Research Article

Incidence of splenectomy in blunt abdominal trauma (Minia university hospital experience)

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Abstract

Objective: To determine the Incidence of splenectomy in blunt abdominal trauma in minia university hospital. **Methodology:** This study was carried out in our Department of Accident and Emergency, Minia University Hospital, from August 2017 to August 2019. We perform Focused Assessment with Sonography in Trauma (FAST) scan as part of the primary or secondary survey of the trauma patient in the emergency department in all patients with suspected blunt abdominal trauma. All Stable patients among all patients underwent CT scan and all Unstable patients underwent laparotomy directly without CT scan. **Results:** 150 patients were included in our study with suspected blunt abdominal trauma who underwent CT abdomen or exploratory laparotomy or both CT abdomen and exploratory laparotomy. The mean age was 32.3±14.4 years. It included 111 (74%) males and 39 (26%) females. 112 (74.7%) cases presented due to road traffic accidents, 29 (19.3%) due to falls and 9 (6%) cases were the result of violence. Forty-four patients (29.3%) were hemodynamically unstable and 106 (70.7%) were hemodynamically stable. Our study showed that 40 (45%) of cases with intra-abdominal injuries had splenic injury. **Conclusion:** Splenic injury incidence in our experience is the most common injured organ. FAST scan has good diagnostic accuracy. It can be routinely utilized to triage the blunt abdominal trauma patients for laparotomy.

Keywords: splenectomy, blunt abdominal trauma, CT abdomen

Introduction

Blunt abdominal trauma (BAT) is regularly admitted in the emergency department with a reported mortality rate of around 11% (Yasmeen et al., 2014).

The prevalence of intra-abdominal injury following BAT has been reported to be as high as 12–15%. The mechanisms resulting in BAT were motor vehicle collision (73%), motorcycle collision (7%), auto-pedestrian collision (6%), and fall (6%) (Boutros et al., 2016).

Rare causes of blunt abdominal injuries include iatrogenic trauma during cardio-pulmonary resuscitation, manual thrusts to clear an airway, and the Heimlich mano-euvre. Commonest involved organs include spleen and liver (Yasmeen et al., 2014).

Injury to intraabdominal structures can be classified into 2 primary mechanism of injury-compression forces and deceleration forces (Srivastava et al., 2017).

Compressive forces resulting from blows to solid parenchymal organs against a fixed object, such as the spine, may lead to sub-capsular hematoma. These forces can also cause lacerations of solid parenchymal organs, such as the spleen and liver, or they can deform and increase the intraluminal pressure in hollow organs. Deceleration injuries cause stretching and linear shearing forces between fixed and more moveable objects resulting in lacerations or injuries of structures such as the renal arteries and mesenteric blood vessels (Weishaupt et al., 2002).

Rapid diagnosis of abdominal injury is an important step in the treatment process to prevent morbidity or mortality in BAT cases. Rapid determination of cases in need of emergency laparotomy is crucial for life

saving, especially for those with unstable hemodynamics, the avoidance of unnecessary surgeries with its invasiveness and complications should be considered (Boutros et al., 2016).

The clinical exam of abdominal injuries, depending on the clinical scenario, may be completed with the following diagnostic methods: peritoneal aspiration, abdominal ultrasonography, computed tomography (CT) and angiography (Negoi1 et al., 2016).

Splenic injury is common affecting up to 32% of patients with blunt abdominal trauma. Laparotomy is accepted as the recommended management strategy for blunt splenic injury in hemodynamically unstable patients. In contrast, the efficacy of nonoperative management in hemodynamically stable patients may consist of observation (with or without angiography) or angiography with proximal or selective splenic embolization (Corn et al., 2019).

Although protected under the bony ribcage, the spleen remains the most commonly affected organ in blunt injury to the abdomen in all age groups. Blunt injuries to the spleen are documented more frequently as the primary solid organ injury in the abdomen. These injuries are common in both rural and urban environments and result from motor vehicle crashes, domestic violence, sporting events, and accidents involving bicycle handle bars (Shahzad et al., 2019).

The most used grading scale for BSI has been established by the American Association for the Surgery of Trauma (AAST Spleen Injury Scale): which grades the BSI into 5 grades according to the extent of hematoma and depth of laceration; low grades (I & II) injuries are usually admitted to the surgical ward and are treated conservatively. While, high grades of BSIs (≥ grade III) are admitted to the intensive care unit and their management depends on the clinical condition and progress of the patient condition (El-Matbouly et al., 2015).

