



NON OPERATIVE MANAGEMENT OF SPLENIC INJURY: A NOBLE APPROACH

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ABSTRACT

Background: Nonoperative management (NOM) of blunt injury to the spleen in adults has become the standard of care in hemodynamically stable patients. This modality of treatment began in the 1970's in paediatric patients. It is highly successful with overall failures rates from 2% to 31% (average 10.8%) - with the majority of failures occurring in the first 24 hours. The objective of this study is to determine the cause, presentation, diagnostic method, management and outcome of isolated splenic injuries from blunt abdominal trauma And to study the failure rate of non operative management of splenic injury. **Methods:** The conduct retrospective study comprises 39 patients with blunt abdominal trauma having isolated splenic injuries. 33 patients were managed conservatively and remaining 6 patient underwent surgical management.. in our study patients were analyzed with respect to the cause, presentation, diagnostic methods, treatment and mortality. **Results:** Most of the patients in our study were in the age group of 21-40 years. with an M:F ratio of 8:1. Motor vehicle accident (86%) was the most common mechanism of injury. Spleen injury was associated with rib fracture in 22%. There was one Mortality. Failure of NOMSI was defined as the need for operation due to ongoing bleeding from the spleen in patients initially managed nonoperatively. Failure rate of non operative management was only 16% without any mortality. **Conclusions:** Non-operative management in blunt abdominal trauma management is challenging owing to the diversity of presentation and wide range of visceral injuries. However, it is quite satisfying to manage them by conservative approach which is highly successful in selective cases.

KEYWORDS: Blunt abdominal trauma, splenic trauma, computed tomographic scan, resuscitation, non operative management.

INTRODUCTION

The spleen is the most easily injured organ in abdominal trauma. Isolated splenic injuries can be found in about one-third of blunt trauma and in 25-30% of patients who suffered a traffic accident.^[1] The history of the splenectomy can be traced back to Aristotle,^[2] who was the first person to consider the spleen to be a non-essential organ. The idea that a splenectomy is the only appropriate treatment for blunt splenic injuries (BSIs) was based on the concept that the spleen is a fragile, vascular structure unsuitable for suturing lacerations, that there is a risk of uncontrollable bleeding in the absence of surgical removal and the high mortality rate associated with nonoperative management (NOM) (90-100%).^[3] The first change in the attitude towards OM occurred with the article by King and Schumacker in 1952, which showed that patients who underwent a splenectomy had a greater susceptibility to infection by *Streptococcus pneumoniae*.^[4]

In 1968, Upadhyaya and Simpson published a retrospective clinical analysis of 52 children with splenic

injury who underwent conservative medical treatment at the Hospital for Sick Children in Toronto.^[5] The results

of this study demonstrated that conservative treatment is efficacious in select patients.

When it comes to visceral injuries following abdominal trauma, there is nothing as radical as the nonoperative management (NOM) of hepatic and splenic injuries.^[6] The treatment for blunt abdominal trauma has significantly changed thanks to new diagnostic methods and the accurate assessment of organ damage.

In order for nonoperative management (NOM) of splenic injuries to be the standard goal of therapy in hemodynamically stable patients, it is necessary to have an accurate knowledge of patient selection criteria for nonoperative management, as well as a precise assessment of the factors precluding conservative therapy. In general, non operative management of splenic injuries has numerous potential benefits including fewer blood transfusions, shorter hospital

stays, avoidance of long-term infectious complications and lower surgical costs.^[7,8]

AIMS AND OBJECTIVE

The aim of the study is to determine the demographic profile, common clinical presentation and to study the safety and advantage of nonoperative management in splenic trauma patient

MATERIALS AND METHODS

A retrospective analysis of 39 patients of isolated splenic trauma who were admitted in LLRM Medical College Meerut, UP, INDIA (A level 2 trauma centre and teaching hospital) within a span of 24 months (from November 2013 to October 2015) was done.

