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Original Research Article

Role of liver enzymes in patients with blunt trauma to liver on conservative management

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ABSTRACT

Background: When blunt abdominal trauma occurs, the liver is the organ most often affected. The liver enzymes are often elevated in blunt trauma to the liver. However, the variation of liver enzymes among various grades of liver injury is not clear. The aim of our investigation is to determine the variation of liver enzymes across various grades of liver injury as well as whether it affects any change in management including surgical intervention.
Methods: Our research was a prospective observational study. Patients of blunt abdominal trauma having a liver damage which was detected on a contrast CT scan and managed conservatively were included. They were categorized as per the AAST (American Association for the Surgery of Trauma) system. Various biochemical markers including liver enzymes were compared between the groups. Any change in management or need for intervention was found out.
Results: A total of 35 patients has been included. Ages between 31 and 40 accounted for the majority of cases (34.3%). Our study showed male preponderance (85.7%). Most patients presented to the hospital within 24 hours of trauma (82.9%). Most of our patients had blood transfusions during their hospital stay (71.4%). AAST grade III injury was predominant (48.6%). Subgroup analysis between minor and major liver injury patients was done. No significant distinction was seen among the two groups concerning the assessed biochemical parameters. No significant variation was observed regarding the necessity for intervention.
Conclusions: Liver enzymes can not be used to differentiate among various grades of liver injury. Patients who are managed conservatively can be managed so with close monitoring and supportive treatment without the need for any intervention. However, larger and randomized studies are needed to validate the results.

Keywords: Liver trauma, Liver enzymes, Grades of injury, Change in management

INTRODUCTION

The liver is the organ that is often injured in blunt abdominal trauma.[1-4] The liver enzymes are often elevated in blunt trauma to the liver and various cut of values are given in different studies.[5-8] Most of the liver trauma patients are managed with non-operative management.[10] AAST (American Association for the Surgery of Trauma) grading is most commonly used to grade liver injury patients based on contrast enhanced computed tomography.[11] The correlation of liver enzymes and different degrees of liver injury remains ambiguous.[12] The aim of our investigation is to determine the fluctuation of liver enzymes across different grades of liver injury and whether it affects any change in management including surgical intervention.

METHODS

Study type

Our study was a prospective observational study.

Study place

The study was conducted at Government Mohan Kumaramangalam Hospital, Salem, TamilNadu, India.

Study duration

Study was done between January 2023 to January 2024.

Sampling technique

We used convenient sampling method so that all patients with blunt abdominal trauma who had injured livers on contrast-enhanced CT scans were incorporated in the current research. The time of presentation after injury was noted. These patients were categorized according to the AAST (American Association for the Surgery of Trauma) evaluation scheme for hepatic damage. Every patient who received non-operative management has been listed.

Various biochemical markers including haemoglobin, neutrophil/lymphocyte ratio, platelet/lymphocyte ratio, CRP, CRP/albumin ratio, and PT/INR were measured daily or until discharge whichever was later.

Tests for liver function were conducted on the day of admission (day 1), on day 3, day 5, and at the time of discharge. The need for blood transfusion during the hospital stay was noted. Any change in management or need for intervention like percutaneous or surgical exploration was found. Two subgroups were made, minor liver injury (grade I, II, III) and major liver injury (grade IV, V) and above-mentioned factors were compared between them.

Inclusion criteria

All patients with blunt trauma abdomen who had liver injury on contrast enhanced CT. Patients managed with non-operative management for liver injury.

Exclusion criteria

Patients with blunt trauma to liver, managed with surgical intervention upfront were excluded from our study.

Ethical approval

Institutional ethics committee approval obtained for our study from our hospital ethics committee.

Statistical analysis

To find the statistical significance between the groups, an independent T test and chi-square test were used. A significant p value was one that was less than 0.05.

RESULTS

Our investigation covered a total of 35 patients. Patients between the ages of 31 and 40 accounted for the majority of cases (34.3%). Our study showed male preponderance (85.7%). Most patients presented to the hospital within 24 hours of trauma (82.9%). Most of our patients had blood transfusions during their hospital stay (71.4%). CECT abdomen done at the time of admission showed AAST grade III injury was predominant (48.6%) followed by grade II (37.1%) and grade IV (14.3%). So, most of our patients (85.7%) had minor liver injuries.

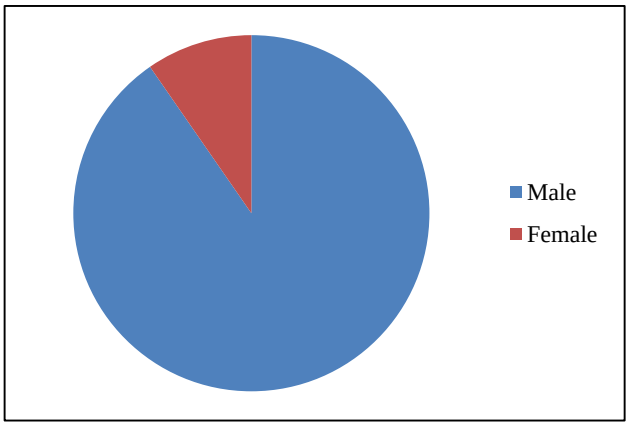

Figure 1: Gender distribution.

