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RESEARCH ARTICLE

OUTCOME OF NON-SURGICAL MANAGEMENT OF LIVER INJURY IN BLUNT ABDOMINAL TRAUMA

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ABSTRACT

Introduction: Injuries to the liver remain a major obstacle for the successful treatment of blunt abdominal trauma. In the early part of the 20th century, aggressive operative treatment was popular. However, following World War II, this was replaced by the use of non-operative strategies.

Objectives:

- To study the outcome of non-surgical management of liver injuries in blunt abdominal trauma.
- To study the percentage of conservatively managed blunt trauma liver cases which had to be managed surgically later.

Methods: This is a cohort study done in the department of general surgery, Govt Medical College, Kozhikode, where 100 patients of isolated blunt trauma liver was monitored and followed up for two to three weeks. The number of cases that has been successfully managed by conservative or surgical methods will be analysed and the percentage of cases that was managed surgically while on non-operative approach would also be assessed.

Results: Of all 100 patients, 96 patients were managed non operatively out of which 2 patients had to be converted to laparotomy later. 94 patients who were managed by non-operative approach was successfully discharged with no mortality, however the 2 patients where non operative approach failed had expired in the postoperative period. 4 patients were hemodynamically unstable at presentation hence had to be managed by surgical means and here only 1 patient was discharged successfully wherein the other three patients had expired in the post-operative period.

Conclusion: Non-operative approach should be the preferred method for managing hemodynamically stable patients and it is associated with a good prognosis and minimal mortality.

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INTRODUCTION

Trauma is the most common cause of death and a significant cause of morbidity in people younger than 40 years of age (Gaines, 2019; Sauaia, 1995). Although the liver and the spleen are organs relatively shielded by the inferior ribs, they account for about two-thirds of all visceral injuries in abdominal trauma (Saxena, 1999; Si-Tayeb, 2010).Till recently, surgical treatment was the preferred therapeutic strategy for blunt trauma of abdominal parenchymatous organs (Almazroo, 2017; O'Brien, 2015). But due to the advanced accuracy of diagnostic imaging, the improvement of interventional radiology techniques and the technical progress in intensive care, conservative management approachesare currently encouraged and examined, and have been found to show satisfactory results (Molinelli, 2018; Wortman, 2018). Non-operative management for blunt hepatic injury is the treatment of choice in hemodynamically stable patients as specified by the Eastern Association for the Surgery of Trauma Practice Management Guidelines. Non-operative therapy is appropriate only at a facility capable of hemodynamic monitoring, serial abdominal examinations, and an operating room that is immediately available for emergency laparotomy. Although it is accepted that patients with blunt hepatic injury undergoing non-operative therapy must be monitored in the intensive care unit (ICU) for a period with serial haematocrits, abdominal exams, nil per oral, and bedrest, the frequency and duration of the samehas not been established, and varies by institution. Several other unanswered questions in the non-operative management of blunt hepatic trauma also exist, includingthe timing of resuming a normal diet, how long one should wait before starting chemical deep vein thrombosis (DVT) prophylaxis, and when the patient can resume full activities. Patients with a higher injury grade are more likely to fail non-operative management with hemodynamic

instability being the leading cause of failure in 75% of patients. But failure of non-operative therapy does not necessarily mean the patient should undergo surgery as angiographic therapy can be effective (Tarchouli, 2018; Inukai, 2018). Although non-operative management is increasingly adopted for blunt trauma management, there is a lacunae in literature that quantifies the outcome in such cases. Understanding the failure rates and associated factors can help in building a robust protocol for evidence-based management of liver injuries in blunt trauma. The objectives of the current study were to study the clinical profile of patients presenting with blunt injury to the liver, study outcomes of non-surgical management and to assess what proportion of conservatively managed patients might require surgical intervention during follow up.

