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"A Clinical Study of Splenic Injury in Blunt Injury Abdomen in Government General Hospital, Vijayawada"

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Abstract*: Blunt abdominal trauma is one of reasons for acute abdomen presentation complicated by liver and spleen injury, most commonly spleen. primary concern being internal haemorrhage. our study aims to study incidence clinical presentations outcome of splenic trauma in blunt injury abdomen. patients with splenic injury were included in study who underwent non- operative and operative management. prospective typestudy . Ultrasound being 88.8% sensitive in identifying trauma and CT scan most useful in non -operative management. most common presentations are with grade 2 and 3. grade 1 and grade 2 injuries showing a good outcome with conservative management grade 3 injuries managed with operative management showing good outcome and overall mortality being 6.66%. the patients with time lapse between injury and treatment with <2 hrs have a better outcome and less morbidity. prophylactic antibiotic and pneumococcal vaccination prevent from overwhelming post splenectomy infections.*

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I. Introduction

Trauma or injury defined as cellular disruption caused by an exchange with environmental energy that is beyond the body's resilience, which is compounded by cell death due to ischemia/reperfusion.

Blunt abdominal trauma is the leading cause of mortality and morbidity among all age groups. It is one of the reasons for the acute abdomen presentation in the emergency department. Missed intra-abdominal injuries and bleeding are frequent causes of increased morbidity and mortality. blunt abdominal trauma is complicated by internal injury; the liver and spleen are most frequently affected; it can lead to damage to the small intestine.

The spleen is the most common substantial organ injury following blunt trauma abdomen in adults, and it is the second most common in children.The primary concern in splenic trauma is internal hemorrhage, and it is, though, to know the exact amount of blood loss in the spleen . Small or minor injuries in spleen often heal spontaneously, especially in children.

Splenic hematoma sometimes ruptures, usually in the first few days, although rupture can occur from hours to even months after injury. So, Immediate diagnosis and treatment of this condition are critical or the patient survival and to decrease the morbidity and mortalitythat usually follows without immediate intervention. CECT abdomen in stable patients and bed ultrasound in unstable patients play a significant role in treating the case.

II. Aims And Objectives Of The Study

AIM:

This study was taken to know the extent of splenic injury in blunt injury abdomen in G.G.H, Vijayawada.

OBJECTIVES OF THE STUDY:

1. To study the incidenceof splenic injuries in blunt injury abdomen.
2. To study the clinical presentations and diagnosis of splenic injury in blunt injury abdomen.
3. To study the outcome of (conservative/surgical treatment) of splenic injury in blunt injury abdomen.
4. To study the postoperative complications, morbidity, and mortality if any in splenic injuries in blunt injury abdomen.

III. Materials And Methods

This prospective study is conducted at Government general hospital, Vijayawada Andhra Pradesh India. 30 patients of splenic trauma out of 80 patients of blunt injury abdomen who are admitted in Government general hospital, Vijayawada and who underwent non-operative(16 patient), non-operative converted to operative(2patient) and operative management (12patient) for abdominal trauma and having splenic injury forms the material of the study.

Study duration: 18 months from January 2018 to June 2019.
Sample size: 30 patients
Study design: prospective study
Study location: government general hospital vijayawada

Inclusion criteria:

1. age 16-60 years
2. blunt injury abdomen with splenic trauma

Exclusion criteria:

1. age <16 and >60yrs

A brief history of the date, along with the time of injury, mode of injury, and complaints like pain abdomen, vomiting, and distension of abdomen are noted, site size, shape, and character of wounds are noted. Specific examination of the abdomen was done with special reference to tenderness, guarding and rigidity and bowel sounds.

Diagnostic peritoneal tap: The diagnostic tap of the abdomen is done for all cases.

In all cases of blunt injury, plain X-rays erect abdomen, chest -rays, and, if necessary plain X-rays of other parts of the body are taken.

Emergency ultrasound of the abdomen Including pelvic cavity of the patient is done in a patient in a supine position. The unstable patient is not subjected to ultrasound.

CT scan of the abdomen is must with and without contrast for that patient who is stable, who has no free peritoneal tap, and who is planned to manage by the non-operative management.

That patient (18) who are stable, no free diagnostic peritoneal minimal free fluid on ultrasound are subjected to CTscan of abdomen and pelvis graded accordingly by grading system given by American Association for Surgery of Trauma Splenic Injury scale and recorded non-operatively by continuous monitoring, two of them converted to surgical management after deterioration of the condition and contrast blush on CT scan.

