

Epidemiology of Causes of Intra-Abdominal Hemorrhage in Blunt Trauma over the Last Decade: A Cross-Sectional Study

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Abstract

Introduction: Trauma is the most common cause of mortality in the first four decades of life. Nowadays, trauma has become a major health problem in the world. Road traffic accident (RTA) is one of the main factors contributing to trauma and the most frequent cause of death.

Materials and Methods: This was cross-sectional descriptive study involving a total 152 patients with intra-abdominal hemorrhage referred to Peymanieh Hospital (Jahrom, Iran) over the last 10 years. The data were collected through 150 patient files in the hospital archive. The documents were confirmed through FAST ultrasound in the patient records, diagnostic peritoneal lavage and CT scan.

Results: Of 152 patients with intra-abdominal hemorrhage due to blunt trauma, 132 were male and 20 were female (i.e. ratio of 6.6 to 1). The minimum and maximum hospitalization ages were 2 and 84 years with a mean of 27.02 and standard deviation of 14.36. The patients were examined for causes of trauma. Of 152 patients, 103 cases (68.70%) were associated with RTA, 27 cases (17%) were falling from height, and 22 cases (14.03%) were associated with direct blow to abdomen.

Conclusion: The most common cause of abdominal trauma in RTA. One considerable fact is the high rate of incidents among young men. It is crucial that authorities devise plans for prevention and improvement of road traffic safety. Given the current mortality rate in hospitals, it is critical to take measures for immediate bleeding control, fluid replacement and early diagnosis of injured organs.

Key words: Epidemiology, Hemorrhage, Trauma

INTRODUCTION

Trauma is the most common cause of mortality in the first four decades of life. Nowadays, trauma has become a major health problem in the world. Road traffic accident (RTA) is one of the main factors contributing to trauma and the most frequent cause of death. In fact, trauma is the most serious health problem facing the world today [1]. The prevalence of abdominal trauma is increasing, and

abdomen is the third zone in human body requiring surgery following trauma. Blunt trauma is the most common abdominal trauma caused by motor vehicle accidents. Other causes of abdominal trauma include assault or rape, industrial incidents, gunshot wounds and cutting tools [2]. The diagnostic approaches to blunt and penetrating abdominal trauma extremely vary. In blunt injuries (e.g. gunshot wounds), preoperative diagnostic procedures are less frequently vital because 90% of injuries involve internal organs. Nonetheless, it is mandatory to perform laparotomy (open abdominal surgery) [3]. It is crucial to examine the patient's abdomen in blunt trauma since the abdominal hemorrhage remains deep inside [4]. There are soft abdomen organs with numerous blood vessels, which may be ruptured leading to profuse bleeding in the abdominal cavity. The abdomen can hold 2 or more liters of blood. Therefore, any delay in diagnosis

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of blood within the peritoneal cavity may lead to the patient's death. Abdominal examination is unreliable, and it is difficult to evaluate intra-abdominal injury in patients with multiple trauma. Most cases of intra-abdominal injury are overshadowed by other injuries. By determining which patients will benefit from surgical treatment, physicians can barely overestimate the clinical assessment of patients. Instead, accurate diagnostic methods such as CT scan and peritoneal lavage are adopted [5]. The mortality caused by abdominal trauma has two peaks, 1) premature death due to severely extended hemorrhage from large abdominal vessels and trauma occurs against solid organs (liver, spleen and kidneys), 2) late-onset sepsis and its subsequent complications [6]. Since most cases of mortality associated with trauma are preventable, it is critical to study the hospitalized patients in an effort to identify the contributing factors and mitigate the mortality rate [7].

