

Original Research Article

Outcomes of surgical management of liver trauma at LUMHS Jamshoro

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ABSTRACT

Background: Mortality from liver trauma remains high despite surgical advancements. The objective of this study was to determine the outcomes of surgical management of liver trauma at LUMHS Jamshoro.

Methods: A cross-sectional observational study using non-probability convenient sampling technique was done at department of surgery LUMHS Jamshoro for 18 months. Patients between 14 to 50 years with blunt hepatic trauma presenting to the E.R. within 04 hours of incident were included and hepatic trauma patients managed conservatively, having multiple trauma and hemo-dynamically stable were excluded. SPSS version 20 was used for data analysis with mean and SD reported for qualitative and frequency and percentages for quantitative variables. Chi-square test was applied keeping p-value of < 0.05 as statistically significant.

Results: From 136 patients with mean age of 32.33±1.23 years, 120 (88%) were male. 122 (89.7%) were admitted due to blunt trauma and 14 (10.3%) due to penetrating trauma. Peri-hepatic packing was performed in 116 (85.2%) and suture hepatorrhaphy in 20 (14.8%). Intra-abdominal sepsis was seen in 41 (30%) of patients followed by recurrent hemorrhage in 33 (24%) while 30 (22%) of patients died. Substantial differences ($p < 0.001$) were observed in terms of surgical technique and each of the complication i.e. sepsis, bile leak and recurrent hemorrhage among alive patients

Conclusions: The most common post-operative complication was intra-abdominal sepsis followed by recurrent haemorrhage and bile leak. Significant mortality was observed in between type of complication as well as surgical technique.

Keywords: Bile leak, Intra-abdominal sepsis, Liver trauma, Recurrent haemorrhage, Surgical management

INTRODUCTION

The fourth reason of death amongst the general population is trauma with abdominal trauma being a more frequent cause.¹ Lately, mortality rates that have been reported for liver injury patients ranging from as low as 05 % to as high as 52%.² Liver surgeries are generally done for treating a vast number of hepatic disorders. These include benign as well as malignant tumours, calculi with intra-hepatic ducts, hydatid cysts and abscess.³ Hepatic operations are especially challenging

not only due to the unique structural, anatomical architecture but also because of the various vital functions that the liver performs.⁴ In spite of the surgical, technical advancements and high experiences of liver surgeries among specialized centres, yet liver trauma remains a burden through relative high post-operative rates of morbidity (04% to 48%) as well as mortality (0.24% to 10%). The usually observed complications after hepatic surgeries are fever, haemorrhage, liver failure, biliary leakage, sub-phrenic infections and pleural effusion.^{5,6}

The fact that the anterior location of the liver within the abdominal cavity and the fragility of the liver parenchyma which can easily be disrupted via Glisson's capsule makes liver ever-so vulnerable to injury, thereby making liver the most commonly injured organ in abdominal trauma.⁷ A massive improvement in the managing liver trauma has been achieved owing to the advances in diagnostic as well as therapeutic modalities.⁸ Over a century ago, Pringle performed an animal experiment by porta hepatis occlusion in liver trauma animals during repairing the injuries.⁹ Unfortunately, applying the same technique on humans caused a high mortality rate. With the advent of computed tomography scanning (CT scan), the use of ultrasound technology in trauma, angiography, enhancements in critical care monitoring and damage control, surgeries have been a revolution in the management of hepatic trauma.¹⁰

Although there have been reports of non-surgical management of liver trauma, however multiple researchers have found that the need for operating and subsequent failure of non-operative management are linked to increases in age, low scoring on Glasgow Coma Scale, hypotension, an low platelet count at pre-operative testing, high requirement of fluids and abdominal trauma in addition to liver trauma.¹¹

For liver surgeries, deep-vein catheterization is normally done; therefore catheter-related infections are a common cause of complications after hepatic surgeries. Post-liver surgery, reactive pleural effusion might be caused by diaphragmatic injuries, obstructed thoracic, venous and lymphatic systems, manipulation of hepatic coronary ligament (most likely caused due to sub-phrenic fluid collection). Infection in the incision can occur within a week of surgery. Exudates and swelling at site of incision, or in severe infection, wound dehiscence can occur.^{12,13}

