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Original Article

Surgical Management of Liver Traumas in a Liver Transplantion Center Analysis of 2 years Experience

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Abstract

Background: Despite advances in diagnostic techniques, liver trauma management remains a challenging issue.
Objectives: To audit the 2 years resutls of liver traumas treated surgically.
Patients and Methods: Retrospective analysis of patients who underwent surgery for liver injury were reviewed. Age, gender, type of trauma, haemodynamic parameters, preoperateive hemoglobin, number of injuries to the liver, coexisting organ injuries, type of surgery, duration of hospitalisation, health status on discharge were evaluated.
Results: : A total of 30 patients underwent surgery for liver trauma, their median age was 35±17.14 (23 male, 7 female). Blunt liver trauma was seen in 50% of the cases (n=15), while, remaining had penetrating trauma. Nine patients (30%) were haemodynamically unstable. Number of injuries to the liver were 1 in 13 patients (43.3%) 2 in 7 patients (23.33%), 3 in 4 patients (13.33%) and more than 3 in 6 patients (20%). Twenty two patients (73.3%) had co-existing injuries to other organs too. Among the surgical procedures used, 9 were damage controlling procedures and 9 were definitive repair, and one patient underwent living donor liver transplantion. Mortality was 10% (n=3).
Conclusion: Coexisting organ injuries and hemodynamically unstable status contributed to mortality.
Key words: Liver trauma, liver transplantion, liver surgery.

Introduction

Following blunt abdominal trauma and penetrating injuries, liver is the most injured organs despite lying in a partially protected location. This large, solid organ consists relatively fragile parenchyma and thin Glisson capsule which are insufficient for providing protection against trauma[1,2].

Although most liver injuries are minor and do not require operative management but extensive injuries are a major challenge for surgeon's skill[3,4]. Living donor liver transplantation (LDLT), a technically sophisticated procedure providing a better control and ability to deal with issues on the intraparenchymal liver anatomy led the surgeons to use this for achieving better outcomes in liver trauma cases. Mortality following liver trauma occurs both due to extensive injury to liver and injury to other organs[3].

Liver trauma ranges from minor capsular tear to extensive disruption involving both lobes[5]. In 1989 Organ Injury Scaling Committee of the American Association for the Surgery of Trauma (AAST) introduced a Hepatic Injury Scale which was revised in 1994 and is currently regarded as the standard by which hepatic injuries are described in most major trauma centres[6,7].

This study reviews the outcome of surgical managment of liver injury admitted to liver transplantation institution.

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Patients and Methods

In this retrospective single-center study, data were collected from 30 consecutive patients who had a preoperative diagnosis of liver trauma and underwent surgical treatment between August 2010 and December 2011 in the Department of General Surgery and Liver Transplantation Institute at Turgut Ozal Medical Center, Malatya, Turkey, a tertiary referral center for abdominal and transplantation surgery.

Data were collected from the database software (Enlil Hospital Management Software, Eskisehir, Turkey) for determining age, gender, type of trauma, pulse rate, mean arterial pressure, time passed from admission to the operation, preoperative hemoglobin (Hb) level, number of injuries to the liver, coexisting organ injuries, duration of operation, type of surgery, total number of erythrocyte and thrombocyte suspensions transfused, number of re-laparotomies, duration of hospitalisation and health status on discharge. Patients were evaluated by computed tomography (CT). Liver injuries were graded according to the American

Association for the Surgery of Trauma – Organ Injury Scale[6,7].

All statistical analysis were carried out with the statistical software (SPSS Statistics version 17.0; SPSS Inc., Chicago, IL).

Results

During the 2 years period, 30 patients underwent surgical treatment for liver injury. The mean age was 35±17,14, with 23 males and 7 females. Cause of liver injury was traffic accident and stab wound in 14 patients (48.2%) each while, one each had gunshot wound and fall from height.

Mean arterial blood pressure was 77.5 mmHg (±38,42), mean pulse rate was 94(±53) beats per minute, haemoglobin level was 11.0 gr/dL (±3,73). Haemodynamic stability was defined as a systolic blood pressure greater than 90 mmHg and pulse rate less than 100 beats per minute at the time of presentation to the hospital[4]. Haemodynamic instability was diagnosed in 9 patients (30 %).

Among the haemodynamically stable 21 patients, indication for laparotomoy was additonal organ failure in 11 cases.

Based on the organ injury scale from AAST, 1(3.3%) patient had grade 6, 7(23.3%) had grade 4, 4(13.3 %) had grade 3, 10(33.3%) had grade 2 and 8(26.,7%) had grade 1 injury**.**

Mean interval between admission and beginning of the operation was 108±52.9 minutes.

Twenty two patients (73.3%) had liver injury in the right lobe, 7(23.3%) in the left lobe and 1(3.3%) had an injury involving both lobes. Twenty five (83.3%) patients continued bleeding. Number of injuries to the liver were 1 in 13(43.3%) patients, 2 in 7(23.3%) patients, 3 in 4(13.3%) patients, and more than 3 in 6(20%) patients**.**

Table 1: Surgical procedures done.

