

Non-operative management of blunt liver trauma in Qena University Hospital

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Abstract

Background: Even though it is in a protective location, the abdominal organ that suffers damage the most frequently is the liver. A revolution in the management of acute abdominal organ injuries has occurred in recent decades, with major advancements in outcomes and a shift away from required surgery.

Objectives: To present our experience in non-operative management of blunt liver trauma patients in Qena University Hospital.

Patients and methods: This prospective cohort study was conducted at general surgery department. The study included 50 patients admitted to the emergency department with blunt liver trauma. The duration of the study ranged from august 2021 to july 2022 .

Results: Treatment success distributions of the studied group show that the majority had Treatment success (86.0). 7 cases died (14.0%) , the cause of death was sepsis in 4 cases (8.0%) , and hemorrhagic shock in 3 cases (6.0%) and transfer to surgical treatment before death

Conclusion; With a high success rate even in the treatment of high-grade liver lesions and a low and acceptable morbidity rate, our protocol offers a safe and effective therapeutic approach for both moderate and severe liver damage.

Keywords: non-operative; liver; blunt trauma.

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Introduction

The abdominal organ that is most frequently damaged is the liver, despite being in a protected region (Jiang and Wang , 2012) . In recent decades, there has been a revolution in the treatment of traumatic abdominal organ injury, which has resulted in dramatic improvements in outcomes and a shift away from required surgery (Stassen et al.,2012) . The widespread use of computed tomography (CT) and ultrasonography in the treatment of liver injuries facilitated the decision-making process, and the selected therapy is backed by mounting evidence that non-operative management (NOM) lowers death rates (She et al.,2016) . Most websites have a success rate of more than 80% . , with NOM incidence for traumatic liver injury ranging from 50 to 85% (Lin et al.,2014) . The American Association for the Surgery of Damage (AAST) divides liver trauma into categories 1 through 6 based on a severity scale from 1 to 6: grades 1 and 2 are considered minor wounds, grades 3 through 5 are serious or "high-grade," and grade 6 lesions are typically incurable (AAST, 1999) .

Widespread acceptance exists for the NOM as the conventional treatment for mild liver damage. Whether it works in severe injuries, meanwhile, is a matter of debate. However, Clinical shock symptoms, prolonged blood transfusion requirements, and a high injury severity score (ISS), and the peritoneal indicators all seem to be factors in NOM's failure to treat liver injuries (Boese et al.,2015) . The objective was to successfully implement a non-operative management approach for the treatment of patients at Qena University Hospital who had had blunt liver injuries.

Patients and methods

The General Surgery Department of Qena University Hospital conducted this prospective cohort study.

In this study, all patients with acute liver trauma admitted to the emergency room are included from August 2021 to July 2022 .

Inclusion criteria: Hemodynamically stable patients, no signs of peritonitis and no associated organ injury needs operative intervention.

Exclusion criteria: Hemodynamically unstable patients, signs of peritonitis, and associated organ injury need operative intervention.

Patients who had come to the ER with blunt liver traumas are eligible for the study. We formulated a medical form in which all data are collected for the poly traumatized patient. The medical form will be feasible and accessible with more structure permitting practical methods of collecting data; taking seriously the matter of privacy and legality. The form will be attached to the patient sheet and implemented to collect the data from the patient sheets.

We will provide all facilities in the hospital and departments with forms that will be distributed inwards, ICU, ER, and operation rooms where the bulk of the data is gathered.

The form included data from the caregiver which are: Name, Age, gender, residency, and mechanism of injury: Motor vehicle crash, fall from height and physical assault to the abdomen, clinical examination: vital signs, laboratory investigations: CBC, INR, Liver function and radiology: FAST US, CT abdomen.

Our protocol of management started initially at emergency room by initial resuscitation then admission to the ward to complete the management that included close monitoring of patients with serial physical examinations: heart rate, blood pressure, respiratory rate, and urinary output. Management also included serial laboratory investigations: Haemoglobin level haematocrit. Coagulation profile and liver function test, imaging included CT scan to detect the grade of injury , repeated pelvi-abdominal US .

Patients received intravenous fluids, antibiotics, analgesics, proton pump inhibitors, packed Red blood cell transfusions were given when hemoglobin levels were less than 8 g/L ,blood products including fresh frozen plasma, and platelet. In severe cases patients were admitted to ICU.

The current study has been approved by the Ethics committee of faculty of Medicine ,SVU ,Qena ,Egypt. With Ethical approval code: SVU-MED-SUR011-1-21-8-230.

Research outcome measures

Primary (main): Identification of the rate of success of non-operative management in liver

trauma. Comparing our practice with protocols used in trauma centres for non-operative management of liver trauma.

Secondary (subsidiary): Creation of trauma registry for trauma patients with liver injury.

Statistical analysis:

The IBM SPSS software programme, version 20.0, was used to enter data into the computer and analyse it. Numbers and percentages were used to describe the qualitative data. The distribution's normality was assessed using the Kolmogorov-Smirnov test. Utilizing range (minimum and maximum), mean, and standard deviation, quantitative data were described. The 5% level was used to determine the relevance of the results.