METHODOLOGY

This was a prospective cohort study conducted in a tertiary care centre in northern Kerala, India. Participants were recruited from the emergency department among patients who arrived after acute trauma. All patients with suspected blunt trauma to the abdomen from May 2019 to October 2020 were included in the study if they had a positive FAST report, diagnosed as blunt trauma liver based on contrast enhanced computed tomography and were available to be followed up for at least two weeks. Patients who were not willing for follow up or had other abdominal organ injuries were excluded from the study. After an initial screening using inclusion and exclusion criteria, the eligible participants were approached for enrolment. Informed consent was obtained prior to data collection. Data collection was done using a structured case report form that documented clinical details. Hemodynamic stability was assessed using pulse rate, blood pressure, abdominal girth, urine output, haemoglobin level and oxygen saturation.

Sample size estimation: Sample size was calculated based on a previous study[11]. Assuming a positive outcome in 90% of participants managed conservatively, at 6% absolute precision and 95% confidence interval, sample size was calculated to be 100. Consecutive sampling was done for recruitment till the sample size was achieved.

Data Analysis: Data was entered in Microsoft Excel 2013 and analysed using STATA version 14. Continuous variables like age were expressed as mean along with standard deviation as well as categorised into 10-year intervals. Categorical variables like gender, presence of co-morbidities, behavioural factors, mode of injury and hemodynamic status were expressed as proportions along with 95% confidence interval. Association between categorical variables was assessed using Chi-square test or Fischer exact test. Association of age with treatment outcome was assessed using student's t-test. A p value of less than 0.05 was considered as statistically significant.

RESULTS

A total of 100 participants were recruited into the study. Table 1 shows the socio-demographic and baseline characteristics of the participants.The age of the participants ranged from 16 to 72 years. The mean (SD) of the participants was 43.3 (14.1) years. The majority were males (89%). The most common co-morbidity encountered was hypertension in 22%, followed by diabetes and coronary artery disease. Alcohol use was found in 22% and tobacco use in 17%.

The main mode of injury (Fig 1) was road traffic accident, found in 51% of the cases, followed by assault and fall from a height. Table 2 shows the condition of participants at presentation. Half of the participants had initial hemoglobin levels around 7 to 10 g/ dl while six participants presented with Hb less than 4 g/dl. More than 50% of participants had systolic BP between 100 and 120 mmHg at presentation. Only 6 participants had SBP less than 80 mmHg. Four were hemodynamically unstable at presentation. The most common grade of injury encountered was grade 2 followed by grade 3 (Figure 2). Of the100 participants, 94 (95%) were managed conservatively. Fourparticipants (95%) were taken up for surgery immediately, while two (95%) converted from conservative to surgical. Overall survival rate was 95%. Factors associated with treatment outcome are summarized in Table 3. The significant predictors of mortality were a history of smoking, hypertension, coronary artery disease, and hemodynamically unstable presentation including low hemoglobin levels and low blood pressure. Age, gender, diabetes mellitus and history of alcohol use were not found be significant predictors.

Table 1. Baseline characteristics of patients presenting with blunt injury liver (N=100)

Variable	Number of participants (n)	95% Confidence Interval
Age (yrs)		
Less than 19	4	1.1 – 9.9
20 – 29	15	8.6 – 23.5
30 – 39	28	19.4 – 37.8
40 – 49	17	10.2 – 25.8
50 – 59	24	16.0 – 33.5
60 – 69	10	4.9 – 17.6
70 – 79	2	0.2 – 7.0
Sex		
Male	89	81.1 – 94.3
Female	11	5.6 – 18.8
Diabetes		
Present	20	11.9 – 28.3
Absent	80	71.6 – 88.0
Hypertension		
Present	22	14.4 – 31.6
Absent	78	68.3 – 85.5
Coronary artery disease		
Present	15	7.9 – 22.5
Absent	85	77.4 – 92.0
Smoking		
Present	17	10.3 – 26.0
Absent	83	73.9 – 89.6
Alcohol Use		
Present	22	14.4 – 31.6
Absent	78	68.3 – 85.5

