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A prospective observational study on clinical review of splenic trauma at government medical college, Jammu

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Abstract

Background: The spleen is one of the intra-abdominal solid organs that is most usually wounded. If not detected at an early stage, the patient may present with shock. Even though treatment depends on the severity of splenic damage, stabilizing the patient remains the primary objective. The operational procedures, which may be splenorrhaphy or splenectomy, are performed using an open or laparoscopic approach.

Aim and Objectives: The purpose of this study is to examine cases of splenic trauma as well as its treatment methods. We also wish to investigate the numerous causes, clinical characteristics, therapy strategies, and consequences of splenic trauma.

Methods: A prospective observational research was conducted on 100 individuals with splenic damage. The trial duration was fifteen months. According to protocol, patients with clinical and radiological evidence of splenic trauma were categorized and provided either operational or non-operative therapy. During the hospital stay, both surgical and nonsurgical outcomes were examined and followed up on.

Results: One hundred individuals were examined, including 72 men and 28 women. Road traffic accidents were the leading cause of injuries, followed by falls. The most prevalent injury was a grade III, whereas the most common accompanying injury was a rib fracture. Pneumonia was a common postoperative consequence.

Conclusions: After a blunt abdominal injury in a young population, splenic damage is a genuine danger. After splenectomy, vaccination and the risk of OPSI (Overwhelming post-splenectomy infection) must always be considered. Early detection and prompt treatment of splenic trauma can save the patient's life.

Keywords: Splenic injury, road traffic accidents, splenectomy, splenorrhaphy, OPSI

Introduction

Abdominal injuries are frequently accompanied with polytraumas. They are potentially fatal, making early detection and treatment the key objective. The spleen is one of the intra-abdominal solid organs that is most usually wounded. The spleen is located in the left hypogastrum, where its hilum rests in the angle between the stomach and the kidney and in touch with the pancreatic tail. Due to its hazardous placement and unsupported splenic pedic, the spleen is frequently subjected to trauma.

Mild stomach discomfort, distension, or guarding over the abdomen are symptoms of splenic damage. If not detected at an early stage, the patient may present with shock. The diagnostic process may involve a full blood count, ultrasound of the abdomen, and CT scan. Based on CT results, splenic trauma can be classified into one of five groups.

Even though treatment depends on the severity of splenic damage, stabilizing the patient remains the primary objective. The operational procedures, which may be splenorrhaphy or splenectomy, are performed by open or Laparoscopic techniques. Recently, attempts have also been made to retain splenic function through angioembolisation. Early diagnosis and treatment may always save a patient's life; thus, it must take precedence over all other ailments.

The purpose of this study is to examine cases of splenic trauma as well as its treatment methods. We also wish to investigate the numerous causes, clinical characteristics, therapy strategies, and consequences of splenic trauma.

Material and Method

Place of study

To analyze the consequences of splenic trauma, prospective observational research was done

on patients who reported with splenic trauma symptoms at the Government Medical College in Jammu.

Methodology

Patients hospitalized to various surgical wards provided the data for the research on surgical care of splenic trauma. The trial lasted from September 2021 through November 2022.

Sample size

During the study period of 15 months, 100 cases of splenic trauma were studied under age groups ranging from 12 years to 63 years.

Inclusion and Exclusion criteria

All patients, histories, clinical examinations, radiological examinations, and intra-operative results were meticulously recorded. All instances of abdominal trauma with evidence of splenic damage of any grade met the inclusion criteria. Patients who were immunocompromised, pregnant, or unwilling to participate in the trial were excluded from the investigation. During the hospital stay, both surgical and nonsurgical outcomes were examined and followed up on. This study's sample size was established by analyzing hospital databases for splenic trauma. Using a statistical method, the sample size of 100 patients was estimated to be determined.

