



ROLE OF MINIMAL INVASIVE INTERVENTIONS IN GRADE 1,2, 3 LIVER AND SPLEEN INJURY

General Surgery

Dr. Priyanka Tiwari	Assistant Professor in General Surgery Department, Kanti Devi Medical College Hospital And Research Centre, Mathura
Dr. Apoorv Gupta	Assistant Professor in Radiology Department Kanti Devi Medical College Hospital And Research Centre, Mathura
Dr. Shyam Bihari Sharma	Professor in General Surgery Department , Kanti Devi Medical College Hospital And Research Centre, Mathura

ABSTRACT

INTRODUCTION : Blunt trauma abdomen is very common in India. In our institute in K.D Medical College Mathura we manage liver and spleen injury with (NOM), MIS and Open laparotomy. The aim of this study was to compare NOM and MIS and RS in Grade 1,2,3 liver and spleen injuries. **MATERIAL AND METHOD:** We managed 27 cases of blunt trauma abdomen in K.D.Medical college. Mathura from Nov 2019 – June 2022 with Grade 1,2,3 liver and spleen injury. It is retrospective Comparative Analytical study in Grade 1,2,3 liver and spleen injury between the 2 groups of treatment NOM and fNOM. **RESULT:** It was hypothesized in our study that NOM is comparatively more beneficial in liver and spleen injury than in comparison to MIS, RS but hypothesis was rejected and p value was .018 significant at $p < .05$. **CONCLUSION :** In our institute, various treatment options, Nonoperative conservative management, fNOM depends upon the patient hemodynamic status, haemoperitoneum, grade of liver and spleen injury.

KEYWORDS

NOM, MIS, RS, haemoperitoneum, Resuscitation, Diagnostic

INTRODUCTION

Road side Accident, Assault, and fall from height are the most common causes of blunt trauma abdomen with liver and spleen injury with haemoperitoneum. (Table 1).

Since centuries ago, blunt trauma abdominal with solid visceral injury were managed by exploratory laparotomy. Now a days Non operative management (NOM) is more beneficial in various grades of liver and spleen injury (Table 2).

The basic concept of Nonoperative management in liver injury and spleen injury is the body's own homeostasis, resuscitation and responder, or nonresponder, to fluid challenges, hemostasis with blood coagulants and drainage of haemoperitoneum. (1)

When failure of NOM occurs, measures used for Injury related damage control, are Minimal invasive interventions and, and laparotomy.

MATERIAL AND METHODS

Place of study –Department of General Surgery in K.D.MEDICAL COLLEGE, MATHURA

Period of study –November 2019 to June -2022

Study design – Retrospective Analytical comparative study. For analysis 2X2 Contingency table was made and for analysis of Grade 1,2,3 liver and spleen injury, patient were divided into 2 groups. Group 1 Nonoperative management and Group 2 failure of Nonoperative management Chi square test applied and p value calculated, with level of significance 0.01, 0.05.

Sample size – n = 27 patients admitted for Blunt trauma abdomen with liver and spleen injury were studied

Inclusion criteria – All patients irrespective of age and sex, admitted with definite diagnosis of blunt trauma abdomen with liver and splenic trauma (after CECT abdomen and pelvis) were included.

Exclusion criteria

- (1) Patients with other associated injuries e.g. Chest injury, Head injury, Pelvic injury, Spine injury, Bone injury etc
- (2) Pregnant women
- (3) Patients allergic to contrast material
- (4) Grade 4,5 Liver and spleen injury

METHODS

On admission, all the patients were evaluated with quick detailed history and clinical examination to reach at a provisional diagnosis. All routine investigations, CBC, LFT, KFT, PT/INR, APTT, USG whole abdomen was done.

CECT scan abdomen and pelvis was done in all cases after

stabilization to grade liver and splenic injury.

Statistical Analysis

Mean age in this study 38.52 $\pm$ 8/55 range is 47 and all patients were male. All 27 patients of liver and spleen injury admitted in emergency, CECT abdomen was done, and the injuries of liver and spleen were graded and treatment followed depends upon the patient hemodynamic status, grade of injury and response to resuscitation.