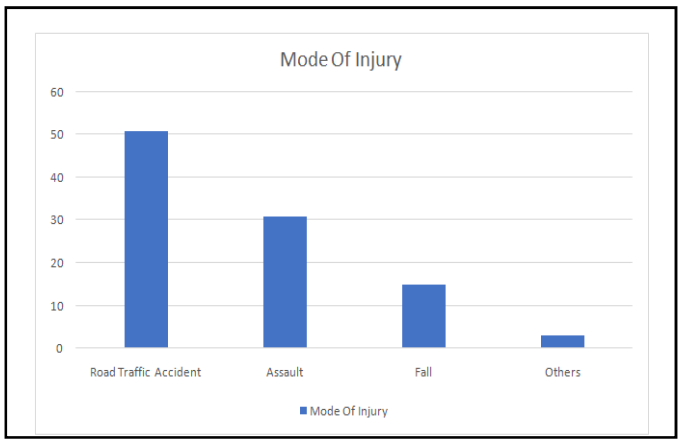

Figure 1. Distribution of study participants by mode of injury (N=100)

Table 2. Clinical characteristics of participants at presentation (N=100)

Variable	Number of participants	95% Confidence Interval
Hb at Presentation (g/dl)		
<4	6	2.2 – 12.6
4 – 7	28	19.4 – 37.8
7 – 10	50	39.8 – 60.1
>10	16	9.4 – 24.6
SBP at Presentation (mmHg)		
<80	6	2.2 – 12.6
80 – 100	22	14.3 – 31.3
100 – 120	57	46.7 – 66.8
>120	15	8.6 – 23.5
Hemodynamic Stability		
Stable	96	90.0 – 98.8
Unstable	4	1.1 – 9.9

Table 3: Factors affecting treatment outcome in patients presentingwith blunt liver injury

Variable	Treatment Outcome (N=100)		P-value
	Survived (N=95) Number of participants, n (%)	Expired (N=5) Number of participants, n (%)	
Age			
Mean (SD)	43.1 (14.2)	47.8 (13.5)	0.474
Gender			
Male	85 (95.5)	4 (4.5)	0.449
Female	10 (90.9)	1 (9.1)	
Smoking			
Present	14 (82.3)	3 (17.6)	0.033
Absent	81 (97.6)	2 (2.4)	
Alcohol Use			
Present	19 (86.4)	3 (13.6)	0.069
Absent	76 (97.4)	2 (2.6)	
Diabetes Mellitus			
Present	17 (85.0)	3 (15.0)	0.053
Absent	78 (97.5)	2 (2.5)	
Hypertension			
Present	17 (77.3)	5 (22.7)	<0.001
Absent	78 (100.0)	0 (0)	
Coronary Artery Disease			
Present	10 (66.7)	5 (33.3)	<0.001
Absent	85 (100.0)	0 (0)	
Hb at Presentation (g/dl)			
<4	2 (33.3)	4 (66.7)	<0.001
4 – 7	27 (96.4)	1 (3.6)	
7 – 10	50 (100.0)	0 (0)	
>10	16 (100.0)	0 (0)	
SBP at Presentation (mmHg)			
<80	3 (50.0)	3 (50.0)	0.001
80 – 100	21 (95.4)	1 (4.6)	
100 – 120	56 (98.2)	1 (1.8)	
>120	15 (100.0)	0 (0)	
Hemodynamic Stability			
Stable	94 (97.9)	2 (2.1)	<0.001
Unstable	1 (25.0)	3 (75.0)	

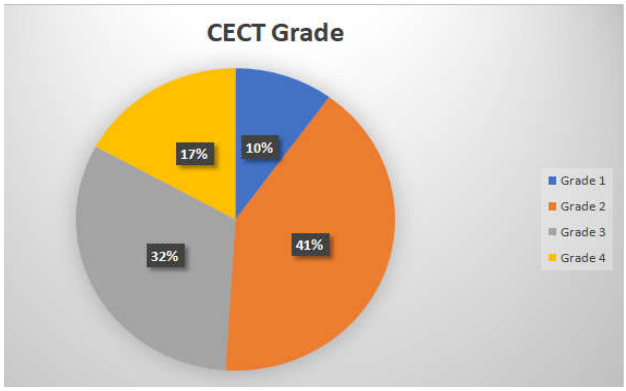

Figure 2. Distribution of study participants by grade of injury (N=100)