All patients underwent an initial assessment upon arrival to the emergency room using the Advanced Life Trauma Support (ATLS) protocol that describes the absolute priorities using the acronym ABCDE: A (Airway), B (Breathing), C (Circulation), D (Disability) and E (Exposure).^[1] Then, the patients underwent a FAST scan, which detects abdominal free fluid with a high degree of accuracy and has good sensitivity for liver and spleen injuries.^[9]

Subsequent diagnostic procedures were utilized based on the hemodynamic stability of patients, evaluated according to the criteria established by ATLS, which recognizes three categories.

- A hemodynamically stable
- B hemodynamically stabilized
- C hemodynamically unstable.^[9]

Patients from all age groups and both sexes were considered. Patient who were hemodynamically unstable at the time of admission and had grade 4 and 5 injuries on CECT Scan were excluded from study.

All patients who were alert and haemodynamically stable without or with minimal peritoneal irritation on abdominal examination, with AAST (American Association for the Surgery of Trauma) organ injury scale 1-3 on CT scan and absence of other clear indication for laparotomy were chosen for Non operative management.

A decision for laparotomy was taken when the patient deteriorated either clinically or haemodynamically. All NOM-group patients were admitted to the surgical intensive care unit and had regular physical examination, haematocrit check and imaging when in doubt.

Table 1. Organ Injury Scale of the American Association for the Surgery of Trauma

Grade	Injury type	Description of injury
I	Hematoma	Subcapsular, nonexpanding, <10% della surface area
	Laceration	Capsular tear, nonbleeding, <1 cm parenchymal depth
II	Hematoma	Subcapsular, nonexpanding, 10-50% surface area
	Laceration	Intraparenchymal, <2 cm in diameter, nonexpanding Capsular tear, active bleeding, 1-3 cm parenchymal depth
III	Hematoma	Subcapsular, >50% surface area or expanding
	Laceration	Ruptured subcapsular hematoma with active bleeding Intraparenchymal, >2 cm in diameter, or expanding >3 cm parenchymal depth
IV	Hematoma	Ruptured intraparenchymal hematoma with active bleeding
	Laceration	Involvement of segmental or hilar vessels producing devascularization >25%
V	Laceration Vascular	Shattered spleen Hilar vascular injury devascularizes spleen

GRADE III splenic injury managed operative approach (FAILED NOM)

RESULTS

Demographic profile

We included 39 blunt trauma patients; 33 (84%) were males and 6 (16%) females.

Most of patients were in age group 21yr to 40 yr.

Table 2 - Age wise distribution in years

Age in years	>20	21-40	41-60	>60
Number of patients	4 (10%)	24 (62%)	10 (22%)	1(2%) **

Epidemiological factors

Road traffic accidents involving both pedestrians and vehicular accidents accounted for majority of injuries (85%).

Table 3: Mode of trauma.

Mode of trauma	MVA	Physical assault	Bicycle injury	Fall from height
Number of patient	33 (85%)	3 (8%)	2 (5%)	1 (2%)

Mode of presentation

Most of patients who was selected for NOM were in grade 1 and 2 shock. Patient in grade 3 shock also responded well to fluid management.

Table 4.

Grade of shock	Grade 1	Grade 2	Grade 3
Number of patient	21(54%)	14(36%)	4(10%)

CT Grading

In all patient of NOM CT Grading of injury was done after initial positive FAST. patient with grade 4 and 5 injury were excluded from study

Table 5.

CT Grading	Grade 1	Grade 2	Grade 3
Number of patient	16(41%)	17(43%)	6(16%)

Failed NOM: Six patient with splenic injury who were initially considered for conservative management underwent splenectomy due to clinical deterioration. Most of who failed to NOM were operated with in 48 hr of admission.

