

Complex therapy for hepatic trauma

Liu Fengjun,
Mteta K A,
Zhi Xuting,
Shou Nanhai

Correspondence to: Dr. K.A. Mteta, Dodoma Hospital, Dodoma, TANZANIA.

Key words: Abdominal injury, hepatic injury, therapeutics, and surgery.

Background: Hepatic trauma is a major cause of death in abdominal injury patients.. This study was aimed at investigating the outcome of management of 197 patients presenting with hepatic injuries.

Methods: This was a retrospective study of all patients treated for hepatic injuries at Oilu Hospital from January 1980 to January 1999 and at Dodoma Regional Hospital from January 1990 to January 2001. Seven patients were treated non-surgically while 188 had surgery. Conservative treatment included absolute bed rest, replacement and stabilization of the blood capacity, anti-inflammation drugs and styptic. Surgical procedures for patients with grade III and IV hepatic trauma included packing with omentum and repair of liver lacerations, debridment or irregular hepatectomy under Pringle's maneuver, perihepatic tamponade with or without selective ligation of hepatic artery and post hepatic vein repair together with T-tube and perihepatic drainage.

Results: There were 30 deaths (15.3% mortality rate). All the seven patients treated conservatively survived. The main cause of death was exsanguination with or without coagulopathy, multiple organ failure (MOSF) and associated injuries.

Conclusion: The basic operative principles for liver injuries are thorough debridment and haemostasis, elimination of bile leakage and unobstructed drainage.

Introduction

Hepatic trauma comprises 15 to 20 percent of all abdominal injuries and is second to splenic injuries. It is the main cause of death in abdominal trauma with a mortality rate ranging between 5.8 and 45 percent. Traditionally, it was believed that active surgical procedures were required once a diagnosis of hepatic injury was made^{1,2}. With improvement in the diagnosis and management of hepatic trauma, the indications and operative

Procedures changed too³. The aim of this study was to evaluate the management of 197 patients treated for liver injuries in two hospitals in China and Tanzania between 19810 and 2001.

Patients and methods

This was a retrospective study of 197 patients treated for hepatic injuries in Oilu Hospital, China between January 1980 and January 1999 and in Dodoma Hospital, Tanzania from January 1990 to January 2001.

Road traffic injuries accounted for 101 cases followed by 53 industrial accidents. Other causes included stab wounds (27 cases), shooting (13 cases) and bombing (3 cases). The right lobe of the liver was injured in 155 cases, the left in 55 and both lobes in 12 patients.

Diagnosis

In 115 patients, the diagnosis of hepatic injury was reached based on the history, physical findings

peritoneal paracentesis. The rest (82 Cases) were diagnosed with the aid of B-Mode ultrasonography, CT scan and MRI.

Hepatic injury grade³

The liver injuries were classified based on the hepatic trauma criteria shown in table 1. Seven patients with Grades I (4 cases) and Grade II (3 cases) were treated conservatively.

The main surgical procedures for Grade I and II hepatic trauma were the use of Gelatine sponge or the omentum packing lacerated wound repair.

Grade III and IV injuries were managed with thorough debridement and ligation of the blood vessels and intrahepatic bile ducts of the lacerated sections under the Pringle's maneuver; if bleeding is excessive, added selective ligation of hepatic artery or debridement hepatectomy, then packing with omentum. Perihepatic and T-tube drainage were always used.

Grade V hepatic injury underwent posthepatic venous repair under the shifting or blockage of the hepatic blood-flow. Debridement or irregular hepatectomy were performed if the patient was in good general condition, otherwise, perihepatic

tamponade and selective ligation of hepatic artery with or without splenic artery ligation. Perihepatic and T-tube drainage were used. There was only 1 case of Grade VI hepatic trauma in our series and the patient died during exploration.

Results

There were 149 male and 48 female patients. The patients' ages ranged between 7 and 71 years with a mean of 37.5 years. There were 101 patients with simple hepatic injuries and 96 cases had associated extra hepatic injuries. A total of 107 patients presented with hypovolaemic shock. Amount of blood transfused ranged from 0 to 10,000 mls with an average of 600 mls.

