

Management of Postoperative Complications in Hepatic Trauma

N AHMAD K J ABID A Z KHAN S T A SHAIH.

Department of Surgery, Mayo Hospital, Lahore

Correspondence to: Dr. Nazir Ahmad, Senior Registrar, West Surgical Ward, Mayo Hospital, Lahore.

The prospective study was conducted over a period of two years, from October 1997 to September 1999 in west surgical ward, Mayo Hospital, Lahore. Thirty-five patients were included in the series. Twenty-five (71.43%) patients presented with firearm and 10(28.57%) with stab injuries. Thirty-four (97.14%) patients were male and 1(2.86%) patient was female. All patients underwent exploration. Various operative procedures were performed according to the severity of the liver injury and associated organ injuries were managed according to their own priority. Postoperative complications observed were, respiratory tract infections in 12(34.28%), haemorrhage in 3(8.57%), biliary fistula in 4(11.43%), liver abscess in 3(8.57%), intra-abdominal sepsis in 4(11.43%) and upper GI bleed in 2(5.71%) patients. More than one complications were seen in some patients. Mortality rate in the series was 20%. High mortality and morbidity was due to multiple organ injuries, non-availability of blood and multiple organ failure.

Key words: penetrating hepatic trauma, hepatorrhaphy, haemorrhage, biliary fistula.

Once accident has occurred, it is the mark of a civilized society to provide the best care for the victim, from time of injury to the completion of rehabilitation. Such a communal commitment implies that groups of skilled and experienced practitioners should be available round the clock, from roadside to ward, to ensure that death and disability are minimized. Important factors in optimizing surgical results and minimizing operative morbidity and mortality include an accurate early diagnosis and thorough understanding of the underlying disease process, adequate consideration of operative risks as affected by associated conditions, thorough analysis of alternative therapies, knowledge of anatomy, and surgical expertise. Most complications can be traced to a breakdown in one of these factors. The out come of surgery is dependent on a balance between factors of aggression and factors of defense. Factors of aggression include not only the surgical stress i.e. type of procedure and anesthesia but also such factors as carcinoma, infections, drugs and radiation, which are often identifiable. Factors of defense depend on immune system, nutritional and physiological status and are more difficult to measure than factors of aggression.

The large size of the liver and its location in both upper quadrants of the abdomen make it especially vulnerable to injury in the patients with penetrating wounds. Hepatic injuries are found in 30% and 40% of the patients undergoing laparotomy for gunshot and stab wounds respectively¹.

Liver injuries run the wide spectrum from minor laceration to lobar destruction. 85-90% of liver injuries (grade I and II) can be treated using simple techniques of haemostasis and remaining 10-15% of injuries are more severe (grade III to grade V) and will require more aggressive techniques to control bleeding².

Patients and methods

The study was undertaken to assess the magnitude and pattern of penetrating liver injuries, out come of various operative procedures, early detection of factors contributing for post operative complications, their prevention and prompt management. The results were compared with similar studies conducted elsewhere. The study period was of two years. All the patients above 13 years of age presented in the Accident and Emergency Department with firearm or stab injuries of the right lower chest or upper abdomen were included in the study. Exploratory laparotomy was done in all patients. Those patients (40%) who were unstable clinically were directly shifted to operation theater for on table resuscitation and exploration while stable patients (60%) underwent surgical intervention after initial resuscitation and carrying out relevant investigations. Antibiotic, Tetanus toxoid and analgesics were given to all patients after taking two intravenous lines with wide bore canulae. All the patients were kept nil by mouth up till they passed flatus. Hospital stay of patients varied from 5-36 days.

Results

Thirty-five patients were included in the study. This study was conducted in West Surgical Ward, Mayo Hospital, Lahore for a period of two years i.e. from October 1997 to September 1999. Most Of the patients (68.57%) were between the age of 13-30 years. Males were 97.14% and females 2.86%. Mechanism of liver injury in 25(71.43%) patients was firearm and in 10(28.57%) was stab. Liver injuries were graded according to the Moore EE, et al³ as shown in Table I.

According to the severity of the liver injury after grading, surgical intervention was made and various operative procedures were performed. Hepatorrhaphy alone

or in combination with some other procedures was our mainstay to secure haemostasis from liver injury.

Table 1: Grades of liver injury.(According to Moore's classification revised in 1994)

Grade	n=	%age
I	4	11.43
II	10	28.57
III	14	40
IV	5	14.29
V	2	5.71

Associated organ injuries were found in 80% of cases and included upper GI injuries, small and large gut injuries, spleen, kidney, aorta, inferior cava, gall bladder, chest and upper and lower extremity injuries. All these injuries were managed according to their own protocol. Post-operative complications observed in the series were hemorrhage, biliary fistula, and sepsis as shown in table 2 along with their management.

Table 2: Post-operative complications with management

Complication	n=	%age	Management
Respiratory tract infections	12	34.28	Conservative (25.71%), Decortication (8.57%)
Haemorrhage	3	8.57	Conservative (2.86%), Re-exploration (5.71%)
Biliary fistula	4	11.43	Conservative (11.43%)
Intra-abdominal sepsis	4	11.43	Ultra-sound guided aspiration (5.71%), Re-exploration (5.71%)
Liver abscess	3	8.57	Ultra-sound guided aspiration (5.71%), Re-exploration (2.86%)
Jaundice	4	11.43	Conservative (11.43%)
Upper GI bleed	2	5.71	Conservative (2.86%), Re-exploration (2.86%)
Wound infection	5	14.29	Drainage and dressings (14.29%)
Hypoglycaemia	2	5.71	Conservative (5.71%)
Wound dehiscence	2	5.71	Closure with retention sutures (5.71%)

Note: More than one complications were seen in some patients.

