Right lobe of liver had significantly higher rate of sustaining injuries 117 (78%). Left lobe 19 (12.7%) cases.



**Table 2:** Involvement of spleen:

Spleen injuries	Frequency	Percent
Laceration/ruptured	26	17.3
Not involved	124	82.7
Total	150	100.0

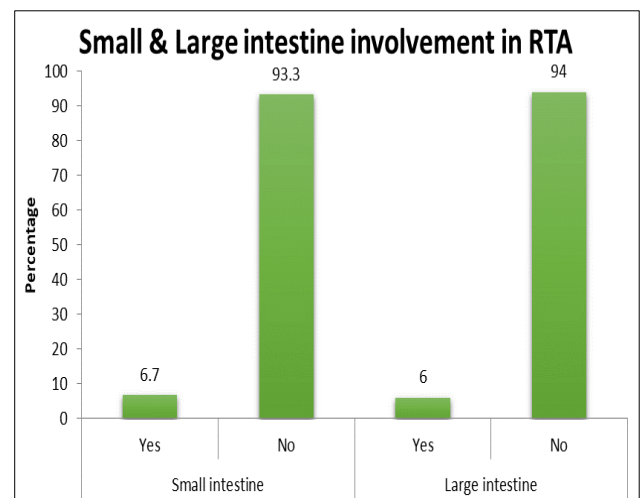
Table 2 presents the involvement of spleen in blunt abdominal trauma victims, out of 150 cases laceration of varying degree was noted 26 (17.3%) cases. In 124 (82.7%) cases spleen was not involved.



**Table 3:** Involvement of small and large intestine:

	Frequency	Percent
Small intestine		
Yes	10	6.7
No	140	93.3
Large intestine		
Yes	9	6.0
No	141	94.0

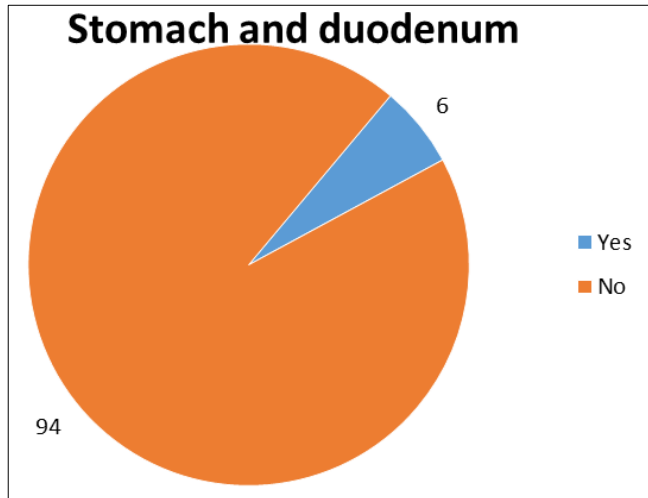
Table 3 presents the involvement of small and large intestine in blunt abdominal trauma in road traffic accidents. Out of 150 cases small intestine involvement was 10 (6.7%) and large intestine was 9 (6%) cases.



**Table 4:** Involvement of stomach and duodenum:

Stomach and duodenum	Frequency	Percent
Yes	9	6.0
No	111	94.0
Total	150	100.0

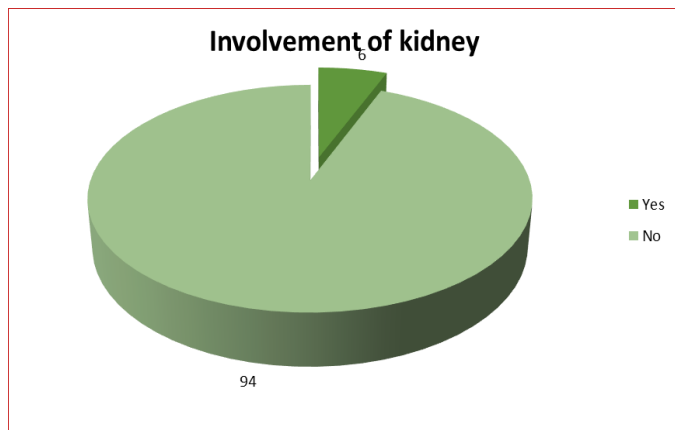
Table 4 presents the involvement of stomach and duodenum in blunt abdominal trauma victims in road traffic accidents. Out of 150 cases rupture of stomach and duodenum were 9 (6%). In 111 (94%) cases stomach and duodenum were not involved.



**Table 5:** Involvement of kidney:

Involvement of kidney	Frequency	Percent
Yes	9	6.0
No	111	94.0
Total	150	100.0

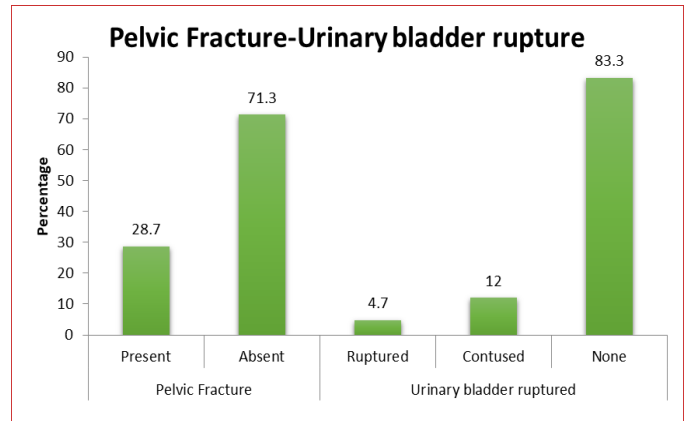
Table 5 presents the involvement of kidneys in blunt abdominal trauma in road traffic accidents. Out of 150 cases laceration of varying degree was noted in 9 (6%) cases. In 111 (94%) cases kidneys was not involved.



