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Surgical Treatment of Liver Trauma

Technical Considerations and Case Reports

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The incidence of abdominal trauma, and thus that of liver trauma, has been increasing in the past few years. Improvements in the understanding of the anatomy of the liver and improvements in diagnostic techniques have resulted in shorter and better operations with less delay between injury and surgery. Improvements in transportation to adequate hospital facilities and vigorous resuscitative measures have also contributed to lowering the mortality rate for this type of injury. Suggestions are made for the surgical management of liver injuries, together with illustrative case reports.

ADVANCES in recent years have contributed to the more successful management of the patient undergoing surgical operation of the liver. The incidence of liver trauma has increased along with the increase in the number of abdominal traumas. Diagnostically, peritoneal lavage has allowed more accurate interpretations in blunt abdominal trauma. In penetrating trauma, improvements in transportation to hospital facilities, vigorous resuscitative measures and prompt surgical intervention have definitely lowered the mortality rate. We believe that all penetrating wounds of the abdomen should be surgically explored. With improved liver scanning and bacteriological studies, morbidity and mortality from liver abscesses have been reduced significantly.

Liver operations are most commonly indicated for:

1. Trauma
2. Abscess
3. a. Benign tumors or cysts
b. Primary or secondary cancers
4. Transplantation

More accurate knowledge of the anatomy of the liver has shortened the length of the surgical procedures and reduced the incidence of postoperative hemorrhage, biliary fistulas and hematemesis. Antibiotics, although important in the control of sepsis, have not helped reduce the incidence of postoperative intra-abdominal purulent collections.

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We encountered 44 liver injuries in 190 patients operated for abdominal trauma during the past five years. This experience has given us an opportunity to evaluate the technical management of these problems. From this experience we will review three case reports and make the following recommendations:

1. Pay careful attention to the post-operative needs of the patient.
2. Superficial liver wounds and through-and-through non-bleeding perforations made by small caliber, low velocity bullets may be treated by drainage only.
3. Larger wounds, usually bleeding at the time of exploration, require suturing as well as drainage.
4. Patients with severe bursting, crushing, high velocity bullet wounds and shotgun wounds at close range require resectional debridement and possible lobectomy. Retrohepatic caval and major hepatic vein injuries near the cava are the chief indications for formal lobectomy.
5. Use of packing either with gauze or "absorbable" hemostatics should be avoided except for temporary purposes.
6. In extensive drainage, Penrose and, when required, sump drains should be instituted.
7. Biliary decompression is recommended only with injuries to the biliary tract, duodenum or head of the pancreas. It is not recommended in injuries confined to the liver.

Discussion

Suturing is usually used to control hemorrhage at the time of surgery. Its usefulness is greatest in the care of stabbing or incised wounds of the liver. Occasionally, sutures used to approximate the liver edges produce more bleeding and bile extravasation than they control.

Excisional debridement involves the removal of all devitalized liver tissue and the control of bleeding and bile extravasation by means of suturing. An attempt should be made to individually ligate all major vessels and bile ducts on the cut surface of the liver with interrupted black silk. To suture the liver parenchyma, we prefer through-and-through overlapping chromic catgut. No attempt should be made to reconstruct the liver profile by approximating sutures and we prefer to leave the raw surface open for better drainage. The introduction of an absorbable hemostatic between two raw surfaces should be condemned. These hemostatics serve as tampons, delay healing and may eventually lead to innumerable complications. Several drains should be used and should be brought out of the abdomen by the shortest route.

Hepatic lobectomy is rarely required and the early enthusiasm of some for this radical treatment is no longer present. There are, however, limited indications for formal lobectomy. One of these is in patients with either blunt or penetrating injuries who have extensive devitalization of a major portion of the tissues of one lobe of the liver. The second major indication would be damage to the hepatic veins or vena cava to the extent that right lobectomy would be required to visualize and control this injury. A left lobectomy can be performed from the abdomen, but the thoraco-abdominal incision offers the best exposure for a right lobectomy. In performing any lobectomy there should be individual ligation of the blood vessels and bile ducts in the porta hepatis. We prefer the finger fracture method of dividing the liver parenchyma and advocate individual ligation of the major vessels and bile ducts in the liver substance. Several Penrose drains are used as well as one or two sump drains. We do not employ a T-tube in the common bile duct unless it has been injured or there is some injury to the duodenum or pancreas.

Surgical Treatment of Liver Trauma

Table 1
Associated Visceral Injuries
In 44 Patients with Liver Trauma

Extent of Injury	Number of Cases	Number of Deaths
Liver only	12	0
One associated injury	14	0
Two associated injuries	8	1
Three associated injuries	3	2
Four associated injuries	4	0
Five or more associated injuries	3	0

Clinical Data

In our series of 44 patients, there were 37 males and 7 females with an age range from 16 to 62 years with a median of 28 years.

Five (5) were blunt injuries and 39 were penetrating injuries, including 6 stab wounds and 2 shotgun wounds. The remaining 31 were pistol or rifle wounds.

It is stated that the number of viscera involved in association with the liver wound is the most important single factor in predicting prognosis.^{1,2} Our experience is given in Table 1.