TABLE 1

N	27
Mean age	38.52 $\pm$ 8/55 (47)
Sex	Male
Rode traffic accident	23 (85.18%)
Assault	3 (11.11%)
Fall from Height	1 (3.70%)

TABLE 2-Relation of Grade of Liver and spleen Injury, with Mean Peritoneal fluid volume, and Response to resuscitation and various types of treatment.

Number of patients (n=27)	Grade of Liver and spleen Injury	Mean Peritoneal fluid	Response to resuscitation	Treatment
10 (37.03%)	Grade 1 liver injury	51ml $\pm$ 100/20 (80)	Responded	NOM Resuscitation
5 (18.51%)	Grade 2 liver injury	460ml $\pm$ 60/400 (200)	Responded	NOM Needle Aspiration of Peritoneal fluid
1 (3.70%)	Grade 3 liver injury	500 ml	Responded	fNOM USG guided pig tail drainage for biloma USG liver abscess drainage Angioembolisation of pseudoaneurysm
1 (3.70%)	Grade 1 liver injury with pseudocyst of pancreas	20ml	Responded	fNOM-Complication Diagnostic laparoscopy with Cystogastrostomy
2 (7.40%)	Grade 1 spleen injury	65 ml $\pm$ 50/80 range 30 ml	Responded	NOM Resuscitation

2 (7.40%)	Grade 1 spleen injury	135 + 120/150 range 30	Responded	NOM USG guided needle Aspiration
2 (7.40%)	Grade 2,3 Spleen Injury	105 ml + 90/120 range 30	Nonresponder	fNOM Laparoscopic Diagnostic peritoneal lavage and Gelfoam packing
3 (11.11%)	Grade 2,3 Spleen Injury	450 + 150/800 range 650	Nonresponder	fNOM Emergency Laparotomy and splenectomy
1 (3.70%)	Grade 1, Spleen injury with splenic abscess	50ml	Nonresponder	fNOM Open Splenectomy

To statically analyse, the above results we divide the results into two groups NOM group which had grade 1,2,3 liver and spleen injury that responded to resuscitation and fNOM group that are either nonresponders to resuscitation, or complications of NOM for which Minimal Invasive and resectional surgery was done. For this, 2x2 contingency table was made and analytical results calculated with online software.

TABLE 3

	NOM	F NOM
GRADE 1 LIVER AND SPLEEN INJURY	51.83% (14)	7.40% (2)
GRADE 2 AND 3 LIVER AND SPLEEN INJURY	18.51 % (5)	22.22 % (6)

RESULT:

Null hypothesis was made, that assume that NOM is good than in comparison to Minimal invasive and resectional surgery, in Grade 1, 2,3 liver injury. Significant difference occur in between the two groups p value was .0187 significant at $p < .05$ thus this difference occur because of chance than. Chi square with Yate correction is 3.69 and p value is .054, not significant at $p < .05$ thus alternate hypothesis was accepted according to which, Minimal Invasive and resectional surgery is more beneficial (Table 2, Table 3)

NOM or Failure of NOM in liver and spleen surgery also depends upon the two independent variables, haemodynamic status and haemoperitoneal fluid volume.

NOM or Failure of NOM in Grade 1, 2,3 liver and spleen injury significantly associated with the haemodynamic status, whether patient responded or, not responded to resuscitation. In total 21 patients of liver and spleen injury that responded to NOM

fNOM occur in 2 patients 2/21 (10.52%) patients. In 6/27 (22.22%) patients are non responders and fNOM occur that were managed with minimal invasive intervention and open surgery.

NOM and fNOM also dependent on volume of haemoperitoneum but p value is 0.52 not significant at $p > 0.05$. (Table 4)

TABLE 4

	NOM	F NOM
MILD HAEMOPERITONEUM 100-120 (ml)	12(44.44%)	4(14.81%)
MODERATE AND SEVERE HAEMOPERITONEUM 120-500 (ml)	7(25.92%)	4(14.81%)

