



## CONSERVATIVE MANAGEMENT OF ISOLATED SPLENIC INJURY IN A TERTIARY HOSPITAL

<b>Dr. S. Senthilvel</b>	M.S, DCh, Associate Professor ,department Of General Surgery, Kapv Govt. Medical College, Trichy .
<b>Dr. D. Chandrasekaran *</b>	M.S, Assistant Professor ,department Of General Surgery, Kapv Govt. Medical College, Trichy . *Corresponding Author
<b>Dr. Renjith. T. V</b>	Postgraduate, Department Of General Surgery, Kapv Govt. Medical College, Trichy
<b>Dr. M. Saravanan</b>	Postgraduate, Department Of General Surgery, Kapv Govt. Medical College, Trichy

### ABSTRACT

**INTRODUCTION:** The spleen is one of the most commonly injured intra-abdominal organs. The goal is to manage the potentially life-threatening hemorrhage. The preservation of functional splenic tissue is secondary and in selected patients it may be accomplished by using non-operative management. Conservative management is applicable to hemodynamically stable patients with spleen injuries detected by CT . Total splenectomy was regarded as the modality of treatment for splenic injuries. But, patient will be more vulnerable for infection with encapsulated organisms. Considering anatomical & physiological status, treatment modality was changed to splenic preservation.

**MATERIALS AND METHODS:** This study is a prospective type study of 50 cases of blunt trauma abdomen with splenic injuries in all wards of MGMGH, Trichy ,KAPV medical college from 2016 to 2018. Once the patient was admitted in the trauma ward, name ,age, sex ,mode of injury & admission time noted, latent period identified. After doing proper resuscitation , all patients underwent proper clinical examination . Depending upon clinical findings decision was taken for next level of management - that is for investigations , chest x ray- pa view , abdomen erect ,USG abdomen , contrast enhanced CT . Thus mode of management was decided . Patients haemoglobin levels were monitored on 3rd day & 5th day with repeat USG . Patients selected for conservative modalities were placed on strict bed rest ,serial clinical examination which include heart rate ,pulse rate ,respiratory rate, repeat abdominal examinations .Those who were operated were monitored for the cause of death . Each patients were followed up to the day of discharge & and every monthly up to 6 months . Post operative morbidity & duration of hospital stay were recorded . The above parameters were recorded in proforma prepared for this study.

**RESULTS:** Total indices- age group based study, in this study majority of the patients are in the age group of 21-30 then 31-40 (36%,34%incidence) . About 50 patients presented with abdominal pain and left hypochondrial tenderness. About 40 patients presented with abdominal distension with guarding and rigidity, and pallor. Kehr's sign was positive only in 2 cases and that was in grade 4 and 5. Hemodynamic instability was only seen in 1 case which was a case of shattered spleen. So grade 1 presents with left hypochondrial pain with tenderness. Grade 2 & 3 presents with pallor & guarding . Kher's sign was positive in grade 4&5. Grade 5 presented with hemodynamic instability . splenic injury has a mean latent period of 16hrs to manifest.

**CONCLUSION:** Grade one injury can present with left hypochondrial pain and tenderness. Distention and guarding can present with grade 2&3. Hemodynamic instability can observe in grade 4 & 5 . Kher's sign may observe in grade 4&5. Left side hemothorax with rib fracture will be the frequent associated injuries . Upto grade 3 we can manage conservatively in our population size grade 4 & 5 incidence is too low. so we can attempt an trial but never resist to convert in operative manner if patient gong for hypovolemia . Blood transfusion is ideal in conservative management of blunt splenic injury.

**KEYWORDS :** Splenic injury , Hemodynamic stability , CT , Conservative management .

### INTRODUCTION

The spleen is one of the most commonly injured intra-abdominal organs. The goal is to manage the potentially life-threatening hemorrhage. The preservation of functional splenic tissue is secondary and in selected patients it may be accomplished by using non-operative management. Liver and spleen are the two most common organs that are injured following blunt abdominal trauma. Non-operative management of these injuries has evolved over the past two decades. splenic injuries alone can be found in about one third of abdominal trauma and in 25–30% of patients who suffered a traffic accident.