Subgroup analysis between minor and major liver injury patients was done. ALP, total protein, serum albumin, hemoglobin, CRP, CRP/albumin ratio, neutrophil/lymphocyte ratio, platelet/lymphocyte ratio, total bilirubin, direct bilirubin, SGOT, SGPT, and INR evaluated serially and compared between the two groups.

Based on the biochemical characteristics mentioned above, no significant distinction was seen between the two groups. Also, there was no significant distinction between the aforementioned two groups in terms of age, gender, time interval between injury and presentation, need for blood transfusion, need for intervention, and overall change in management (Tables 1,2 and 3). None of our patients had any change in management in terms of percutaneous or surgical intervention.

Table 1: Age distribution of patients.

Age (years)	10-20	21-30	31-40	41-50	51-60	61-70	71-80
No. of patients	5	8	12	5	1	2	2

Table 2: Parameters comparing major and minor liver injury.

	Minor liver injury	Major liver injury	Independent t test value	P value
Age	37.93±17.22	32.60±13.27	0.65	0.51
Total bilirubin	1.35± 0.59	1.22±0.85	0.44	0.66
Direct bilirubin	0.60±0.33	0.48±0.32	0.78	0.44
SGOT	326.63±130.54	405.60±110.57	0.39	0.69
SGPT	298.07±138.46	468.50±189.66	1.05	0.29
ALP	107.71±47.46	128.00±51.25	0.72	0.47
Total protein	5.47±0.74	5.12±0.58	1	0.32
Serum albumin	3.07±0.43	3.12±0.36	0.23	0.81
Haemoglobin	10.57±1.67	9.78±0.85	1.03	0.3
CRP	59.90±25.97	75.60±36.67	0.58	0.56
CRP/Albumin	20.25±10.66	24.40±11.25	0.37	0.15
Neutrophil/ lymphocyte	9.0±3.57	8.80±2.68	0.15	0.87
Platelet/ lymphocyte	179.10±73.40	163.23±56.83	0.4	0.68
INR	1.75±0.38	1.62±0.34	0.64	0.52

Table 3: Time duration after injury to presentation at hospital.

Time duration	Minor liver injury (%)	Major liver injury (%)	Total (%)	Chi square value	P value
<1 day	25 (86.2)	4 (13.58)	29 (100)	1.11	0.8
1 to 3 days	4 (80)	1 (20)	5 (100)		
>3 days	1 (100)	0	1 (100)		

Table 4: Blood transfusion between subgroups.

Blood transfusion	Minor liver injury (%)	Major liver injury (%)	Total (%)	Chi square value
Yes	22 (88)	3 (12)	25 (100)	0.37
No	8 (80)	2 (20)	10 (100)	
Total	30 (85.7)	5 (14.3)	35 (100)	

DISCUSSION

Zachariah SK et al, found the mean age of liver injury patients to be 39.24.[7] Shrestha et al, found the mean age to be 27.5 Alanezi et al, found a mean age of 29.3.[9] In our investigation, the average patient age with blunt abdominal trauma was found to be 35. Most of the studies found a male preponderance. Zachariah SK et al. found 86.1% of patients while Shrestha et al. found 78.9% of patients having liver injury were males.[7,5] Alanezi et al, found 77.8% were male patients.[9] In our study, the male patients constituted 85.7% of total liver trauma patients. Most of our patients belonged to the minor liver injury category (85.7%). This is comparable to the results of previous studies. Minor liver injury patients in Zachariah SK et al. were 63.8% while in Alanezi et al, they were 77.8%.[7,9] In the study by Shrestha et al, minor liver injury patients were 86.8%.[5] Upon further analysis, the most common AAST grade in our study was grade III (48.6%). Zachariah et al reported 19.4% while Alanezi et al, reported 37.8% of patients having grade III liver injury.[7,9] Shrestha et al reported that 47.4% had grade III liver injury.[5] Upon subgroup analysis of various biochemical parameters between minor and major liver injury patients, no significant difference was found in our investigation among the two groups. This was in contrast with the research that Shrestha et al conducted, the median of hematocrit ($p<0.05$), AST ($p<0.001$), ALT ($p<0.001$), and hemoglobin ($p<0.05$) showed a significant difference across the various grades of liver injury.[5] However, no difference was found in total ICU stay and hospital stays in their study. But various other studies did not show any significant difference in terms of liver enzymes among the various grades of liver injury.[7,9] 71.4% of our patients had blood transfusions during their stay. This is in contrast to the study done by Shrestha et al, which showed blood transfusion in 23.7% of patients.[5] None of our patients needed any intervention including surgical exploration. Zachariah et al, reported surgical intervention in 27.7% of patients, Shrestha et al 13.2%, Alanezi et al, 13.3%.[7,5,9] Further, Alanezi et al reported that 4.4% need laparotomy after being put in initial conservative management.[9]

Limitations

Small sample size, single centre study, observational study are the limitations of the study.

CONCLUSION

While patients with liver injury who have had blunt abdominal trauma consistently have higher liver enzyme levels, there is no significant difference in liver enzymes among the various grades of liver injury. The same is true for other biochemical parameters used in our study. So, these parameters cannot be used to differentiate the various grades of liver injury. Further, those patients who are managed conservatively do not need any intervention including surgical exploration. These patients can be managed conservatively with close monitoring and supportive treatment. However, larger and randomized studies are needed to validate the results.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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