International Surgery Journal
Nar AS et al. Int Surg J. 2019 Nov;6(11):4090-4094
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20195128

Original Research Article

Outcomes in splenic injury at a high volume tertiary care centre

Amandeep S. Nar, Harpreet S. Lubana, Harmandeep S. Jabbal*, Ravinderpal Singh, Atul Mishra, Chamanjot S. Birring

Department of Surgery, Dayanand Medical College and Hospital, Ludhiana, Punjab, India

Received: 12 September 2019
Accepted: 17 October 2019

***Correspondence:**
Dr. Harmandeep S. Jabbal,
E-mail: harmandeep.s.jabbal@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: The objective of the present study was to study the outcomes of patients following splenic injury at a tertiary care centre.
Methods: This prospective study was conducted over a period of 2 years, from January 2017 to December 2018, at Dayanand Medical College and Hospital, Ludhiana to include all patients presenting to the emergency department with splenic injury diagnosed on focused abdominal sonography in trauma (FAST)/contrast enhanced computed tomography (CECT) abdomen. 60 cases were studied over this time-period. After thorough a work-up, patients were either managed conservatively or by surgical intervention. The results were recorded in a predesigned proforma and the statistics were analyzed to determine the outcome of splenic injury patients at DMCH, Ludhiana.
Results: Among 10% of cases were Grade-V (American Association for Surgery in Trauma (AAST) grading), all of whom required surgical intervention. 3.3% of cases with lesser grade of injury required surgical intervention due to other reasons. 86.7% were managed conservatively. Mean length of stay was 10.9 days. 83.4% of cases were discharged in stable condition with 13.3% cases being discharged against medical advice and a mortality rate of 3.3%.
Conclusions: Majority of patients (86.7%) with splenic injury can be managed conservatively. Surgical intervention is only indicated in patients with Grade-V AAST injury (10%) or in patients with concomitant injury to other organs requiring laparotomy (3.3%). In essence, early diagnosis with FAST and CECT abdomen is the cornerstone in the management of splenic injury, which can help trauma surgeons establish an early management protocol for the better outcome of patients with splenic injury. However, a study with greater sample size is required to further establish the principles of management of splenic trauma in this region.

Keywords: Abdomen, Exploratory laparotomy, American association for surgery in trauma, Contrast-enhanced computed tomography

INTRODUCTION

Traumatic injuries are the major cause of mortality in the under 40 year old population and abdominal trauma is the third common trauma with a high rate of morbidity and mortality.[1-3] Rapid diagnosis and treatment can decrease the rate of abdominal trauma related mortality, up to 50%.[4] Immediate referral of the victim to a trauma center and timely diagnosis and treatment play a key role in improvement of patient outcome. When a patient with suspected blunt abdominal trauma is presented to emergency department, the physicians look to determine the presence of intra-abdominal injuries and predict patient outcome.[5] The spleen is one of the most commonly injured organs in blunt abdominal trauma.[6] The spleen is particularly vulnerable to injury by virtue of its position and its fragile capsule. Advanced trauma life support (ATLS) has been recognized globally as the best modality in assessing polytrauma patients. This system provides a systematic approach of managing the patients. It begins with assessment of life threatening conditions first (primary survey), followed by serial sequential

valuations to exclude other injuries (secondary survey) and finally a more comprehensive evaluation to identify any pre-existing conditions present (tertiary survey).[7]

During the initial assessment of the polytrauma patient, time is always of the essence. Hence, early identification of life threatening conditions and prompt initiation of definitive care are crucially important. A focused abdominal sonography in trauma (FAST) is the earliest radiological modality utilized to exclude, presence of a cardiac tamponade as well as the presence of haemoperitoneum in a traumatized patient.[8] Other radiological evaluations may be employed such as Computer aided tomography scans (CT scans) or X-rays, once the patient has been stabilized. The problem of missed injuries has been noted for a long time. This has been alluded to: clinical and radiological misdiagnoses, the lack of equipment and the lack of experience. Commonly missed clinically significant injuries include: diaphragmatic, splenic, liver, duodenal, pancreatic, renal and colonic injuries. At this point if the patient is found to have splenic laceration it is graded according to the AAST splenic injury scale. This study conducted in the department of General Surgery at Dayanand Medical College and Hospital, reviewed the management and outcome of patients with diagnosis of splenic trauma diagnosed on CT scan or ultrasound abdomen.