When the spleen is injured, hemoperitoneum may be created & the amount of bleeding depends on the size of the injury. A hematoma of the spleen does not bleed into the abdomen at first but may rupture and bleed in the first few days after injury, although rupture sometimes does not occur for weeks or months. A traumatized spleen can result in painful and tender abdomen. Blood irritates peritoneum and causes pain. The pain is in the left side of the abdomen just below the rib cage. Sometimes the pain is felt in the left shoulder. The abdominal

muscles contract reflexively and feel rigid. If excess blood leaks out, blood pressure falls, resulting in blurred vision, confusion and loss of consciousness.

Doctors can perform ultrasonography or computed tomography (CT) of the abdomen if they suspect an injury to the spleen or any other solid organ. If patient is hemodynamically instable, surgery is done immediately to make a diagnosis and control the bleeding. Patients should be resuscitated with intravenous fluids and blood transfusions.

Conservative management is applicable to hemodynamically stable patients with spleen injuries detected by ct.

Splenic injuries occur worldwide both in developing and developed countries. The common causes include road traffic accidents, fall from height, blunt trauma abdomen etc. Penetrating injuries such as gunshot and stabbing are rare total splenectomy was regarded as the modality of treatment for splenic injuries. But, patient will be more vulnerable for infection with encapsulated organisms. Considering

anatomical & physiological status, treatment modality was changed to splenic preservation. This can be achieved by conservative means: angiography and embolization or operative salvage can be done. Operative modality may be by splenorrhaphy, partial splenectomy, subtotal splenectomy or deliberate auto transplantation. The mode of management depends on the grade of splenic injury and hemodynamic instability. Due to easiness & reduced mortality rate by nonoperative management of splenic injuries in all age groups, the indications for conservative management have been confirmed. This trend is pushed further by today's well managed care environment, as physicians and administrators look for ways to cut costs without sacrificing quality of care. We wondered if relaxing the criteria for nonoperative management or changing the monitoring and follow-up was potentially harmful to spleen, the treatment of splenic injury shifted from surgical resection to conservative manner.

A general consensus of trauma admissions at 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.

**MATERIALS & METHODS**

Inclusion criteria	Exclusion criteria
all age groups above 10 with blunt trauma isolated splenic injury without hemodynamic instability	all blunt traumas with hemodynamic instability all penetrating injuries all iatrogenic splenic injuries

This study is a prospective type study of 50 cases of blunt trauma abdomen with splenic injuries in all wards of MGM, GH, Trichy, KAPV medical college from 2016 to 2018. once the patient is admitted in the trauma ward, name, age, sex, mode of injury & admission time noted, latent period identified. after doing proper resuscitation, all patients underwent proper clinical examination depending upon clinical findings decision was taken for next level of management-that is for investigations, chest x ray- pa view, abdomen erect, USG abdomen, contrast enhanced CT. Thus mode of management was decided. patients hemoglobin levels were monitored on 3rd day & 5th day with repeat USG. Patients selected for conservative modalities were placed on strict bed rest, serial clinical examination which include heart rate, pulse rate, respiratory rate, repeat abdominal examinations. those who are operated were monitored for the cause of death. each patients were followed up to the day of discharge & every monthly up to 6 months. post operative morbidity & duration of hospital stay were recorded. The above parameters are recorded in proforma prepared for this study.

**OBSERVATION AND RESULTS**

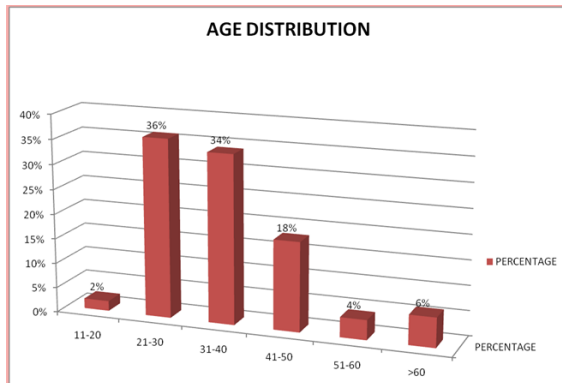
Total numbers of patients under this study were 50.