MATERIALS AND METHODS

This was cross-sectional descriptive study involving a total 152 patients with intra-abdominal hemorrhage referred to Peymanieh Hospital (Jahrom, Iran) over the last 10 years. The data were collected through 150 patient files in the hospital archive. The documents were confirmed through FAST ultrasound in the patient records, diagnostic peritoneal lavage and CT scan. The essential information and variables were recorded on a checklist prepared for that purpose. The variables included age, gender (male or female) cause of trauma (fall from height, crash, physical conflict, etc.), primary vital signs (blood pressure, respiratory rate, body temperature), results of abdominal and pelvic ultrasound (positive or negative for internal bleeding), CT scan (indicating the source of bleeding), treatment procedure (surgery or support) and mortality. It should be noted that additional examinations, including x-ray, brain CT and ECG, were simultaneously performed on the patients. This study included subjects with no life-threatening problems in terms of other systems under review (neurology or orthopedic surgery, etc.), no death within the first 48 hours due to internal bleeding unidentified or poorly treated. In this case, abdominal trauma was assigned the top priority. The mortality cases involved autopsy report and death certificate.

The inclusion criteria were: 1. RTA patients suffering from intra-abdominal hemorrhage, 2. Trauma to the abdominal area. The exclusion criteria were: 1) lack of intra-abdominal hemorrhage given the patient's ultrasound records, 2) penetrating abdominal trauma and patients with life-threatening multi-system involvement. Data were analyzed through descriptive statistics. If necessary, the variables were compared through chi-square and Fisher's test.

RESULTS

Of 152 patients with intra-abdominal hemorrhage due to blunt trauma, 132 were male and 20 were female (i.e. ratio of 6.6 to 1). The minimum and maximum hospitalization ages were 2 and 84 years with a mean of 27.02 and standard deviation of 14.36. The patients were examined for causes of trauma. Of 152 patients, 103 cases (68.70%) were associated with RTA, 27 cases (17%) were falling from height, and 22 cases (14.03%) were associated with direct blow to abdomen.

The most common causes of intra-abdominal trauma and hemorrhage in men was RTA (73.8%) followed by direct blow (13.1%), fall from height (13.1%). The most common causes in women were fall from height (40%), direct blow (25%) and RTA (35%). In this study, the primary vital signs on admission to the hospital were examined. The average respiratory rate was 17.73 with standard deviation of 1.54. The lowest blood pressures in trauma patients were 80 (systole) to 60 (diastolic) and highest was 160 (systolic) to 110 (diastolic) with a mean of 110 (systolic) to 80 (diastolic) with a standard deviation of 14.26. Moreover, it was also found that among 152 trauma patients, the lowest and highest Hb (hemoglobin) levels were 8 and 16, respectively, with standard deviation and mean of 12.10 and 1.51. The minimum and maximum body temperature of patients with intra-abdominal hemorrhage ranged from 36 to 38.5 °C (Mean±SD of 37.34 and 1.12 °C). The mean pulse rate of patients under study was 76 beats per minute with a standard deviation of 5.54 (minimum and maximum values were 55 and 95 beats per minutes, respectively). Of 152 patients under study, 91 had splenic injury (60.3%), 60 had liver damage (40%), 22 had digestive system injury (14.7%), 5 had bladder injury (3.3%), 18 had kidney injury (12%), and 5 had retroperitoneal injury (3.3%). Furthermore, 66 (43.38%) suffered from more than one intra-abdominal organ injury according to the results of ultrasound and CT scan available in patient file. In this study, it was revealed that 63 patients (42%) underwent surgery upon admission, 44 underwent surgery within the first 48 hours (33%) and 38 were hospitalized without any surgery (25%). Of 152 patients hospitalized with abdominal bleeding, 3 deaths occurred due to trauma-related bleeding within the first 48 hours (2%), 2 deaths after the first 48 hours (1.4%) and 6 deaths due to non-traumatic abdominal injuries (neurosurgery, orthopedics, etc.) (4%). Moreover, 45 patients were treated in the surgical ward (30%) while 99 patients were treated in the ICU (66%). Among the patients diagnosed with liver damage through ultrasound or CT scan, 31.7% underwent surgery upon admission, 21.7% underwent surgery within the first 48 hours, and 46.7% were monitored. Among patients with spleen damage, 62.9% underwent surgery upon admission, 28.1%

underwent surgery within the first 48 hours, and 9% were monitored (Tables 1 and 2).