Post-operative haemorrhage can be caused by 3 main reasons namely. First, bleed from residual surfaces of liver that might be due to arterial truncation or congestion of hepatic vein because of stenosis or ligation. Secondly incomplete intra-operative hemostasis which can be caused by manipulating root of hepatic vein, diaphragmatic trauma, increase in intra-thoracic or vena caval pressure that may cause bleeding. Thirdly, loosening or falling off of vascular sutures, which is attributed to increased vena cava pressures due to body movements of the patient, like turning or severe cough. A detached ligature on short hepatic vein might form a gap in vena cava wall.¹⁴ Post-operative intra-peritoneal haemorrhage is mostly seen in 48 hours of operation, either from residual liver surface or diaphragm. Therefore, a thorough intra-operative hemostasis is vital and critical, and so a must background knowledge is a necessity before concluding the surgery. Through artificial increasing of intra-thoracic pressure, haemorrhage from vein or anterior to inferior vena cava can be controlled when hepatic vein root is manipulated.^{15,16}

The objective of the study was to determine the outcomes of surgical management of liver trauma at Liaquat University of Medical and Health Sciences, Jamshoro.

METHODS

After ethical approval from the Institutional Review Board (IRB) of the hospital, a cross-sectional observational study using non-probability convenient sampling technique was done for a period of 18 months from April 2017 to October 2019 at the department of surgery of Liaquat University of Medical and Health Sciences Jamshoro. Following ethical approval, patients between the ages of 14 to 50 years having hepatic trauma presenting to the emergency department within 04 hours of the incident either due to road traffic accident, injury due to fall or any other cause leading to liver trauma were selected for the study while liver trauma patients that were managed conservatively, having multiple organ lesions with poly-trauma and all liver trauma patients which were hemo-dynamically stable were excluded from the study.

Written and informed consent was sought from all the patients or their attendants. All the patients were shifted and operated by a consultant having minimum experience of 08 years. Roof top or mid-line incision was used for exploration and right lobe visualization was enhanced through the usage of large Richardson retractor by elevating right costal margin. Liver was mobilized through division of falciform ligament and lateral triangle ligaments, after which liver was rotated medially into surgical field. At the beginning, hemostasis was temporarily carried out by Pringle's manoeuvre or through manually compressing surface of liver. Any associated injury during the initial process of hemostasis was inspected and dealt with accordingly afterwards.

For definitive management and control of bleeding with repair, suture hepatorrhaphy or peri-hepatic packing was done. All patients were kept in ICU post-operatively and shifted to surgical ward after stabilization. After stabilization, patients were sent home and regular follow-ups were advised in surgical outdoor department. Patient's record was analyzed for complications and outcome till 5 weeks.

SPSS version 20 was used for data analysis. Mean and SD were reported for qualitative variables while frequency and percentages were reported for quantitative variables. For testing the outcomes of patients, chi-square test was applied keeping p-value of <0.05 as statistically significant.

RESULTS

After application of inclusion and exclusion criteria, a total of 136 patients were included in the study having a mean age of 32.33 ± 11.23 years. From the 136 patients, 120 (88.2 %) were males while 16 (11.8%) were females. 122 (89.7%) of patients reported to have blunt injury

while 14 (10.3%) had penetrating injuries. In majority of cases 116(85.2%) peri-hepatic packing was performed and it was successful when packs were removed 24 to 72 hours later (Table 1).

Table 1: Basic demographical representation of patients in the study.

Baseline demographics		Frequency (%)/ Mean±SD n=136
Mean age (years)		32.33±11.23
Gender	Male	120 (88.23%)
	Female	16 (11.76%)
Injury	Blunt	122 (89.7%)
	Penetrating	14 (10.3%)
Surgical technique	Peri-hepatic packing	116 (85.2%)
	Suture hepatorrhaphy	20 (14.8%)

The most common postoperative complication reported was intra-abdominal sepsis observed in 41 (30%) of patients. Bile leakage causing biloma formation was seen in 22 patients (16%) and recurrent hemorrhage in 33 (24%) of patients. 30 patients (22%) died because of liver failure or due to coagulopathy in the postoperative period (Figure 1).

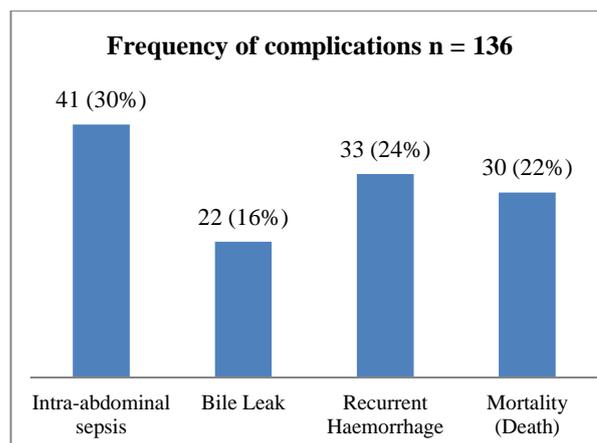


Figure 1: Outcomes after surgery.