**AGE DISTRIBUTION**

Table 1- Age group

AGE	NO.OF PATIENTS	PERCENTAGE
11-20	1	2%
21-30	18	36%
31-40	17	34%
41-50	9	18%
51-60	2	4%
>60	3	6%
TOTAL	50	100%

Total indices- age group based study, in this study majority of the patients are in the age group of 21-30 then 31-40 (36%,34%incidence)..21-40yr met with the incidence of 33%ahmed et al

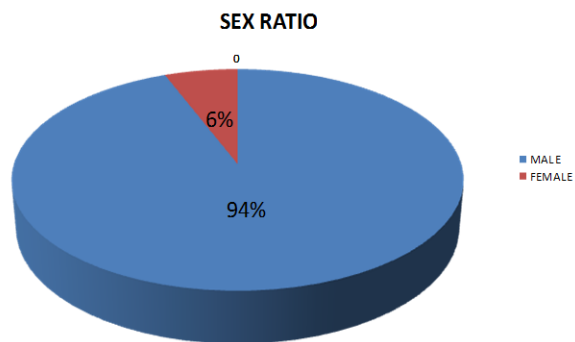


**Oneway ANOVA**

Age	Assault		Bull gore		RTA		Total		Statistical inference
	n	%	n	%	n	%	n	%	
11 to 20yrs	0	.0%	0	.0%	1	2.6%	1	2.0%	X <sup>2</sup> = 15.232 Df= 10 .124>0.05 Not Significant
21 to 30yrs	1	14.3%	4	80.0%	13	34.2%	18	36.0%	
31 to 40yrs	5	71.4%	0	.0%	12	31.6%	17	34.0%	
41 to 50yrs	0	.0%	0	.0%	9	23.7%	9	18.0%	
51 to 60yrs	1	14.3%	1	20.0%	1	2.6%	3	6.0%	
61yrs & above	0	.0%	0	.0%	2	5.3%	2	4.0%	
Total	7	100.0%	5	100.0%	38	100.0%	50	100.0%	

**SEX RATIO**

GENDER	NO.OF PATIENTS	PERCENTAGE
MALE	47	94%
FEMALE	3	6%
TOTAL	50	100%



From this chart out of 50 patients 47 were males & 3 were females, About 94% Were Males & 4% Were Females

**ANOVA TEST**

Mode of injury	Male		Female		Total		Statistical inference
	n	%	n	%	n	%	
Assault	6	12.8%	1	33.3%	7	14.0%	X <sup>2</sup> = 1.208 Df= 2 .547> 0.05 Not Significant
Bullhit	5	10.6%	0	.0%	5	10.0%	
RTA	36	76.6%	2	66.7%	38	76.0%	
Total	47	100.0%	3	100.0%	50	100.0%	

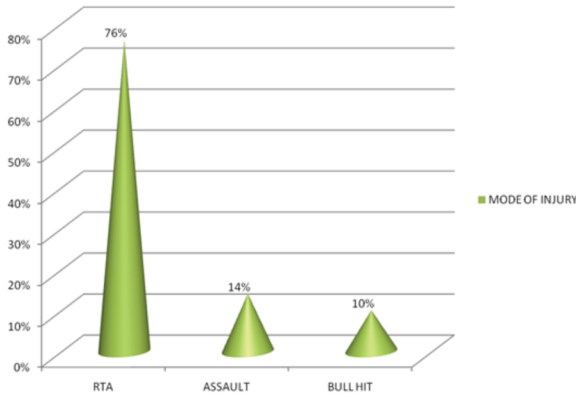
Hence The P Value Is > 0.25 The Data Having No Significance

**MODE OF INJURY**

MODE	NUMBER	PERCENTAGE
RTA	38	76%
ASSAULT	7	14%
BULL GHORE	5	10%

Rta constitutes about 76% of total blunt trauma.

