RESEARCH

# STUDY OF ROLE OF CONSERVATIVE MANAGEMENT IN SPLENIC INJURY IN BLUNT TRAUMA ABDOMEN

**S.S.N. Moulika[1], Sunitha Dharavathu[1]**

[1]Assistant professor: Department of General surgery: Siddhartha Medical College: Vijayawada, Andhra Pradesh, India.

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Corresponding Author:
**Dr. Sunitha Dharavathu**
Email: sunithadharavath22@@gmail.com
ORCID: 0000-0002-7341-8251

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## Abstract

**Background:** With a view to prevent the immediate and late complications of operative procedures of spleen, especially the risk of Overwhelming post-splenectomy sepsis syndrome (OPSS), conservative treatments have been proposed when the haemodynamic condition of the patient permits this. The objective of study is to evaluate the prevalence, severity and mode of splenic trauma, role of conservative management and complications amongst the blunt abdominal trauma cases. **Materials and Methods:** This was a prospective study of 50 cases of splenic injuries amongst blunt abdominal trauma patients in. For every patient, serial monitoring of clinical and haematological data was done. For every case FAST was done, and CECT-Abdomen was done in all cases to arrive at an accurate assessment of the severity of splenic and concomitant injuries. In all patients conservative approach was adopted as the first option based on the general condition. **Result:** Road traffic accidents were the most common cause in splenic injuries (66%). Splenic injuries were mostly seen in the age group of 20-39 years (50%), which form the young and economically productive group. Males were predominantly affected (74%). Conservative management has increased acceptance and is successful in selected patients, guided by modern imaging modalities. 42 out of 50 (84%) GradeI and II Splenic injuries are managed conservatively. Only 8 out of 50 (16%) splenic injuries are converted into operative management. Post operative complications like wound infection, dehiscence, respiratory infections and pancreatic fistula were noted in operatively managed patients and this study showed a mortality of 4.47%. In this clinical study at our tertiary care centre,most of the splenic injuries in Blunt abdominal trauma were managed non-operatively (84 %). **Conclusion:** In view of the well-known early and late complications of splenectomy, spleen preservation should be considered as the principle choice in selected cases.

## INTRODUCTION

Trauma is a major worldwide public health problem. It is one of the leading causes of death and disability in both industrialized and developing countries. Globally, injury is the seventh leading cause of the death, resulting in 5.8 million deaths each year. In 1990, approximately 5 million people died worldwide as a result of injury. The risk of death from injury varied strongly by region, age, and sex. Approximately 2 male deaths due to violence were reported for every Female death. Injuries accounted for approximately 12.5% of all male deaths, Compared with 7.4% of female deaths.[1] Estimates indicate that by 2020, 8.4 million people will die yearly from injury, and injuries from traffic collisions will be the third most common cause of disability worldwide and the second most common cause in the developing world.[2]

Data from the World Health Organization (WHO) indicate that falls from Heights of less than 5 meters are the leading cause of injury, and automobile crashes are the next most frequent cause. These data reflect all injuries, not just blunt injuries to the abdomen. A similar paper from India reported that blunt abdominal trauma is more Frequent in males aged 21-30 years; the majority of patients were injured in automobile accidents. A German study indicated that, of patients with vertical deceleration injuries (ie, falls from heights), only 5.9% had blunt abdominal injuries.[3]

Firearm associated suicide was highest in the United States at 6.3. The Frequency of penetrating abdominal injury across the globe relates to the industrialization of developing nations, weapons available, and, significantly, to the presence of military conflicts. Therefore, frequency varies. Approximately one half of trauma deaths occur


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within seconds or minutes After injury. Very few of these patients can be saved by trauma systems, and these Deaths must be addressed by improved injury prevention and control strategies.[4]

The second mortality peak occurs within hours of injury and accounts for approximately 30% deaths. Half of these are caused by haemorrhage, and the other half are caused by central nervous system injury. Most of these deaths can be averted by treatment during the golden hour. Trauma systems with acute patient care have the greatest impact on this group of injured patients. Recent analysis of trauma system efficacy suggests at least a 10% reduction in preventable death. The third peak in mortality represents deaths that occur 24hours after injury and include late mortality due to infection and multiple organ failure. Traditionally this peak has included 10-20% of trauma related death. Further improvements in mortality reduction will require a different strategy for each peak. Early deaths will be reduced by injury prevention and control programmes, active legislation, and behavioural modification. Regional planning and trauma system development will impact the second mortality peak most effectively. Late deaths will be impacted only as we better understand the pathophysiology of multiple organ failure and delayed treatment of secondary brain injury.