Any unstable patient who has a positive focused assessment with sonography in trauma (FAST exam) or diagnostic peritoneal aspiration/lavage (DPA/DPL), which may be due to an injured spleen, should undergo laparotomy to control life-threatening hemorrhage and evaluate for splenectomy. In any study examining blunt splenic injury, these patients who have an immediate indication for surgery are excluded from non-operative management of their injuries. These usually represent around 25% of all the patients with blunt splenic injury and can represent a mix of splenic laceration grades and associated injuries. This indication is absolute (Mowery et al., 2018).

The primary goal for a splenic injury management is the diagnosis and prompt management of potentially life-threatening hemorrhage. The preservation of splenic tissue function is secondary, and in selected patients, it may be accomplished by using non-operative management and operative salvage techniques (Al-Baaj and Saleh, 2018).

The decision to perform splenectomy versus splenic salvage (i.e., splenorrhaphy, partial splenectomy) is made based upon the grade of injury, presence of associated injuries, patient's overall condition, and experience of the surgeon. The small future risk of overwhelming postsplenectomy sepsis needs to be balanced against the more significant risk of recurrent hemorrhage (Mowery et al., 2018).

Methodology:

This cross-sectional study was conducted on 150 patients with blunt abdominal trauma who were admitted to the Minia University Hospital after approval by hospital ethical committee and taking consent, during the period between August 2017 to August 2019. Patients consists of 111 males and 39 femals, with an age ranged from 6 to 69 years old.

In our the study both patients were concluded in the study whom underwent

CT scan and patients who were haemodynamically unstable.

In our study we exclude patients with penetrating abdominal injuries on history and inconclusive FAST scans due to patient size, subcutaneous emphysema, or limited sonographic windows.

In our experience FAST was performed as part of the primary or secondary survey of the study population in the emergency department. An emergency ultrasound was performed by a surgeon under supervision of radiologist within 1 hour of the patient arriving in the hospital. An ultrasound machine with live 2-D mode (rapid B-mode) and transducer frequencies between 3-6 MHz was used. Optimal depth settings depended on patient body habitus. The four standard views obtained with the patient in supine position were pericardial, perihepatic, perisplenic, and pelvic.

We recommend the use of CT scan for the evaluation of hemodynamically stable patients. In FAST negative patients if they are hemodynamically stable they were retained for CT scan. Patients with FAST positive scans were admitted, If hemodynamically stable they may be further evaluated by contrast-enhanced CT of abdomen and pelvis and if indicated they will undergo a laparotomy. If unstable they may undergo a laparotomy without any further evaluation.

