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Original Research Article

Modalities in the management of splenic trauma

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ABSTRACT

Background: The aim of the study to study the modalities in the management of splenic trauma. Factors affecting non operative management in order to improve the outcome of conservative management, and the factors responsible for conversion to operative management.
Methods: 30 patients were admitted in the Department of Surgery, NRI Institute of Medical Sciences, Visakhapatnam, satisfying the inclusion criteria between 01 June 2016 to 31 August 2018.
Results: A cross-sectional type of study was performed. Among the 30 patients, 21 were male and 9 were female. It was seen that in 80% of patients the mode of injury was road traffic accident. Human assault, animal attack and fall from height contributed to 6.66% each. The most common reason for conversion to operative management was fragile hemodynamic status of the patient. 20% of the cases were grade I, 40% grade II, 26.66% grade III, 6.66% each of grade IV and grade V, all cases of grade IV and grade V were managed operatively. In this study 60% of the cases could be managed conservatively, 1 case (3.33%) splenorraphy was done. 33.3% (1/3rd) patients required splenectomy, and 1 (3.33%) patient expired who presented late and with hemodynamic instability, belonged to grade V splenic injury.
Conclusions: Conservative management has replaced splenectomy as the most common method of splenic trauma management in patients with stable hemodynamic status. Higher grades of splenic injuries have been managed conservatively. As a result, 60% of all blunt splenic injuries can be managed non-operatively with a success rate of 98%. Operative management associated with stringent intensive care unit (ICU), transfusions are restricted to higher grades of splenic injuries.

Keywords: Splenic trauma, Conservative management, Splenectomy

INTRODUCTION

Trauma is among the leading causes of death accounting to 10.7% of deaths in India.[1] It should be considered a disease rather than an accident from a public health point of view taking into consideration the inflation in incidence of traumatic events.[2]

All traumatic events are not merely due to road traffic accidents as only 22.8% are transport related. Majority are because of falls, agriculture related trauma, assaults, fall of objects, intentional self-harm and drowning.

They are the leading causes of death among people younger than 40 years of age. In general they can be prevented, and blunt trauma abdomen belongs to this category.

Blunt trauma has a greater tendency to injure solid organs as they absorb greater energy during the impact and lead to greater tissue destruction, and spleen is among the most commonly injured organ.[2] Splenic injuries are clinically more evident than liver injuries so they were considered more common before computed tomography (CT) imaging usage became more rampant. It helped to a larger extent in

revealing the overshadowed liver injuries. There has been a changing trend towards management of splenic injuries, grades of splenic injuries which were considered inevitable to lose spleen are being managed conservatively.

Approximately 45% of the patients required emergency surgery following splenic trauma. The operative rate was higher in those hospitals were there are limited resources which may also be due to different hospital protocols, this might be the reason for variability in multi institutional study with single institutional series. Penetrating trauma were mostly managed surgically because of their concerns about other intra peritoneal injuries.

Diagnostic peritoneal lavage (DPL) usage has been replaced with availability of ultrasonography (USG) and computed tomography (CT) abdomen. Focused assessment with sonography in trauma (FAST) can easily assess the hemoperitoneum but just like DPL it cannot indicate the organ of injury and sub-capsular hematomas are missed. CT abdomen is the most reliable non operative means of diagnosis.[2]

Grading systems for splenic injury

These grading systems were based on CT imaging and on table/intra operative findings, the best known grading system adopted was American Association for the Surgery of Trauma (AAST).[2]

- I Hematoma: subcapsular, <10% surface area. Laceration: capsular tear, <1 cm parenchymal depth
- II Hematoma subcapsular, 10-50% surface area, <5 cm in diameter. Laceration: 1-3 cm parenchymal depth that does not involve trabecular vessel
- III Hematoma: subcapsular, >50% surface area or expanding or ruptured subcapsular/parenchymal hematoma; intraparenchymal hematoma >5 cm or expanding. Laceration: >3 cm parenchymal depth or involving trabecular vessels
- IV Laceration: involving segmental or hilar vessels producing major devascularisation (>25% of spleen)
- V Laceration: completely shattered spleen. Vascular: hilar vascular injury that devascularises spleen

Advance one grade for multiple injuries up to grade III. Although non operative management has become more commoner mode of treatment but in around 40% of the patients do require immediate surgical intervention. It is purely based on age, hemodynamic stability, grade of injury, amount of hemoperitoneum and associated other organ injuries.[2]

METHODS

Study setting

The study was conducted in the Department of General Surgery, tertiary care centre in Andhra Pradesh.