Statistical analysis

All information was gathered and calculated. Tabular presentation of descriptive statistics with mean, standard deviation, and percentage. Continuous variables were given

as Mean standard deviation for analytical statistical computations. Unpaired-T tests were used to compare continuous variables, and two-tailed p values were obtained. The Fisher exact test was used to compare categorical variables reported in real numbers and percentages, and the two-tailed p value was determined. The p0.05 threshold was deemed statistically significant. During the 30-day demo period, statistical analysis was performed using the free trial version of graph pad prism 6® for Windows, version 6.07 (trial).

Results

In the present study done for evaluation of splenic trauma patients, 100 patients were analysed over the period of 15 months. The results are shown as below:

Age Distribution

The maximum number of patients was from the age group of 21-30 years of age (42%). The youngest patient was a boy aged 5 years, while the oldest individual was 63-year-old.

Table 1: Age distribution

Age (years)	Number of cases	% age
5 to 20	16	16
21 to 30	42	42
30 to 40	30	30
<40	12	12
Total	100	100%

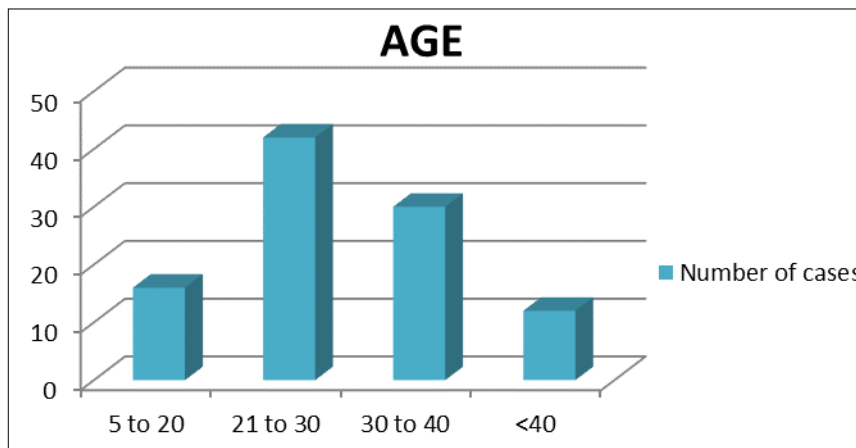


Fig 1: Age distribution

Gender Distribution

On analysing the data, there was a clear male predominance

in the study. There were 72 (72%) male patients while females comprised 28 (28%) cases.

Table 2: Gender distribution

Gender	Number of cases	% age
Male	72	72
Female	28	28
Total	100	100%

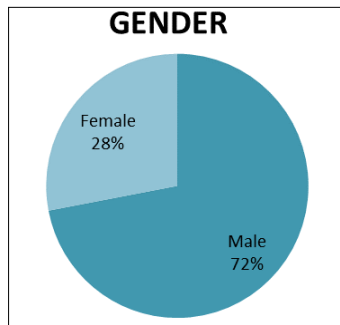


Fig 2: Gender distribution

Mode of injury

The different modes of injury in our study population are shown in Table 3 below. The commonest etiology of splenic trauma in our study was road traffic accidents. It comprised

almost a third of case 36 patients (36%). Just lagging behind was fall from height 26 (26%). Remaining cases were due to railway accidents, other blunt trauma to abdomen etc.

Table 3: Mode of injury

Mode of injury	Number of cases	% age
Assault	4	4
Blunt assault	4	4
Blunt trauma	12	12
Fall from height	26	26
Railway accident	16	16
Road traffic accident	36	36
Stab by knife	1	1
Stab injury	1	1
Total	100	100%