Road-traffic accidents are increasing at annual rate of 3%. A vehicular accident is reported every 2 minutes and a death every 8 minutes on Indian roads. A trauma-related death occurs in India every 1.9 minutes.[5] The majority of fatal road- traffic accident victims are pedestrians, two wheeler riders and bicyclists. Mortality in serious (ISS > 16) injuries 6 times worse in a developing country such as India compared to a developed country. According to the experts at the National Transportation Planning and Research Centre (NTPRC) the number of road accidents in India is three times higher than that prevailing in developed countries. The number of accidents for 1000 vehicles in India is as high as 35 while the figure ranges from 4 to 10 in developed countries. 22.8% of all trauma is transport related. Majority, 77.2% is other trauma like: Falls, Agricultural related trauma, Fire Arms, Intentional self-harm, Assault, Fall of objects, Burns, Drowning, Natural disasters, Terrorist attacks.[6]

Non-operative management of splenic injuries from blunt abdominal trauma, especially in stable patients, has become the order of the day in many centers.[7] The safety and feasibility of such an approach is possible in the trauma centres with readily available modern amenities like CT, angiography and ICU support and it has been the preference modality of treatment. This study was carried out to estimate the prevalence, severity and mode of splenic trauma, role of conservative management, and complications from amongst the abdominal trauma cases.

## MATERIALS AND METHODS

This is a prospective observational study carried out in Department of General Surgery, katuri medical college and hospital, major referral centre in coastal Andhra Pradesh, from May 2010 to October 2013. During this period a total number of 143 cases of blunt abdominal trauma have presented to the casualty, out of which 125 had various grades of splenic injury of which 50 cases are planned for conservative management.

**Inclusion Criteria**

patients of all age group who are having blunt trauma abdomen with splenic injury and who are stable.

**Exclusion Criteria**

Patients of blunt abdominal trauma who expired within 2 hrs of presentation, patients who are having other injuries which needed laparotomy, with systolic BP<90 mm0f hg, pulse rate >120/min, CECT findings of extravasation of contrast blush, grade III-V Injuries, large amount of hemoperitoneum, FAST score >3.

Data was collected from the patients and/or their attendants. Demographic data collected included the age, sex, occupation and nature and time of accident leading to the injury. Documentation of patients, which included, identification, history, clinical findings, diagnostic tests, reasons for failure of conservative management, operative findings, operative procedure, complications during the stay in the hospital and during subsequent follow-up period, were all recorded on a proforma specially prepared. The decision for operative or non-operative management depended on the outcome of the clinical examination and results of diagnostic tests. The cases were followed up and complications noted.

Patients selected for non-operative or conservative management were given bed rest, were subjected to serial clinical examination which included hourly pulse rate, blood pressure, respiratory rate and repeated clinical examination of abdomen & other systems. Abdominal ultrasonography was used on need basis during hospital stay.

## RESULTS

Maximum incidence of splenic injury is observed in age range of 20-39yrs (50%). Maximum (74%) incidence of splenic injury is observed in Males. Most common mode of injury in splenic injury is road traffic accidents (66%). 12% of patients who are unstable at admission are monitored closely.


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**Table 1: Demographic distribution in present study.**

| Age | Number of Patients | Percentages |
|---|---|---|
| 10-19 years | 05 | 10 |
| 20-29 years | 11 | 22 |
| 30-39 years | 15 | 30 |
| 40-49 years | 05 | 10 |
| 50-59 years | 04 | 8 |
| 60-69 years | 04 | 8 |
| 70-79 years | 02 | 4 |
| Total | 50 | 100 |
| Sex | | |
| Male | 37 | 74% |
| Female | 13 | 26% |
| Mode of Injury | | |
| RTA | 33 | 66% |
| Assaults | 09 | 18% |
| Fall from heights | 07 | 14% |
| Sport injuries | 01 | 2% |