The hemodynamically stable trauma patient with splenic injury identified on CT scan may be initially observed or undergo angiographic embolization as an adjunct to observational management. However, observational management requires adequate resources, and if unavailable, initial surgical management should be considered depending on the patient's medical comorbidities.

Grade-V injuries with hemodynamic instability warrant an early surgical intervention. Indications for surgical exploration in the hemodynamically stable trauma patient with splenic injury who is being nonoperatively managed (i.e., observation with or without splenic embolization) include:

- Signs of other intra-abdominal injury (e.g., free air, peritonitis) necessitating exploration.
- Failure of nonoperative management.

METHODS

This prospective study was conducted over a period of 2 years, from January 2017 to December 2018, at Dayanand Medical College and Hospital, Ludhiana to include all patients presenting to the emergency department with splenic injury diagnosed on FAST/CECT abdomen. 60 cases were studied over this time-period after obtaining consent for inclusion to the study. After a detailed history and clinical examination, routine investigations including hemogram, RFT, amylase, lipase, chest X ray, FAST, ultrasound and CECT abdomen as indicated was done. After a thorough a work-up, American Association for Surgery in Trauma (AAST) grading scale was used to formulate a treatment plan. Patients were either managed conservatively or by surgical intervention. The results were recorded in a predesigned proforma and the statistics were analyzed to determine the outcome of splenic injury patients at DMCH, Ludhiana.

Table 1: AAST grading scale for splenic injury.

Grade		Injury description
I	Haematoma	Subcapsular, <10 % surface area
	Laceration	Capsular tear,<1 cm parenchymal depth
II	Haematoma	Subcapsular 10-50 % surface area Intraparenchymal <5 cm in diameter
	Laceration	Capsular tear, 1-3 cm parenchymal depth that does not involve a trabecular vessel
III	Hematoma	Subcapsular, >50 % surface area or expanding ruptured subcapsular or parenchymal hematoma: intraparenchymal hematoma >5 cm or expanding
	Laceration	>3 cm parenchymal depth or involving trabecular vessels
IV	Laceration	Laceration involving segmental or hilar vessels producing major devascularization (>25 % of spleen)
V	Laceration	Completely shattered spleen
	Vascular	Hilar vascular injury with devaascularizes spleen.

- Time of surgery (if performed) after the trauma was noted along with the post op complications.
- Stay of the patient in ICU or ward noted in days.

Outcome of the patient noted after 4 weeks of the trauma episode. Most of the operated patients had uneventful recovery. Diagnosis of the pathology was confirmed by histopathology reports.

Patients were asked to present themselves for follow up during at regular intervals. Relevant data was collected in specifically designed case sheets.

Statistical analysis was done by using descriptive and inferential statistics using Chi-square test and software used in the analysis were SPSS 17.0 version and graph pad prism 5.0 version and $p<0.05$ was considered as level of significance.

RESULTS

In this study, author used AAST splenic injury grading scale to define the grade of injury. Following is the distribution of various grades on injury in 60 patients that were a part of the study.

Table 1: Distribution of subjects on the basis of AAST splenic injury grading.

AAST grade	No. of cases	Percentage
Grade 1	10	16.7
Grade 2	26	43.3
Grade 3	16	26.7
Grade 4	2	3.3
Grade 5	6	10.0
Total	60	100.0

Majority of the patients (70%) sustained Grade II and Grade III injuries. In this study, splenectomy was required in all patients of Grade-5 injury. 2 patients with Grade-2 underwent exploratory laparotomy due to associated injuries. 86.7% of cases were managed conservatively. It was seen that average hospital stay for splenic trauma patient was 11.8 days with a mean 5 days ICU stay and 6.8 days stay in the ward.

Author noted that blood products were required in 50% of patients with splenic injury. 22 patients out 60 (42.3%) who required blood products were conservatively managed and all patients (13.3%) who underwent surgical intervention required blood products.