DISCUSSION

The current study found favourable treatment outcomes for patients treated conservatively after blunt trauma to the liver, with a successful outcome in 97%. Survival rates were dependent on other co-morbid conditions like hypertension and coronary artery disease, and behavioural risk factors like smoking. But diabetes mellitus and alcohol use were not found to have a statistically significant effect. The status of the patient at presentation was also found to be an important predictor of treatment outcome. A prospective study by Brillantino et al. looked at hemodynamically stable patients who were put under non-operative management after blunt trauma abdomen in Italy [11]. The success rate was similar to the current study, at 96%.On the other hand, a retrospective study by Inukai et al. in Japan found a lower rate of favourable outcome, at 90% of the cases recovering in the conservative group with no switching of cases from non-operative to operative management [10]. The methodological similarities, prospective allotment of stable cases into conservative group could be the reason for similar results in the former, whereas lack of opportunity to switch patients to emergency surgery might have contributed to higher mortality in the latter. The Korean study by Park et al. also showed a highly positive outcome with non-operative patients, similar to the current study [13]. The study has several strengths. Since all eligible patients were consecutively included, there was no sampling bias during selection. The main limitation of the study is that it was done at a single hospital and may be affected by the surgical and therapeutic protocols followed there.

CONCLUSION

Non-operative management of blunt liver trauma represents a safe and effective treatment for both minor and severe injuries, achieving a high success rate and an acceptable morbidity rate. Continuous monitoring of hemodynamic status of a patient in blunt trauma liver helps us to choose the right management, wherein stable patients can be managed by a non-operative approach and with surgery being the main stay for unstable patients.

REFERENCES

1. Gaines BA. Intra-abdominal solid organ injury in children: diagnosis and treatment. *J.Trauma*. 2009; 67(2 Suppl):S135-9.
2. Sauaia A, Moore FA, Moore EE, Moser KS, Brennan R, Read RA, et al. Epidemiology of trauma deaths: a reassessment. J Trauma. 1995; 38(2):185-93.
3. Saxena R, Theise ND, Crawford JM. Microanatomy of the human liver-exploring the hidden interfaces. Hepatology. 1999 Dec;30(6):1339-46.
4. Si-Tayeb K, Lemaigre FP, Duncan SA. Organogenesis and development of the liver. Dev Cell. 2010 Feb 16;18(2):175-89.
5. Almazroo OA, Miah MK, Venkataramanan R. Drug Metabolism in the Liver. Clin Liver Dis. 2017 Feb;21(1):1-20.
6. O'Brien L, Hosick PA, John K, Stec DE, Hinds TD. Biliverdin reductase isozymes in metabolism. Trends Endocrinol Metab. 2015 Apr;26(4):212-20.
7. Molinelli V, Iosca S, Duka E, De Marchi G, Lucchina N, Bracchi E, Carcano G, Novario R, Fugazzola C. Ability of

specific and nonspecific signs of multidetector computed tomography (MDCT) in the diagnosis of blunt surgically important bowel and mesenteric injuries. Radiol Med. 2018 Dec;123(12):891-903.
8. Wortman JR, Uyeda JW, Fulwadhva UP, Sodickson AD. Dual-Energy CT for Abdominal and Pelvic Trauma. Radiographics. 2018 Mar-Apr;38(2):586-602.
9. Tarchouli M, Elabsi M, Njoumi N, Essarghini M, Echarrab M, Chkoff MR. Liver trauma: What current management? Hepatobiliary Pancreat Dis Int. 2018 Feb;17(1):39-44.
10. Inukai K, Uehara S, Furuta Y, Miura M. Nonoperative management of blunt liver injury in hemodynamically stable versus unstable patients: a retrospective study. EmergRadiol. 2018 Dec;25(6):647-652.
11. Brillantino A, Iacobellis F, Festa P, Mottola A, Acampora C, Corvino F et al. Non-Operative Management of Blunt Liver Trauma: Safety, Efficacy and Complications of a Standardized Treatment Protocol. *Bull Emerg Trauma*. 2019 Jan;7(1):49-54.
12. Park KB, You DD, Hong TH, Heo JM, Won YS. Comparison between operative versus non-operative management of traumatic liver injury. *Korean J Hepatobiliary Pancreat Surg*., 2015; 19(3): 103-108.

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