ORIGINAL ARTICLE

Hepatic Injuries in Blunt Trauma Abdomen

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ABSTRACT

Aim: To study the outcome of grade III to VI hepatic injuries in blunt trauma abdomen at Mayo Hospital, Lahore.
Study design: Descriptive study
Place and Duration of study: Department of Surgery, West Surgical Unit, King Edward Medical University / Mayo Hospital Lahore. One year from June 2009 to June 2010.
Methodology: A total of 40 patients of blunt liver injuries grade III to VI were included in this study. Detail history of presenting complaints was taken and relevant physical examination including vital signs (pulse, BP, temperature, respiratory rate) and relevant abdominal examination, any imprint sign, present over the right hypochondrium and epigastric region or laceration or abrasion were recorded. Routine investigations (CBC, urine complete, urea, creatinine, serum electrolyte) were recorded. All confounding variables such as age and sex of the patient, site of trauma, nature of trauma and duration of trauma were studied along with main outcome measures as a complications and mortality related to grade III to VI hepatic blunt trauma.
Results: The mean age of the patients was 32.8±9.8 years. In the distribution of sex, there were 33(82.7%) male patients and 7(17.5%) female patients. Regarding the post operative complications, there were 3(7.5%) patients of haemorrhage, 8(20%) patients of jaundice, 8(20%) patients of wound infection, 3 (7.5%) patients of septicemia, 5(12.5%) patients of biloma, 8(20%) patients of bile leakage, 1 (2.5%) patient of coagulopathy, 2(5%) patients of liver abscess and 2(5%) patients of wound dehiscence. Regarding mortality, there were 22(55%) patients were recovered and 18(45%) patients were expired.
Conclusion: Patients undergoing surgery for blunt hepatic trauma had high rates of complications because of the high grade of liver injury (grade III-VI) and concomitant vascular/ organ injury. Timely intervention, resuscitation, damage control surgery can help to reduce morbidity and mortality.
Keywords: Hepatic injuries, blunt trauma abdomen, complications

INTRODUCTION

Injury to liver is known to have present in Egyptian mummies. Since the advent of modern fire arm weapons and high speed automobile accidents, the frequency of the liver injury is on the increase, even by the international statistic. Liver is one of the commonest organ to be injured, still the diagnosis of the hepatic trauma is not always a straight forward matter due to variable presentations.

It occurs in 20, 30 and 40 percent of the patients operated on for blunt, gunshot and stab wounds respectively. Overall blunt injury usually secondary to motor vehicle accidents is the commonest cause[1].

Liver involvement is second only to small intestine in penetrating injuries and second to spleen in blunt trauma[2].

Despite its relative protected location, liver is the most commonly injured intra-Abdominal organ, although splenic injuries are more common following blunt abdominal trauma. Associated injuries to other organs, uncontrolled haemorrhage from liver and subsequent development of septic complication contribute significantly to morbidity and mortality. Complications following liver trauma have been reported in 64% of patients. Associated injuries and extent of liver injuries seem to be most important predisposing factor for post-operative problems. Major complications include secondary haemorrhage, intra-abdominal abscess, perihepatic collection of bile (Bilomas), haemobilia & biliary fistulaes[3].

Complications in patient with complex injuries are not uncommon, but most of the complications are safely treated by less invasive procedure[4].

In fact 50% of all liver injuries are non-bleeding at time of exploration and direct suturing and hemostatic agents can manage about 20% Nonetheless severe liver injuries are difficult to manage, and are responsible for high mortality[5].

From a world war 1 mortality of 66% it has come down to the current 10 to 20 percent, mainly due to safer anesthesia and better surgical practices and materials, along with a more accurate critical care,

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however it still remains one of the most challenging problems for the trauma surgeon[6].

Right lobe of liver is more commonly injured than left lobe of the liver, because it is larger and less mobile, and anterior surface of the liver is more affected[7]. A steering wheel injury may cause trauma to entire lobe of liver[8]. Pneumoperitoneum, major diaphragmatic injury, gross organ displacement and metallic foreign body may be identified on radiological examination[9].

There has been a dramatic change in the management of blunt hepatic injury specifically its non-operative management. Even though non-operative management has become a standard care in children, its use in adult population is controversial[1].