Study design: The study was a cross sectional study.

Study period: The duration of the study was from 01 June 2016 to 31 August 2018.

Study population/participants

All patients presenting to emergency department with blunt trauma abdomen.

Sample size: 30 patients were satisfying the inclusion criteria.

Inclusion criteria

All patients admitted with history of blunt trauma abdomen.

Exclusion criteria

Patients with penetrating trauma causing injuries, other solid organ injuries in abdomen, hollow viscous perforation, associated bone, head and chest injuries and pregnant women were excluded.

Statistical analysis

All statistical analysis was performed by using statistical product and service solutions (SPSS) trail version 20 and Microsoft (MS) excel 2007.

RESULTS

This cross-sectional study was carried out to study the diagnosis and various modalities in the treatment of blunt trauma abdomen with splenic injuries, the various presentations of splenic injuries patients, the diagnostic accuracy of imaging strategy adopted in these cases and to study the adoption of non-operative management in various grades of splenic injuries. 30 patients fulfilling the inclusion criteria from General Surgery were included in this study. These patients were either conservatively or surgically managed by taking into consideration the clinical presentation of the patient during the hospital stay.

As shown in Table 1, male dominance was observed with majority belongs to 25-34 years age group.

Table 1: Age and gender distribution.

Age range (in years)	Male N (%)	Female N (%)
15-24	2 (6.66)	0
25-34	11 (36.66)	1 (3.33)
35-44	4 (13.33)	5 (16.66)
45-54	2 (6.66)	1 (3.33)
55-64	1 (3.33)	0
≥65	2 (6.66)	1 (3.33)

Maximum patients showed distension and left hypochondrium tenderness (26.6%). Majority had grade 3 splenic injury (26.6%). Road traffic accidents were reported as main mode of injury in the study participants (80%).

Table 2: Examination findings.

Finding	Number	Percentage
Diffuse tenderness	5	16.6
Distention	8	26.6
Guarding	1	3.33
Free fluid	3	10
Abdominal distension + left hypochondrium tenderness	2	6.66
Left hypochondrium tenderness	8	26.6

Table 3: Grades of splenic injury.

Grade of splenic injury	N (%)
Grade 1	6 (20)
Grade 2	12 (40)
Grade 3	8 (26.6)
Grade 4	2 (6.66)
Grade 5/ shattered spleen	2 (6.66)

Table 4: Modes of injury.

Mode of injury	N (%)
Road traffic accidents	24 (80)
Human assaults	2 (6.66)
Animal attacks	2 (6.66)
Fall from height	2 (6.66)

DISCUSSION

This study was carried out in the department of general surgery, 30 cases have been included in this study that have qualified for the above mentioned inclusion criteria. Non-operative management has become the standard of care for hemodynamically stable patient with blunt trauma abdomen with splenic injury, but in patients who are hemodynamically unstable and evidence of intraperitoneal hemorrhage underwent immediate exploratory laparotomy.

Pachter et al in 1998, showed that 65% of all splenic injuries could be managed non-operatively with minimal transfusions, morbidity and mortality, with a success rate of 98%.[3] In this study 60% of the cases could be managed conservatively. In 1 (3.33%) case splenorraphy was done, 1/3rd of the cases splenectomy was done and 18 cases were managed conservatively which belonged to different grades of splenic trauma.

Sartorelli et al study showed a higher success rate in non-operative management than my study which could be because of the inclusion of other solid organ injuries (like kidney, liver and pancreas along with spleen) in their study where as in the present study only isolated splenic injuries were studied.[4]

Although older adults had significantly greater injuries, they had similar failure rates of non-operative management when compared with younger adults. They had significantly higher mortality, but this was not a result of their splenic injury. Therefore, age should not be criteria for non-operative management of splenic injuries. There are studies to show that non-operative management was rather more successful in children than in adults because pediatric age group patients most commonly have isolated splenic injuries.

Cooney et al showed that using a combination of clinical and CT scan criteria, identified a small percentage of patients with splenic injury that were likely to benefit from selective arterial embolization.[5] Although their use of selective arterial embolization salvaged two thirds of their patients with high-grade splenic injury or decreasing hematocrit level, there was a failure rate resulting from persistent bleeding and/or subsequent infarction this modality of treatment could not be applied in my study because of the non-availability of services of interventional radiologist in our hospital setting.