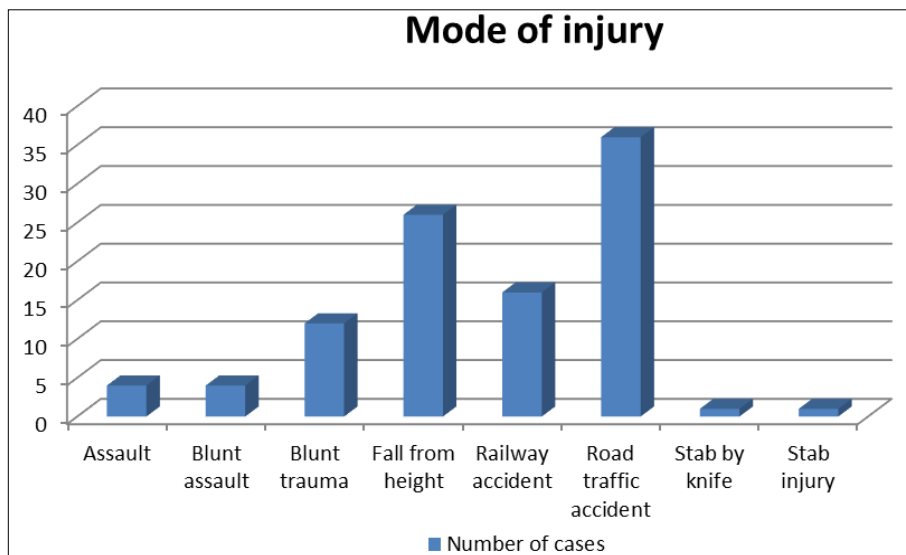


Fig 3: Mode of injury

Various grades of splenic injuries in Recovered/mortal patients

During evaluation of suspected splenic trauma patients, CT scan was done to grade splenic injury. In our analysis of 100 cases, mortality was seen in 14 cases (14%). Of those 14

cases, 10 (71.4%) had grade III injury, while 4 cases (28.6%) had grade IV splenic injury. The remaining 86 cases (86.5%) recovered well whose grades of splenic injuries are shown in Table 4 and fig 4 below.

Table 4: Various grades of splenic injuries in recovered/mortal patients

Grades	Death	%age	Recovered	%age
Grade I	0	0	8	9.3
Grade II	0	0	22	25.5
Grade III	10	71.4	40	46.5
Grade IV	4	28.6	16	18.7
Grade V	0	0	0	0
Total	14	100%	86	100%

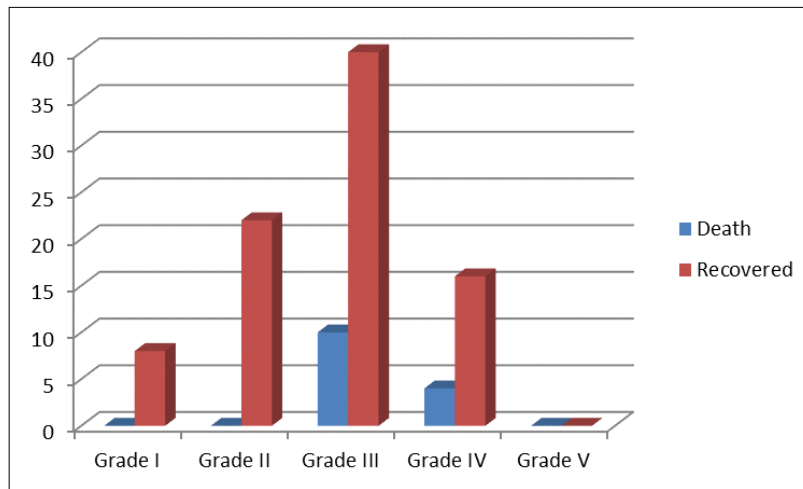


Fig 4: Various grades of splenic injuries in recovered/mortal patients

Coexisting injuries along with splenic injuries in recovered patients

Cases of splenic injury were mostly because of road traffic accidents. This type of high velocity injuries is often

associated with coexisting other organ injuries. The description of such associated injuries is shown in Table 5 and fig 5 below. Highest among them were rib injury (12 cases)