The management of major liver injury is a formidable challenge. Prompt recognition and effective resuscitation is the integral part of the initial management. The advantage of emergency laparotomy are the ability to access solid organs and hollow visceral injury, together with the opportunity to expedite surgical repair. However, clinically and experimentally, it has been shown that bleeding from the injured liver can seize spontaneously, hence strategies that advocate selective non-operative management have evolved. It is possible because of improvement of resuscitation, intensive care and monitoring of trauma patients coupled with advances in diagnostic radiology[11].

The principal objectives in the treatment of liver trauma are early and effective control of bleeding with preservation of hepatic functions, prevention of septic and Ischemic complications. Most injuries are uncomplicated and can be managed by well established basic surgical techniques. Complicated injuries may need specific hepatic artery ligation i.e., right and left[12]. However, in patients with complex liver injuries, the operative mortality rate still exceeds 40% even in trauma referral centers, the leading cause of death in severe liver injuries is uncontrolled bleeding, while multiple organ failure and residual sepsis are the primary cause of morbidity and late death[13].

Sometimes the diagnosis of liver injury is not easy. The over sensitivity of diagnostic peritoneal lavage, along with the new advances in the field of radiological imaging techniques helps in diagnosing liver injuries including Abdominal Ultrasound and CT scan[10].

CT scan is an important imaging study for diagnosis and follow up of the patients, there is however no reliable predictor of failure of non operative treatment, other than the ultimate development of hemodynamic instability[14].

METHODOLOGY

A total of 40 patients of blunt liver injuries grade III to VI fulfilling the inclusion criteria were selected from emergency department of West Surgical Unit, Mayo Hospital, Lahore. Informed consent was obtained from all the patients. Detail history of presenting complaints if any would be asked and physical examination (pulse, BP, temperature) were recorded. Routine (CBC, urine complete, urea, creatinine, serum electrolyte) were recorded. All confounding variables such as age, sex, and nature of trauma were studied along with complications. All the collected information was collected on a specially designed proforma (attached). All the patients were followed up for complications after the hepatic injury for three months period. At the completion of study data was transferred to the computer and analyzed with the help of SPSS version 12. The variables like age, sex, nature of trauma, duration of injury, grades of liver injury, complications and mortality. The quantitative variables like age and duration of injury were presented as mean and standard deviation. The qualitative variables like sex, nature of trauma, grades of liver injury, complications and mortality were presented as frequency and percentages. Age, sex and nature of trauma were compared with outcome variables i.e. complications. As this was a descriptive study therefore no test of significance was applied.

RESULTS

The mean age of the patients was 32.8±9.8 years. There were 7(17.5%) patients of age range of 18-20 years, 15 (37.5%) patients of age range of 21-30 years, 10 (25%) patients of age range of 31-40 years, 6(15%) patients of age range of 41-50 years and 2(5%) patients of 51-60 years .

In the distribution of sex, there were 33(82.7%) male patients and 7(17.5%) female patients. In the distribution of nature of trauma, there were 7(17.5%) patients of history of fall, 5(12.5%) patients of history of fight and 28(70%) patients with history of road traffic accident .

The mean duration of injury of the patients was 7.8±4.4 hours. There were 7 (17.5%) patients of duration of injury of 1-5 hours, 29(72.5%) patients of duration of injury of 6-10 hours, 1 (2.5%) patient of duration of injury of 11-15 hours and 3(7.5%) patients of duration of injury of 16-20 hours .

In the distribution of grades of liver injury, there were 18(45%) patients of grade III of livery injury and 15(37.5%) patients grade IV, 3(7.5%) patients of grade V and 4(10%) patients grade VI of liver injury.

In the distribution of procedure, there were 14(35%) patients of hepatoraphy, 4(10%) patients of specific hepatic artery ligation, 9 (22.5%) patients of hepatoraphy and hemostatic agent, 6(15%) patients of hepatoraphy and perihepatic packing, 3 (7.5**%) patients** of left lobectomy and 4 (10%) patients of perihepatic packing (Table 1).

In the distribution of patients by associated injuries, there were 5(12.5%) patients of small intestine injury, 4 (10%) patients of fracture pelvis, 6(15%) patients of colonic injury, 8(20%) patients of rib fracture, 3(7.5%) patients of diaphragm injury, 9(22.5%) patients of negative, 5(12.5%) patients of stomach and 4(10%) patients of pancreas (Table 2).