**MODE OF INJURY**



From The Data Rta Is The Most Common Event That Causing Injury About 76%

But From The Anova Test It Shows P Value Less >.05 Show No Significance

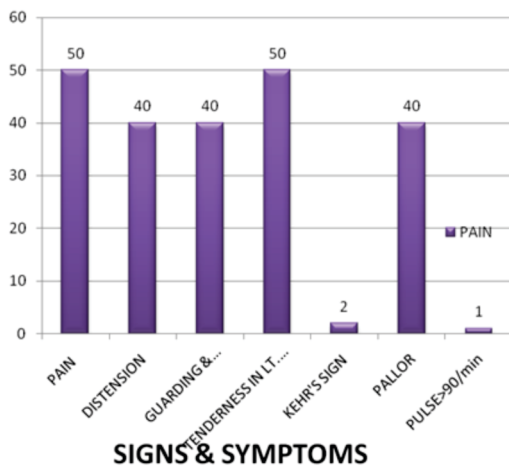
Age	n	Mean	S.D	Min.	Max.	Statistical inference
Assault	7	37.86	10.558	28	60	F=0.179 .837>0.05 Not Significant
Bull hit	5	34.00	12.410	26	56	
RTA	38	36.66	11.158	20	70	
Total	50	36.56	11.007	20	70	

**CLINICAL SIGNS AND SYMPTOMS**

CLINICAL SIGNS AND SYMPTOMS	NO.OF PATIENTS
PAIN	50
DISTENTION	40
GUARDING AND RIGIDITY	40
TENDERNESS IN LEFT HYPOCHONDRIUM	50
KEHR'S SIGN	2
PALLOR	40
PULSE >90/MIN	1
SYSTOLIC BP <90mm Hg	1
BOWEL SOUND ABSENT	8

HDI-Haemo Dynamic Instability From the signs and symptom applying ttest we p value of <..001 hence Clinical features having significance

	1 <sup>st</sup> grade		2 <sup>nd</sup> grade		3 <sup>rd</sup> grade		4 <sup>th</sup> grade		5 <sup>th</sup> grade		Total		Statistical inference
	n	%	n	%	n	%	n	%	n	%	N	%	
<b>Pain</b>													-
No	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%	
Yes	10	100.0%	32	100.0%	6	100.0%	1	100.0%	1	100.0%	50	100.0%	
<b>Distention</b>													X <sup>2</sup> = 50.000 Df=4 .000<0.05 Significant
No	10	100.0%	0	.0%	0	.0%	0	.0%	0	.0%	10	20.0%	
Yes	0	.0%	32	100.0%	6	100.0%	1	100.0%	1	100.0%	40	80.0%	
<b>Tenderness</b>													X <sup>2</sup> = 50.000 Df=4 .000<0.05
No	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%	
Yes	10	100.0%	32	100.0%	6	100.0%	1	100.0%	1	100.0%	50	100.0%	
<b>Guarding</b>													X <sup>2</sup> = 50.000 Df=4 .000<0.05
No	10	100.0%	0	.0%	0	.0%	0	.0%	0	.0%	10	20.0%	
Yes	0	.0%	32	100.0%	6	100.0%	1	100.0%	1	100.0%	40	80.0%	
<b>Pallor</b>													X <sup>2</sup> = 44.355 Df=4 .000<0.05
No	10	100.0%	1	3.1%	0	.0%	0	.0%	0	.0%	11	22.0%	
Yes	0	.0%	31	96.9%	6	100.0%	1	100.0%	1	100.0%	39	78.0%	
<b>HDI</b>													X <sup>2</sup> = 50.000 Df=4 .000<0.05
No	10	100.0%	32	100.0%	6	100.0%	1	100.0%	0	.0%	49	98.0%	
Yes	0	.0%	0	.0%	0	.0%	0	.0%	1	100.0%	1	2.0%	
<b>Khers sign</b>													X <sup>2</sup> = 50.000 Df=4 .000<0.05
No	10	100.0%	32	100.0%	6	100.0%	0	.0%	0	.0%	48	96.0%	
Yes	0	.0%	0	.0%	0	.0%	1	100.0%	1	100.0%	2	4.0%	
<b>Bowel sound</b>													X <sup>2</sup> = 50.000 Df=4 .000<0.05
No	10	100.0%	32	100.0%	0	.0%	0	.0%	0	.0%	42	84.0%	
Yes	0	.0%	0	.0%	6	100.0%	1	100.0%	1	100.0%	8	16.0%	
<b>Total</b>	10	100.0%	32	100.0%	6	100.0%	1	100.0%	1	100.0%	50	100.0%	