Results

Table 1. Distribution of studied sample according to demographic data (Trauma registry for trauma patients)

Variables	Number	Percent
Age (years)		
Range	4-39	
Mean±S.D.	16.29±11.226	
Sex		
Male	21	42.0
Female	29	58.0
Residency		
Nag-Hammadi	17	34.0
Dishna	8	16.0
Abu-Tesht	7	14.0
Qift	7	14.0
Qus	5	10.0
El-Waqf	4	8.0
Qena	2	4.0
BMI		
Range	27-31	
Mean±S.D.	28.40±1.229	

Table (1) shows the demographic data of the studied group. Age was ranged between 4-39 years with mean value 16.29±11.226 years. Male cases were 21(42.0%) while female cases were 29(58.0%). About one-third were from Nag-Hammadi (34.0%). BMI was ranged between 27-31 with mean value 28.40±1.229 kg/m².

Table 2. Distribution of studied sample according to different scores

Variables	Min. – Max.	Mean±S.D.
American Association for the Surgery of Trauma	1.70 – 2.70	2.16±0.343
Injuries severity score	14.5 – 18.5	16.50±1.325
Revised trauma score	4.9 – 6.2	5.69±0.253

Table (2) shows the different scores of the studied group. American Association for the Surgery of Trauma was ranged between 1.70 – 2.70 with a mean value of 2.16±0.343. Injuries severity score was ranged between 14.5 – 18.5 with a mean value of 16.50±1.325. Revised trauma score was ranged between 4.9 – 6.2 with a mean value of 5.69±0.253.

Table 3. Distribution of studied sample according to Mechanism of injury

Mechanism of injury	Number	Percent
Vehicle traffic accident	21	42.0
Pedestrian struck	15	30.0
Falling from height	8	16.0
Aggression	6	12.0
Total	50	100

Table (3) shows the Mechanism of injury distributions of the studied group and it shows 21(42.0%) the mechanism of injury was Vehicle traffic accident, 15(30.0%) the mechanism of injury was Pedestrian struck, 8(16.0%) the mechanism of injury was falling from height and 6(12.0%) the mechanism of injury was Aggression.

Table 4. Distribution of studied sample according to Liver grade

Liver grade	Number	Percent
I	11	22.0
II	32	64.0
III	3	6.0
IV	4	8.0
Total	50	100

Table (4) shows Liver grade distributions of the studied group and it shows 11(22.0%) had liver grade I, 32(64.0%) had liver grade II, 3(6.0%) had liver grade III and 4(8.0%) had liver grade IV.

Table 5. Distribution of studied sample according to laboratory investigations

Variables	Min. – Max.	Mean±S.D.
Hb	9.2 – 11.5	10.51±0.741
AST	234 – 567	418.12±81.969
ALT	546 – 989	721.06±137.808

Table (5) shows laboratory investigations of the studied group. Hb was ranged between 9.2 – 11.5 with a mean value of 10.51±0.741. AST was ranged between 234 – 567 with a mean value of 418.12±81.969. ALT was ranged between 546 – 989 with a mean value of 721.06±137.808.

Table 6. Distribution of studied sample according to treatment success

Treatment Success	Number	Percent
No	7	14.0
Yes	43	86.0
Total	50	100

Table (6) shows treatment success distributions of the studied group and it shows that the majority had Treatment success (86.0).

Table 7. Distribution of studied sample according to in-hospital mortality

In hospital mortality	Number	Percent
No	43	86.0
Yes	7	14.0
Sepsis	4	8.0
Hemorrhagic shock	3	6.0
Total	50	100

Table (7) shows in-hospital mortality distributions of the studied group and it shows that 7(14.0%) died 4(8.0%) the cause of death was sepsis and 3(6.0%) had a hemorrhagic shock and transfer to surgical treatment before death.

Discussion

Even though the liver is concealed, both blunt and penetrating trauma frequently results in liver damage.

Most injuries are mild or superficial and don't require treatment. The most common reason for trauma-related death is liver injury. (20–40%), and also it comes in second place in abdominal trauma frequency (She et al.,2016) .

Regarding the demographics of the group under study, Age ranged from 4 to 39 years, with a mean age of 16.29±11.226 years. Male cases were 21(42.0%) while female cases were 29(58.0%). About one-third were from Nag-Hammadi (34.0%). BMI was ranged between 27-31 kg/m² with a mean value 28.40±1.229 kg/m².

However, in the study of **MOHEB et al., 2021**, they included twenty-seven patients presented to their department with blunt abdominal trauma with variable grades of liver injuries. Their age ranged from (18-62 years) (mean 31.1 ±7.51 years). Nineteen male patients (65.5%), eight female patients (29.6%).