DISCUSSION

The study was conducted on 152 patients with abdominal trauma and the consequent intra-abdominal hemorrhage. In this study, 132 patients were men and 20 were women (male to female ratio of 6.6). This was similar to a previous study carried out by Leonard K. (2012) in Tanzania. In many similar studies based in Iran, however, the ratio tends to be smaller due to the cultural structure in Jahrom, i.e. greater involvement of men in the society [8]. The minimum and maximum hospitalization ages were 2 and 85 years with a mean of 2.27 and SD of 14.37. This is almost similar to a study by Alli with an average age of 25.2 years, and Ezzati *et al.* with an average age of 24 years [9]. In this study, the greatest cause of blunt abdominal trauma was road traffic accident (RTA) (68.7%). This was consistent with a study by Farzandipour in Kashan. In Sabiston's Textbook of Surgery, the most common cause of blunt abdominal trauma has been reported to be RTA [10]. In this study, the most commonly injured organ was spleen (60.3%) followed by liver (40%) (there were a few patients with several intra-abdominal organ injuries). This was consistent with a study carried out by Moti and Seyedjavadi in Qazvin [11-12]. At Peymanieh Hospital (Jahrom), 42% of patients with abdominal trauma and consequent intra-abdominal hemorrhage underwent surgery upon admission and 25% were monitored without any surgery. This was inconsistent with studies conducted in developed countries such as that by Pachter based in New York (50 to 80% of patients were monitored). Demetriades in Los Angeles, Shapiro in Pennsylvania (66% non-surgical treatment), consistent with a study by Nazir A. in Pakistan (55% surgery on admission). This may be due to lack of diagnostic facilities and ICU-equipped wards. Nonetheless, the decision for surgery depends on several factors such as the patient's hemodynamic status, age, severity of organ injury and the associated pain intensity [13-15]. In this study, it was found that 66% of patients were treated in the ICU. This was similar to a study by Yanar H similar in 2008, where 71% of trauma patients with intra-abdominal hemorrhage were hospitalized and treated in the ICU [16]. At Peymanieh Hospital, patients whose spleens had been injured according to the results of ultrasound or CT scan underwent surgery upon admission (62.9%), while patients with liver injury were simply monitored (46.7%). This was consistent with a study by Sido in Germany (56% of patients with splenic injury underwent surgery upon admission) [17].

Table 1: Frequency distribution of patients with blunt abdominal trauma according to causes

Cause of trauma	Count	Percentage
RTA	103	68.70
Falling from height	27	17
Direct blow	22	14.03

Table 2: Frequency distribution of the treatment type versus injured organs

Treatment type Injured organ	Surgery on admission (%)	Surgery within the first 48 hours (%)	Monitored (%)
Spleen	62.9	28.1	9
Liver	31.7	21.7	46.7
Digestive system	40.9	54.5	4.5

CONCLUSIONS

The most common cause of abdominal trauma in RTA. One considerable fact is the high rate of incidents among young men. It is crucial that authorities devise plans for prevention and improvement of road traffic safety. Given the current mortality rate in hospitals, it is critical to take measures for immediate bleeding control, fluid replacement and early diagnosis of injured organs. With regard to the increase in non-surgical approach to abdominal trauma patients in developed countries, it is recommended to provide Peymanieh Hospital with advanced diagnostic facilities and highly-equipped medical wards for trauma cases. The surgeon's presence at patient's bed can be highly beneficial since the hemodynamic status, rapid diagnosis of injured organs, severity and type of injury can determine the treatment type and the specialist surgeon's approach, severity and type of injury.

Recommendations

It is recommended that the analysis of abdominal trauma be completed through conducting a similar study on penetrating abdominal trauma and ensuring that patient records are always completed accurately.

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