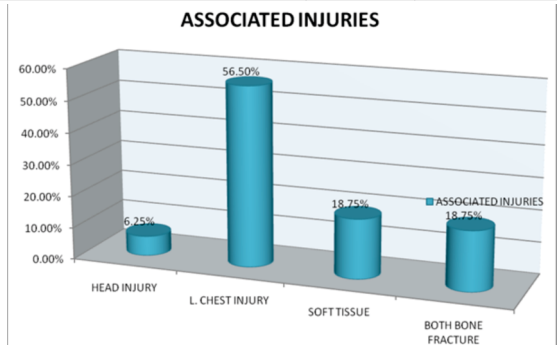
About 50 patients presented with abdominal pain and left hypochondrial tenderness. About 40 patients presented with abdominal distention with guarding and rigidity, and pallor. Kehr's sign was positive only in 2 cases and that was in grade 4 and 5. Hemodynamic instability was only seen in 1 case which was a case of shattered spleen.

So grade 1 presents with left hypochondrial pain with tenderness Grade 2&3 presents with pallor & guarding Khers sign was positive in grade 4&5 Grade 5 presented with haemodynamic instability

**Associated Injuries**

INJURIES	NO.OF PATIENTS	PERCENTAGE
HEAD INJURY	1	6.25%
LEFT HEMOTHORAX WITH RIB FRACTURE	9	56%

SOFT TISSUE INJURY	3	18.75%
BOTH BONE FRACTURE	3	18.75%
<b>TOTAL</b>	<b>16</b>	



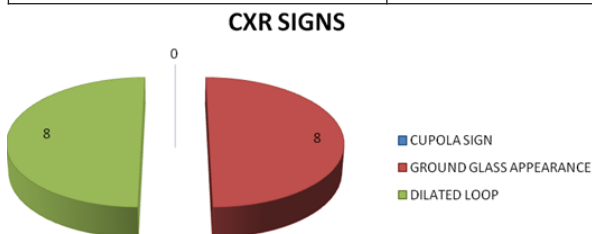
As from this above chart and graph, left sided thoracic injuries are more common in case of splenic injury, followed by the soft tissue injury and both bone fracture.

Associated Injuries	Assault		Bull hit		RTA		Total		Statistical inference
	n	%	n	%	n	%	n	%	
Head injury	0	.0%	1	20.0%	0	.0%	1	2.0%	X <sup>2</sup> =22.329 Df=8 .004<0.05 Significant
Left Hemothorax with rib fracture	1	14.3%	1	20.0%	8	21.1%	10	20.0%	
Soft tissue injury	0	.0%	2	40.0%	1	2.6%	3	6.0%	
Both bone fracture	0	.0%	0	.0%	1	2.6%	1	2.0%	
No Injuries	6	85.7%	1	20.0%	28	73.7%	35	70.0%	
<b>Total</b>	<b>7</b>	<b>100.0%</b>	<b>5</b>	<b>100.0%</b>	<b>38</b>	<b>100.0%</b>	<b>50</b>	<b>100.0%</b>	

Among the injuries RTA is more common so while comparing between associated injuries &? No associated injuries in RTA from the above data applying t test i got p value of .05 hence having significance

**INVESTIGATIONS**  
**CHEST X-RAY PA VIEW**

SIGNS	NO. OF PATIENTS
CUPOLA SIGN	0
GROUND GLASS APPEARANCE	8
DILATED LOOP	8

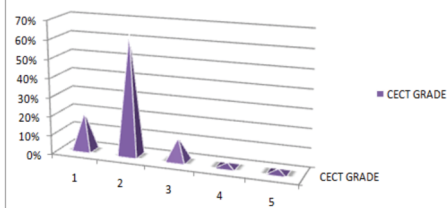


Ctscan is very important in imaging hemodynamically stable Injury, in all 49 patients ct scan was taken followed by cect and Identified grading of injury.