Two of our three deaths occurred in patients who had serious medical problems in addition to their trauma. One of our deaths occurred in a patient with rheumatic heart disease who had undergone aortic valve replacement. The second occurred in a massively obese male who exhibited a "Pickwickian" syndrome.

All three deaths occurred in patients who also had massive peritoneal contamination from colon injuries. Although definite conclusions cannot be drawn from such a small series, it appears that the degree of contamination at the time of injury is more important than the number of associated visceral injuries. None of our deaths occurred in patients undergoing hepatic lobectomy.

Table 2
Treatment of Liver Injuries in
44 Patients

Type of Treatment	Number of Cases
Drainage only	25
Suturing and drainage	8
Debridement, partial resection and drainage	8
Hepatic lobectomy and drainage	3

The types of treatment employed are given in Table 2.

It can be seen that almost 60% of liver injuries can be managed successfully by drainage alone. We have had no mortality and minimal morbidity in cases treated by drainage alone.

Illustrative Case Reports

Case Report # 1

A 34-year-old policeman sustained a gunshot wound of the chest and abdomen. After a thoracotomy tube was inserted to relieve an expanding hemo-pneumothorax, the patient underwent an exploratory laparotomy. Multiple injuries included:

- (1) A five centimeter stellate laceration of the right lobe of the liver;
- (2) Laceration of the second portion of the duodenum and head of the pancreas;
- (3) Laceration of the right colon, and
- (4) Transection of the spleen.

The bleeding from the liver was controlled by means of suturing. The lacerations of the duodenum and pancreas were sutured and a T-tube inserted into the common duct. A splenectomy and a right transverse colostomy were performed. After a stormy post-operative course including massive pulmonary embolism, intra-abdominal infection and wound dehiscence, the patient was discharged from the hospital three months later.

Comments

Hemorrhage from smaller liver lacerations can usually be controlled by suturing. We believe that T-tube drainage of the common bile duct is necessary in the

presence of duodeno-pancreatic injuries; but is unnecessary and even harmful in liver resection alone.³ Adequate drainage of the hepatic and subhepatic area is most important. This removes blood and bile which form an excellent culture medium for the bacterially-contaminated tissues. We prefer to drain with multiple Penrose drains and some type of sump drain. These drains are brought out through a dependent drainage incision placed subcostally at the midaxillary or posterior axillary line. When extensive liver resections are required, McClelland and Shires⁴ have suggested that in addition to anterior drainage, posterior drainage should be provided by excising a portion of the twelfth rib to establish through-and-through drainage of the resected liver bed. The drains are allowed to remain until there is no further drainage except for a serous type of fluid from the tissues. They are gradually shortened over a period of three to four days.

Case Report # 2

An 18-year-old male was brought into the Emergency Room after sustaining a stab wound in the right upper quadrant. He was hypotensive, but had no other significant findings. At laparotomy, 2000 ml of partially clotted blood was presented in the peritoneal cavity. A small puncture wound was found in the liver, but it had ceased bleeding. Nothing was done to the puncture wound and the abdomen was closed with drainage to the damaged area.

Comments

This case represents a common finding after exploration for a single stab wound of the abdomen with injury to the liver. Similar findings are seen with some small

caliber, low velocity gunshot wounds of the liver. Most of the time the only treatment consists of drainage of the area. We believe that any hemostatic packing of the wound should be avoided as these agents serve as tampons to prevent the drainage of blood, bile, and devitalized liver tissue. Likewise, closure of small defects in the surface of the liver can produce the same effect. For these reasons, we believe in leaving the wound open unless it is bleeding massively.

Case Report # 3

A 20-year-old male sustained a gunshot wound of the right upper abdomen. At laparotomy a large stellate fracture of the right lobe of the liver and a complete transection of the upper right ureter were found. The ureter was repaired by an end-to-end anastomosis and a right hepatic lobectomy was performed. The area of the hepatic lobectomy was drained by three Penrose drains. No T-tube was used. Two weeks post-operatively the patient underwent drainage of a large right subphrenic abscess. His condition slowly improved and he was discharged from the hospital three weeks later.

Comments

Hepatic lobectomy was performed in this patient because it was the best, if not only, way to control hemorrhage and remove devitalized tissue. The proper management of hypovolemia and a better understanding of the anatomy of the liver are factors contributing to the lower mortality rate in hepatic resections for trauma. In spite of apparently adequate drainage in right hepatic lobectomies, we continued to have the subphrenic abscess as a common complication. We are considering the use of posterior drainage through the bed of the twelfth rib.

References

1. Madding GF, Lawrence KB and Kennedy PA: Forward surgery of the severely wounded. *Second Aux Surgical Group* 1: 307, 1942-1945
2. Mikesky WE, Howard JM and DeBaakey ME: Injuries of the liver in 300 consecutive patients. *Int Abst Surgery* 103:232, 1956
3. Lucas CE and Walt AJ: Critical decisions in liver trauma. *Arch Surg* 101:277, 1970
4. McClelland R and Shires T: Hepatic resection for massive trauma. *Trauma* 4:282, 1963