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Splenic Trauma Management in a Tertiary Care Hospital

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Abstract

Background: Splenic injuries are one of the most common injuries sustained following blunt abdominal trauma all over the world. Significant mortalities and morbidities result due to splenic injury. Hence prompt diagnosis followed by optimal and effective treatment is the cornerstone for saving lives in this group of patients. Aims & Objective: Our study aims to find out the incidence, the treatment modalities, and the outcome of complications following splenic injury. **Materials and Method:** We did a prospective study including the patients attending the emergency department of Assam Medical College with splenic trauma with or without any other organ injuries following trauma for a period of 1 year. After clinical examination, we used USG(FAST) in the emergency setting and CECT to confirm and grade the injuries and accordingly imparted treatment for splenic injuries in either the conservative (Non-Operative) or Surgical line. We carefully watched for any post-operative complications that developed in some cases and also the overall outcome of patients in regard to mortality and morbidity. **Result:** Out of 36 patients with splenic injury all were following blunt trauma with maximum incidence in the age group of 30-39 years with 15 patients (50%) having Grade II and 8 patients (26.67%) having Grade I splenic injury on CECT. 31(86.11%) patients were treated conservatively (Non-operatively) while 5(13.89%) patient were treated surgically with death of total 2(5%) patients from the each group.

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Introduction

Trauma is globally the leading cause of death among people under the age of 45 years.[1] The liver and spleen are the two most common organs that sustain injury following blunt abdominal trauma.[2] Only splenic injuries can be found in about one-third of abdominal trauma and in 25–30% of patients who suffered a traffic accident.[3] As the spleen is highly vascular, splenic injury can be potentially life-threatening due to bleeding[4]. A general consensus of trauma admissions at Level 1 trauma centers across the country suggests splenic injury occurs in as many as 25% of the average 800-1200 admissions for blunt trauma per year.[5] The common causes include road traffic accidents, fall from height, and penetrating injuries such as gunshot and stabbing.[2, 6]

A ruptured spleen may present in 3 ways –

1. The patient succumbs rapidly from massive hemorrhage usually because of trauma.

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2. Initial shock, recovery, signs of late bleeding—the initial shock is due to blood loss, tamponade occurs and further bleeding takes place.
3. The delayed case—the initial sign of splenic injury may pass quickly ornot be recognized but delayed rupture can occur.[7]

Radiological classification of splenic injury is now well established and can help the clinician identify patients who can be managed non-operatively.[7] The diagnosis and prompt management of potentially life-threatening hemorrhage is the primary goal. In selected patients, it may be accomplished by using non-operative management or operative salvage techniques.[6] Non-operative management of these injuries has evolved over the past two decades.[8]

Hemodynamically stable patients with spleen injuries detected by CT are managed non-operatively. Focused assessment with sonography for trauma (FAST) examination has replaced diagnostic peritoneal lavage as a diagnostic modality. Hemodynamically stable patients can be managed by conservative means, angiography, and embolization or operative salvage like selenography, partial splenectomy, subtotal splenectomy, or deliberate autotransplantation.[9,10] The treatment method employed depends on the grade of splenic injury, hemodynamic stability of the patient, associated injuries, anesthetic technique, laboratory backup, and the experience of the surgeon.[11-13]

The present study has been undertaken to evaluate the pattern of splenic injury arising following trauma, with special reference to its management and outcome, keeping in mind the recent trend of managing patients, both with nonoperative as well as operative methods.

Aims: To manage and evaluate the outcome of patients with splenic injuries following trauma attending the different surgical units of Assam Medical College and Hospital during the study period.

Objectives

1. To study the appropriate line of management depending on the Grade of splenic injury.
2. To study the outcomes of surgical and nonsurgical management.

Materials And Methods

Place Of Study: The study was conducted in the Department of General Surgery, Assam Medical College &Hospital, Dibrugarh

Duration Of Study: One year

Type Of Study: Hospital Based Prospective Study

Study Population: Patients with splenic injury admitted to Assam Medical College & Hospital, Dibrugarh

Inclusion Criteria: All patients of trauma with diagnosed splenic injury, admitted in different General Surgical Units of AMCH, during the study period were taken up for the study.

Exclusion Criteria: All Patients with splenic injury admitted to the Paediatrics surgery Ward of AMCH were excluded.

Statistical Analysis

Statistical analysis was done in terms of range, mean ± standard deviation (±SD), frequencies (number of cases), and relative frequencies (percentages) when appropriate. All statistical calculations were done using computer programs Microsoft Excel 2010 and SPSS (Statistical Package for the Social Sciences).

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Results And Observations

The present study comprises 50 cases of splenic injuries following trauma.