**Table 2: Signs and symptoms in present study**

| Signs and Symptoms | Number of Patients | Percentages |
|---|---|---|
| Abdominal pain | 46 | 92 |
| Abdominal distension | 30 | 60 |
| Guarding and rigidity | 05 | 10 |
| Abdominal tenderness | 45 | 90 |
| Rebound tenderness | 27 | 54 |
| Vomiting | 05 | 10 |
| Hematuria | 02 | 4 |
| Pulse >100/min | 23 | 46 |
| BP <90 mmHg | 03 | 6 |
| Pallor | 35 | 70 |
| Free fluid | 28 | 56 |
| Absent bowel sounds | 20 | 40 |
| Tenderness in the lower chest | 05 | 10 |

Most common symptom of splenic injury is abdominal pain and sign is abdominal tenderness

**Table 3: Time interval between trauma and arrival at casualty (total 50 cases)**

| Hours | Number of Patients | Percentages |
|---|---|---|
| 0-5hrs | 01 | 2% |
| 6-10hrs | 08 | 16% |
| 11-15hrs | 23 | 46% |
| 16-20hrs | 01 | 2% |
| 21-25hrs | 12 | 24% |

Splenic injury patients presented to the casualty more commonly in the time range of 11-15 hours.(46%)

**Table 4: Grading of splenic injury.**

| Grading of splenic injury CECT Grading | No of Patients | Percentages |
|---|---|---|
| Gr I | 18 | 36 |
| Gr II | 22 | 44 |
| Gr III | 10 | 20 |
| Gr IV | 00 | 00 |
| Gr V | 00 | 00 |
| Grade of splenic injury (per operative) | | |
| Gr I | 00 | 0 |
| Gr II | 01 | 2 |
| Gr III | 05 | 10 |
| Gr IV | 02 | 4 |
| Gr V | 00 | 0 |
| Grade of splenic injury (conservative) | | |
| Gr I | 18 | 36 |
| Gr II | 18 | 36 |
| Gr III | 06 | 12 |
| Gr IV | 00 | 0 |
| Gr V | 00 | 0 |

Most of the cases that are shifted to operative management are grade- III Injuries. Majority of Grade I and II were conservatively managed.


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**Table 5: Haemoperitoneum in present study**

| Amount of Blood | No of Patients | Percentages |
|---|---|---|
| <500 ml | 10 | 20 |
| 500-1000 ml | 05 | 10 |
| 1000-1500 ml | 00 | 00 |
| > 2000 ml | 00 | 00 |

Blood loss in majority of splenic injury patients is less than 500 ml.

**Table 6: Cases received blood transfusion in association with grading of spleen**

| Grade of Injury | Cases received blood transfusion | Percentages |
|---|---|---|
| I | 18 | 36 |
| II | 21 | 42 |
| III | 09 | 18 |
| IV | 02 | 04 |
| V | 0 | 0 |

Average blood transfusion for conservatively managed cases is 3.5 units while surgically managed cases required blood transfusion of 4.5 units on average.

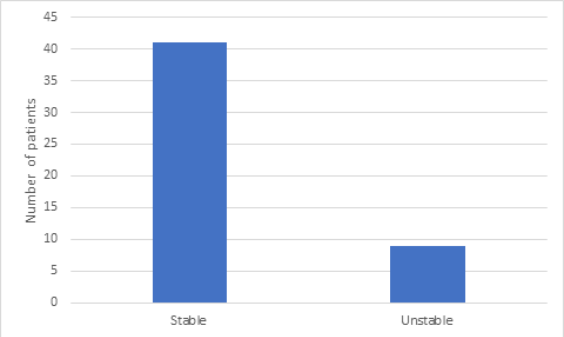


**Figure 1: General condition of patients after 6 hrs**

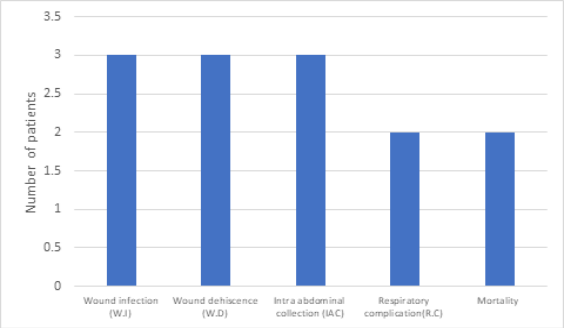


**Figure 2: Morbidity and mortality in present study**

Most common complication of operated cases is wound infection. That of conservative management is intra-abdominal collection A total of two patients have died in our study both of them were attempted conservatively failed and operated. Mortality in the study is 4.477%.

