



## A STUDY OF PATIENTS PRESENTING WITH BLUNT ABDOMINAL INJURY WITH SPLENIC TRAUMA AND THEIR OUTCOME.

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**ABSTRACT** **INTRODUCTION** - Splenic injuries are among the most frequent trauma-related injuries. At present, they are classified according to the anatomy of the injury. The optimal treatment strategy, however, should keep into consideration the hemodynamic status, the anatomic derangement, and the associated injuries. The management of splenic trauma patients aims to restore the homeostasis and the normal physiopathology with a multidisciplinary team. Thus, the study to determine the presentation of a patient and further its investigation management and outcome is necessary. **OBJECTIVE:** To study all the cases (investigation and outcome) of blunt abdominal trauma with splenic laceration with its incidence, mode of presentation, grade, management and factors responsible for morbidity and mortality. **MATERIAL AND METHODS:** A study was conducted in our tertiary care hospital on 22 patients presented with blunt abdominal trauma with splenic injury in emergency department during July 2019 to June 2021. **RESULTS:** In our retrospective study, all the patients underwent primary radiological and pathological investigation with 36% having associated limb injuries (fractures); 4.5% with ckd, 9% with thoracic injury, 40% amongst 20-40 age group, 86% being male, 59.5% resulted from RTA, 31.5% resulted from fall from height, 0% with assault, 4.5% along with head injury, 9% with associated rib fracture, 0% patient with free gas under diaphragm; 9% with grade 1, 22% with grade 2, 31.5% grade 3, 13.5% grade 4, 22% grade 5 splenic injuries. 91% patients underwent splenectomy and were given vaccination 15 days postoperatively against capsulated organisms. 9% patients were managed conservatively. Patients were followed up for 6 months postoperatively with 4.5% mortality rate. **CONCLUSION:** Splenic injury is most common solid organ injury in blunt abdominal trauma in 20-40 years age group majority male and results maximally by RTA; associated with limb fractures commonly with liver as associated solid organ injured. Aggressive resuscitation and emergency laparotomy (splenectomy) yields excellent outcome.

**KEYWORDS :** Spleen, Splenic Rupture, Blunt Trauma, Hemostasis, Abdominal Trauma, Splenectomy, Laparotomy, Rta.

### INTRODUCTION

With economic growth, industrialization and rapid growth of automobile industries, the number of road traffic accidents (RTA) is sharply on the rise in developing countries like India. The abdomen is a very vulnerable site with many vital organs, and abdominal injuries are often life-threatening. Blunt trauma abdomen accounts for approximately 79% of all abdominal injuries.[1],[2],[3] The spleen and liver are the most commonly injured intra-abdominal organs following blunt trauma.[4],[5],[6] In up to 60% of patients, the spleen is the only organ injured, with a mortality rate of roughly 8.5%.[2],[3],[4] Over 75% of splenic injuries occur due to motor vehicle collisions.

The spleen is the most vascular organ of the body, and approximately 250 liters of blood passes through it per day. It is located posterolaterally in the left upper quadrant of the abdomen beneath the left hemidiaphragm and lateral to the greater curvature of the stomach. Splenic injuries, therefore, result in a potentially life-threatening situation in patients with thoracoabdominal trauma. The spectrum of injuries range from the trivial to the catastrophic and hence the initial assessment, resuscitation, and investigation of patients with abdominal trauma must be individualized. Abdominal distension, left hypochondrial tenderness, tachycardia, and hypotension are the usual signs of splenic injury. The primary goal is prompt diagnosis and aggressive management of potentially life-threatening hemorrhage. The preservation of functional splenic tissue is secondary and in selected patients may be accomplished using non-operative management or operative salvage techniques. Emergent and urgent splenectomy remains a life-saving measure for many patients. The outcome of conservative management of splenic injuries remains unpredictable because of the risk of a delayed splenic rupture despite the initial computed tomography (CT) scan showing only a minor parenchymal injury.[7],[8],[9] Our aim is to study the profile of splenic injuries following blunt abdominal trauma among patients presenting to the emergency department (ED).

### MATERIAL AND METHODS:

We conducted our study in tertiary care hospital after ethical clearance and included 22 patients presented to the emergency department or

surgical opd with blunt abdominal trauma with suspicion of splenic injury from July 2019 to June 2021. From our study we excluded the patients with other solid organ injuries and pregnant female.

After initial assessment of patients presenting to the outpatient and emergency department in tertiary care hospital with history of blunt abdominal trauma and signs, symptoms and early radiological investigations suggestive of splenic injury who met the inclusion and exclusion criteria admitted and were thoroughly examined clinically, pathologically and radiologically like complete blood count, urine routine, X ray chest and abdomen, ultrasound abdomen and pelvis, CT scan and other investigations as required.