Mortality noted in the series was 20%(7 deaths). Three patients died on the table due to exanguination and other three deaths were within 24 hours of operation due to shock and multiple organ failure. One patient died on 12th post-operative day due to upper GI bleed (haematemesis/stress ulcers) and sepsis.

Discussion

The liver is the organ most commonly injured in penetrating abdominal trauma⁴. Minor hepatic injuries include 85-90% and remaining 10-15% are complex injuries. Complex hepatic injuries remain formidable

challenge even for the most experienced trauma surgeons. Due to advances in pre-hospital resuscitation and improvement in surgical techniques, that reduces both morbidity and mortality, but still uncontrolled hemorrhage from major hepatic disruption continues to be a major challenge. Exanguination is cited as a cause of death in 31-76% of the patients^{5,6}.

Hepatic trauma occurs predominantly in young males in their most reproductive years of life. Mean age was 25 years in the series that is in comparison with the study conducted by Sherlock DJ, et al⁷ who reported the mean age of 26 years in 46 patients.

In our study, the cause of liver injury was firearm in 25(71.43%) and stabs in 10(28.57%) cases. It is due to easy availability of weapons and increase in street violence. In the series, right lobe injury was observed in 20(57.14%) patients that coincide with the study conducted by Trunkey DD, et al⁸ on his 811 patients.

Exploratory laparotomy was done in all patients. No operative procedure was performed in 5(14.29%) patients for liver injury. Main surgical procedure to treat liver injury was horizontal mattress sutures ligation technique, either alone in 13(37.14%) patients and in combination with spongoston in 6(17.14%), over omental packing (omento-hepatorraphy) in 2(5.71%) and after resectional debridement in 2(5.71%) patients. Simple suture ligation technique was applied in 2(5.71%) patients. This is in comparison with the study conducted by Feliciano DV, et al⁹ where he used these procedure in 881(88.1%) patients in a series of 1000 cases. Perihepatic packing was undertaken in 2(5.71%) patients and this coincides with the studies conducted by Feliciano DV, et al¹ and Feliciano DV, et al¹⁰ where they used this technique in 4-25% of their patients. Segmentectomy was done in 1(2.86%) patient and this is in resemblance with the study conducted by Cogbill TH, et al¹¹ where this procedure was performed in 2-4% of cases of liver trauma. Perihepatic drainage was carried out in all patients by placing sub-phrenic and sub-hepatic drains.

Post-operative complications after liver trauma may be related to the liver injury itself or to those of associated organ injuries. Among those related to liver trauma, the most important are haemorrhage, biliary fistula and intra-abdominal sepsis. Re-bleeding in the post-operative period is the challenging problem for the surgeon.

Post-operative haemorrhage was observed in 3(8.57%) patients. One of them was managed conservatively and other 2 patients were re-explored to control the haemorrhage. This is in comparison with the study conducted by John TG, et al¹² where he noted post-operative haemorrhage in 4.5% of his cases.

Biliary leakage was seen in 4(11.43%) patients and all of these patients managed conservatively. This management of biliary fistula is in comparison with the study conducted by Marr JDF, et al¹³ where they observed biliary fistula in 10.2% of the cases.

Intra-abdominal sepsis was seen in 4(11.43%) cases in the series. Two of these patients were re-explored for drainage and in other 2 patients ultrasound guided aspiration was done. This coincides with the study conducted by Bender JS, et al¹⁴ where they observed intra-abdominal sepsis in up to 12% of their patients.

Liver abscess at the site of liver injury was found in 3(8.57%) patients. Ultra-sound guided aspiration was done in 2 patients and one patient was re-explored to drain the liver abscess. This is in comparison with the study conducted by Feliciano DV, et al¹⁰ where they found intra-hepatic abscess in 32% of the cases.

Respiratory tract infections were seen in 12(34.28%) patients. Out of these, 9 patients were managed conservatively and decortication was done in 3 patients to treat the chronic empyema in the department of Chest Surgery. This is in comparison with the study conducted by Krige JE, et al¹⁵ where they noted respiratory tract infections in 40% of cases.

Mortality rate was 20%(7 deaths) in the series. Three were on table deaths and other three patients died within 24 hours of operation and one patient died on 12th post-operation day due to massive upper GI bleed and sepsis. This is in comparison with the study conducted by Watson CJE, et al¹⁶ where mortality rate was 17.5%.

The morbidity and mortality rate was high in the series due to exsanguination, associated organ injuries especially major vessels, multiple organ failure and non-availability of blood at the time of resuscitation and operation.

Optimum results for patients with hepatic trauma may be obtained with the specialist team that includes an experienced liver surgeon, an anesthetist and radiologist with intensive post-operative care and back up of efficient blood bank services. Per-operative detection and management of associated organ injuries on their own priority, treatment of multiple organ failure, availability of blood for transfusion, early detection and prompt

management of post-operative complications can reduce definitely both the morbidity and mortality in hepatic trauma.

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