Table 5: Associated injury

Associated injury	Count
Femur	4
Humerus	2
Ribs	12
Tibia	2
Grade II liver trauma	4
Grade III liver trauma	4
Head injury	10
Ileal perforation	10
Jejunal perforation	2
Jejunal tear	2
None	48
Total	100

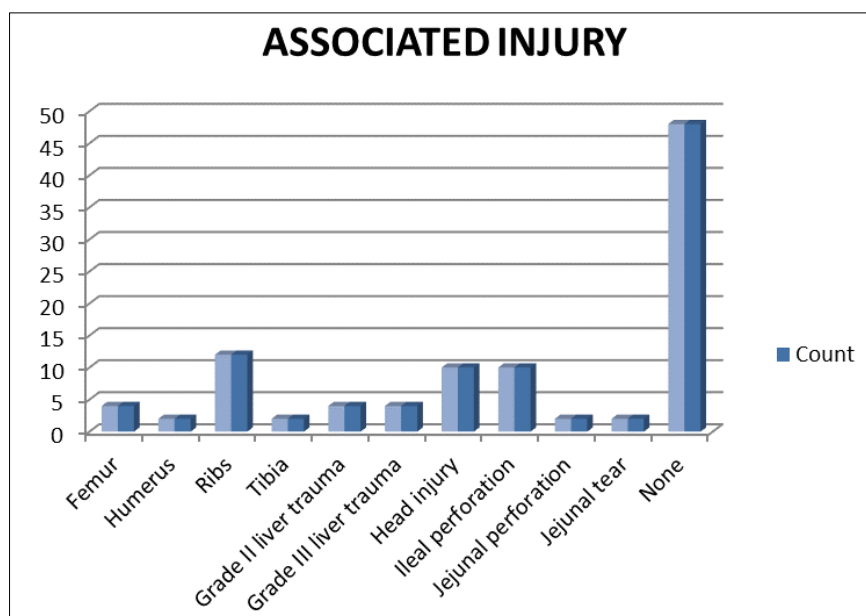


Fig 5: Associated injury

Different Modalities of Management for Splenic Injuries

The various modalities of management for splenic injuries are categorised as operative and non-operative. In our study,

only 9 cases (9 %) patients were managed conservatively, whereas 91 cases (91%) were managed by some operative intervention (Table 6) and fig 6.

Table 6: Different modalities of management for splenic injuries

Variables	Count	%age
Non-operative/ conservative	9	9
Operative	91	91
Splenectomy	73	73
Splenectomy + blood transfusion	14	14
Splenorrhaphy	4	4
Total	100	100%

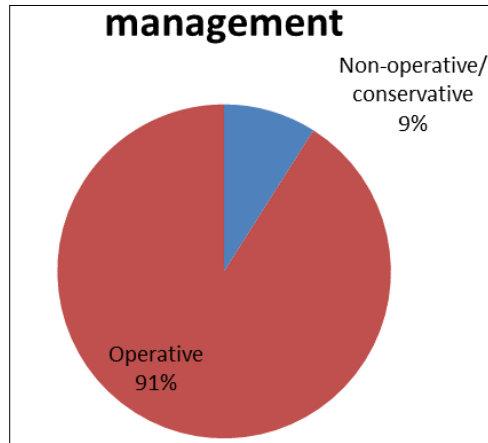


Fig 6: Different modalities of management for splenic injuries

Complications after management of splenic injuries

The complications often occur post surgically. In our study the commonest complication was pneumonia in 14 cases

(14%), while Superficial wound infection and wound gaping was observed in 10 cases each (10%). Fifty three cases (53%) of individuals had no complication (Table 7).