50 out of 60 patients (83.3%) were discharged in stable condition and 8 patients took discharge against medical advice. Mortality rate in this study was 3.3% (2 out of 60 patients).

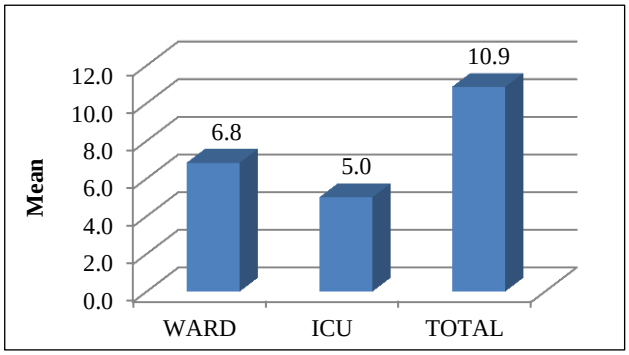

Figure 2: Distribution of subjects on the basis of duration of hospital stay.

Table 2: Distribution of subjects on the basis of AAST splenic injury grading and its management.

AAST grade		Conservative management		Surgical management	Total	Chi-square value	P-value
Grade 1	8	15.4%	2	25.0%	10	23.077	0.000
Grade 2	26	50.0%	0	0.0%	26		
Grade 3	16	30.8%	0	0.0%	16		
Grade 4	2	3.8%	0	0.0%	2		
Grade 5	0	0.0%	6	75.0%	6		
Total	52	100.0%	8	100.0%	60		

Table 3: Distribution of subjects on the basis of blood products required.

			Conservative management		Surgical management	Total	Chi-square value	P-value
Blood products required	No	30	57.7%	0	0.0%	30	4.615	0.032
	yes	22	42.3%	8	100.0%	30		
Total		52	100.0%	8	100.0%	60		

DISCUSSION

Road traffic accident forms the single most important cause for splenic injury abdomen in this study. This assumes all the more significance because people involved in RTA are in their most active and productive phase of life. By the year 2020 road traffic accidents will be the second most important cause of death in developing nations. Prevention is better than cure. A 10% increase in speed translates into 40% rise in case fatality risk for the occupants of motor vehicle. Use of seat belts reduces the risk of death or serious injury for front seat occupants by 45%. Helmets reduce the risk of fatal head injury by about one-third and reduce the risk of facial injury by two thirds. Among persons who ride two wheelers. Avoiding alcohol before driving is an important preventive step. In the management of poly trauma patients, the steps in the ATLS philosophy should be followed.

- Primary survey with simultaneous resuscitation of the patient.
- Secondary survey to proceed and identify all other injuries.
- Tertiary survey and definitive care of the injuries.

The steps in the primary survey are:

- Airway with stabilization of cervical spine.
- Breathing and oxygen supplementation.
- Circulation and hemorrhage control.
- Disability evaluation.
- Exposure and complete examination.

In this study of 60 patients, who were admitted in triage ward, met with deceleration type motor vehicle accident, a driver with a driver's side impact type motor vehicle accident or any patient with a direct blow to the left lower ribs or left upper quadrant of the abdomen.

There is no substitute to a thorough history and clinical examination to arrive to an early diagnosis. This can be augmented with the use of imaging investigations like FAST and CECT Abdomen to correctly grade the severity of injury. Using AAST injury scale can help in deciding the type of management that is required, along with better outcomes of patients.

Clinical examination has been found to be the corner stone for primary assessment of blunt abdominal trauma patients.[9] In this study, author found abdominal distension and tenderness to be the most common positive findings in about 75% cases which was consistent with the existent literature.[10]

In this study the most common grades of splenic injury were Grade II and III (According to AAST grading system on CECT abdomen) comprising 70% of the patients. Savage and colleagues found that 80% of patients with lower-grade (AAST grades I-II) injuries showed complete healing of the spleen by post-injury day 50.[11] Among 13.3% (8 out of 60) of the patients were managed surgically. Majority of these (75%) were Grade-V injury, reinstating the fact that Grade-5 injury can have better outcome with an early surgical intervention. 2 out 60 cases underwent surgical exploration due to associated injuries to the mesentery, colon etc.

