Hepatectomy For Hepatocellular Carcinoma Without Hospital Mortality

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Summary

Objective : To report the result of hepatectomy for hepatocellular carcinoma (HCC) in Queen Mary Hospital, Hong Kong.

Design : A review of data that were collected prospectively.

Subjects : 150 consecutive select patients with resectable HCC operated between December 1995 and August 1998 at Queen Mary Hospital, Hong Kong.

Main outcome measure : Hospital mortality rate.

Results : There was no hospital mortality in the 150 select patients undergoing hepatectomy for HCC. Blood transfusion was not required in 96 (64%) patients. Cirrhosis was present in 70 (47%) patients and chronic hepatitis was present in 56 (37%) patients.

Conclusion : Hepatectomy for HCC can be accomplished without hospital mortality with current techniques. (*HK Pract* 1999;21:51-54)

Keywords : Hepatectomy, hepatocellular carcinoma, hospital mortality

摘要

目的 : 報導於香港瑪麗醫院進行肝細胞肝癌肝切除術的結果。

設計 : 檢討預期收集得的資料數據。

對象 : 於1995年12月至1998年8月期間，在香港瑪麗醫院接受肝細胞肝癌肝切除術的連續150名被挑選的病人。

測量內容 : 在院死亡率。

結果 : 連續150名接受肝細胞肝癌肝切除術的病人均沒有在院死亡。96名（64%）病人毋須接受輸血。70名（47%）病人呈現肝硬化，56名（37%）病人感染慢性肝炎。

結論 : 現時肝細胞肝癌的肝切除術可完全避免在院死亡。

主要詞彙 : 肝切除術、肝細胞肝癌、在院死亡率

Introduction

Hepatectomy for hepatocellular carcinoma (HCC) has been a dangerous operation in the past because the liver is often cirrhotic and the liver function is unsatisfactory. The operative mortality rate in cirrhotic patients was 58% in Foster's survey in 1977.[1] Many of the deceased patients suffered from massive ascites, hyperbilirubinaemia, sepsis and encephalopathy. Over the last 10 years at Queen Mary Hospital, the surgical techniques and perioperative care for hepatectomy have gradually evolved into a standardized protocol.

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Since December 1995, 150 consecutive patients with HCC underwent hepatectomy without hospital mortality. In this report, the perioperative management that led to the satisfactory short-term result was reviewed.

Patients and methods

Between December 1995 and August 1998, 150 consecutive patients with HCC underwent hepatectomies at Queen Mary Hospital, Hong Kong. All data were collected prospectively by a research assistant.

Preoperative management

Hepatic functional assessments, including Pugh *et al*[2] modification of Child's hepatic function classification and indocyanine green (ICG) clearance test, were performed after the tumour was assessed to be resectable by radiological studies. The selection of patients for hepatectomy was based mainly on the result of ICG clearance test. A value of retention of ICG less than 14% 15 minutes after injection was considered acceptable for major hepatectomy.[3] Bowel washout was performed in the evening before hepatectomy and antibiotic cover was given at the time of skin incision.

Surgical technique

Surgery was performed through a generous bilateral subcostal incision with an addition of thoracic extension when the tumour was large or located in the right posterior segment. The aim was to allow adequate exposure of the tumour and to avoid unnecessary manipulation of the liver. Intraoperative ultrasonography was performed to detect lesion in the contralateral lobe of liver and to mark on the liver surface the optimum transection line. Dissection and control of ipsilateral hepatic artery and portal vein, followed by mobilization of the liver lobe bearing the tumour, and transection of the liver parenchyma under inflow vascular control by ultrasonic dissector were done. The ipsilateral hepatic duct was divided during liver transection, because by this, the hepatic duct could be ligated or sutured securely with the hilar plate and the chance of bile leakage would be reduced. After completion of liver transection, the transected surface was inspected carefully for bile leakage. If present, the leakage site was closed carefully by fine sutures. During the operation, care was exercised to reduce bleeding, to preserve volume of liver remnant and to avoid any hypoxic injury to the liver remnant.

Postoperative care

Postoperatively, the patients, particularly those with cirrhosis and major hepatectomy, were monitored in the intensive care unit (ICU) with attention to fluid balance, oxygenation, and tissue perfusion. Mechanical ventilation was given to 59 patients. All patients received low-salt albumin for 3 to 5 days. Parenteral nutrition consisting of branched-chain amino acid-enriched solution, low dose dextrose, medium chain triglycerides was started immediately after hepatectomy in all patients with cirrhosis or major hepatectomy, and was continued for 3 to 7 days until the gastrointestinal function returned.[4] Once parenteral nutrition was started, no other intravenous fluid was given in order to avoid fluid retention, elevation of central venous pressure and congestion of the liver remnant.