Two patients with Grade V hepatic injuries died before surgery. Two patients (one each with Grade V and Grade VI) of the 188 cases who had surgery died during operation. The overall mortality was 15.3%. Table 2 shows the distribution of patients by hepatic injury grades. None of the 35 patients with Grade I liver injuries died.

The only patient with Grade VI liver injury died during surgery.

Table 1. Hepatic Trauma Grading Criteria.

Gr.	Features of hepatic trauma
I	Haematoma: subcapsular, non-expanding, <10% of the hepatic surface area Laceration: Capsule lacerated, depth < 1 cm, no active bleeding.
II	Haematoma: sub capsular, 10-15% of the hepatic surface, non-expanding or Intra-parenchyma, non-expanding < 2 cm. Laceration: Length < 10 cm, depth < 3 cm.
III	Haematoma: Sub capsular, >50% of the hepatic surface or still expanding or with active bleeding, or intra parenchyma, diameter > 2 cm. Laceration: Depth of the lacerated hepatic parenchyma > 3 cm.
IV	Haematoma: Central parenchyma haematoma rupture. Laceration: Hepatic parenchyma damage >25 to 75% of all.
V	Laceration: Hepatic parenchyma >75% of all. Blood vessels: Post hepatic vein damage (post-hepatic inferior vein cava or major hepatic vein)
VI	Hepatic avulsion.

Table 2. Outcome of complex management of hepatic trauma.

Gr	Management	Total No.	No. of Deaths	% Mortality
I	Non-surgical management. Gelatine sponge packing and hepatic laceration repair.	35	0	0
II	Non-surgical management. Gelatine sponge or omental packing, debridement, hepatic laceration repair & peri-hepatic drainage.	60	2	3.3
III	Debridement. Ligation of blood vessels and intra-hepatic bile ducts of hepatic lacerated sections, omental packing, selective ligation of hepatic artery, peri-hepatic and T-tube drainage	45	5	11.1
IV	Regular or irregular hepatectomy under Pringle's maneuver, ligation of blood vessels and intra-hepatic bile ducts of hepatic lacerated sections, selective ligation of hepatic artery, omental packing, peri-hepatic and T-tube drainage.	37	8	21.6
V	Post-hepatic venous repair after hemihepatectomy or under the shifting or blockage of hepatic blood flow, peri-hepatic tamponade and selective ligation of hepatic artery or ligation of splenic artery, peri-hepatic and T-tube drainage	19	14	73.7
VI	Exploratory laparotomy	1	1	100
	Overall	197	30	15.2

Discussion

Most of the patients in the present study were in serious condition and had distinct signs and symptoms and clear history of injury. With the development of modern diagnostic technology and improvement of resuscitation in hepatic trauma, conservative treatment is used successfully in patients who are in stable haemodynamics and have no associated abdominal injuries^{4,6}. Patients with unstable haemodynamics require active surgical intervention³. Most patients with liver trauma need operation and basic operative principles include debridement and haemostasis, elimination of bile leakage and unobstructed drainage.

Grade I and II hepatic trauma

Whereas non-surgical management of splenic injuries is acceptable to most surgeons today, there is much controversy about possible management of hepatic injuries without surgery mainly because many of them are associated with extra hepatic abdominal injuries.

With the help of B-mode ultrasonography, CT scan and MRI, it is now possible to determine without resorting to laparotomy whether a patient has hepatic or extra hepatic injuries and to grade the hepatic trauma accurately. This made non-surgical management possible in seven of our patients. We believe that Grade I and II hepatic injuries can be successfully managed conservatively under intensive monitoring, provided the patients have stable vital signs, no clinical features of peritoneal irritation and no evidence of extra hepatic abdominal injuries.

The non-surgical management includes absolute bed rest, blood replacement and stabilization of the blood capacity, anti-inflammatory drug administration and use of stypctic. If the patient develops non-stable vital signs and/or features of peritoneal irritation and/or more haemoperitoneum suggested by B-mode ultrasonography or CT scan timely exploratory laparotomy is required.

In Grade I and II hepatic trauma patients, surgery mostly consisted of debridement, gelatin sponge or omental packing and repair of the liver laceration. Only a few of our patients needed perihepatic drainage. Of the 88 patients we managed this way, only two died from their associated injuries.