Some of the patients had multiple injuries and all patients were thoroughly evaluated with respect to their clinical and investigative findings. The following observations were made during the course of the study.

TABLE 1: TYPE OF INJURY IN SPLENIC INJURY CASES

TYPE OF INJURY	**NUMBER *(n)***	**CENTAGE(%)**
Blunt	36	100.00
Penetrating	0	0.00
TOTAL	36	100.00

All the patients with splenic injuries were due to blunt trauma.

TABLE 2: AGE-WISE DISTRIBUTION OF PATIENTS

AGE GROUP *(in years)*	**NUMBER *(n)***	**CENTAGE(%)**
<20	0	0.00
20—29	9	25.00
30—39	12	33.33
40—49	6	16.67
50—59	5	13.89
>/=60	4	11.11
MEAN ± S.D.	7± 13.30 years	

The majority of the splenic injury patients belong to the age group of 30-39 years comprising 12 patients(33.3%).

TABLE 3: CECT GRADING OF THE SPLENIC INJURY PATIENTS

CT ABDOMEN (GRADE)	**NUMBER *(n)***	**CENTAGE(%)**
Grade I	8	26.67
Grade II	15	50.00
Grade III	4	13.33
GradeIV	2	6.67
Grade V	1	3.33
TOTAL	30	100.00

Most of the patients belonged to the group of Grade-II(no-15;50%) splenic injury followed by Grade-I(no-8;26.67%) splenic injury.

TABLE 4: RATIO OF OPERATIVE TO NON-OPERATIVE TREATMENT

MANAGEMENT	**NUMBER *(n)***	**CENTAGE(%)**
Conservative (Non-operative)	31	86.11
Operative	5	13.89
TOTAL	36	100.00

Most of the patients were treated conservatively (31;86.11%) while 5 patients underwent

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operative intervention.

TABLE 5: TYPE OF SURGERY PERFORMED IN PATIENTS

PROCEDURE	**NUMBER OF CASES**
Only Splenectomy	2
Splenectomy + Hepatorrhaphy	1
Splenectomy +Repair of pancreatic tail	1
Splenorrhaphy	1

Splenectomy was done in 2 patients out of 5 while the rest of each underwent Splenorrhaphy, Splenectomy with hepatorrhaphy and splenectomy with the repair of the tail of the pancreas.

TABLE 6: INTRA-OPERATIVE GRADING OF SPLENIC INJURY

OPERATIVE FINDING (GRADE)	**NUMBER *(n)***	**CENTAGE(%)**
Grade I	0	0.00
Grade II	0	0.00
Grade III	1	20.00
Grade IV	3	60.00
Grade V	1	20.00
TOTAL	5	100.00

3 out of 5(60%) operated patients had grade IV splenic injury. One had grade III and rest one had grade V splenic injury.

TABLE 7: POSTOPERATIVE COMPLICATIONS

POSTOPERATIVE COMPLICATIONS	**NUMBER *(n = 5)***	**CENTAGE(%)**
Wound Infection	2	40.00
Wound Dehiscence	0	0.00
Intra-abdominal Collection	0	0.00
Sepsis	1	20.00
Respiratory Complication	1	20.00
Others (if any)	0	0.00

Wound infection was found to be the most common post-operative complication.

TABLE 8: MORTALITY IN OPERATIVE AND CONSERVATIVELY TREATED PATIENTS

TYPE OF TREATMENT	**NUMBER OF CASES *(N)***	**NUMBER OF DEATH *(N)***
OPERATIVE	5	1
CONSERVATIVE	31	1
TOTAL	36	2

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One out of five patients treated surgically succumbed while one out of 31 patients treated conservatively died.

Discussion

The present study was done from the time of admission to discharge or death. After thorough history taking of the injury and presenting complaints, clinical findings were recorded. Investigation reports were assessed and patients were managed accordingly. The results of therapy whether conservative or operative, were evaluated and complications if present were dealt with.

The people in the group 30- 39 years are most commonly involved in blunt trauma which is comparable to Pinjala N *et al*[5] (2016) where it has been clearly stated that the people in the age group 21-40 years are most commonly involved.

CECT was done in 30 cases. 3 patients could not afford due to financial constraints and 3 patients were hemodynamically unstable and were taken directly to the OT on clinical diagnosis for exploratory laparotomy. Computed tomography (CT) could easily provide reliable information on haemoperitoneum, the extent of splenic injuries and ongoing bleeding by means of radiographic blush. Grading of injuries was done accurately on CT. CT findings in 3 of the operated cases were correlated and found to be correct. The remaining 27 cases were treated conservatively depending on CT findings and were improving. In Clancy TV *et al*[14] (1997) and Malhotra AK *et al*[15] (2000) study, it was concluded that in a hemodynamically stable patient, if the liver or splenic injury is detected by CT, nonoperative management with close observation, serial examinations, and hematocrits is now standard. Overall, the sensitivity and specificity of CT in the detection of splenic injury is close to 100%.