DISCUSSION

In our study 10(37.03%) patients with grade 1 liver injury, were haemodynamically stable and Non operative management with IV fluid resuscitation was followed, Inj Trenexa 500 mg BD and Inj Vit K 10mg OD IM was given for 3 days. In 1 patient with Grade 1 liver injury failure of NOM occur as complication of liver injury, CECT abdomen showed pseudocyst formation for which diagnostic Laparoscopy and Cystogastrostomy was done (Table 2)(4,5). 5(20%) patients of grade 2 liver injury were haemodynamically unstable, CECT Abdomen showed no contrast leak, but mean

peritoneal fluid volume was 460 ml +/- 600 /400ml range 200ml. In these patients resuscitation with IV Fluid and massive blood transfusion and FFP was done. Patient responded with hemostasis was done with coagulants infusion with Inj Trenexa @ 1 ml/hr, Inj Buteropase, FFP and electrolyte correction, haemoperitoneal fluid drained with needle aspiration. 1(4%) patient with Grade 3 liver injury, on CECT abdomen showed no contrast leak but a small pseudoanuryism was present.

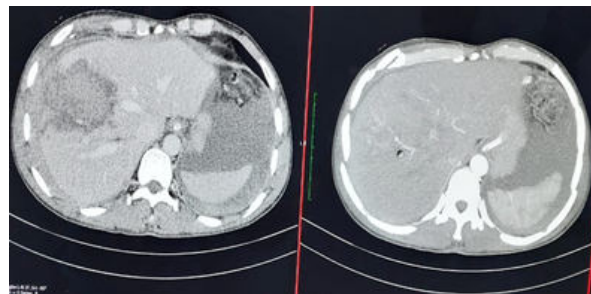


Fig 1: Grade 3 Liver Injury with small Pseudoanuryism in liver

Patient responded well with NOM and haemoperitoneum was also removed with needle aspiration but he developed subcapsular bilioma after 14 days that was drained with USG guided pigtail insertion

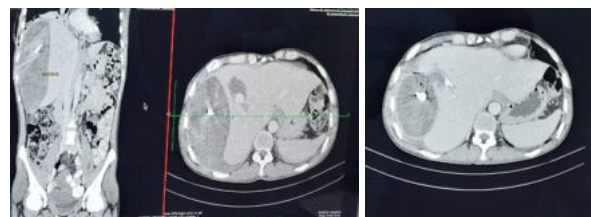
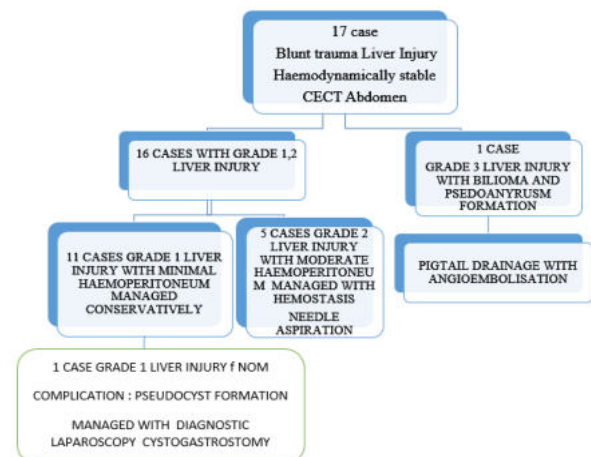


Fig 2 : Resolving liver abscess after, pigtail insertion and after Angioembolization

He also had pleural effusion ~ 1200 ml and haemoserous fluid was drained from right pleural cavity. But this patient had rebleeding after 1 month and CECT showed increase in size of pseudoaneurysm that was managed with endovascular angioembolisation. After 45 days, he developed liver abscess, ~ 800cc? resolving large subcapsular haematoma that was again managed with another pig tail insertion, pig tail was removed after 40 days when size of abscess was 5 ml. (6)



2 (7.40%) patients, with Grade 1 Spleen Injury with mean peritoneal fluid volume 65 ml were managed with resuscitation and 2 patients of grade 1 splenic injury with mean peritoneal fluid volume 135 were also managed with Resuscitation and peritoneal fluid aspiration. (3) 1 patient (3.70%) with Grade 1 spleen injury failure of NOM occur with splenic abscess for which diagnostic Laparoscopy splenectomy was done (Table 2)(4,5)

5 patients with Grade 2,3 splenic injury were managed with NOM protocol but failure occur because of complications that were managed with, diagnostic laparoscopy and hemostasis and

exploratory laparotomy and splenectomy.

