

MANAGEMENT OPTIONS IN SPLENIC TRAUMA – OUR EXPERIENCE

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ABSTRACT

Introduction: The spleen is a lymphoreticular organ situated in upper left quadrant of the abdomen which is extremely friable and highly vascular organ, and very prone to injury during trauma to abdomen (both blunt and penetrating, although more common in blunt trauma). Splenic trauma is most commonly seen to occur following motor vehicle accidents (RTA), though it can also result following falls, sport related activities or assault. **Materials and Methods:** During the period of study from 1st June 2018 to 31st May 2019, 50 patients with splenic trauma admitted in Department of Surgery, GMCH were taken up for the purpose of study. Appropriate investigations like hematological investigations, X-ray chest and abdomen, ultrasonography, CT scan and angiography were done as required in those cases of splenic injury. Either non-operative or operative management was done in these cases depending upon the situation. **Results and Observations:** Our study population comprised 50 patients of splenic injury following blunt trauma out of which 46 patients were male (92%) and 4 patients were female (8%) with a ratio of 11.5:1. Majority of the cases were observed in second and third decade of life and the most common cause was found to be motor vehicle accidents (60%). 28 patients (56%) presented with mild to severe pain abdomen, 14 patients (28%) with distension of abdomen, 10 patients (20%) with dyspnoea, 5 patients (10%) with vomiting and 4 patients (8%) with oliguria. Physical findings on abdominal examination in order of frequency were tenderness in 27 cases (54%), abdominal distension in 14 patients (28%), tenderness in chest in 14 patients (28%), shock in 5 patients (10%), rigidity in 6 cases (12%), absent bowel sound in 2 patients (4%) and pallor in 8 patients (16%). Out of 50 patients with splenic injury, 12 patients (24%) had associated chest injury, 10 patients (20%) had renal injury, 10 patients (20%) had hepatic injury, 5 patients (10%) had head injury and 4 patients (8%) had bowel injury. Most of the patients, i.e., 5 in numbers were operated within 7-12 hours of presentation to hospital (28.56%). All the operative procedure were splenectomy. **Conclusion:** It has been found that splenic injury is very common following road traffic accidents, that too, among the male population between the age of 15-25 years. Careful physical examination is the key factor in early diagnosis. Investigation reports are complementary to physical findings. Great number of patients, except a few, sustaining blunt abdominal injury can be saved, provided they reach the hospital early. Early hospitalization, better methods of diagnosis, proper timely surgical intervention, availability of blood transfusion, close clinical observation and nursing care are have allowed reliable identification of variables that can guide the surgeon either to immediate laparotomy, angiography, or a non-operative course.

INTRODUCTION

The spleen is a lymphoreticular organ which is extremely friable and highly vascular, and most prone to injury during trauma to abdomen following motor vehicle accidents (RTA), though it can also result following falls, sport related activities or assault. A review of world literature indicates that the reasons of routine splenectomy for trauma can be traced to four sets of

misconceptions, passed on from generation to generation by surgeons viz.:

- The spleen has no function and is therefore not essential for life
- Non-operative management carries a high mortality of 90-100%
- Imminent danger of delayed rupture, if the spleen is not removed

(d) The spleen is a friable, vascular organ and, therefore, splenic lacerations cannot be safely sutured.

Early diagnosis and management of splenic injury is vital. Improvement in assessment of injury with adjuncts such as Focused Assessment with Sonology in Trauma (FAST), abdominal Computed Tomography (CT) have allowed reliable identification of splenic injury. Treatment options for splenic injury vary from non-operative management to operative management, which is still a challenge to surgeons and is sometimes complicated by life threatening complications.

AIMS AND OBJECTIVES

1. To study about the different types of clinical presentations of splenic injury.
2. To study various management options and their outcome in study period.

MATERIALS AND METHODS

It is a prospective clinical study conducted in Gauhati Medical College and Hospital in the period of 1 year from 1st June 2018 to 31st May 2019, wherein, 50 patients with splenic trauma admitted in Department of Surgery were taken up for the purpose of study.

Patient selection: Patients selected for this study are those diagnosed with splenic injury either pre-operatively or post-operatively.

Exclusion criteria: Iatrogenic injury of spleen, if any, done accidentally while performing abdominal surgery.

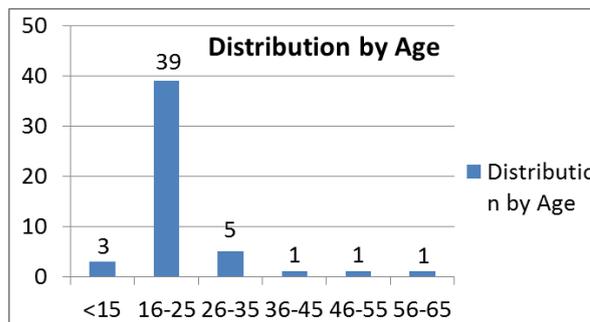
Methods of data collection: Appropriate investigations like hematological investigations, X-ray chest and abdomen, ultrasonography, CT scan were done as required in those cases of splenic injury. Either non-operative or operative management was done in these cases depending upon the situation. A proforma was used to collect relevant information (patient data, clinical findings, lab investigations, operative findings, procedure performed, and post-operative complications) from all the selected patients.