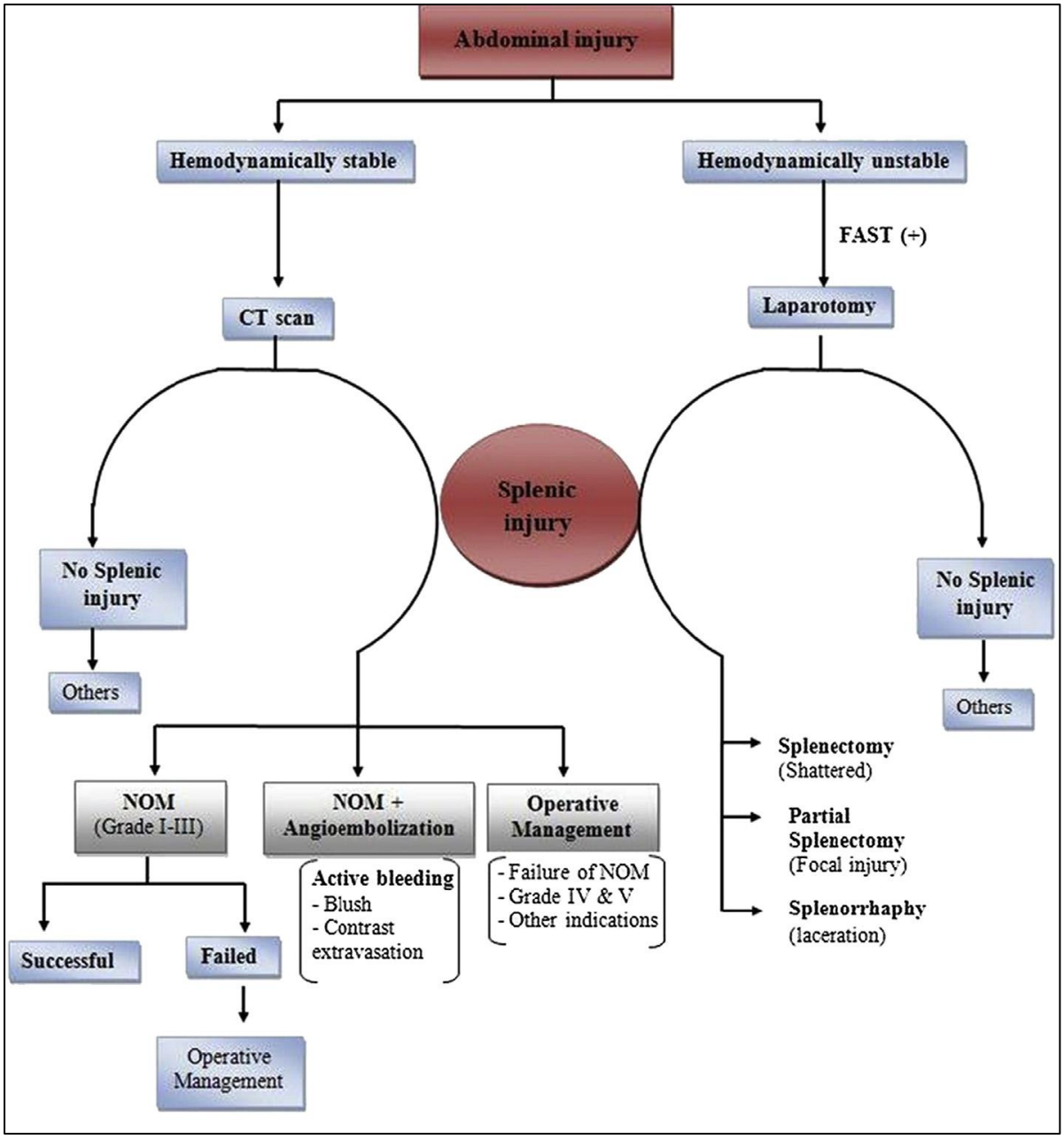
All patients in the study underwent a FAST scan. All of them also underwent either CT or exploratory laparotomy depending on their clinical conditions. FAST examination results, which were recorded as positive or negative and were compared with the findings on CT and/or exploratory laparotomy, which were considered definitive. All exploratory laparotomies were performed by the same surgical team consisting of a surgeon with at least 5-years clinical experience and the trainee as the assistant.
Data Analysis: The data was analyzed using SPSS 12. Categorical variables like gender and true positives were presented as frequencies and percentage. For numerical variables like age, mean $\pm$standard deviations were presented.

Results:
We studied 150 patients with the age from 6 to 69 years. The mean age was 32.3±14.4 years. It included 111(74%) males and 39 (26%) females. 112(74.7%) cases presented due to road traffic accidents, 29 (19.3%) due to falls and 9 (6%) cases were the result of violence.

All patients underwent a FAST scan. Exploratory laparotomy was performed in (60%) patients. CT scan was performed in all haemodynamically stable patients. Forty-four Patients (29.3%) were hemodynamically unstable.

Our study showed that 40(45%) of cases with intra-abdominal injuries had splenic injury. Among them 34(38.2%) were underwent laparotomy and 6(6.8%) were treated conservatively.

Two patients died in the present study, One was due to severe haemorrhage from lower limb compound fracture with liver injury and the other one was due to splenic avulsion. Since out of total patients two patients die, mortality rate was about 1.3%.



NOM= Non-Operative Management.

Figure (1) Splenic injury management algorithm

Table (1): Distribution of type of trauma:

Type of trauma	Males	Females	Total
Road traffic accidents	92 (61.4%)	20 (13.3%)	112 (74.7%)
Fall from height	22 (14.6%)	7 (4.7%)	29 (19.3%)
Violence	7 (4.7%)	2 (1.3%)	9 (6%)
Total	**121 (80.7%)**	**29 (19.3%)**	**150 (100%)**

