

• LIVER CANCER •

# Etiology and management of hemorrhage in spontaneous liver rupture: a report of 70 cases

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## Abstract

**AIM:** To analyze the causes and management of hemorrhage in spontaneous liver rupture.

**METHODS:** Seventy cases of spontaneous liver rupture were retrospectively analyzed for causes of hemorrhage and therapeutic effects of surgical approaches.

**RESULTS:** It was demonstrated that the causes of spontaneous liver rupture were primary liver cancer in 60 cases (85.7 %), cirrhosis in 3 cases (4.3 %), liver angioma in 2 cases (2.9 %), liver adenoma in 4 cases (5.7 %), and secondary liver cancer in 1 case (1.4 %). Hemostasis was achieved with surgical approaches in 68 cases (97.1 %) and non-surgical approaches in 2 cases (2.9 %). Surgical interventions included suture, ligation of hepatic artery, hepatic artery chemoembolization and partial hepatic resection.

**CONCLUSION:** The results suggest that surgical intervention is still the main therapeutic method and the best procedure that should be selected according to causes of disease and patient's condition and history.

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## INTRODUCTION

Bleeding of spontaneous liver rupture is a severe complication in liver diseases, owing to its clinical signs being usually not specific. Therefore, correct diagnosis and management are very important. At present, it is a difficult problem in surgery for the diagnosis and therapy of spontaneous liver rupture. In this paper, the etiology and management in seventy cases of spontaneous liver rupture treated in Tian Jin medical university general hospital in ten years were analysed.

## MATERIALS AND METHODS

Seventy patients with spontaneous liver rupture (41 male and 29 female) with a median age of 49±4.3year (range,17-75years) were admitted from January 1992 to December 2001. There were 68 cases with surgical intervention and 2 cases with non-surgical therapy.

Majority of patients initially experienced some abdominal complaints, such as abdominal pain, anorexia, vomiting and abdominal distention. The serious cases had signs of anemia, shock and acute peritonitis (Table1).

**Table 1** Clinical symptoms of spontaneous liver rupture in 70 cases

	Abdominal pain	anemia	shock	acute peritonitis
number	63	48	37	19
percentage	90.0%	68.6%	52.9%	27.1%

Twenty one patients had hepatitis history and 1 patient had undergone Mile's operation two years ago because of rectum carcinoma before the liver rupture. Abdominal paracentesis showed that blood was incoagulable in 61 patients. B type ultrasonography and/or computed tomography (CT) displayed hydroperitonitis and liver tumor or liver cirrhosis in 68 patients. Thirty seven patients had hemoglobin(Hb) below 100 g/L. Liver functions of all patients were classified according to Child's criteria: Child A in 17 patients, Child B 39 patients, Child C 14 patients. Alpha-fetoprotein(AFP) was positive in 41 cases. Sixty eight cases had diagnosed pathological diagnosis: primary liver carcinoma 60 cases, liver cirrhosis 3 cases, liver angioma 2 cases, liver adenoma 4 cases, secondary liver cancer 1 case (Table2). Twenty six patients had history of slight injury.

**Table 2** Cause of spontaneous liver rupture in 70 cases

	Primary liver cancer	cirrhosis	liver angioma	liver adenoma	secondary liver cancer
number	60	3	2	4	1
percentage	85.7%	4.3%	2.9%	5.7%	1.4%

Two patients were treated by non-surgical method, selective hepatic artery chemoembolization via femoral artery. Sixty-eight patients had undergone operation and surgical methods included partial resection of liver and ligation of hepatic artery (Table3).

**Table 3** Therapeutic methods of spontaneous liver rupture in 68 patients

	suture	packing	ligation of hepatic artery	hepatic artery chemoembolization	hepatic partial resection
number	17	7	23	2	40
percentage	24.3%	10.0%	32.9%	2.9%	57.1%

Operative methods were as follow: (1) suture: Long and thin needles with thick silk were selected to enter the normal liver tissue near the lesion in one side of the split and came out

of the other side through the health tissue after hepatic artery and portal vessels were blocked. Silk was finally ligated after suture of the split had been finished. (2) packing: If bleeding of the gap had not been controlled completely after ligation of hepatic artery, suture should be applied to the lesion and if the patient was too weak to undergo the complicated operation, packing with gauze cushion should be used to procure hemostasis. The edge of gauze cushion was let out from the incision and left there for three days after surgery. Finally, if hemostasis was successful, the gauze cushion should be pulled out. (3) ligation of hepatic artery: When the hepato-duodenal ligament was pulled up near the Winslow pole, the pulse of hepatic artery could be palpated, the artery was then isolated and ligated. It should be prudent to ligate the stem of the hepatic artery in cirrhosis, lest hepatic coma would occur after the procedure. (4) hepatic artery chemoembolization: The catheter was inserted to proper hepatic artery or right and left hepatic artery, gelfoam and iodized oil were used as suppository, and injected via gastroduodenal artery or right gastro-epiploic artery. Methylene blue was injected to locate the site of embolization before procedure. (5) liver partial resection: Eleven, seven, two and twenty one patients had received hepatic left lateral lobectomy, left hemihepatectomy, right hemihepatectomy and non-regular hepatic partial resection respectively.