Table 7: Complications after management of splenic injuries

Complications	Cases	%age
Coagulopathy	2	2
Fistula formation	2	2
Patient died 1 day after surgery	2	2
Patient died 2 day after surgery	4	4
Pleural effusion	2	2
Pneumonia	14	14
Septic shock	1	1
Superficial wound infection	10	10
Wound gape	10	10
None	53	53
Total	100	100%

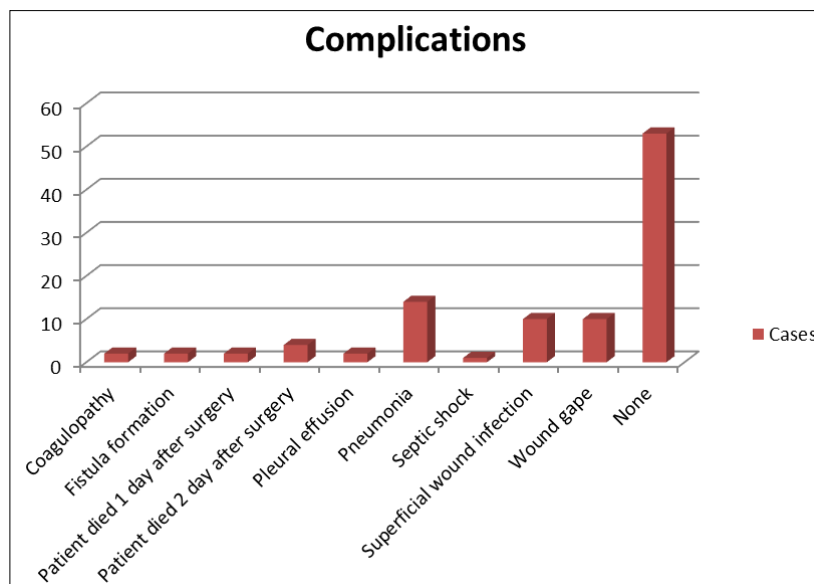


Fig 7: Complications after management of splenic injuries

Discussion

This study included the identification of the cause of the trauma and grading splenic injury thereby deciding the further management which was conservative or operative upon the type of injury. It was done in a group of patients who had history of abdominal trauma by modes like road traffic accidents, falls, assaults etc. We assessed the history based on the criterion compromising the history of patients or relatives' presentation of signs and symptoms, findings during the operative procedures.

The analysis of 100 cases of splenic injury; majority were due to road traffic accidents and others were due to fall from

heights. Blunt trauma is the second commonest mode of abdominal trauma and spleen is the most commonly injured organ after blunt trauma. The overall mortality rate from splenic injury was reported as 14% or high in many series and this mortality rate is secondary to associated injuries.

Patients with active splenic hemorrhage were more likely to undergo splenectomy than patients with contained injuries. Also, Intravenous contrast-enhanced CT has been shown to be accurate in the evaluation of splenic injuries resulting from blunt trauma. Grades of splenic injury are vital to know (Table 8).

Table 8: Grades of splenic trauma on dual arterial/portal venous phase imaging by CT scan

Grades	Lesions
I	Subcapsular hematoma <10 % of surface area Parenchymal laceration < 1 cm depth Capsular tear
II	Subcapsular hematoma 10-50% of surface area Intraparenchymal hematoma < 5 cm Parenchymal laceration 1-3 cm in depth
III	Subcapsular hematoma >50% of surface area Ruptured subcapsular or intraparenchymal hematoma ≥5 cm Parenchymal laceration >3 cm in depth
IV	Any injury in the presence of a splenic vascular injury* or active bleeding confined within splenic capsule Parenchymal laceration involving segmental or hilar vessels producing >25% devascularisation
V	Shattered spleen Any injury in the presence of splenic vascular injury with active bleeding extending beyond the spleen into the peritoneum

There is a general trend toward nonsurgical management of abdominal traumatic injuries as well as the confidence our surgeons have in our ability to accurately stage splenic injuries, including evidence of active bleeding, and to exclude with confidence other visceral injuries that would necessitate surgery. Others also reported in that grade III splenic injury was the most frequent that corroborated our findings.