Also, **van der Wilden et al.(2012)** shown that the study population's age was 33 (16) years on average (SD) (median age, 28 years; age range, 15-95 years). It is the main cause of death and a major contributor to morbidity among people under 40 in western countries. Trauma is a significant therapeutic issue. About two-thirds of all gut injuries result from abdominal forceful trauma, with injuries to the liver and spleen being the most frequent. despite being relatively protected by the inferior ribs. Prior to three decades ago, surgery was the most popular form of treatment for blunt abdominal parenchymatous organ injuries (**Hancock and Farquharson , 2012**) . The present study showed that as regard different scores of the studied group. American Association for the Surgery of Trauma was ranged between 1.70 – 2.70 with a mean value of 2.16±0.343. Injuries severity score was ranged between 14.5 – 18.5 with a mean value of 16.50±1.325. Revised trauma score was ranged between 4.9 – 6.2 with a mean value of 5.69±0.253. Whereas in the study of **van der Wilden et al. (2012)**, the mean (SD) Injury Severity Score was 32 (14) (median, 29; range, 4-75).

In the study of **Zago et al. (2012)**, 7.60 0.58 was the average Revised Trauma Score. These patients had an average Injury Severity Score of 24.11± 8.73.

The current study showed that as regard Mechanism of injury distributions of the studied group it shows 21(42.0%) the mechanism of injury was Vehicle traffic accident, 15(30.0%) the mechanism of injury was Pedestrian struck, 8 (16.0%) the mechanism of injury was falling from height and 6 (12.0%) the mechanism of injury was Aggression.

Our results were supported by the study of **Norrman et al. (2009)** as they noted that the most frequent reasons were fraudulent in five cases (11%) and road accidents (20 patients; 43%), which involved horses. 24% of all trauma incidents involved four-wheel motor vehicle injuries. A total of 199 injuries were connected with 36 patients (or 78% of all patients), 100 of which were fractures. 30% of patients had abdominal injuries, including 17% splenic injuries and 9% intestinal injuries. In the study in our hands, as regard laboratory investigations of the studied group. Hb was ranged between 9.2 – 11.5 with a mean value of 10.51 ± 0.741 . AST was ranged between 234 – 567 with a mean value of 418.12 ± 81.969 . ALT was ranged between 546 – 989 with a mean value of 721.06 ± 137.808 . As regard liver grade distributions of the studied group and it show 11(22.0%) had liver grade I, 32(64.0%) had liver grade II, 3(6.0%) had liver grade III and 4(8.0%) had liver grade IV.

Our results were in line with the study of **Mansy et al. (2021)**. Furthermore they noted that 256 (78.29%) patients had minor liver damage (grades I to III), while 71 (21.71%) patients had serious liver injuries (grades IV and V). Most of the liver trauma was minor lesions, grades I–III. High liver enzymes were in major liver trauma (grades IV–V).

However, in the study of **Brillantino et al. (2019)**. According to the American Association for the Surgery of Trauma (AAST) organ injury scale, 63 patients (34.8%) had grade I injuries, 48 (26.5%) had grade II, 39 (21.5%) had grade III, 21 (11.6%) had grade IV, and 10 (5.5%) had grade V injuries. According to the clinical data of the researched group, the current investigation demonstrated that. 13 (26.0%) people required blood transfusions and were brought to the ICU. The average hospital stay was 6.40 days, however it ranged from 4.7-8.7 days. The average length of stay in the hospital was three days in the study by **van der Wilden et al. (2012)**, while the 324 patients who needed critical care needed a mean (SD) hospital stay of nine (17) days (range, 0-164 days) (median, 8 days; range, 1-204 days). whereas in the study by **Brillantino et al. (2019)**, the median hospital stay was 11 days (7-17). For the patients who were included, the median follow-up time was 24 months (6-36). The median blood transfusion rates for patients with mild (AAST grade I–II) and severe (AAST grade III–V) injuries were

significantly different [0.5 (0–2) vs. 2 (0–4): p 0.0001; Mann Whitney U-test].

MOHEB et al., (2021), demonstrated that twenty-one patients (77.7%) received blood transfusion.

Our results showed that as regard treatment success distributions of the studied group and it show that the majority had Treatment success (86.0). Regarding in hospital mortality distributions of the studied group it show that 7(14.0%) died 4(8.0%) the cause of death was sepsis and 3(6.0%) had hemorrhagic shock and transfer to surgical treatment before death.

In the study of **MOHEB et al., (2021)**, twenty patients (74%) were managed Nonoperatively. Nineteen patients (95%) underwent effective non-operative therapy, although one patient (5%), who required delayed surgery because of hepatic hematoma-related delayed bleeding, underwent successful surgery. The mean hospital stay was 8.82 ± 3.4 days. One patient (5%) died from associated head injury and ARDS in ICU.

Conclusion

With a high rate of success even when treating high-grade liver lesions and a low and manageable morbidity rate, our protocol for nonoperative management of blunt hepatic trauma is a safe and effective therapeutic approach for both mild and severe injuries.

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