RESULTS AND OBSERVATIONS

Our study population comprised of 50 patients of splenic injury following blunt trauma abdomen out of which 46

patients were male (92 %) and 4 patients were female (8 %) with a ratio of 11.5:1

Majority of the cases were observed in second and third decade of life



Most common cause was found to be motor vehicle accidents (road traffic accidents) – 60 %. Other causes were fall from height (14%), physical assault (12%), sports injury (6%), animal attack (4%)

The most common symptom at the time of presentation is found to be pain abdomen (56%) followed by abdominal distension (28%), dyspnea (20%), vomiting (10%), oliguria (8%)

Most common finding is tenderness in left hypochondrium (54%), distension of abdomen (28%), tenderness in left chest (28%), pallor (16%), abdominal rigidity (12%), shock (10%) and absent bowel sounds (4%)

Associated injuries such as hemothorax with rib fractures (24%), liver injury (20%), head injury (10%), renal injury (20%) or bowel injury (8%) were also seen in certain patients, most common association being blunt chest injury

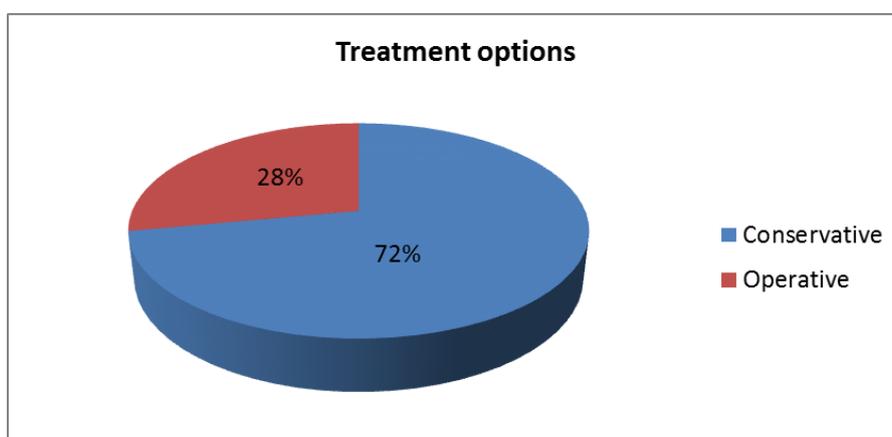
Ultrasonography could detect splenic injury in 88% of the cases; and revealed blood in peritoneal cavity in 78% of the cases.

41 patients had undergone CT scan of abdomen. 80% patients had findings corresponding upto Grade III splenic injury. 20% had Grade IV or Grade V splenic injury.

SL. No.	Findings	No. of cases	Percentage
1	Splenic injury involving trabecular vessels (Grade III)	8	19.51%
2	Subcapsular haematoma > 50% surface area (Grade III)	6	14.62%
3	Subcapsular haematoma < 10% surface area (Grade I)	7	17.07%
4	Subcapsular haematoma involving 10-50% (Grade II)	5	12.20%

5	Intra-parenchymal laceration 1-3 cm not involving trabecular vessels (Grade II)	5	12.20%
6	Hilar vessel injury, intra-parenchymal haematoma with devascularisation > 25-75% (Grade IV)	3	7.32%
7	Splenic contusion with devascularisation (Grade V)	3	7.32%
8	Shattered spleen (Grade V)	2	4.88%
9	Intra-parenchymal haematoma \geq 5cm (Grade III)	2	4.88%
TOTAL		41	100%

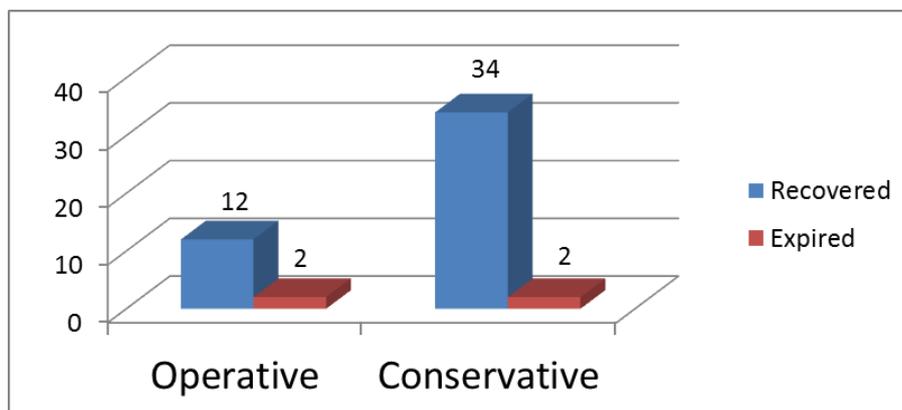
Out of 50 patients 36 (72 %) were managed conservatively. Rest of the 14 patients (28 %) had undergone operative management