## RESULTS

Two patients (AFP positive) who were given non-surgical intervention with bleeding entirely controlled could not survive over one year. All the rest adopted surgical therapeutic methods. Suture with addition of ligation of hepatic artery were performed in seventeen patients, with their primary diseases proved by pathology. There were 16 cases of primary liver cancer, and one liver cirrhosis. Hemostasis was achieved in 13 patients, bleeding of three patients could not be controlled and one patient developed liver failure and died during seven days after operation. Only one patient survived about one year. Ligation of hepatic artery supplemented with packing was used in seven patients with four died of hemorrhagic recurrence. The mean survival time in the seven patients was about nine months. Single ligation of hepatic artery was applied in two patients with primary carcinoma and their survival time was less than one year. Two patients of primary liver carcinoma were given hepatic artery chemoembolization and died within one year. Bleeding in forty patients was controlled by partial hepatectomy, but liver failure took place in two patients who died ten days after the surgery. Fourteen patients with four patients of hepatic adenoma among them lived more than one year.

## DISCUSSION

Spontaneous liver rupture can happen not only in the primary liver cancer but also in liver benign tumor and liver cirrhosis. Careful history, physical and examination with necessary laboratory tests and imaging examination can provide enough clue for the diagnosis of liver rupture without difficulty. A typical patient usually presented with severe upper abdominal pain, abdominal distension, anorexia and vomiting. Rupture usually occurred during working or after slight injury. Facial pallor, cold sweat, pulse >100 times/minute, systolic pressure <90 mmHg, tenderness, rebound tenderness and muscular tension over upper abdomen, positive abdominal paracentesis, Hb<100 g/L and hematocrit 25-30 % suggest that the disease would be quite serious. B-ultrasonography(B-us) can detect 72.5 % tumor of liver and is a helpful and simple method to

diagnose liver cancer, detect cancerous embolus of portal vein and evaluate the degree of intraperitoneal hemorrhage<sup>[1]</sup>. However, computed tomography (CT) especially helical CT is more sensitive to diagnosis liver tumor than B-us owing to its higher resolving power<sup>[2,3]</sup>. CT can detect tumors as small as 1 cm in diameter, and it may also differentiate the quality, the position and the invasion range of the tumor accurately<sup>[4]</sup>. Patient's therapy should be individualized because each case is not exactly similar.

### *Spontaneous rupture of primary liver carcinoma*

As we know that hepatocellular carcinoma (HCC) is the most common primary liver tumor. Worldwide annual incidence of HCC was estimated to be at least one million new patients<sup>[5]</sup>. Its incidence of spontaneous rupture was about 10 %<sup>[6,7]</sup>. Liver rupture is short of special symptoms, especially it can usually be misdiagnosed if liver cancer is not diagnosed before rupture. But it is not very difficult if the diagnosis of intraperitoneal hemorrhage is made and examinations of B-us and CT are done. Primary liver cancer accompanied with cirrhosis accounted 53.9-85.0 % of liver malignancies. Because liver function in these cases is generally poor, the principle of treatment is to resuscitate rapidly, control bleeding, resect cancerous tissue and to retain as much healthy liver tissue as possible<sup>[8-10]</sup>. Firstly the vital physical signs and blood loss should be evaluated; Secondly the number of tumors, its size, location, invasive range, and the possible presence of cancerous in portal vein should all be considered. Thirdly, liver function must be assessed, and presence or not jaundice and ascitic fluid as well as the degree of cirrhosis should be evaluated. The liver functional status should be classified according to Child's criterion. Hepatic partial resection should be performed immediately if patients's vital physical signs are stable, Child's classification was A or B, tumor's range is localized in one hepatic segment or lobe, and the first or the second hepatic hilus and the inferior vena cava are not invaded. Operation program include hepatic lobe or segment resection and non-regular hepatic partial resection<sup>[11-14]</sup>. If a great deal of blood is lost, despite the rest conditions are better or Child's classification of liver is C, tumor is too massive to be resected and tumor invades the hepatic portal vessels and the inferior vena cava, hemostasis should be considered first. In this situation the most simple surgical methods such as ligation of hepatic artery and hepatic artery chemoembolization should be selected<sup>[15-19]</sup>. Because blood supply of primary liver carcinoma is mainly by hepatic artery, ligation of hepatic artery can thus block the blood supply and nutrition of the carcinoma. If bleeding can not be controlled by blocking or embolization of hepatic artery, suture should be used in addition, and packing would be the final choice<sup>[20-23]</sup>.