In this study, hospital mortality was defined as death, irrespective of cause, during hospitalization for hepatectomy. Major hepatectomy was defined as resection of 3 or more liver segments of Couinaud's nomenclature.[5] Minor hepatectomy was defined as resection of 2 or fewer than 2 segments.

Results

There were 122 male and 28 female patients, with the median age of 52.5 (range 7 – 80). The size of the tumours ranged from 1.2 cm to 22 cm (median 6.3). Cirrhosis was present in 70 (47%) patients, and chronic hepatitis was present in 56 (37%) patients. Major hepatectomy was performed in 89 (59%) patients, of whom 25 had underlying cirrhosis (**Table 1**). Blood transfusion was given in 54 (36%) patients. Complications occurred in 58 (39%) patients (**Table 2**). There was no hospital mortality nor any patient who returned soon after discharge had died in the second admission. Those patients who developed complications were mostly with blood transfusion (**Table 3**).

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Table 1: Types of hepatectomy according to histological status of liver

	Major hepatectomy	Minor hepatectomy
Cirrhosis	25	45
Chronic hepatitis	46	10
Normal liver	18	6

Table 2: Complications

Type	Number
Chest infection	12
Pleural effusion	24
Wound infection	22
Wound dehiscence	4
Subphrenic abscess	1
Variceal bleeding	1
Peptic ulcer bleeding	2
Biliary fistula	1
Infected ascites	1
Intestinal obstruction	1
Bleeding gastrojejunostomy anastomosis	1
Anastomosis leakage	1
Incision hernia	1
Renal failure	1
Postoperative bleeding from diaphragm	1

The distribution of TNM stages was: stage I – 6 patients, stage II – 67 patients, stage III – 66 patients, stage IVA – 11 patients.

Discussion

In the past 2 decades, hepatectomy has evolved from a rough, hasty, and bloody procedure to a refined, deliberate, and relatively bloodless operation. The hospital mortality rate of many recent series was less than 5%.[6-7] This level of success may become a new standard for hepatectomy in future.

The success of hepatectomy for HCC depends on careful selection of patients based on indocyanine green clearance test, meticulous technique to reduce bleeding, preserve liver volume and function, and optimum postoperative care to preserve or even enhance liver function and regeneration. The good result is the endeavour of a team of surgeons, anaesthetists, and intensive care physicians. However, the most

Table 3: Comparison of patients with and without complication

	With complication (n = 58)	Without complication (n = 92)	p value
Blood loss (L)	1.6 (0.2-10)	1 (0.1-10)	0.001
Blood transfusion (L)	0.15 (0-12.9)	0 (0-9)	0.0029
Number of patients without blood transfusion	50%	73%	0.0045
Operative time (minutes)	430 (135-780)	390 (105-795)	0.0361
Fresh frozen plasma replacement (units)	0 (0-3)	0 (0-1.3)	0.07
Hospital stay (days)	17 (7-66)	10 (5-27)	0.0000
Indocyanine green clearance (% at 15 min)	10.65 (2-48)	11.4 (1.6-66.9)	0.8375
Child's A	54	85	0.87057
Child's B	4	7	–

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Key messages

1. Hepatectomy for hepatocellular carcinoma can be performed nowadays without hospital mortality and with minimum blood transfusion.
2. Such a result is only possible when meticulous surgical techniques and perioperative care are employed.

important aspect is the supervision of the senior surgeon who should ensure that the protocol is followed and there is no surgical error leading to massive bleeding and injury to the liver remnant. With technical error, the effort to salvage the patient, no matter how good and immensely implemented in the ICU, is often futile.

In the postoperative period, measures to improve tissue oxygenation and avoidance of congestion of the liver remnant are the primary goal. Mechanical ventilation in the cirrhotic patients can maintain adequate oxygenation and reduce pleural effusion.[8] Restriction of intravenous fluid and lowering of central venous pressure to prevent congestion of the liver remnant is necessary. Parenteral nutrition is given immediately after surgery, which is the time when the patients most require metabolic support. Parenteral nutrition can also stimulate liver regeneration, serve as an efficient metabolic vehicle for resolving acute electrolytes and acid-base disturbances. However, parenteral nutrition may induce overloading of circulation. Thus it is important to stop all other routes of intravenous fluid administration once parenteral nutrition is given. The other potential hazard of parenteral nutrition is catheter sepsis. Once it occurs, all the metabolic gain will be cancelled out. To avoid catheter sepsis, it is mandatory to use a separate catheter for administration of parenteral nutrition inserted under aseptic technique, and to start oral feeding as soon as the gastrointestinal function returns.

In conclusion, with adoption of a standard protocol of surgical technique and perioperative care, a zero hospital mortality of hepatectomy for HCC is achieved. The next goal in the management of HCC is to improve the long-term survival. ■

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