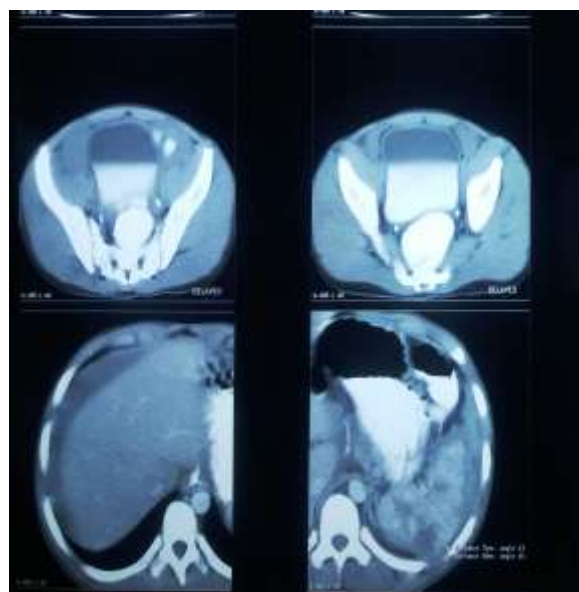
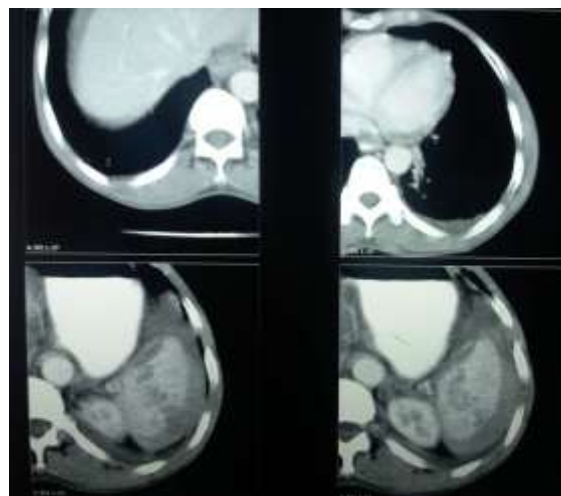
Table 6

Duration of failed NOM	<48hr	48hr-72hr	3days – 5days	>5 days
Number of patient	4	1	0	1 *

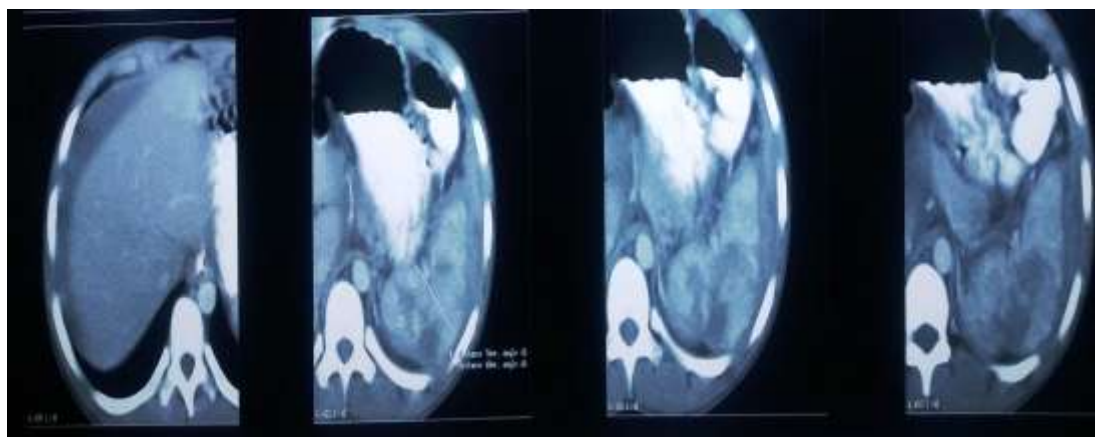
*after discharge on 9th day possibly because of re-trauma.

** only mortality (2%) was a male patient who was 70 year old and having grade 2 injury with multiple rib

fracture. Patient expired on fourth day of NOM due to lung injuries and not because of splenic injury.