## DISCUSSION

Trauma is the leading cause of death in persons under 45 years of age, with 10% of these fatalities attributable to abdominal injury. Indian statistics reveal a disproportionate involvement of younger age groups (15- 25 yrs). The Indian fatality rates for trauma are 20 times that for developed countries. About 30% of such deaths are thought to be preventable. Swift recognition of injury with prompt and appropriate treatment to reduce morbidity and mortality is the goal of modern trauma care and hence accurate diagnosis is essential.[8]

Blunt Abdominal Trauma (BAT) has often proved to be the trauma surgeon's nemesis, due to the multitude of its manifestations. The recent trend is heavily in favour of non-operative or conservative surgical management of abdominal solid visceral injuries given the various sophisticated and highly accurate non-invasive imaging tools at the trauma surgeon's disposal today.[9] However, the feasibility and safety of such an approach, especially in a limited-resource set-up, hamstrung by the non-availability of ICU and advanced imaging/ interventional techniques like CT and angiography, has often been a contentious issue. This prospective study was undertaken to evaluate the pattern of splenic injury arising from BAT with special reference to its conservative management and outcome in the setting of a hospital having better surgical ICU and CT support.

In present study 42 out of 50 (84%) GradeI and II Splenic injuries. In Bansod AN et al.[10] study 23 patients had isolated splenic injuries. Most common splenic injury in this study as per AAST grading was patients with grade III splenic injury which included 17 out of 23 cases of isolated splenic injury 73.91 % of splenic injury patients.

Trauma demonstrate that mortality from splenic injury still occurs, even in Level1 trauma centers. Overall, outcome from grade 1-2 splenic injuries remains excellent but not perfect, and outcome worsens as the injury grade increases. The risk of complications or failure of nonoperative management appears to be worse in patients older than 55 years, and women older than 55 years are significantly more likely to fail nonoperative management with an increased mortality. Multisystem injury or concomitant liver, pancreas, or bowel injury increases the likelihood of splenectomy. Operative treatment with isolated injury is more likely at low-volume centers, but overall salvage rates for nonoperative management are similar between low- and high-volume centers.


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In our study Blood loss in majority of splenic injury patients is less than 500 ml. Average blood transfusion for conservatively managed cases is 3.5 units while surgically managed cases required blood transfusion of 4.5 units on average. Haemoperitoneum almost always accompanies splenic injury. Uncommonly, a perisplenic clot is present without evidence for capsular disruption, which has been reported in approximately 9% of patients and is termed the sentinel clot.[11]

In present study Complication of operated cases is wound infection. That of conservative management is intra-abdominal collection. A total of two patients have died in our study both of them were attempted conservatively failed and operated. Mortality in the study is 4.477%. Data by Mozes et al,[12] showed a 2.4% (3 of 126) mortality within the first 6 months, compared with an 8% (2 of 25) mortality associated with splenectomy. Both deaths related to splenectomy were associated with postoperative pancreatitis. Statistics reported by Mozes et al,[12] were based on the embolization of no more than 60-70% of splenic tissue. Others have confirmed the unacceptably high morbidity and mortality rates involved with excessive tissue embolization or attempted nonsurgical splenectomy. Morbidity rates as high as 79% and mortality rates ranging from 12%38 to 43% have been reported in the literature.[13]