### *Spontaneous rupture of cirrhosis without malignant change*

Liver cirrhosis usually supervenes hemorrhage of upper digestive tract<sup>[24]</sup>, but rarely supervenes spontaneous rupture. Macronodular cirrhosis or varicose veins and lymphatic vessels can occasionally produce spontaneous rupture and leads to bloody abdomen. Once rupture in macronodular cirrhosis happens, the patient would die of liver failure in a short time. Rupture of varicose veins and lymphatic vessels is manifestation of terminal hepatic disease owing to high pressure of portal vein, therefore its prognosis is very poor<sup>[25]</sup>. Hepatic partial resection is not indicated in this kind of rupture, and control of hemorrhage by ligation of hepatic artery with packing and suture is the best choice. Liver tissue of cirrhosis is very crisp, inappropriate manipulation can lead to

uncontrollable bleeding. Thin bending needle and thick silk should be selected in suture, and silk should be ligated after suture.

### Rupture of liver angioma

Hemangiomas which arise from mesenchymal cells are the most common benign tumor of the liver<sup>[26,27]</sup>. It can occur in all age groups, with incidence of 7 % in general population. The circumscribed lesions are composed mostly of closely packed hyperplastic vascular channels lined by a single layer of normal appearing endothelial cells. The majority of hemangiomas are small without symptom. However, it may be enlarged and associated with diffuse hemangiomatosis and even nearly replace the liver. Spontaneous rupture in hemangiomas is not usual but can be dramatic and very dangerous. Patients can die of massive hemorrhage in a short time. In this condition patients are too weak to endure massive operation owing to hematemesis. Therefore, hemostasis is the first choice of treatment<sup>[28,29]</sup>. Ligation of hepatic artery or packing should be performed to control bleeding instantly as soon as shock is being treated. If the hemorrhage is stopped and the patient's condition is good, secondary operation to cure angioma should be selected. Suturing the split should be between healthy liver tissue, otherwise the massive bleeding may recur.

### Rupture of liver adenoma

Liver adenomas which arise from epithelial tissue are relatively common benign tumors of liver<sup>[30]</sup>. Majority of adenoma have capsules and minority of adenoma without capsule are prone to malignant change. Liver adenoma usually is solitary and varies in size. Occasionally they may be multiple and cluster within families. Tumor rupture or dramatic bleeding occurs in approximately one third of patients. Microscopically, the adenoma are closely approximated cords of hepatocytes that have vacuolated sinusoidal borders. Centers of adenomas may undergo degenerative changes. Some adenoma have abundant blood supply which are separate from adjacent normal hepatic tissue<sup>[31]</sup>. At present, adenomas are associated with the use of oral contraceptives and usually occur in young women<sup>[32]</sup>. The incidence goes up gradually. For rupture of adenoma the treatment principle is similar to that of primary liver cancer. If patients's conditions are stable and tumors are localized in one lobe or segment of liver, partial hepatectomy should be performed instantly. If blood loss is big, and the tumors are unresectable, then therapy should be ligation or embolization of hepatic artery to control bleeding<sup>[33,34]</sup>. Delayed resection can be prepared after successful hemostasis<sup>[35]</sup>. Liver transplantation can be considered for diffuse adenomatosis or the tumor exceeds half of the liver in diameter<sup>[36]</sup>.

### Rupture of secondary liver carcinoma

Liver is a frequent site for metastases arising from gastrointestinal cancers, which is a significant oncologic problem. Secondary liver carcinomas are generally diffuse but may present as a single cirrhotic nodule which is distinguished from healthy liver tissue with degenerative changes in its center. The histological structures of metastatic carcinoma resemble the primary cancer outside the liver. Secondary liver cancers grow slower than primary liver carcinoma and are usually unresectable. Ligation or chemoembolization of the hepatic artery should be selected to control bleeding first, then the next step in treatment will be decided. Cancer should be resected, if the patients's condition gets better and the metastatic cancer may be limited to one

lobe or a segment of the liver, the partial hepatectomy can be selected as emergency operation.

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