**CECT GRADING**

CECT GRADE	NO.OF PATIENTS	PERCENTAGE
1	10	20%
2	32	64%
3	6	12%
4	1	2%
5	1	2%

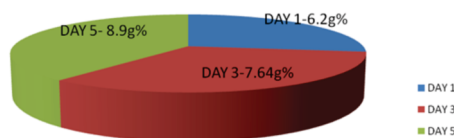
**CECT GRADE**



**HEMOGLOBIN**

DAY OF HOSPITALISATION	MEAN HEMOGLOBIN
DAY 1	6.2 g%
DAY 3	7.64g%
DAY 5	8.9g%

**MEAN Hb**



The hemoglobin taken on the day of admission was found to be 6.2g%, that is the mean hemoglobin of all the 50 patients under study. After blood transfusion, mean hemoglobin value increased to 7.64g% on day 3 of hospitalisation . The repeat hemoglobin value taken on day 5 of hospitalisation was found to be 8.9g% after adequate blood transfusion. On day 5 of hospitalisation usg abdomen was taken and no free fluid is found.

Hb day 1	N	Mean	S.d	Min.	Max.	Statistical inference
Assault	7	6.7714	.65247	5.50	7.30	F=3.156
Bull gore	5	6.4400	.20736	6.30	6.80	.052>0.05
Rta	38	6.2921	.45225	5.10	7.30	Not significant
<b>Total</b>	<b>50</b>	<b>6.3740</b>	<b>.48815</b>	<b>5.10</b>	<b>7.30</b>	

Hb day 3	N	Mean	S.d	Min.	Max.	Statistical inference
Assault	7	7.8143	.67683	6.50	8.60	F=1.402
Bull gore	5	7.7200	.21679	7.50	8.00	.256>0.05
Rta	38	7.5368	.40831	6.40	8.40	Not significant
<b>Total</b>	<b>50</b>	<b>7.5940</b>	<b>.44374</b>	<b>6.40</b>	<b>8.60</b>	

Hb day 5	N	Mean	S.d	Min.	Max.	Statistical inference
Assault	7	9.1143	.42984	8.20	9.50	F=0.535
Bull gore	5	8.9000	.18708	8.60	9.10	.589>0.05
Rta	38	8.9711	.39586	7.20	9.40	Not significant
<b>Total</b>	<b>50</b>	<b>8.9840</b>	<b>.38352</b>	<b>7.20</b>	<b>9.50</b>	

**Latent period**

Grading	Latent period (hrs)	Number of patients	Total
1	18	10	180
2	16	32	512
3	15	6	90
4	14	1	14
5	12	1	12
<b>Mean latent period = 16hrs</b>			

From the study i came to conclude that splenic injury has a mean latent period of 16hrs to manifest.

Grade of injury	Mean days of hospitalization	Total
1	10	100
2	12	384



3	14	42
4	15	15
5	15	15
	Mean average days of hospitalization=11	

from my above study i came to conclude that for the grade 1 injury patients has a mean average days of hospitalization about 10 days and 2,3,4& 5 are having 12, 14, 15 & 15 days respectively.

Mode of treatment	2		3		4		6		Total		Statistical inference
	N	%	N	%	N	%	N	%	N	%	
Non-operative	40	95.2%	3	75.0%	2	66.7%	0	.0%	45	90.0%	X <sup>2</sup> = 54.792 df=6 .000<0.05 Significant
Non-operative with liced	2	4.8%	1	25.0%	1	33.3%	0	.0%	4	8.0%	
Splenectomy	0	.0%	0	.0%	0	.0%	1	100.0%	1	2.0%	
Total	42	100.0%	4	100.0%	3	100.0%	1	100.0%	50	100.0%	

On follow up of all the patients no other complications were found in 49 patients. 1 patient failed to come back for review visits consecutively on first, second and third month. When we tried to reach the patient through phone call we came to know that the patient expired due to myocardial infarction. Hence splenic injuries were found to be resolved by conservative management.