Velmahos et al in their study labelled as management of the most severely injured spleen nearly two-thirds of the patients with grade IV or V blunt splenic injuries required surgery. A grade V splenic injury and brain injury predict failure of non-operative management. This data must be taken into account when generalizations are made about the overall high success rates of non-operative management, which do not represent severe blunt splenic injury.[6] In this study total four cases two each of grade IV and grade V were operatively managed because of the hemodynamic instability, delayed presentation and the patient choice of undergoing a non-risky treatment.

Non-operative management of splenic injuries in adults is attempted in approximately 85% of all patients with blunt splenic injury, with failure rates ranging from 8% to 38% early two-thirds of patients with grade 4 or 5 blunt splenic injury require surgery. A grade V blunt splenic injury and brain injury predict failure of non-operative treatment (NOM).

Cathey et al in their study published as blunt splenic trauma: characteristics of patients requiring urgent laparotomy suggested that the non-operative management accounted to 70% in their study which in the present study was 60% which belonged to grade 1-3 of splenic injuries. In their study all cases considered for non-operative management were screened by computerized tomography of abdomen so was in this study where all cases were screened with CT abdomen with or without contrast.[7]

Having a reliable screening modality for injuries is always the need of the hour in case of blunt trauma abdomen as non-operative intervention in these cases can be applied only when clear evidence of other injuries are excluded and dealt with, as studies show that the failure of the non-operative management was to a greater extent was because of the associated injuries which are influencing the outcome of the non-operative management.

Zarzaur et al in their study edited as the real risk of splenectomy after discharge home following non-operative management of blunt splenic injury.[8] 72.4% were managed conservatively, 27 of the 1,932 were re-admitted for splenectomy within 180 days. Median time from the injury to re-admission for splenectomy was 8 days. The median time from injury to readmission in my study was 3 days. The 180-day risk of splenectomy was 1.4% after non operative management and discharge home, where as in the present study non-operative management percentage was 60%. Because of the limitations in the follow up status of the patient the delayed operative risk could not be assessed.

McIntyre et al discussed the failure of non-operative management in splenic injuries. 2243 patients met the criteria for inclusion in study. 610 patients (27%) underwent immediate splenectomy, splenorrhaphy, or splenic embolization (within 4 hours).[9] In this study 30% of the patients underwent immediate splenectomy or splenorraphy in their study remaining 1633 patients who were admitted with planned non operative management, 252 patients (15%) failed. Of the injury and the patient characteristics reviewed, being older than 55 years and having an ISS higher than 25 were significantly associated with failure. Risk of failure also increased with admission to a level III or IV trauma hospital compared with a level I trauma hospital being older than 55 years and having an ISS higher than 25 along with admission to a level III or IV trauma hospital were associated with a significant risk of failure of non-operative management of splenic injuries.

Angioembolization was not attempted in our hospital setting due to limited availability of interventional radiologist.

Pearl et al published as splenic injury, 5-year update with improved results and changing criteria for conservative management only 23% of patients treated non-operatively required blood transfusions, and the length of both hospital stay and time spent in the intensive care unit (ICU) was reduced. In 5-year, comparison rate the number of patients treated without surgery rose from 70% to 87%, in my study it was 60% of total were managed conservatively, those receiving blood transfusions dropped from 36% to 23% in their study, the transfusion requirement was 20% in this study. The number undergoing a splenectomy fell from 24% to 4%, the percentage of splenectomies in this study was 36.6% Their data suggested that most children with splenic injury can be successfully treated without operation in my study there was limited representation from pediatric age group so consensus on that aspect could not be reached, the total hospital stay for uncomplicated splenic injury can be limited to seven days. A laparotomy can be safely reserved for patients with immediate massive hemorrhage or with transfusion requirements is higher.[10]

In a study by Liu et al 83% were managed on conservative basis according to their study, their results published as non-surgical management of blunt splenic trauma.[11] In comparison to their study on this aspect 60% were non-operatively managed, splenorraphy was done in 3.33% of cases.

CONCLUSION

Conservative management of blunt splenic injuries has replaced splenectomy as the most common method of splenic trauma management in patients with stable hemodynamic status. Higher grades of splenic injuries have been managed conservatively surpassing the need for operative management. As a result, 60% of all blunt splenic injuries can be managed non-operatively with a success rate of 98%. Operative management associated with stringent ICU care, transfusions and high morbidity and mortality are restricted to serious grades of splenic tears in order to tide over dire consequences.

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