According to data reported in the literature, failure rate of the non-surgical management of splenic lesions was between 8%- 38%. (3) But in our study, failure rate is 6/10 (60%), that is higher than the previous data.

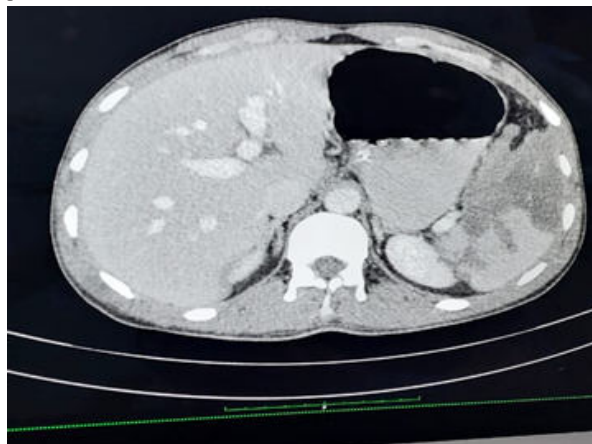


Fig 3 Grade 3 Spleen Injury with intact vascular pedicle

Total incidence of failure of NOM occur in 29.62% patients (8/27), of which, in liver injury incidence of failure, 7.40% (2/27) is less than the splenic injury 22.22% (6/27) (7,8)

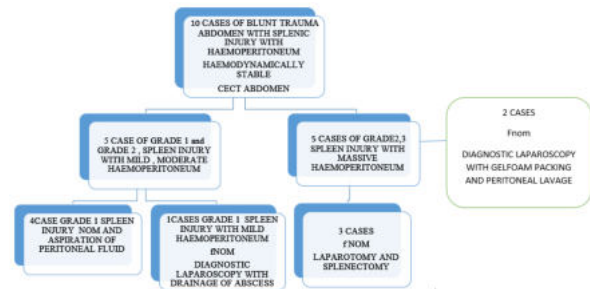


Fig 5

Thus, the aim of NOM is Organ function preservation but failure of NOM and complications of NOM protocol can occur in grade 1,2,3 liver and spleen injury that were managed with diagnostic laparoscopy and peritoneal lavage, and Minimal invasive and radiology interventions and resectional surgery and there was significant difference between the two groups p value was .018 that is significant, and after Yate correction no significant difference occur, thus our hypothesis is rejected and alternate hypothesis of other that f NOM, Minimal invasive intervention or resectional surgeries is more beneficial accepted. (8)

CONCLUSION:

Thus in our study, total 27 patient with blunt liver and spleen injury, nonoperative management was done. And if we compare the two groups, NOM and fNOM p value .018 that is less than $p < 0.05$. Other associated causes of failure of NOM, are nonresponder to resuscitation, massive haemoperitoneum with uncontrolled bleeding not responded to coagulants.

Acknowledgement : No

Conflict of interest : No

REFERENCES

1. Coccolini, Lena Napolitano, Davide Corbella et al. Liver trauma: WSES 2020 guidelines World Journal of Emergency Surgery (2017) 12:40
2. Coccolini, Saverio, and Ansaloni L et al. Splenic trauma: WSES classification and guidelines for adult and pediatric patients World Journal of Emergency Surgery (2020) 15:24
3. Stassen NA, Bhullar I, Chen JD, et al. 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(5 Suppl. 4):S294-300
4. Thakur S, Ishfaq Ahmed, Wani Non operative management of isolated traumatic splenic injury et al. International Surgery Journal 2021;8(4):1101-1108
5. Mohapatra, Kishan Bhoi et al. Current Management Procedures of Splenic Injury

6. International Journal of Contemporary Medical Research Nov 2020, 7 (11)
7. Ruscelli, Gemini, A Parisi, et al The role of grade of injury in non-operative management of blunt hepatic and splenic trauma. Medicine (2019) 98:35
8. Gwendolyn M. van der Wilden,; George C. Velmahos et al Arch Surg. 2012;147(5):423-428
9. Park RW, Chrysos E, Diamond T et al Management of Liver Trauma British Journal of Surgery 1999, 86, 1121-1135