Following which 20 patients underwent laparotomy and grading of splenic injury done; splenectomy was done with complete abdominal exploration. Specimen was sent for histopathological examination. Post operative care and vaccination done with follow up taken for 6 months. Finally all data was collected in a retrospective manner.

**Table no. 1 : Spleen Injury Scale**

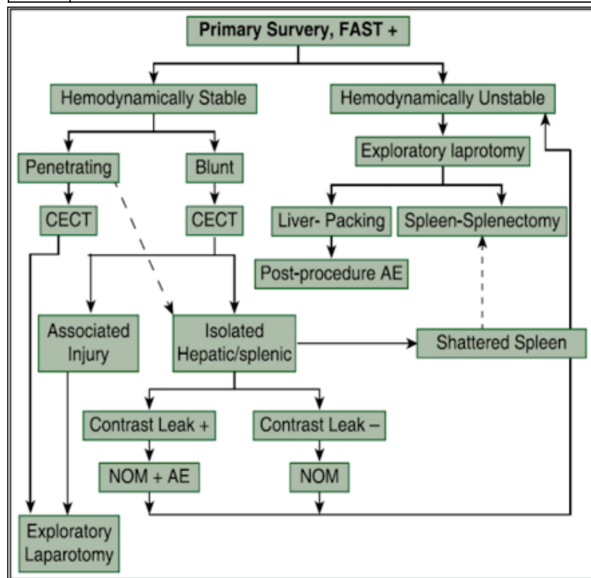
Grade	Type of Injury	Description of Injury
1	Hematoma Laceration	Subcapsular <10% Capsular tear <1cm in depth
2	Hematoma Laceration	Subcapsular, 10%-50% intraparenchymal <5 cm in diameter Capsular tear 1-3 cm in parenchymal depth, not involving trabecular vessel
3	Hematoma Laceration	Subcapsular, >50% surface area or expanding, ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma, >5cm or expanding. >3cm in parenchymal depth or involving trabecular vessel.
4	Laceration	Segmental or hilar vessels, major devascularization(>25%)
5	Laceration Vascular	Completely shattered spleen Hilar vascular injury that devascularizes the spleen.

Grading of the splenic injury is confirmed on the CECT report and patient is straight away shifted for laparotomy and report confirmed intraoperatively.

Out of 22 cases of splenic injury 20 cases were subjected to underwent exploratory laparotomy and splenectomy. Most common age group involved was 21 to 40 years males.

**Table no. 2 Management modalities in splenic injury.**

Grade	Therapeutic options
1	Conservative treatment
2	Coagulation, fibrin glue, collagen fleeces, conservative, resection in unstable patient.
3	Coagulation, fibrin glue, collagen fleeces, conservative, hemostatic mesh, resection in unstable patient.
4	Hemostatic mesh, Splenectomy
5	Splenectomy



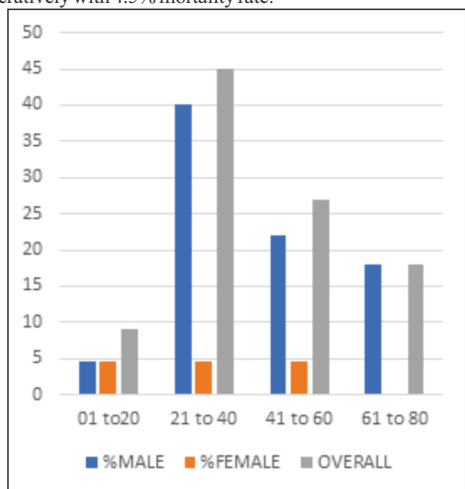
**Figure no. 1: Investigation and management of blunt abdominal trauma.**

**ABBREVIATION**

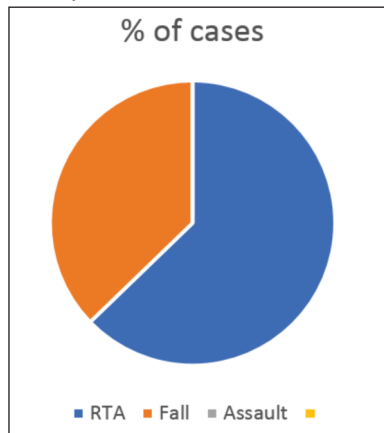
- 1. NOM: NON OPERATIVE MANAGEMENT
- 2. AE: ANGIO EMBOLIZATION