The rest of the patients are taken up for surgery after resuscitation. All the patients were operated under general anaesthesia with cuffed endotracheal intubation.

Laparotomy:

Incision and procedure: All the patient are operated by midline incision and incision extended when necessary.

Haemoperitonem evacuated by suction apparatus, and the injury was noted. Grading in spleen injury assessed according to grading system is given by American Association ,spleen is mobilized after separation from all ligamentous attachments, then short gastric vessels are ligated splenic artery, and vein is double ligated, hemostasis secured well, peritoneal cavity washed with normal saline, drain kept in the splenic bed and abdomen closed.

Induction doses of intravenous ceftriaxone 1gm and metronidazole 500mg are given to the patients. The antibiotics were continued during the post-operative period until the patients are discharged — pneumococcal Vaccine administered to all the patients postoperatively.

The patient is allowed on an oral diet from 2nd or 3post-operative day if uncomplicated. The abdominal drain removed whenever the collection is less than 25ml. In our study, most of the drains are removed on the 5^{th} or 6thpost-operative day.

Statistical Analysis

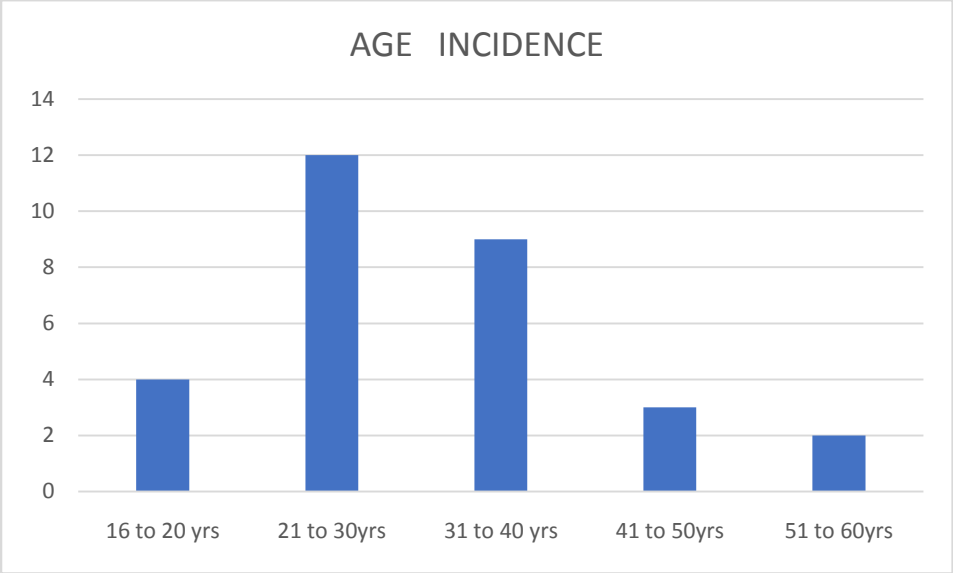
The correlation of observations is done by the Chi-square test applied to test the association between duration of injury to admission and complication, a grade of splenic trauma and management, and complications.

IV. Results And Analysis

Total abdominal injuries from January 2018 to June 2019
Total injuries of Splenic trauma: 30
Incidence of Splenic Trauma

Table no.1AGE OF INCIDENCE:

AGE OF PATIENTS	NUMBER OF PATIENTS	PERCENTAGE
16 to 20 yrs	4	13.33%
21 to 30yrs	12	40%
31 to 40 yrs	9	30%
41 to 50yrs	3	10%
51 to 60yrs	2	6.66%



From the above data that a maximum number of patients are in the age group of 21-30 years (40%). The mean age of presentation is years 29.5yrs(16-60years)