In our series we had performed total splenectomy in 87% patients. Other similar study also concluded that the need for splenectomy was most significantly correlated with higher grades of splenic injury. A study was conducted on children and adolescents were admitted to acute care hospitals in Pennsylvania, with a diagnosis of blunt injury to the spleen, where the researchers reported 23.2% of children with blunt splenic injury in their study were treated operatively. Of the 752 patients who were treated operatively, 56 (7.4%) were characterized as having had a partial splenectomy, 208 (27.7%) as a repair/plastic operation of the spleen, 484 (64.4%) as a total splenectomy and 4 (0.5%) as other operations on the spleen.

In our study, postoperative complications were observed in around 47% cases. Post-operative complication was comparatively less than other studies. The success rates in treating blunt splenic injury in children had been reported to be over 90% in other studies.

In a Nigerian study, 23 cases were managed for splenic injuries that consisted of more males and less females. Whereas in our study there were 72 males and 28 females in our age group (5- 63) The risk factors were blunt injury in 21 cases and penetrating in two cases with motor vehicle accident being the commonest which was corroborated by our study (36%).

In our study, only 9 cases (9 %) patients were managed conservatively, whereas 91 cases (91%) were managed by some operative intervention. Splenectomy was the most

frequently performed procedure as seen in our study. Challenges identified in the management of patients with splenic injuries in Nigeria include delayed presentation, underutilization of CT, unavailability of interventional radiology, inadequate ICUs, limited vaccination, discharge against medical advice and poor follow-up.

In the hemodynamically stable patients with splenic injury, nonsurgical management has become the customary care in children and adolescents. But the opinion is divergent on outcome and prognosis. Researchers noted significant difference in time required for healing among all grades when followed up for injury healing on nonsurgical management on children and adolescents with splenic injuries grade 1-3. There was a clear relationship between the severity of blunt splenic injury and adolescents and the time course.

In a recent extensive review, Iribhogbe *et al.* summarised that non-operative management of blunt splenic injuries has become the norm in the developed countries. In the absence of RCTs, conservative management has shown itself superior to laparotomy, through practice, in terms of mortality rates, blood transfused and splenic preservation. The management protocols used abdominal CT scanning to diagnose the degree of splenic injury and to rule out associated abdominal injuries requiring surgery. However, the sole indication of need for surgery was clinical-hemodynamic instability. Further, the reasons for surgical intervention in the non-operative group varied within the surgical panel responsible for the decisions that included both clinical and CT criteria.

In our study the patients who survived were hemodynamically stable in the majority of cases (86%) and the subset in which patients died, majority were unstable (14%). The most common coexisting injury was found to be fracture of ribs (12%), followed by head injury (10%) and ileal perforation (10%) but in almost half of the cases no

coexisting injury was found (48%). Also, few patients had Polytraumas with multiple organs injured which needed urgent management. In the most of cases splenectomy was done as an operative procedure (73%) and Splenorrhaphy was done in (14%), while around 9% patients were managed using conservative measures.

In our study, maximum numbers of patients were found to be of grade III, followed by grade IV injury. These grades are found to be similar in study by Mario *et al.* The spectrum of complications revealed pneumonia as the most common in the patients amounting to 14% followed by surgical site infection and wound gaping. These findings are also similar to the study by Mario *et al.* In the given study 7 patients died amounting to 13.46% of total sample size and among them majority had grade III or higher injury with coexisting injuries and were highly unstable on clinical presentation which was similar to Mario *et al.* The exploratory laparotomy was done and was found to be the best investigation as well as treatment modality for the patients with hemodynamically unstable splenic trauma. Sequelae of OPSI must be kept always in mind after splenectomy which can be managed by educating the patient about early hospitalisation and prompt treatment.

Conclusion

Splenic injury is a real threat after blunt abdominal trauma in young population. Immediate hospitalisation, investigation and operative intervention saves the patient however death may occur in higher grade injury probably due to unstable condition when they present. Splenic trauma diagnosed early and treated immediately can save the patient's life.

Conflict of Interest

Not available

Financial Support

Not available

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