All of the case were managed by conservative modalities, the grade 5 was also presented with haemodynamic stability initially hence attempted non operative manner by on next day of hospitalization he went for shock so did the conversion procedure so while comparing with non operative manner vs conversion in t test p value of <.001 hence highly significance

**DISCUSSION**

In my study conducted at kapv medical college &MGM,GH Trichy, in a population of 50 RTA was found be the most common etiology for splenic injury, in Ahmed et al it was 66.6%while in Arslan et al Fall from height had the highest incidence[51%] followed by RTA [42%]; in Obafemi awolowo university study RTA incidence was 75.3% while Nikhil &Nageshwara et al had an RTA incidence of 62.5%.in our study the incidence of RTA was 76%. Any RTA can lead to splenic injury, but all splenic injuries are not due to RTA. males are more prone to injury, among which 2<sup>nd</sup> and 3<sup>rd</sup> decades are more prone to injuries;but having no significance.in our study male:female ratio is 15.6:1;in Ahmed et al it was 6.5:1;in Obafemi awolowo et al it was 2.2:1.in all grades of injuries pain and tenderness are found to be present in all 50 patients,totaling to a 100%.in Nikhila and Nageshwara et al xivpain was and distension was the most common finding present in all 100%.in Ahmed et al the most common finding was pain (56.6%).in all grades excluding grade 1,guarding,rigidity and pallor were present. only one patient presented with haemodynamic instability.in Nikhila and Nageshwara xivet al haemodynamic instability was found in 65%.in Dalvi mr et al 87.5 % having BP less than 90 mmHg underwent surgical management while 63.3%with PR >100 underwent operative management.in our study ;2% was having haemodynamic instability and they underwent surgery.in our study ; grade 1 corresponded to 20%,grade 2-44%,grade 3- 12%, grade 4 and 5 were 2%.in Obafemi awolowo et al grade 1 corresponds to 1.4%;grade 2 corresponds to 29.9%,grade 4 corresponds to 46%,grade 5 corresponds to 4.1%.in Arslan et al grade 1 corresponds 12.3%,grade 2 corresponds 26.6%,grade 3 corresponds 21%,grade 4 corresponds 40%.in Nikhil and Nageshwar et al grade 1 (35%)and grade 2 (25%).kehr's sign was found only in grade 4 and 5 patients.in our study, in our study left sided thoracic injury was the most common associated injury – 56%.in Arslan et al thoracic injury was the most common associated injury with 63.3%;while in Nikhil and Nageshwara et al thoracic injury was 40%.from the day of hospitalisation we started checking the haemoglobin and repeated on the third and fifth day. the mean haemoglobin value was found to be raising.initially treatment was given after explaining complications to the patient and getting consent. Catheterisation was done, ryles tube introduced,nasal oxygen given, iv fluids started,antibiotics,analgesics and

proton pump inhibitors started. Blood transfusion was the mainstay treatment .in Arslanxii et al all operated cases needed blood transfusion, while 45.2%of n on operative cases needed blood transfusion.in our study, all cases underwent blood transfusion .the highest was given to the splenectomy case who was transfused 6 pints of whole blood.in Ahmed et al 63 %had successful non operative management.in Cirochil et al non operative management was the golden treatment for grade 1 and 2 injuries.in Obafemi awolowoxiii et al 27.4%underwent conservative management.in our study 98% were managed conservatively while 2% were operated. there was no complications for the 98%;but the remaining 2%met mortality within 2 months.in Obafemi awolowo et al 21.9 met with complications.in Cirochi et al grade 3 had 4.78 %mortality while in grade 5 13.5%mortality was present.in Azienda Ospedaliera Universataria et al mortality rate was 9.8%.in surgical cases it was 15.4 % while in non operated cases it was 4.5%.the relative risk for surgery was 3.417.intercostal drainage was given for haemothorax and conservative management for both bone fractures and cerebral contusions.while comparing non operative management (blood transfusion) and conversion procedure (laparotomy)the ' p ' value was found to be less han 0.0001. Whole blood was transfused-maximum transfused about 6 pints especially for grade 5 injury.in our study the grade 5 injury was presented with haemodynamic stability initially.on the next day,patient went for hypotension.then we planned for conversion procedure.thus proceeded with laparotomy and finally splenectomy was done.there was no intraoperative and postoperative complications.the patient was discharged after 12 days of hospitalisation.the patient came for review for 2 months which he then discontinued. on contacting,it was known that the patient expired in a private hospital due to myocardial infarction,so further results could not be traced.in all study groups,repeat ultrasound was taken on 10<sup>th</sup> day of hospitalisation to rule out free fluid in intraabdominal cavity and was discharged.in Dalvi mr et al mean hospitalisation stay was 10 days.in our study it is about 10 days.every study member was reviewed every month for a duration of six months.all study members successfully recovered after a period of six months.among the 50 patients rta was the most common cause.among them ,left sided haemothorax was the most common associated injury followed by the bothbone and soft tissue injuries.while comparing associated injuries other groups in rta 'p' value was found to be less than 0.001 which was significant.