In the distribution of complication, there were 3(7.5%) patients of post operative haemorrhage, 8(20%) patients of jaundice, 8(20%) patients of wound infection, 3(7.5%) patients of septiciemia, 5(12.5%) patients of biloma, 8(20%) patients of bile leakage, 1(2.5%) patient of coagulopathy, 2(5%) patients of liver abscess and 2(5%) patients of wound dehiscience (Table 3)**.**

In the distribution of mortality, there were 22(55%) patients were recovered and 18(45%) patients were expired.

In the comparison of age with complications, 18-20 years of age there was only 1(2.5%) patients of haemorrhage, 3(7.5%) patients of bile leakage, 1(2.5%) patient of coagulopathy and 2(5%) patients of liver abscess. In the age range of 21-30 years, 2(5%) patients of haemorrhage, 6(15%) patients of jaundice, 2(5%) patients of wound infection, 3(7.5%) patients of bile leakage and 2(5%) patient of wound dehiscence. In the age range of 31-40 years, 2(5%) patient of jaundice, 3(7.5%) patients of wound infection, 3(7.5%) patients of septiciemia, and 2(5%) patients of biloma. In the age range of 41-50 years, there were 1(2.5%) patients of wound infection, 3 (7.5%) patients of biloma and 2(5%) patients of bile leakage, in age group of 51-60 years there were 2(5%) patients of wound infection (Table 4).

In the comparison of nature of trauma with complications, in fall from height, 1(2.5%) patient of haemorrhage, 3(7.5%) patients of jaundice, 1(2.5%) patient of biloma and 2(5%) patients of wound dehiscence. In the history of fight, 5(12.5%) patients of bile leakage. In road traffic accident, 2(5%) patients of haemorrhage, 5 (12.5%) patients of jaundice, 8(20%) patients of wound infection, 3(7.5%) patient of septicemia, 4(10%) patients of biloma, 3(7.5%) patients of bile leakage, 1(2.5%) patient of coagulopathy and 2(5%) patients of liver abscess (Table 5).

Table 1: Distribution of patients by procedure (n=40)

Procedure	**n**	**%age**
Hepatorraphy	14	35
Hepatorraphy and hemostatic agent	9	22.5
Hepatorraphy and perihepatic packing	6	15
Hepatic artery ligation	4	10
Perihepatic packing	4	10
Left/right lobectomy	3	7.5
Total	40	100

Table 2: Distribution of patients by associated injuries (n=40)

Associated injuries	**n**	**%age**
Isolated injury	9	22.5
Rib fracture	8	20.0
Colonic injury	6	15.0
Small intestine injury	5	12.5
Stomach	5	12.5
Pancreas	4	10.0
Fracture pelvis	4	10.0
Diaphragm injury	3	7.5

Table 3: Distribution of patients by complications (n=40)

Complications	**n**	**%age**
Jaundice	8	20
Wound infection	8	20
Bile leakage	8	20
Biloma	5	12.5
Haemorrhage	3	7.5
Septicaemia	3	7.5
Liver abscess	2	5
Wound dehiscence	2	5
Coagulopathy	1	2.5

Table 4: Comparison of age with complication (n=40)

Complications	**Age (Years)**				
	18-20	**21-30**	**31-40**	**41-50**	**51-60**
Haemorrhage	1	2	0	0	0
Jaundice	0	6	2	0	0
Wound infection	0	2	3	1	2
Septicaemia	0	0	3	0	0
Biloma	0	0	2	3	0
Bile leakage	3	3	0	2	0
Coagulopathy	1	0	0	0	0
Liver abscess	2	0	0	0	0
Wound dehiscence	0	2	0	0	0

Table 5: Comparison of nature of trauma with complication (n=40)

Complications	Nature of trauma		
	Fall from height	History of fight	Road traffic accident
Haemorrhage	1	0	2
Jaundice	3	0	5
Wound infection	0	0	8
Septicaemia	0	0	3
Biloma	1	0	4
Bile leakage	0	5	3
Coagulopathy	0	0	1
Liver abscess	0	0	2
Wound dehiscence	2	0	0

DISCUSSION

This study was conducted on 40 consecutive patients of hepatic injuries in blunt trauma abdomen.

Parks et al s[15]tudied patient of Liver trauma in Mater Hospital Belfast his study published in May 1999 and concluded that in Europe blunt liver trauma was (80.90%) in South Africa it was (66%) and in North America it was (88%), Celebi[16] at Attaturk University saw in 174 patient that patient of blunt liver injuries were (61%) and (25.3%) had penetrating injuries.