**RESULTS: :**

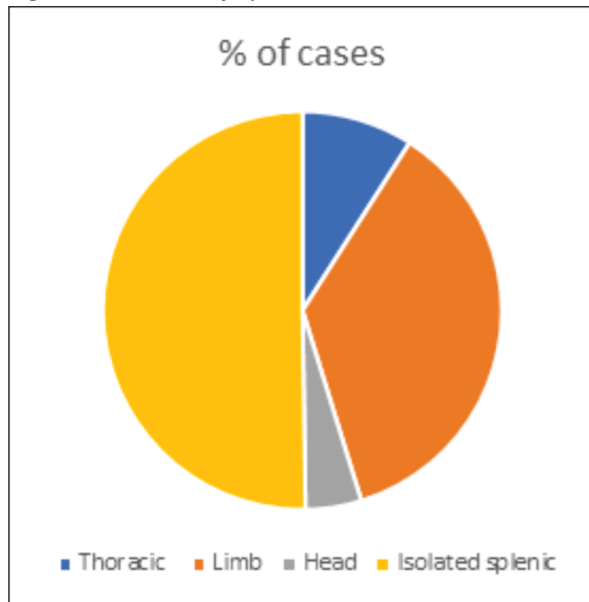
In our retrospective study , all the patients underwent primary radiological and pathological investigation with 36% having associated limb injuries (fractures);4. 5% with ckd , 9.5% with thoracic injury, 40% amongst 20-40 age group , 86% being male, 59.5% resulted from RTA, 31% resulted from fall from height,0% with assault, 4.5% along with head injury, 9% with associated rib fracture,0% patient with free gas under diaphragm ; 9 % with grade 1, 22% with grade 2, 31.5% grade 3 , 13.5% grade 4, 22%grade 5 splenic injuries. 91% patients underwent splenectomy and were given vaccination 15 days post operatively against capsulated organisms. Patients were followed up for 6 months postoperatively with 4.5% mortality rate.



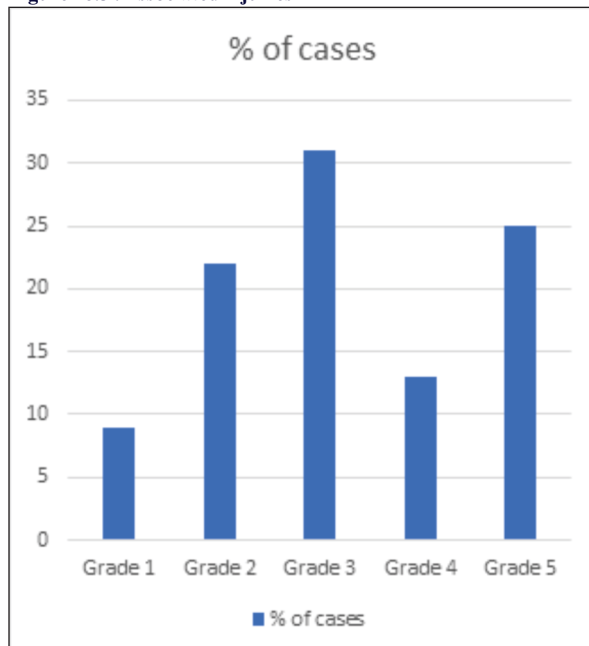
**Figure no.2 : Age wise distribution of cases in percentage.**



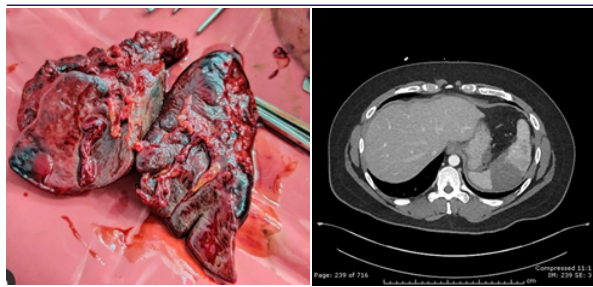
**Figure no. 2: Cause of injury**



**Figure no.3 : Associated injuries**



**Figure no. 4: % of cases and grading of splenic injury.**



**Grade 5 splenic injury after blunt abdominal trauma .**

#### DISCUSSION:

The mechanisms most commonly described are trauma to the left upper quadrant, left rib cage or left flank. However, the absence of these types of injuries cannot exclude the possibility of splenic injury. Enquire about previous operations including splenectomy. Other questions that doctors should explore are liver or portal venous disease, the use of an anticoagulant agent, bleeding tendency, and the use of aspirin or nonsteroidal anti-inflammatory agents. The typical presentation includes left upper quadrant pain, abdominal distension, and hypotension. Left shoulder pain may occur due to diaphragmatic irritation. Evaluate the abdomen for external signs of trauma such as abrasions, lacerations, contusions, and seatbelt sign. The absence of these external findings does not exclude intra-abdominal injury. Up to 10% to 20% of patients with intra-abdominal injury may not have these findings upon examination. An initial examination on arrival may not show tenderness, rigidity, or distension. Therefore, it may not be sufficiently sensitive nor specific enough to identify a splenic injury.