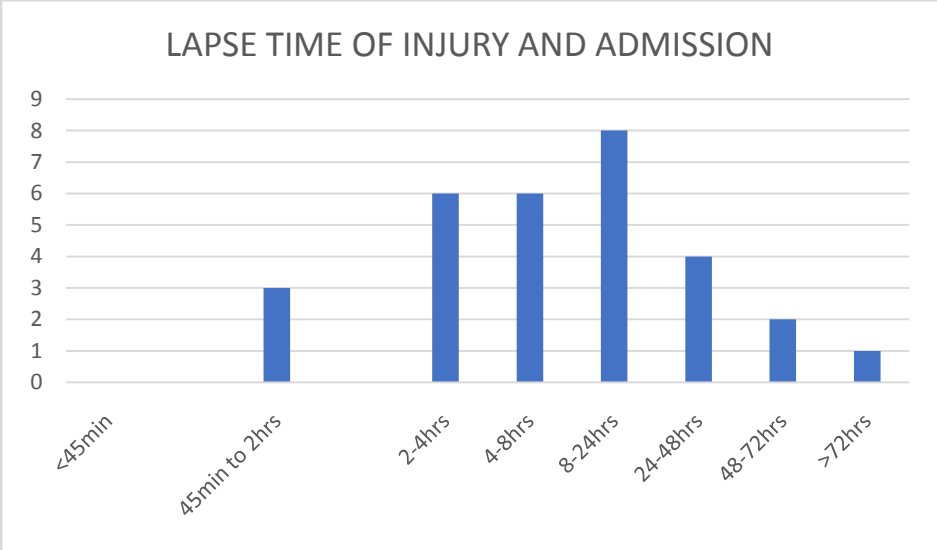
Table no 2SEX INCIDENCE:

SEX	NUMBER OF PATIENTS	PERCENTAGE
MALE	24	80%
FEMALE	6	20%

80%of a patient (24) are males, and 20% of patients (6) are females.so the male-female ratio is 4:1

Table no 3LAPSE TIME OF INJURY AND ADMISSION

TIME DURATION	NUMBER OF PATIENTS	PERCENTAGE
<45min	0	0%
45min to 2hrs	3	10%
2-4hrs	6	20%
4-8hrs	6	20%
8-24hrs	8	26.66%
24-48hrs	4	13.33%
48-72hrs	2	6.66%
>72hrs	1	3.33%



Lapse time of injury and admission varied from 45 minutes to 78 hours, and the patients who got admitted 78 hours following injury does not remember the incidence of injury. It is clear that 50% of patients (15/30) presented within 8 hours after injury.

Table no 4 LAPES TIME OF ADMISSION AND SURGERY

TIME DURATION	NUMBER OF PATIENTS	PERCENTAGE
<1 HR	1	3.33%
1-2 HRS	2	6.66%
2-4 HRS	7	23.33%
4-8 HRS	9	30%
8-16 HRS	5	16.66%
>16 HRS	0	0

The lapse time of surgery after the admission of the patients is varying from 30 minutes to 12 hours. 3.33%of patients (1/30) is operated within one hour that was in 30 minutes. One patient, who is operated after 12 hours after admission, did not respond to resuscitation.

Table no 5 MODE OF INJURY

MODE OF INJURY	NUMBER OF PATIENTS	PERCENTAGE
ROAD TRAFFIC ACCIDENTS	21	70%
WALL COLLAPSE	1	3.33%
BULLOCK CART INJURY	2	6.66%
FALL FROM HEIGHT	6	20%

The maximum number of patients presented with injury are due to road traffic accident 70%

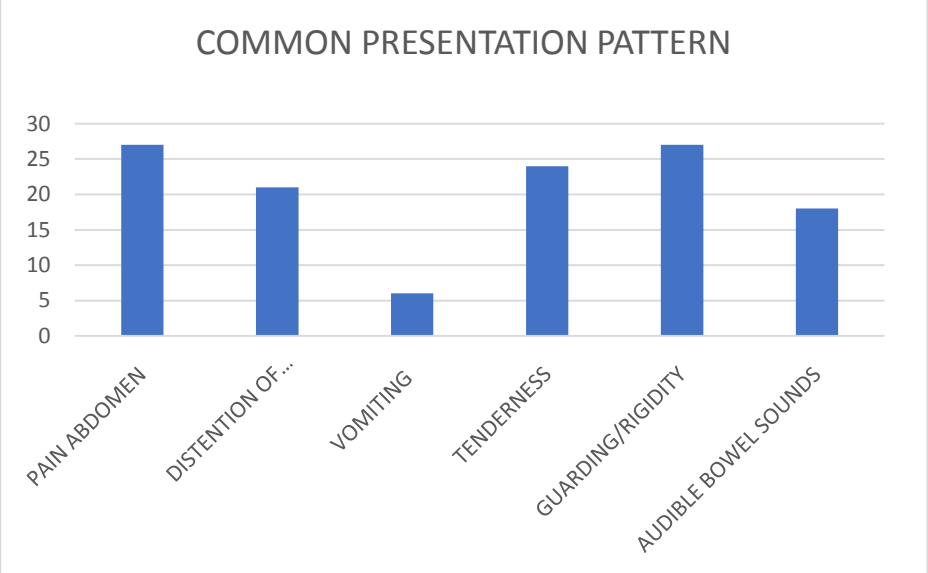
6)VITAL PARAMETERS AT ADMISSION

76.66% of patients presented with stable vital data, i.e., pulse rate from 60-100 beats per minute and blood pressure ranging from >100 mm of hg of systolic and 70-90 mm of hg diastolic blood pressure.