Roberto Cirocchi et al, in their study stated Non-Operative Management as the treatment of choice for grade I, II and III blunt splenic injuries. Splenectomy was the chosen technique in patients who met exclusion criteria for NOM, as well as for patients with grade IV and V injury.[12]

Among 86.7% cases in this study were managed conservatively, establishing the use of AAST Grade to define the management protocol. 83.3 % patients were discharged in stable condition and the mortality rate was only 3.3% as compared Pitcher et al, who reported an overall mortality rate of 10% about three decades.[13] It is evident that with the advent of better imaging technology like FAST and CECT abdomen coupled with an efficient AAST injury scale, a surgeon can provide better outcomes to splenic injury patients.

CONCLUSION

Author conclude that early diagnosis and grading is paramount in determining the morbidity and mortality due to splenic injury. CECT abdomen is the most sensitive imaging modality in diagnosing splenic trauma. Surgical management is needed mostly in Grade V injuries while Grade I, II, III, IV injuries can be managed conservatively with close monitoring.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Miniño AM, Heron MP, Murphy SL, Kochanek KD. Deaths: final data for 2004. Natl Vital Stat Rep. 2007;55:1-119.
2. Hofman K, Primack A, Keusch G, Hrynkow S. Addressing the growing burden of trauma and injury in low-and middle-income countries. Am J Pub health. 2005;95(1):13-7.
3. Sabzghabaei A, Shojaee M, Safari S, Hatamabadi HR, Shirvani R. The accuracy of urinalysis in predicting intra-abdominal injury following blunt traumas. Emerg. 2016;4(1):11.
4. Chardoli M, Rahimi-Movaghar V. Analysis of trauma outcome at a university hospital in Zahedan, Iran using the TRISS method. East Afr Medi J. 2006;83(8):440-2.
5. Shojaee M, Dolatabadi AA, Sabzghabaei A, Malekirastekenari A, Faridaalaee G, Yousefifard M, et al. New scoring system for intra-abdominal injury diagnosis after blunt trauma. Chin J Traumatol. 2014;17(1):19-24.
6. Brady RR, Bandari M, Kerssens JJ, Paterson-Brown S, Parks RW. Splenic trauma in Scotland: demographics and outcomes. World J Surg. 2007;31(11):2111-6.
7. Advanced Trauma Life Support® Manual. 8th ed. 2010.
8. Van der Vlies CH, Van Delden OM, Punt BJ, Ponsen KJ, Reekers JA, Goslings JC. Literature review of the role of ultrasound, computed tomography, and transcatheter arterial embolization for the treatment of traumatic splenic injuries. Cardio Int Radiol. 2010;33(6):1079-87.
9. Brown CK, Dunn KA, Wilson K. Diagnostic evaluation of patients with blunt abdominal trauma: a decision analysis. Acad Emerg Med. 2000;7(4):385-96.

10. Schiffman MA. Nonoperative management of blunt abdominal trauma in pediatrics. Emerg Med Clin North Am. 1989;7(3):519-35.
11. Savage SA, Zarzaur BL, Magnotti LJ, Weinberg JA, Maish GO, Bee TK, et al. The evolution of blunt splenic injury: resolution and progression. J Trauma Acute Care Surg. 2008;64(4):1085-92.
12. Cirocchi R, Corsi A, Castellani E, Barberini F, Renzi C, Cagini L, et al. Case series of non-operative management vs. operative management of splenic injury after blunt trauma. Ulus Travma Acil Cerrahi Derg. 2014;20(2):91-6.
13. Pitcher ME, And RC, Mackay JR. Splenectomy for trauma: morbidity, mortality and associated abdominal injuries. Aust New Zeal J Surg. 1989;59(6):461-3.

Cite this article as: Nar AS, Lubana HS, Jabbal HS, Singh R, Mishra A, Birring CS, Outcomes in splenic injury at a high volume tertiary care centre. Int Surg J 2019;6:4090-4.