## CONCLUSION

The conservative management of splenic injury in BAT has evolved considerably over the past decade with the advent of sophisticated imaging technology. Mandatory laparotomy with splenorrhaphy or splenectomy has been replaced in most cases by nonoperative management. Patients with severe splenic injuries, grade III and higher can also be managed conservatively with a better trauma care setup and added sophisticated imaging facilities. FAST is safer, simpler to perform, relatively cost-effective, rapidly confirms significant haemoperitoneum and simultaneously evaluates the thorax in addition to the abdomen. Hence it is the investigation of choice for rapid assessment of BAT. The role of CT in the early diagnosis and management of BAT has often been emphasized in this revolutionary era of medical advances. It remains one of the most precise diagnostic tools for assessment of severity and follow-up of splenic injuries. Laparoscopic procedures can be judiciously used in selected cases of splenic injury in BAT for diagnostic as well as therapeutic purposes. Repeated clinical assessment by an experienced surgeon coupled with non- invasive imaging like USG & CT-Scan helps in proper selection of cases for conservative management of splenic injuries in blunt abdominal trauma.

## REFERENCES


1. Reza A, Mercy JA, Krug E. Epidemiology of violent deaths in the world. Inj Prev. 2001;7(2):104-11. doi: 10.1136/ip.7.2.104.
2. Lyons BH, Fowler KA, Jack SP, Betz CJ, Blair JM. Surveillance for Violent Deaths - National Violent Death Reporting System, 17 States, 2013. MMWR Surveill Summ. 2016;65(10):1-42. doi: 10.15585/mmwr.ss6510a1.
3. Roy S, Hossain Hawlader MD, Nabi MH, Chakraborty PA, Zaman S, Alam MM. Patterns of injuries and injury severity among hospitalized road traffic injury (RTI) patients in Bangladesh. Heliyon. 2021;7(3):e06440. doi: 10.1016/j.heliyon.2021.e06440.
4. Polinder S, Haagsma J, Bos N, Panneman M, Wolt KK, Brugmans M, et al. Burden of road traffic injuries: Disability-adjusted life years in relation to hospitalization and the maximum abbreviated injury scale. Accid Anal Prev. 2015;80:193-200. doi: 10.1016/j.aap.2015.04.013.
5. Gururaj G. Road traffic deaths, injuries and disabilities in India: current scenario. Natl Med J India. 2008;21(1):14-20.
6. Lutge E, Moodley N, Tefera A, Sartorius B, Hardcastle T, Clarke D. A hospital based surveillance system to assess the burden of trauma in KwaZulu-Natal Province South Africa. Injury. 2016;47(1):135-40. doi: 10.1016/j.injury.2015.08.020.
7. Fransvea P, Costa G, Massa G, Frezza B, Mercantini P, BaIducci G. Non-operative management of blunt splenic injury: is it really so extensively feasible? a critical appraisal of a single-center experience. Pan Afr Med J. 2019;32:52. doi: 10.11604/pamj.2019.32.52.15022.
8. Choi J, Carlos G, Nassar AK, Knowlton LM, Spain DA. The impact of trauma systems on patient outcomes. Curr Probl Surg. 2021;58(1):100849. doi: 10.1016/j.cpsurg.2020.100849.
9. Stawicki SP. Trends in nonoperative management of traumatic injuries - A synopsis. Int J Crit Illn Inj Sci. 2017;7(1):38-57. doi: 10.4103/IJCIIS.IJCIIS_7_17.
10. Ozturk H, Dokucu AI, Onen A, Otçu S, Gedik S, Azal OF. Non-operative management of isolated solid organ injuries due to blunt abdominal trauma in children: a fifteen-year experience. Eur J Pediatr Surg. 2004;14(1):29-34. doi: 10.1055/s-2004-815777.
11. Orwig D, Federle MP. Localized clotted blood as evidence of visceral trauma on CT: the sentinel clot sign. AJR Am J Roentgenol. 1989;153(4):747-9. doi: 10.2214/ajr.153.4.747.
12. Mozes MF, Spigos DG, Pollak R, Abejo R, Pavel DG, Tan WS, et al. Partial splenic embolization, an alternative to splenectomy--results of a prospective, randomized study. Surgery. 1984;96(4):694-702.
13. Fodor M, Primavesi F, Morell-Hofert D, Kranebitter V, Palaver A, Braunwarth E, et al. Non-operative management of blunt hepatic and splenic injury: a time-trend and outcome analysis over a period of 17 years. World J Emerg Surg. 2019;14:29.




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