In the present study, out of 36 cases with splenic injury, 31 cases (86.33%) were managed non-operatively. Only one patient died in this group, thus showing a success rate of 96.77% with conservative treatment. Raza *et al*[16] *(2013)* reported a success rate of 90% in non-operative management of intra-abdominal solid organ injury. There were no significant differences between the operated and NOM groups in relation to age, co-morbidities, and mechanism of injury. Blood transfusion requirement, morbidity, mortality, and incidence of non-therapeutic laparotomy were significantly reduced with NOM. Historically, as NOM was associated with a high mortality rate, surgical management was the preferential treatment for most blunt abdominal injuries. However, a lot of the laparotomies were unnecessary and non-therapeutic. With the improved quality and wide availability of CT scanning and the more modern less invasive intervention options, such as angio-embolization, NOM has evolved into the treatment of choice for hemodynamically stable patients.

The criteria for nonoperative management of splenic injuries in adults included:

1. Hemodynamically stable after minimal fluid resuscitation;
2. Splenic injury documentation by imaging techniques;
3. Absence of a serious associated intra-abdominal injury; and

No altered level of consciousness that may interfere with serial abdominal examinations.

In the present study, 5 cases (13.89%) were only operated out of 36 patients with splenic injury. In operated cases, the grade of splenic injury was as follows: grade III in 1 case (20%), grade IV in 3 cases (60%), and grade V in 1 case (20%). In non-operative cases, 28 patients had done CECT abdomen and the grade of splenic injury was as follows: grade I in 8 cases, grade II in 15 cases, grade III in 4 cases, and grade IV in 1 case.

On laparotomy, splenic injuries varied from large subcapsular hematoma with intraparenchymal laceration, and laceration with involvement of hilar vessels to completely shattered spleen, and splenectomy was performed in all those cases because of hemodynamic instability and severity of injury. Splenectomy was done in 4 cases. Splenorrhaphy was done

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in one case. In these four splenectomy cases, hepatorrhaphy was also done in one case for associated liver injuries. Repair of the pancreatic tail was done in 1 patient with pancreatic injury associated with splenic injury. Carlin *et al*[17] *(2002)* found that the need for splenectomy was most significantly correlated with higher grades of splenic injury as supported by the present study. Khanna *et al*[18] (1999) did splenectomy in 5 patients out of 19 patients with splenic injury.

Vaccination after splenectomy against encapsulated organisms is highly recommended for all splenectomised patients before their discharge from the hospital, with re-vaccination every 5-10 years and additional antibiotic prophylaxis to compensate for the documented occasional vaccination failure.[19] In the present study, our patients received post-splenectomy vaccination. Polyvalent pneumococcal, meningococcus, and Hib vaccine were given.

A total of 2 patients died in our study. One died after splenectomy mainly due to hypovolemia or sepsis and the other died after being managed conservatively due to sepsis with severe head injury and associated pancreatic injury making the overall mortality of 5.54%. The mortality rate in Ahmed H *et al*[20] (2015) is 6.66%. The mortality rate in Pinjala N *et al*[5] (2016) is 5%.

Thirty patients attended follow-up clinics at two weeks and four weeks after discharge and were examined for evidence of thrombocytosis, overwhelming post-splenectomy infection, or infection with capsulated organism and 3 patient had respiratory complication for which broad-spectrum antibiotic was given.

Conclusion

The spleen is one of the most common intra-abdominal organs to be injured in abdominal trauma, especially on the left side of the abdomen. The most common cause of splenic injuries was RTA The majority of the patients belonged to the age group 20—39 years and males grossly outnumbered females involving the economically productive age group. CT is the Gold standard initial imaging for the detection and evaluation of splenic injuries, USG can play a major role in follow-up imaging and may avoid major radiation exposure. Many of the patients with splenic injuries who are hemodynamically stable can be managed non-operatively, provided other life-threatening intra and extra-abdominal injuries have been ruled out and there is good institutional support like well-equipped ICU facilities, CT scans, and round-the-clock availability of professionals who can operate if required. If the patient develops hemodynamic instability, which occurs in the first 24 hours, surgery may be necessary. Early hospitalization, appropriate methods of diagnosis, proper timely surgical intervention, availability of blood transfusion, thorough and repeated clinical examination and monitoring, and skilled nursing care are important contributory factors for the reduction in mortality resulting from blunt splenic trauma.

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