**Table 6:** Pelvic fracture-urinary bladder rupture:

	Frequency	Percent
<b>Pelvic Fracture</b>		
Present	43	28.7
Absent	107	71.3
<b>Urinary bladder ruptured</b>		
Ruptured	7	4.7
Contused	18	12.0
None	125	83.3

Table 6 show pelvic region involvement in a Blunt Abdominal trauma cases. Pelvic Bone fracture was observed in 43 (28.7%) cases. Whereas urinary bladder rupture was seen in 7 (4.7%) cases, contusion of urinary bladder was noted in 18 (12%) cases, remaining cases were not involved.



**Discussion**

**Liver Injuries:** In present study shows, extensive crush injury of entire liver was seen in 14 (9.3%). Right lobe of liver had significantly higher rate of sustaining injuries 117 (78%) Left lobe 19 (12.7%) was involved.

A study done by observed that Among the 46 Autopsy cases with liver injuries 36 (78.3%) were male and 90 (21.7%) females.

Involvement of right lobe was seen in 34 (73.9%) cases that of left lobe was seen in 5 (10.9%) cases and bilobar involvement was seen in 7 (15.2%) cases.

Singh *et al* (2012) [4] observed that out of 55 cases, liver was found injured in 67.27% cases.

Tripathi S. K., Kumar M (2003) [11] shows that In the abdominal cavity Liver (38.23%) were internal organs affected.

**Spleen Injuries:** In present study shows that the involvement of spleen in blunt abdominal trauma victims. Lacerations/rupture of varying degree was observed in 26 (17.3%) cases.

Study conducted by Numan H. *et al.* (2009) show that involvement of spleen was (16.18%) cases.

Tripathi S. K., Kumar M (2003) [11] show that involvement of spleen were 21.56%.

**Small and large Intestine:** In present study shows that small Intestine involvement was 10 (6.71%) and large intestine was 9 (6%) cases.

In our study Singh *et al.* (2012) [4] observed that small intestine were involved in 18.18% cases.

**Involvement of Kidney:** In present study show involvement of kidneys in blunt Abdominal trauma in RTA.

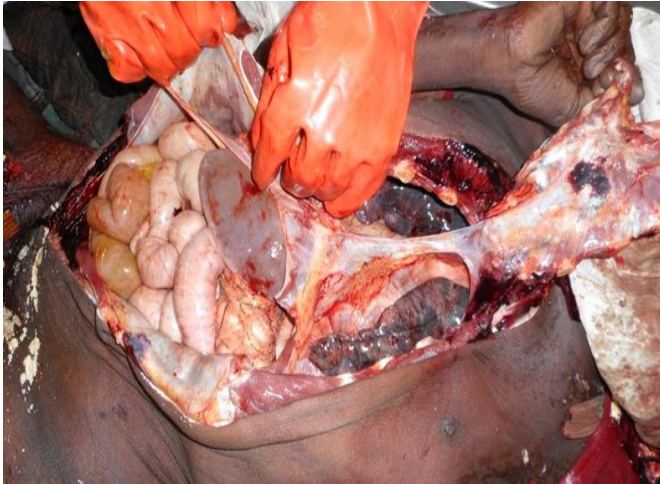
Involvement of kidneys was noted in 9 (6%) cases.

Numan H *et al.* (2009) in our study show (12.71%) kidney involvement.

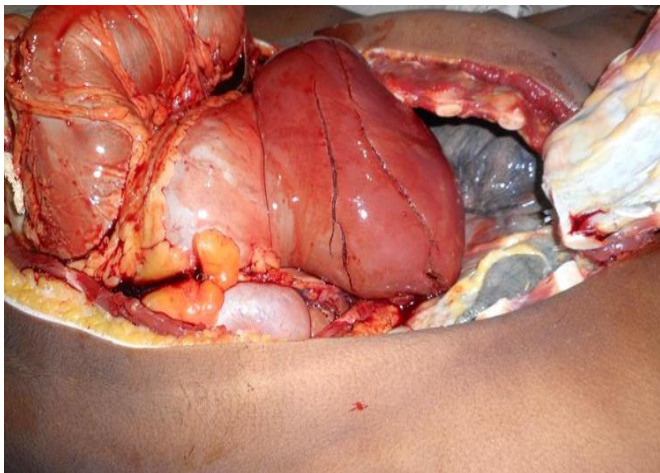
**Pelvic Fracture and Urinary bladder rupture:** In present study show pelvic region involvement in Blunt Abdominal trauma cases. Pelvic Bone fracture was observed in 43 (28.7%) cases urinary bladder rupture was seen in 7 (4.7%) cases, contused urinary bladder was noted in 18 (12%) cases. Tripathi S. K. Kumar M (2003) [11] observed that Fractures of Pelvic bone with retroperitoneal hematoma were in 11.76% victims.

Numan H. *et al.* (2009) in our study shows that urinary bladder rupture was 6.93%.





Spleen along with liver rupture



Rupture of liver



Crushed effect on thoraco abdominal region

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