23.33% of patients presented with unstable vitals and were resuscitated, patients presented with a feeble pulse, and low blood pressure, of which only one patient died without responding to resuscitation

Table no 7COMMON PRESENTATION PATTERN

CLINICAL PATTERN	NUMBER OF PATIENTS	PERCENTAGE
PAIN ABDOMEN	27	90%
DISTENTION OF ABDOMEN	21	70%
VOMITING	6	20%
TENDERNESS	24	80%
GUARDING/RIGIDITY	27	90%
AUDIBLE BOWEL SOUNDS	18	60%



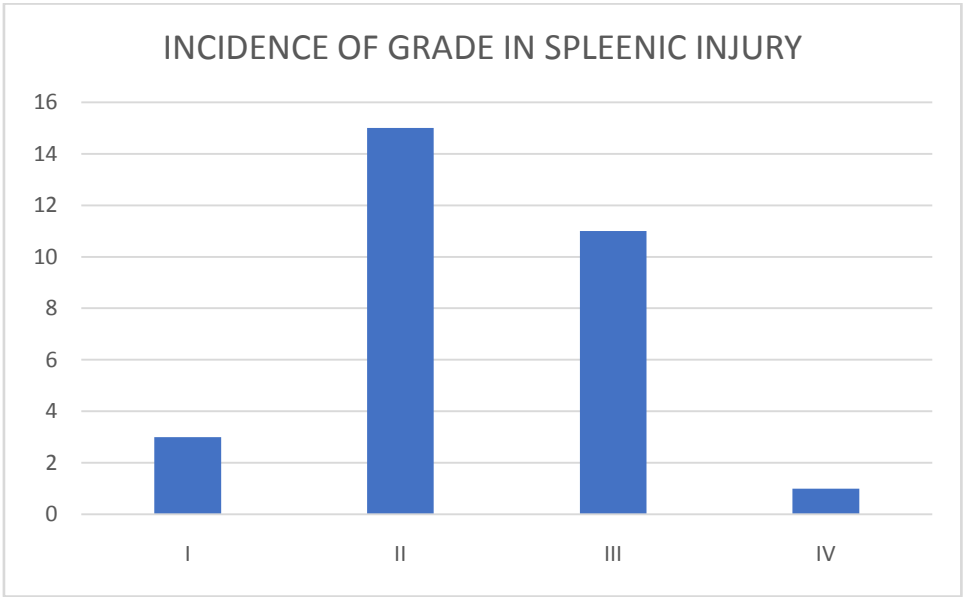
The common presentation pattern was pain abdomen with and without distention. On examination, 80% of patients had abdominal tenderness associated with guarding and rigidity.

8)ULTRASOUND SCAN OF ABDOMEN AND PELVIC CAVITY

94% of patients (28/30) pre-operative ultrasound scanning of the abdomen and pelvic cavity is done. Of these 28 patients, the preoperative ultrasound s1canning of the abdomen and pelvic cavity was consistent with CT scan and laparotomy findings in 24 patients. Sensitivity in our series is 85.7%

Table no 8 INCIDENCE OF GRADE IN SPLENIC INJURY

GRADE OF SPLEEN INJURY	NUMBER OF PATIENTS	PERCENTAGE
I	3	10%
II	15	50%
III	11	36.66
IV	1	3.33



The most common grades of splenic trauma are both grade II and grade III. These two grades were consisting of 86.66% of splenic injuries.

10)MANAGEMENT PROCEDURE:
Out of 30 patients, six patients are non-operatively managed, 21 patients are operatively managed, three patients are initially managed non-operatively then converted to operative management

11)DURATION OF HOSPITAL STAY
This duration is ranging from less than 24 hours to 60 days. Patients who presented in hemodynamic instability and died of hemorrhage are comprising of patients having a hospital stay less than 24 hours.

12)CAUSE OF DEATH
6.66% of patients (2/30) expired. One patient died due to septicemia, and another patient died of acute myocardian infraction.

