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Autopsy-Based Study of Abdominal Traffic Trauma Death after Emergency Room Arrival

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Abstract

We experienced the autopsy cases that the deceased was alive in emergency room on arrival. Bleeding is the leading cause of preventable death after injury. This retrospective study aimed to characterize opportunities for performance improvements identified in patients who died from traffic trauma and were considered by the quality improvement of education system. We focused the abdominal traffic trauma injury. An autopsy-based cross-sectional study was conducted. A purposive sampling technique was applied to select the study sample of 41 post-mortems of road traffic accident. 16 patients (39.0%) were abdominal trauma injury. The mean period of survival after meeting with accident was 13.5 hours, and compared abdominal trauma death was 27.4 hours longer. In road traffic accidents, the most injured abdominal organs were the liver followed by mesentery. We thought that delayed treatment was associated with immediate diagnostic imaging, and so expected to expand trauma management examination.

Keywords

Abdominal Traffic Trauma, Preventable Death, Autopsy

1. Introduction

The abdomen is the common region of the body that is injured in civilian trauma. Blunt abdominal trauma is one of the leading causes of the mortality among trauma victims [1]. Haemorrhage is the leading cause of preventable death after trauma [2]. The management of potentially fatal traumatic haemorrhage is a complex and dynamic multidisciplinary process. Substantial international evidence shows that trauma outcomes are optimized

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by working within inclusive trauma systems with effective quality improvements [3] [4]. The tri-model distribution of trauma deaths was first described in 1983 [5]. As a function of elapsed time after injury, deaths from traumatic injury are classified as generally falling into one of three categories: immediate, early, and late. Immediate deaths are those that occur <1 h after injury, making up ~50% of the total; early deaths occur within the first few hours after injury and account for 30%; and late deaths occur days to weeks after injury and are 20% of all trauma deaths. Immediate deaths are largely due to neurologic injury (brain, brain stem, spinal cord) or laceration of the heart or major vessels and classified as not preventable.

Early deaths are largely due to severe blood loss from the head, respiratory system, and abdominal organs. These deaths are largely treatable and therefore possibly preventable. Finally, most late deaths are due to infection and multi organ failure. Reducing the number of injury-related deaths during each period largely relies upon expedient and optimal medical care [6]-[8]. Trauma care in Japan in the early 2000s was not satisfactory; a national survey reported in 2002 that death might have been prevented in approximately 38% of patients with trauma who arrived at the hospital with any vital signs [9]. We conduct an autopsy-based cross-sectional study and analyze the epidemiology and pattern of fatal abdominal injuries in road traffic accidents.

2. Materials and Method

An autopsy-based, cross-sectional study conducted in correlation with the relevant clinical records. A purposive sampling technique was applied to select the study sample of 41 post-mortems autopsies, which were alert at the emergency room on arrival, between April 1999 and March 2014 (for 15 years) of traffic trauma death to medico-legal autopsy at the department of Forensic Medicine, Shiga University of Medical Science, Japan. The data were compiled with a focus on the analysis of injuries in the abdominal region with special reference to the nature of the wound and organs most commonly affected in traffic accidents and epidemiological factors in relation to victims and vehicles. Details availably included age, gender, time and date of injury, time and date of death, and cause to death. The mechanism of injury and cause of death were determined by autopsy.

3. Results

16 patients (39.0%), mean age 57.8 years (18 - 91 years), were abdominal trauma injury. Data were collected on patient demographics, mechanism of injury, abbreviated injury scale (AIS), and injury severity score (ISS). Max AIS was five and all patients had an ISS > 25 (mean ISS was 38.3.). Of these patients, 11 patients (68.8%) were male and car drivers were seven, followed by pedestrians five, and two-wheelers (motor cyclist scooterist, bicycle etc.) four. The mean period of survival after meet with accident was 13.5 hours (30 minutes-112 hours). The nine victims survived more than 3 hours after the traffic accident. We determined the direct cause of death was abdominal trauma of six cases by autopsy. The breakdown of cause of death was fatal traumatic haemorrhage (5 cases) and peritonitis (1 case). Only six cases, the mean period of survival after meet with accident was 27.4 hours longer. In this study, abdominal injured were liver (six cases), mesentery (four cases), gastrointestinal tract, diaphragm (each three cases), spleen, kidney, and abdominal aorta (each one case) (**Table 1** and **Table 2**) (**Figure 1** and **Figure 2**).

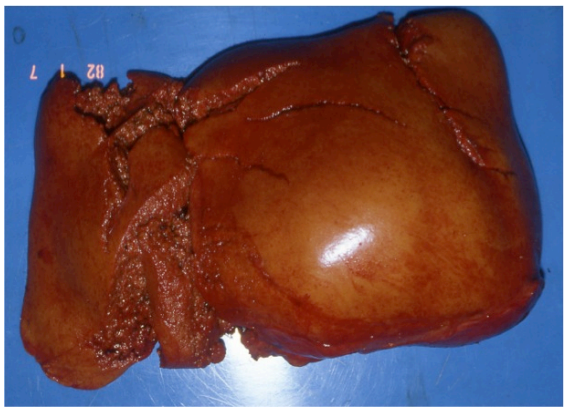

Figure 1. The superficial contusion in the liver. (Case 10).