Brammer et al in studied 52 patients of Liver Injuries over 10 years at Queen Elizabeth Hospital U.K, in his observation 50% of the patients were managed operatively and others non-operatively, despite the fact that there is increasing advocacy on non-operative management of Liver Injuries, but still the operative management is widely practiced the reason is because haemorrhage requires surgical intervention, liver injuries are associated with other organ injuries, and higher grade injuries have higher mortality.

In this study associated injuries were seen in the patients. Most commonly injured organ was small bowel 25%, stomach 12.5% and colon 15%. Rest of organs injured were diaphragm (7.5%), pancreas (10%) and stomach (7.6%). Marr et al[18] studied 153 patients of gunshot liver injuries in Cape Town University and observed that associated injuries with liver trauma was (77%), most commonly injured organ was stomach in (29%), colon in 27%, small bowel in 17%, and pancreas in 14%. Carrillo et al5 studied the non-operative management of blunt abdominal trauma at University of Louisville School of medicine Kentucky USA and at University of Zurich, Switzerland, his work published in 1998, he suggested that associated Injuries occurring with Liver trauma were seen in (63%) of the patients and mostly seen in gastrointestinal tract, and association of diaphragm rupture was (3-9%).

Marr et al[19] studied 153 patient of gunshot Liver Injuries at cape town University Cape Town, he noted that in (30%) of the patients suturing was sufficient to control bleeding, (23%) patients required perihepatic packing. While other required more complex surgical procedures as lobectomy and vascular Isolation. Celebi et al[16] at Attaturk University, studied 174 patients and noted that 60% of the patients required hepatorraphy. Perihepatic packing in (2.3%) of the patients, suturing with haemostatic patch on (23%), surgical cell patch in (30%) and specific artery ligation in (1.1%) of the patients.

Parks et al[15] studied the complication related with liver trauma in May 1999, at Mater Hospital, Belfast and he noted septic complications in 7-12% of the patient.

The next most common complications seen was Jaundice. Jaundice in all these patients settled in 2nd or 3rd week. Paranik et al86 Conducted a study on 44 patient of Liver trauma, in Broward General Medical Center Florida USA, and they observed that 35% of the patients had elevated liver enzymes after the liver injuries and if AST is more than 400 and ALT is more than 250 IU/L there was a greater risk of liver damage, in this study jaundice was common in those patient who had greater liver damage.

Biloma formation was seen in (12.5%) of the patients, and was diagnosed on postoperative ultrasonography, Pacther HL et al87 studied 495 patients of Blunt liver trauma in April 1995 and observed bile leak in 4% of the patients and Biloma formation in 2% of the patients. Zelank et al[17] at Cech University Hospital studied 18 patients of Liver trauma and observed Bile leak in 6% of patients. So, the results were almost compatible with the above mentioned studies as biloma formation was a common complication seen after liver injuries.

Bile leak was seen in (20%) of the patients, Bile leaking started from the drains of eight patients and settled in 3rd–4th week spontaneously. Parks et al[18] at Mater Hospital Cape Town studied patients of liver trauma and observed biliary fistula formation in 2-8% of the patients, Marr et [19] in Cape Town University Cape town studied 153 patients of gunshot liver injuries and observed bile leak leading to fistula

formation in 8% of the patients, two patients with Biliary Fistula required ERCP.

Mortality rate among the patients of liver injuries in this study was (45%) the cause of death was (MOSF) multiorgan system failure, Post-operative haemorrhage and associated injuries pancreatic, colonic and severity of liver trauma. According to Parks et al[15] Mater Hospital, Liver Injuries carry mortality upto 10-30%. Marr et al[19] saw mortality in 17% of the patients, he observed mortality about 50% in grade III and VIIn our observation grade III 10%, grade IV 20%, grade V 33.3% and grade VI 75% mortality. Mortality increases with the severity (grade) of liver injury. From above studies it is clear that liver trauma all over the world carries high mortality.

CONCLUSION

Patients undergoing surgery for blunt hepatic trauma had high rates of complications because of the high grade of liver injury (grade III-VI) and concomitant vascular/ organ injury. Timely intervention, resuscitation, damage control surgery can help to reduce morbidity and mortality

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