**CONCLUSION:**

From my study i came to the conclusion

- Grade one injury can present with left hypochondrial pain and tenderness
- Distention and guarding can present with grade 2&3
- Haemodynamic instability can observe in grade 4 & 5
- Kher's sign may observe in grade 4&5
- Left side haemothorax with rib fracture will be the frequent associated injuries
- Upto grade 3 we can manage conservatively in our population size grade 4& 5 incidence is too low so we can attempt an trial but never resist to convert in operative manner if patient going for hypovolemia

- Blood transfusion is ideal in conservative management of blunt splenic injury.

## REFERENCES

1. Shackford SR, Sise MJ, Virgilio RW, Peters RM. Selective management of blunt splenic trauma. *J Trauma*. 1986;26:970-9.
2. Hamilton Bailey's Emergency Surgery, 10th edition, chapter 22. 1982.
3. Sinha S, Raja SVV, Lewis MH. Recent Changes in the management of blunt splenic injury: effect on splenic trauma patients and hospital implications, *Ann R Coll Surg Engl*. 2008;90:109-12.
4. Shamim SM, Razzak JA, Umer SM, Chawla T. Splenic Injury After Blunt Abdominal Trauma. *J Emergency Med*. 2011;41:489-91.
5. Hamidi MI, Aldaoud KM, Qtaish I. The Role of computed tomography in blunt abdominal trauma. *Sultan Qaboos Univ Med J*. 2007;7:41-6.
6. Stassen NA, Indermeet B, Julius CD. Selective nonoperative management of blunt splenic injury: An Eastern Association for the Surgery of Trauma practice management guideline. *J Trauma Acute Care Surg*. 2012;73:S294-300.
7. Ahmed H, Pegu N, Rajkhowa K, Baishya RK, Hiquemat N. Splenic injury: a clinical study and management in a tertiary care hospital. *Int Surg J* 2015;2:652-9.
8. Frumiento C, Vane DW. Changing patterns of treatment for blunt splenic injuries: an 11-year experience in a rural state. *J Pediatr Surg* 2000; 35:985-988
9. Haan JM, Bochicchio GV, Kramer N, Scalea TM. Nonoperative management of blunt splenic injury: a 5-year experience. *J Trauma* 2005; 58:492-498
10. McLellan BA, Hanna SS, Monoya DA. Analysis of peritoneal parameters in blunt abdominal trauma. *J Trauma*. 1985;25:393-99
11. Davis KA, Fabian TC, Croce MA. Improved success in non-operative management of blunt splenic injuries. *J Trauma*. 1998;44:1008-15.
12. Meguid AA, Bair HA, Howells GA, Bendick PJ, Kerr HH, Villalba MR. Prospective evaluation of criteria for the nonoperative management of blunt splenic trauma. *Am Surg* 2003; 69: 238-242, discussion 42-
13. Cogbill TH, Moore EE, Jurkovich GJ, Morris JA, Mucha P Jr, Shackford SR, Stolee RT, Moore FA, Pilcher S, LoCicero R et al. Nonoperative management of blunt splenic trauma: a multicenter experience. *J Trauma* 1989; 29: 1312-1317.
14. Longo WE, Baker CC, McMillen MA, Modlin IM, Dequitis LC, Zucker KA: Nonoperative management of adult blunt splenic trauma: criteria for successful outcome. *Ann Surg* 1989;210: 626-629
15. Koury HI, Peschiera JL, Welling RE: Non-operative management of blunt splenic trauma: a 10-year experience. *Injury* 1991;22:349-352
16. Davis KA, Fabian TC, Croce MA, Gavant ML, Flick PA, Minard G, Kudsk KA, Pritchard FE: Improved success in nonoperative management of blunt splenic injuries: embolization of splenic artery pseudoaneurysms. *J Trauma* 1998;44:1008-1015