Grade III and IV

All Grade III and IV hepatic injuries need operation. The main surgical procedures include employed in our patients included thorough debridement and haemostasis, regular or irregular hepatectomy under Pringle's manouvre, ligation of blood vessels and intrahepatic ducts of the lacerated sections, omentum packing and selective ligation of hepatic artery; if still bleeding severely, gauze tamponade had to be used. If used, the gauze should be pulled out slowly on the 5th postoperative day and completely removed by 7th to 10th day.

Eleven patients had selective regular hepatectomy of whom one died. None of the 7 patients who underwent irregular hepatectomy died. Pachter⁵ reported that 7.2% of the 583 patients with hepatic trauma underwent hepatectomy and had 52% mortality. Balasegaram² treated 20% of severe hepatic trauma patients with hepatectomy and found a 10.6% mortality associated with hepatectomy. We believe that removal of too much of normal hepatic tissue is not only unnecessary but also makes the operation more difficult and increases the operative morbidity and mortality.

Only 3 patients in our series were managed with gauze tamponade. Two of them died of exsanguinations and severe infection respectively. The only patient who survived had three operations. Our limited experience with gauze tamponade was unfavourable and therefore should be avoided as far as possible except as a temporary procedure in patients with severe bleeding that cannot stand major surgery.

Use of perihepatic drainage in patients with Grade III patients and T-tube drainage in patients with deep lacerated wounds associated with extensive intrahepatic bile duct damage gave satisfactory results. The procedure can eliminate bile leakage and perihepatic abscess. The T-tube can also be used as a local haemostatic and for introduction of anti-inflammatory therapy.

Grade V and VI

Most of our patients with Grade V or VI liver trauma presented in critical conditions with shock and consumptive coagulopathy due to exsanguinations.

Exploratory laparotomy was done as soon as it was possible while at the same time replacing the blood loss.

Non-remittent retro-hepatic bleeding under Pringle's manouvre suggested post hepatic venous damage. The main surgical procedures were post hepatic vein repair under shifting or blockage of hepatic blood-flow or after hemihepatectomy. In cases of life-threatening bleeding or if the patient's condition is critical, perihepatic gauze tamponade and selective ligation of hepatic artery with or without splenic artery ligation were performed. Fourteen of the 19 Grade V patients died.

It was reported that posthepatic vein repair under the shifting or blockage of the hepatic blood-flow has a low successful rate^{7, 8}. Although Feliciano⁹ thought that posthepatic vein damage was the contraindication for perihepatic tamponade, Beal¹⁰ proved the haemostatic effect of perihepatic tamponade and proposed that this first procedure of choice in posthepatic vein injury.

It is our view that in patients who cannot stand post hepatic venous repair, post hepatic tamponade is an important procedure in controlling life-threatening bleeding especially in patients with post hepatic venous injury.

References

1. Pacter HL, Spencer FC. The management of complex hepatic trauma. Philadelphia Saunders. 1983; 241-249.
2. Balasegaram DM. Hepatic resection in trauma. *Adv Surg* 1984; 17:129.
3. Pachter HL, Spencer FC, Hofstetter S. Significant trends in treatment of hepatic trauma, experience with 411 injuries. *Ann Surg* 1992; 215:492.
4. Hiatt JR, Harrier HD, Koenig BV. Non-operative management of major blunt liver injury with hemoperitoneum. *Arch Surg* 1990; 125:101.
5. Meyer AA, Crass RA, Lim RL Jr. et al. Selective non-operative management of blunt liver injury using computed tomography. *Arch Surg* 1985; 120:550.
6. Karp MP, Kim JL. The non-operative management of hepatic trauma. *J Paed Surg* 1983; 18:512.
7. Hanna SS, Gorman PK, Harrison AW, et al. Blunt liver trauma at Sunnybrook Medical Center. *J Trauma* 1987; 27: 965-9.

8. Buechter KJ, Sereda D, Gomez G et al. Retrohepatic vein injuries: experience with 20 cases. *J Trauma* 1989; 29:1698-1704.
 9. Feliciano DV, Mattor KL, Jordan GL et al. Management of 1000 consecutive cases of hepatic trauma (1979-1984) *Ann Surg* 1986; 204:438-445.
 10. Beal SL, Fatal hepatic haemorrhage: an unresolved problem in the management of complex liver injuries. *J trauma* 1990; 30:193-196.
-