The overall mortality (death rate) out of 136 patients was seen in 30 (22.0%) patients. 17 (56.7%, n = 30) patients died by the operative procedure suture hepatorrhaphy and 25 (83.3%, n = 30) patients died due to intra-abdominal sepsis, 13 (43.3%) bile leak and 20 (66.7%, n = 30) recurrent hemorrhage. However, surgical technique and postoperative complications were significant cause of death (p value < 0.05).

Table 2: Outcome of patients with different parameters.

Outcome	Mortality (death)		Total	p value
	Yes n = 30	No n = 106		
Gender				
Male	28 (93.3%)	92 (86.8%)	120 (88.2%)	0.52
Female	2 (6.7%)	14 (13.2%)	16 (11.8%)	
Surgical technique				
Peri-hepatic packing	13 (43.3%)	103 (97.2%)	116 (85.3%)	<0.001
Suture hepatorrhaphy	17 (56.7%)	3 (2.8%)	20 (14.7%)	
Complications				
Intra-abdominal sepsis	25 (83.3%)	16 (15.1%)	41 (30.1%)	<0.001
Bile leak	13 (43.3%)	9 (8.5%)	22 (16.1%)	<0.001
Recurrent hemorrhage	20 (66.7%)	13 (12.3%)	33 (24.2%)	<0.001

DISCUSSION

In the findings of this study, an overall mortality rate of 22% was reported while 30% of patients were found to have intra-abdominal sepsis, 16% biliary leakage and 24% were reported to have recurrent post-operative hemorrhage. In a Pakistani study of 113 patients, 91 (81%) were males and 22 (19%) were females. The mean age of patients was 34.85±9.75 years.¹⁷ The findings were similar to present study where most patients were males as well as similar mean age of patients was reported.

Penetrating or blunt injuries vary according to geographical regions of the studies conducted. Studies done in high income countries like Scotland reported incidences of 69% and 91% of blunt hepatic trauma, respectively.¹⁸ Low income countries were found to have a higher incidence of blunt trauma; with 66% in South Africa and 61.6% in a study, carried out in Brazil.^{19,20}

In the present study, 60% patients developed post-operative complications. These were more common among patients with multiple injuries. Lin BC et al documented 52% complication rate among patients with

complex hepatic trauma.²¹ Similarly 50% morbidity was documented by Asfar S. et al in their research on management of liver trauma.²²

In a study by Prichaudh S. et al, reported that among 218 patients of liver injury, 156 (72%) of patients were identified with blunt trauma while 62 (28%) of patients with penetrating trauma. 45 patients underwent damage control surgery. The overall mortality rate was reported to be 17.4% with mortality rate being higher in the operative group than the non-operated group.²³ Although similar findings were reported in the study as well, however in present study only those liver trauma patients were included that were to undergo surgery.

Bile leakage in present study was reported at 16 %. The incidence of biliary leaking has been reported to range from 04% to 20%.²⁴ Present study findings tend to fall in the range mentioned. Possible reasons for post-operative bile leakage are; the most common cause being truncation of distal bile duct in residual liver or leaking at bile duct-intestinal anastomosis, or incomplete suturing around T-tube and lastly bile duct injury from inappropriate surgery method.²⁵

In few researches, peri-hepatic packing has had proven efficacy in hepatic trauma.^{26,27} Similarly in most of the patients of this study, i.e. 116 (85%), peri-hepatic packing was done and successful in the patients when packs were removed in 24 to 72 hours. Saaiq M. et al also reported similar findings in their study.²⁸ In another study by Ali U. et al, peri-hepatic packing was performed in 58.83% of patients, having a success rate of 80%.²⁹

Although the findings of the study were in line with the objectives of the study, however the study was not free from observer, selection and gender bias. Surgical expertise and the fact that the study was carried out at a single centre, could have also possibly caused a bias.

In addition, limited sample size with unequal patients according to gender and surgical technique were observed, further multi-centred studies with larger sample size would help in achieving the aims better.

CONCLUSION

According to the results of the study, mortality of patients with liver trauma was observed in a quarter of patients while the most common post-operative complication was intra-abdominal sepsis. Significant mortality was observed in between type of complication as well as surgical technique.

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

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