GRADE II and III splenic injury managed by non operative approach successfully



GRADE III Splenic Injury Managed Operative Approach (FAILED NOM)

DISCUSSION

NOM (non operative management) of blunt abdominal injuries is well established and strategies based on haemodynamic stability and CT scan findings are now being widely used in the treatment of solid organ injuries including liver, spleen, kidneys, pancreas and pelvic injuries.^[11] Non-therapeutic laparotomy (NTL) for trauma patients varies from 1.7% to 38% depending on the experience and practice patterns of the individual trauma centre.^[12] In one prospective study of 938 laparotomies for abdominal injury, 27% were deemed unnecessary.^[13] NTL is associated with significant morbidity and cost to the health system.

The **general principles**^[11] of NOM are.

- Always keep the mechanism of injury in mind.
- The patient should be in alert, awake and responsive.
- The patient should be examined repeatedly.
- The patient should be haemodynamically stable and have no coagulation disorders.
- There should be no other clear indication for laparotomy.
- Maintain high index of clinical suspicion.
- Be very cautious in multiple injured patients.

-Higher level of care with round-the-clock availability of laboratory, radiology and operation theatre.

NOM to be **abandoned** (14) when there is

- a) Deterioration of vital signs.
- b) Development of new peritoneal signs.
- c) Continued need for blood transfusion.
- d) Falling haematocrit or progressing haematoma.

The **risks**^[14] associated with NOM are.

- Missed injuries.
- Delayed diagnosis and treatment.
- Retained hematoma, sepsis and/or abscess.
- Bowel/biliary/pancreatic/urinary leaks.
- Pseudoaneurysm formation and delayed rupture.
- Delayed treatment of vascular injuries and their complications.
- Risks involved in blood transfusion.

Our NOM success rate was 84.6%, which is similar to the past literature, which quotes rates around 80%.^[15]

In our analysis, the NOM failure rate was 15.4%, which is similar to the 17% failure rate reported in previous studies.^[15]

No complications occurred in patients who underwent NOM. We must however emphasize patients who underwent NOM had less severe spleen injuries due to the exclusion criteria for NOM.

The study by Di Saverio and Moore^[16] highlighted how patients with grade IV through V splenic injury were at increased risk for developing complications and had a higher NOM failure rate, even though NOM is being utilized increasingly more for high-grade lesions.

Similarly, the study by Peitzman and Richardson^[17] showed that the NOM failure rate was proportional to the splenic injury grade: 5% in grade I, 10% in grade II, 20% in grade III, 33% in grade IV and 75% in grade V. Comparable failure rates were seen in the study conducted by Velmahos^[18] in 14 trauma centers, in which the failure rate was 34.5% for patients with grade IV lesions and 60% for grade V lesions.

Mortality in the NOM group was 2.5% in our study, and similarly, the rate was 12.6% in the past literature (12.6%).^[17] The patient who died in the NOM group was who was 70 year old and having grade 2 injury with multiple rib fracture. Patient expired on fourth day of NOM due to lung injuries and not because of splenic injury.

CONCLUSION

In our experience, NOM was the treatment of choice for multiple reasons in blunt splenic injuries grade I, II and III. Splenectomy was the chosen technique in patients with exclusion criteria for NOM, as well as in those with grade IV and V injury. In the literature, the use of NOM in patients with grade IV and V splenic injuries is still under debate, and no unanimous opinion has been reached to date.

Non-operative management in blunt abdominal trauma management is challenging owing to the diversity of presentation and wide range of visceral injuries. However, it is quite satisfying to manage them by conservative approach which is highly successful in selective cases. The advent of sophisticated imaging and the availability of interventional radiologists has somewhat lightened the trauma surgeons' operative burden. However, even today, nothing surpasses the value of repeated clinical examination by an experienced surgeon in guiding the ultimate therapeutic decision.

“When in doubt it is better to open and see than to wait and watch”- Grey Turner.

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