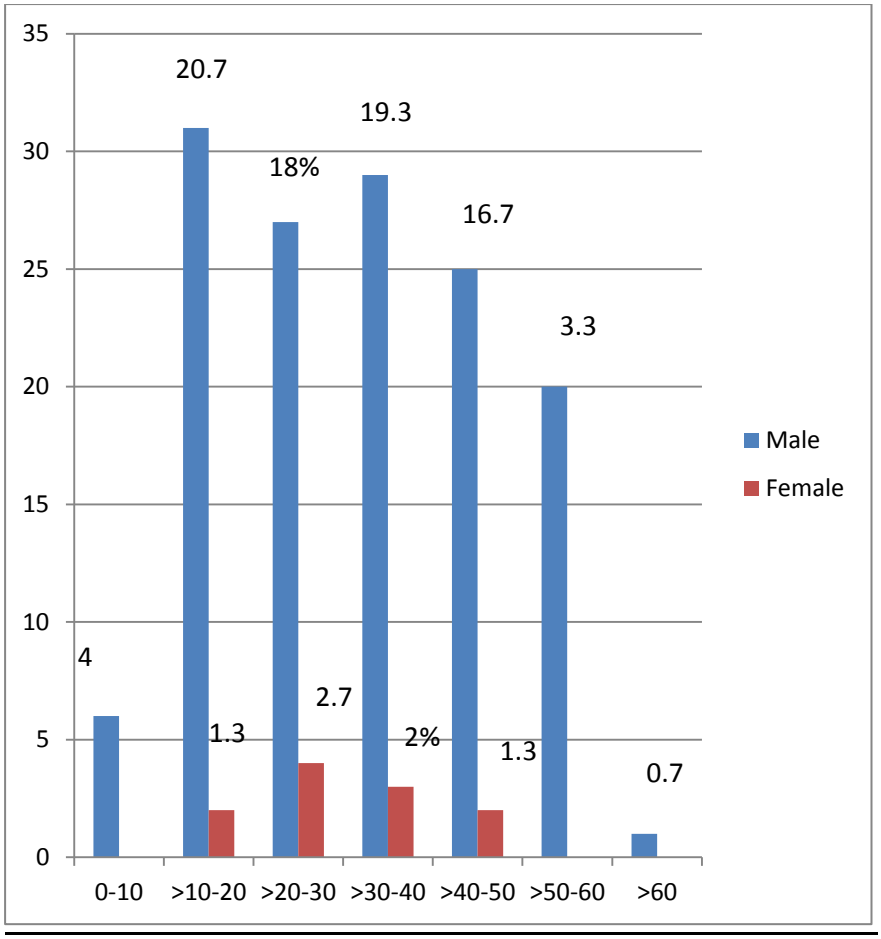


Figure (2): Age distribution of both males and females

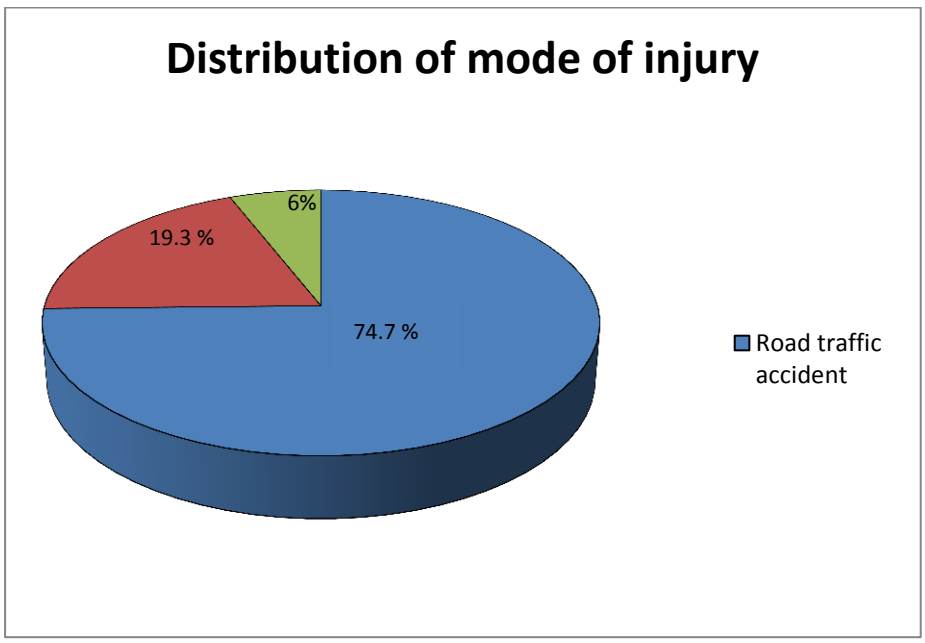


Figure (3): Distribution of Mode of injury:

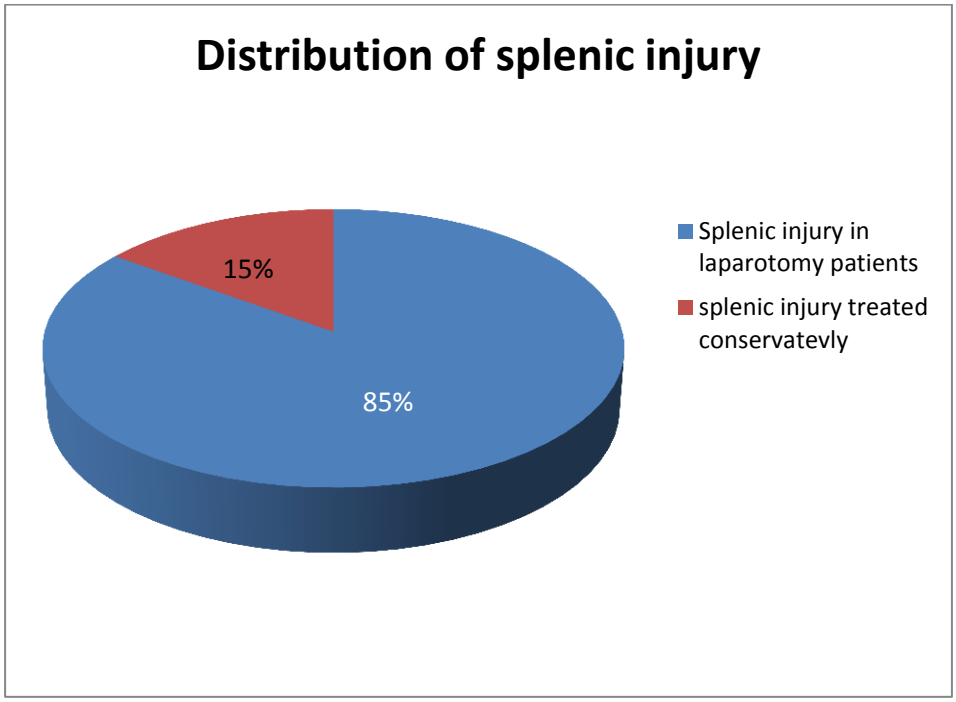


Figure (4): Distribution of splenic injury

Disscussion

In our study, out of 150 cases; 111 (74%) were males and 39 (26%) were females with a mean age (32.3±14.4) years. The young aged males were the most common victims of blunt abdominal trauma.

During this study, there was an increase in incidence of abdominal trauma in males (74%), this is seen to be a similar pattern in other studies as males are more involved in violent and traumatic experiences, involving abdominal injuries.

Ozpek et al., implemented a multivariate inquiry of patients with abdominal injuries and the responsible factors affecting mortality and in his study he had (78.9%) being males and (21.1%) being females with a mean age of 36.7 ±16.97 years (3-80 years) (Ozpek et al., 2015). In America census and statistics of 2011 they report that roughly (90%) of patients with invasive trauma are males (Kochanek et al., 2011).

In our study, the commonest cause of blunt abdominal trauma was road traffic accidents 112(74.7%), followed by fall from height 29(19.3%) followed by violence 9 (6%).

Davis et al., found that 70% of blunt abdominal trauma cause was road traffic accidents, followed by fall from height (6%). Also Khanna et al., also found that road traffic accidents represent (57%) of blunt abdominal trauma causes, followed by fall from height (Srivastava et al., 2017).

So that it clearly states that road traffic accidents is the most common mode of injury because of increased number of vehicles recently. The young people also give priority to speed rather than safety.

In our study, Out of total patients of blunt abdominal injury, 90 patients were operated and 60 patients were treated conservatively. Out of these 90 operated patients, most common operative procedure was splenic-tomy in 35(38.9%) patients. Second most common operative procedure was repair of liver laceration in 17(18.9%).

Spleen is the single commonest visceral organ to rupture following blunt trauma.

Factors contributing to its increased susceptibility to injury in trauma are:
1. The soft consistency of the organ.
2. Its intimate contact with ninth to twelfth ribs and
3. Its tendency to enlarge becoming pulpier with variety of disease.

Conclusion:

- Road traffic accident form the most common mode of injury. Though conservative management is successful in carefully selected patients, operative management remains the main stay of treatment
- Plain x-ray abdomen in erect posture is valuable investigation taken for gastrointestinal injuries.
- Spleen is the first most common injured organ and majority of patients were managed by splenectomy.
- FAST scan has good diagnostic accuracy. It can be routinely utilized to triage the blunt abdominal trauma patients for laparotomy, however, a multi-institutional research study in our setup is required to further validate the findings of our study.

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