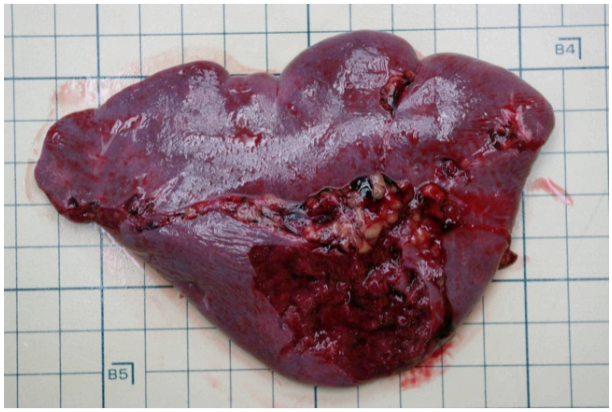

Figure 2. The ventral injury in the spleen (Case 16).

Table 1. Demographic and injury characteristics of abdominal trauma injury (16 cases).

1	71	M	4	25	34	Lt. renal injury	car
2	57	M	5	43	0.5	pancreas rupture, spleen rupture, mesenteric injury	car
3	20	M	5	45	22	ascending colon rupture, diaphragmatic injury	motor bicycle
4	69	M	5	30	7	pelvic fracture, diaphragmatic injury	bicycle
5	77	F	5	50	2	heart rupture, pulmonary contusion, liver contusion	pedestrian
6	58	M	5	38	1.5	thoracic aortic rupture, mesenteric injury	car
7	65	F	4	34	112	diaphragmatic rupture	motor bicycle
8	49	M	5	33	2.5	liver contusion, pancreas rupture	car
9	75	M	5	29	3	abdominal aortic rupture, subarachnoid hemorrhage	pedestrian
10	65	M	4	29	11	liver contusion, mesenteric injury	pedestrian
11	59	M	5	38	1.5	liver contusion	pedestrian
12	80	M	4	36	6.5	mediastinal hematoma, multipke rib fracture, mesenteric injury	car
13	37	F	5	54	2	liver rupture, brain contusion	car
14	18	F	5	45	4	lung injury, splenic injury	car
15	34	M	5	50	4	liver contusion, splenic injury	motor bicycle
16	91	F	5	33	2	abdominal aortic rupture	pedestrian

Table 2. The breakdown of abdominal trauma death (6 cases).

	age	gender	Max AIS	ISS	Time from Injury to Death	The direct cause of death
Case 1	71	M	4	25	34	hemorrhagic shock
Case 7	65	F	4	34	112	peritonitis
Case 8	49	M	5	33	2.5	hemorrhagic shock
Case 9	75	M	5	29	3	hemorrhagic shock
Case 10	65	M	4	29	11	hemorrhagic shock
Case 16	91	F	5	33	2	hemorrhagic shock

AIS: Abbreviated Injury Scale; ISS: Injury Severity Score; Time from Injury to Death (hr).

4. Discussion

In 1980, the American College of Surgeons Committee on Trauma established an educational program for initial trauma care, the ATLS program [10]. Several improvements have been reported in the quality of trauma care and in mortality rates [11]-[13]. To help eliminate preventable deaths from trauma and to improve trauma care in Japan, in 2002 the Joint Committee of the Japanese Association for the Surgery of Trauma and Japanese Association for Acute Medicine corporately developed a standardized trauma care protocol, named the Japan Advanced Trauma Evaluation and Care (JATEC) [14] [15]. The JATEC is a 2-day off-the-job training course in initial trauma management that consists of a primary survey (*i.e.*, physiological, ABCDE approach) and a secondary survey (*i.e.*, history taking and anatomical, systemic approach) and as such it is similar to ATLS [16].

This study was a retrospective observational autopsy-based study. Trauma severity was generally as indicated by significantly higher ISS. The period of survival after meet with accident was tendency of long in the abdominal trauma death. A faulty ultrasound machine might predispose to a failure to perform an early focused assessment with sonography for trauma (FAST) scan and therefore to diagnose intra-abdominal bleeding. FAST is convenient because of capable use in the emergency room.

Computed tomography (CT) scanning is increasingly and aggressively used in trauma care. However, the attitude of immediate diagnosis attributed to CT and radiology might be delay in treatment. Acting as coordinated trauma response is to improve the timing and quality of the emergency response through the appropriate use of acute interventions, such as fluid replacement, endotracheal intubation, transcatheter arterial embolization (TAE), and emergency surgery [10] [11]. Problems with judgment of the emergency response are associated with remediable failures in care. The decision critical to patients with significant bleeding is between immediate intervention and further investigation. Some studies of deaths after trauma have found that 5 - 35 per cent are “preventable” or “potentially preventable”, and errors are found in many aspects of care [17]-[23].

5. Conclusion

We examined autopsy-based study. In abdominal traffic trauma death, the mean period of survival after meeting with accident was longer. We thought that the cause of delay is the appropriate judgment through the use of acute interventions. We needed to expand the trauma examination training education to avoid preventable trauma death.

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