Out of the 14 cases operated, all underwent splenectomy. 10 out of the 14 cases were operated by a standard midline laparotomy incision whereas 4 cases required a lateral extension for better exposure and rapid control of bleeding

On laparotomy, blood in peritoneal cavity was found in all cases. The procedure executed in all cases were splenectomy 3 patients had wound infection post-operatively, which accounted for 21% of the total operated cases. Other complications seen were pancreatic fistula (1), chest infection (1) and intra-peritoneal abscess (1)

In our study, total 4 patients (8%) had expired, 2 patients (4%) died in the operative group and 2 patients (4%) expired in the non-operative group. Both patients in the operative group succumbed to post-operative sepsis (on Day 4 and Day 5 respectively) whereas two patients in the non-operative group succumbed to sudden onset hypovolemic shock (in an otherwise hemodynamically stable patient) which might be due to sudden dislodgement of clot/hematoma and subsequent bleeding.



SUMMARY

In our study, it was found that splenic injury following blunt trauma abdomen is much more commonly seen in males in the age group of 15 to 25 years and the most common cause was found to be road traffic accidents (60%). Clinical presentations at the time of admission were abdominal pain (most common- 56 %), abdominal distension, dyspnea, vomiting, oliguria and shock. Physical signs most commonly seen were tenderness in left hypochondrium (54%), tenderness over left chest, rigidity, pallor, absent bowel sounds. Associated injuries such as chest injury, injury of other abdominal viscera such as liver and kidney, bowel injury, head injury were seen; most common of them being chest injury (24%). Out of the 50 cases with splenic injury, 36 cases were managed conservatively and 14 patients needed operation. All the operative procedures done were splenectomy. All patients who underwent splenectomy were vaccinated with meningococcal, pneumococcal and *Hemophilus influenzae* type B vaccine. Overall mortality rate in our study was 8 % (4 patients). Two cases were from non-operative group and 2 cases from operative group. Success rate in non-operative group was 94.44%

DISCUSSION

Accuracy of USG abdomen (FAST): In our study, out of the 50 patients, USG-FAST could detect splenic injury in 44 patients pre-operatively with an accuracy of 88 %.

Karen J. Brasel et al stated that ultrasound had an accuracy of 95.6 % in trained hands.

Authors	Years	Success rate for NOM
Cogbill	1989	72-93%
Mathew J. Kuehnert	1993	83%
Myers et al	1999	93%
Rajani RR et al	2006	77-96%
George C. Velmahos, MD, PhD et al	2010	62%
Mayur R. Dalvi, A.N. Beedkar et al	2016	66.66%
Present study	2019	94.44%

The average hospital stay in *operative group was 8 days* and in the *non-operative group was 12-14 days*. Patients were advised to avoid exertional activity for a period of 3 months. The finding is more or less similar to report of *Satish D et al*, and *T.T. Changlani et al (1990-1994)*

CONCLUSION

Great number of patients, except a few, sustaining blunt abdominal injury can be saved, provided they reach the hospital early. Early hospitalization, timely diagnosis and surgical intervention, availability of blood transfusion, close clinical observation and nursing care are important contributory factors for reduction in mortality resulting from blunt splenic trauma.

Rozycki et al stated specificity of 99.7% and sensitivity of 81.5%

Mathew J Kuehnert stated ultrasonography was able to detect fluid including hemoperitoneum in 25 out of 25 (100%) patients and isolated splenic parenchymal injuries in 22 out of 25 patients (88 %)

Incidence of splenectomy in our study was 28% which is lower than various studies as shown in the table below which indicates that non-operative management is becoming more popular and effective with time with the advent of adjuncts such as FAST and CECT abdomen and better monitoring techniques.

Authors	Years	Splenectomy rate
Dr Stuart Thompson et al	1956-65	58%
Mathew J. Kuehnert	1993	8%
Satish D et al	1995	74%
Karen J Brasel et al	1998	42%
Khanna et al	1999	26%
Present study	2019	28%

Success rate of non-operative management in our study was found to be 94.44%; which is better than many other studies shown in the table below; indicates that conservative or non-operative management when executed with proper strict monitoring, close clinical observation, availability of blood transfusions, timely review of intra-abdominal status with ultrasonography, and timely intervention if needed any; can effectively curb the need for splenectomy and its subsequent immediate and long-term complications.

Improvements in assessment of injuries with adjuncts such as the FAST and higher resolution CT scanners; facilities for close monitoring of hemodynamically stable patients; and round the clock availability of medical staff and facilities for emergency operation whenever required have improved the success rate of non-operative management for splenic trauma in recent times.

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