Name of the procedure	*Number of Lesions Treated*	*%*
Simple surgical procedure	19	40.42
Packing	9	19.14
Definitive repair	9	19.14
Debridement and/or resection	5	10.63
Total vasculary exclusion	2	4.25
Hepatotomy and selective ligation	1	2.12
LDLT	1	2.12
Total	47	100

Of the 30 patients subjected to laparotomy and therapeutic procedure to the liver, 17 had multiple liver lesions, each requiring a different surgical treatment. Therefore a total of 47 surgical procedures were performed on these lesions/injuries. One patient was subjected to LDLT. This patient was referred to us from a regional hospital, where after falling from height a liver resection was performed, which resulted in liver failure. The surgical procedures done on these lesions included cauterization, application of haemostatic agent, simple superficial sutures etc (Table-1). Seven patients required re-laparotomy during hospitalisation. Mean operation time was 159±130 minutes. Concomittent multi organ trauma was seen in 22(73.3%) patients with thorax injury seen being most common seen in 20 cases (Table-2).

Table 2: Co-existing organ injuries.

Location	*Organ Involved or Type of Lesion*	*Number of Injuries*	*%*
Thorax	Pneumothorax	15	51.72
	Diaphragmatic injury	4	13.79
	Cardiac injury	1	3.44
Abdomen	Splenic	3	10.34
	Gastric	2	3.38
	Renal	2	3.38
	Jejunal	1	3.44
	Colonic	1	3.44
Total		29	100

Mean duration of hospital stay was 10.7±9.2 days. Twenty seven patients (90%) recovered and were discharged, however, 3(10%) patients died during hospital stay. All these 3 liver injuries were due to traffic accident, 1 of them was subjected to simple surgical procedures and 2 of them underwent segmentectomy. One patient had a cardiopulmonary resuscitation performed at the emergency unit but died in the operation room, another had hypovolemic shock and died in the operation room and the third patient died on 15th day of hospitalisation due to sepsis. Mortality was nil in stab wound patients.

Discussion

In the present study high mortality was seen in cases having liver injury along with other organ injury during blunt abdominal injury. During the past few decades, non-operative management of liver trauma has increased[7] but even this group requires delayed surgical treatment[7]. Major clinical skills on management of liver trauma depend on patient selection for initial nonoperative management, identification of patients who require delayed surgery after trial of nonoperative management and intraoperative decision making between definitive repair of the injury and a damage control strategy[7,8].

Strong et al. had set the standard for resection in cases of liver injuries, and suggested that surgical therapy is best managed by a dedicated liver team[9]. Mortality rate from liver trauma bears a linear relationship to the severity of the injury and an inverse

relationship to the experience, judgement and skill of the team caring for the patient[4]. Based on a large group of patients who underwent liver resection at a specialised hospital, the investigators reported that lack of experience in achieving hemostasis and performing anatomic resection for liver injury may account for unfavorable results[10]. In this study rate of resections performed was 14.8 % with no mortality,

In one study gastrointestinal perforations were seen in 0.25% cases of blunt abdominal traumas[11] while others reported extrahepatic organ injuries in 35.7% cases having liver injuries who were haemodynamically stable[12,13]. Patients presenting with clinical signs of haemodynamic unstability are recommended to be treated with early surgery[12]. In the present study some haemodynamically unstable patients underwent laparotomy when there was an indication of additional organ injury and this group had high mortality

Liver transplantation performed as a last resort following trauma has been reported previously in 19 patients[14]. Major indications for transplant were liver failure, extended necrosis, liver gangrene and multiple episodes of gastrointestinal bleeding related to portal hypertension, injuries of the portal vein that can not be reconstructed[9,15]. In the present study a 5 year old male underwent liver resection following injury in a distant hospital. His liver functions detoriated postoperatively resulting in hepatic necrosis, therefore, he was referred to our center where he was placed on the transplant list and underwent an orthotopic LDLT[16]. Following hepatic resection overall mortality is reported to decline from 10.4% to 5.3% over a decade[17]. This study also showed that high volume centers improved their outcome more significantly when compared with the lower volume centers. Our patient subjected to LDLT was also referred to our center from a lower volume distant hospital where the inital hepatic resection was performed. It is therefore recommended that instead of performing surgical procedures with unpredictable outcomes, extensive liver injuries should be referred to tertiary centers which can provide a facility of liver transplantation when indicated.

Mortality rates are related not only to the extent of hepatic injury, but also to the number of other organs involved[3]. Another study mentioned that while, most early deaths in patients with liver trauma are due to uncontrolled haemorrhage and associated injuries, most late deaths are due to head injuries and sepsis with multiple organ failure[5]. In our study, mortality was 10% with 2 patients dying due to severe pulmonary parenchymal injury and pneumothorax and 1 due to splenic rupture presenting with hypovolemic shock upon on admission.

Optimum results for patients with severe liver injuries are provided in tertiary referral centers with experienced liver surgeons and appropriate intensive care facilities. It is feasible to advice most general surgeons encountering severe liver injuires to consider placing perihepatic packing to control haemorrhage and transfer the patient to a regional hepatobiliary center for definitive treatment, taking an emergent need for liver transplantation into account.

The recent non-operative management of liver traumas include extensive hepatorraphy, hepatotomy, resectional debridement, lobectomy, segmentectomy and liver transplantation or have co-existing organ injuries. Such patients should be referred to tertiarry, multidisciplinary centers for better outcomes.

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