V. Discussion

This study is a prospective study of 30 patients done during a time span 18 months from Jan 2018 to June 2019

Splenic Trauma Incidence:
29.5% of abdomen trauma resulted in splenic injury.

Age Incidence:
40% of patients (12/30) presented to us are in the age group of 21-30 years, and 30% of patients (9/30) are in the age group of 31-40 years. There are no patients above 60 years. The most affected population is in the age group of 21-30 years (12 patients). In our series, the mean age of presentation is 29.5 years (8-60). In Cocanour CS et al. series, the mean age of presentation is 35.3 years.

Sex Incidence:
In our series, 80% of patients (24/30) are males, and only 20% of patients (6/30) are females. In Cocanour CS et al. series, 90% of patients are male, 10% of patients are females. Males are more affected by Spleen injury.

The time interval between injury and admission:
The minimum lapse time was 30 minutes in our series, and the maximum period was 79 hours. The patients who presented early within 2 hours have a good outcome ($p<0.01$).

Patients Clinical Presentation:
In our series, 90% of patients (27/30) presented with abdomen pain. Some of them have associated with distension of the abdomen, and very few patients have associated vomiting. 80% of patients (24/30) on examination had tenderness, guarding, and rigidity, bowel sound is presented in only 60% of patients (18/30). The most common symptom is pain abdomen and clinical sign in the tenderness of the abdomen associated with guarding and rigidity.

Ultrasound scan of abdomen and pelvis:
In our series, 94% of patients have scanned ultrasound scan abdomen and pelvic preoperatively. The sensitivity of ultrasound scan in our series is 87.5

Table no 9

ULTRASOUND SCAN SENSITIVITY	STUDY GROUP
63%	Bode PJ et al
82%	Golleti O et al
87.5%	Govt general hospital Vijayawada

The incision for Laparotomy: Almost all patients managed by surgery on, a midline incision was taken. Incidence of the grade of spleen injury:

Table no 10

Grade of spleen Injury	Zuker et al. (n=68)	Our series(n=50)
I	19	3
II	28	15
III	17	11
IV	4	1

In Zucker et al. series, grade I and grade II injuries are commonly involved, accounting for 70% of patients.
In our series, grade II and grade III injuries are more commonly involved, accounting for 86.66% of patients.

Table no 11

STUDY GROUP	MAYERS et al. 19	ZUCKER ET AL32	COCANOUR ET AL11	OUR SERIES
Total no.of Patients	204	68	368	30
operative	136	44	311	21
non-operative	68	24	57	6
non-operative Success%	93%	95%	86%	85.6%
non-operative Failure%	7%	5%	14%	14.3%

In Myers et al. series 68 out of 204 were non-operatively managed, and success rate of non-operative management is 93%, and the failure rate is 7%
In Cocanour et al. series, 57 out of 311 patients were non-operatively managed Success rate of non-operative management is 86% and the failure rate is 14%
In Zucker et al. series, 24 out of 68 were managed non-operatively and success rate of non-operative management is 95%, and the failure rate is 5%
In our series, 6 out of 30 were managed non-operatively and success rate of non-operative management is 85.6%, and the failure rate is 13.34%

Mortality:
The mortality rate is 6.66% in our series (2patients) one patient has died due to septicemia, and another died of acute myocardial infraction .None of our patients have died due to non-operative management.

VI. Conclusions

1) most commonly injured organ is spleen in intra-abdominal injuries (25.2%)
2) age and sex of patients have no association with the outcome of management.
3) males are commonly involved in splenic trauma 29.5years.
4) the mean age group involved in splenic trauma 28-45 years.
5) the time-lapse between injury and treatment has significant associated with outcome. Patients who presented with less than 2 hours of injury have a better prognosis with less morbidity and mortality ($p<0.05$).
6) grade of splenic injury, continuous monitoring of patients, and associated injuries have a direct bearing on the outcome.
7) a preoperative ultrasound scan of the abdomen and pelvic cavity is diagnostic of splenic injury with a sensitivity rate of 81.81%.
8) CT scan is most useful in the non-operative management of trauma.
9) Overall Splenic injuries of grade I, II have a good outcome with non-operative management when not associated with other injuries($P<0.001$).
10)A prophylactic antibiotic will prevent post-operative complications.
11)Pneumococcal vaccine prevents overwhelming post Splenectomy infection.
12) Respiratory complication are common in post-operative patients.

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