The presentation of splenic injury depends upon associated internal hemorrhage. Patients may present with hypovolemic shock manifesting tachycardia, and hypotension. Other findings include tenderness in the upper left quadrant, generalized peritonitis, or referred pain to the left shoulder (Kehr's sign). This is a rare finding, which should increase the suspicion of splenic injury. Some patients may have pleuritic left-sided chest pain. Physical examination may be limited by decreased mental status or distracting injuries. Upon initial evaluation, a splenic injury which is contained may have few symptoms. One should evaluate for splenic injury if lower left rib (below the sixth rib) fractures are identified. In adults, up to 20% of patients with lower left rib fractures may have an associated splenic injury. However, in children, the plasticity of the chest wall can result in a severe underlying injury to the spleen in the absence of any rib fracture. One should suspect a pelvic fracture if the mechanism involves a high-energy blunt trauma. Also, one should consider bowel injuries in patients presenting with blunt splenic trauma, which occurs in less than 5% of patients who were initially thought to have an isolated organ injury. Several adjuncts can be used to identify splenic injury.

#### Focused Assessment with Sonography for Trauma (FAST)

Focused assessment with sonography in trauma (FAST) is now widely recognised as a mainstream emergency medicine technique in the management of trauma. The conventional areas that are screened for intraperitoneal blood following trauma include the hepatorenal interface (Morison's pouch), perisplenic space, pericardium and the pelvis. In the context of abdominal trauma, fluid or blood is indicated by the presence of black anechoic collections. where FAST resulted in early diagnosis of splenic rupture, allowing for early institution of prophylactic anti-opportunistic postsplenectomy infection measures and urgent CT.

**Computed Tomography (CT)** The initial management of the trauma patient with splenic injury should follow the ABCs (airway, breathing, and circulation) of trauma resuscitation. The assessment of circulation during the primary survey includes early evaluation of the possibility of hemorrhage in patients with blunt trauma. It is important to assess whether the patient is in early shock and provide prompt resuscitation. Beware that there is a possibility of concomitant hollow viscus injury in patients with solid organ injury

**Spleen Organ Injury Scale** Splenic injury is classified based on CT findings according to the American Association for the Surgery of Trauma (AAST) Organ Injury Scale. It is a useful scale that categorizes splenic injuries, but it does not predict the need for surgical intervention.

This CT grading may not always correlate with the grading of the injury as identified on surgical exploration. This may be due to technical issues and variability of the CT scan interpretation. Haemorrhage from a splenic injury can be ongoing at the time of presentation or may have stopped. Injuries in which bleeding has ceased can be managed without splenectomy, although patients may develop delayed hemorrhaging. Delayed rupture of the spleen may occur up to 10 days following an injury. The rate of late bleeding may occur up to 10.6% of the time, but it varies with the grade rating of the splenic injury. Therefore, careful selection of patients should be performed and make sure that one closely monitors these patients, and a serial abdominal examination should be performed.

The treatment of choice for a splenic injury with hemodynamic compromise is an exploratory laparotomy with splenectomy, with only a few laparoscopic sporadic cases in the literature. Surgical management is imperative in approximately 20%- 40% of cases, and this number increases in patients who are in hemorrhagic shock with massive hemoperitoneum. An emergency splenectomy involves placement in the supine position, exposure of the peritoneal cavity and achievement of temporary hemostasis. The spleen should be mobilized from its ligamentous attachments, with ligation of the splenic pedicle, achievement of hemostasis, complete resection, and abdominal closure. Stable patient shall be monitored for 15 days and can be managed conservatively with regular monitoring and radiological investigations for hemoperitoneum.

#### CONCLUSIONS :

The management of spleen trauma must be multidisciplinary and must keep into consideration the physiological and anatomical derangement together with the immunological effects. Critical and operative decisions can be taken more effectively if both anatomy of the injury and its physiological effects, and the associated lesions are considered especially considering the emergency investigations and exploratory laparotomy.

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**Ethics Approval:** The study was approved by the Institutional ethical committee.

**Conflicts Of Interest:** There are no conflicts of interests.

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