Acta Medica et Biologica
Vol. 47, No.3, 125-129, 1999

Successful Inokuchi Shunt Operation for Early Gastric Cancer and Concomitant Esophagogastric Varices: A Case Report

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Received November 9 1998; accepted July 5 1999

Summary. **We encountered a case of esophagogastric varices concomitant early gastric cancer resistant to balloon retrograde transvenous obliteration, but which was successfully treated using the Inokuchi shunt: the left gastric veno-infrahepatic vena cavo anastomosis was shunted using the right superficial femoral vein. Many investigators have documented a high risk of morbidity and mortality accompanying abdominal operations in cirrhotic patients. To the best of our knowledge, this is the first reported case of a patient who successfully underwent both gastric surgery and a simultaneous selective shunt. If postoperative management is carried out carefully, selective shunt operations for esophagogastric varices together with a partial gastrectomy can be effective against early lower gastric cancer and allow the avoidance of variceal bleeding and the discomfort of endoscopic therapy.**

Key words—Inokuchi shunt, esophagogastric varices, early gastric cancer.

INTRODUCTION

Liver cirrhosis is the critical factor contributing to morbidity and mortality in liver and biliary and gastrointestinal surgery[1,2]. In addition, cirrhotic patients with esophagogastric varices are at particular risk, and variceal bleeding can lead to death[3]. Therefore it is clinically important to determine adequate treatment for such cirrhotic patients.

The most effective treatment for gastric cancer and concomitant esophagogastric varices in patients with liver dysfunction has remained an open question. It has been reported that simultaneous operations on these patients results in high mortality rates[4]. We here report successful simultaneous operations: partial gastrectomy and Inokuchi selective shunt operation[5] for early gastric cancer, gallbladder stones, and concomitant esophagogastric varices.

CASE REPORT

A 68-year-old woman with liver cirrhosis of types B and C was admitted to our hospital department on October 31, 1997 presenting early gastric cancer, cholecystolithiasis, and uncontrolled concomitant esophagogastric varices. In our hospital on November 1994, liver cirrhosis of type B and C with esophageal varices (F1, Cw, RC (-)) were detected by examination of the melena. Mild fever had continued since November of the previous year. In July 1998, gastrointestinal fiber (GIF) scope revealed esophageal varices F2, Cb, Ls, RC (+), and gastric varices F2, Cb, Lgcf, RC (-). The patient was therefore admitted to the Department of Internal Medicine on August 29, 1998. Further examinations demonstrated that the depth of the early gastric cancer might include the submucosa of the anterior antrum wall together with the cholecystolithiasis. Balloon-occluded retrograde transvenous obliteration was attempted twice for gastric varices, but failed because of the ethanolamine oleate stealing into the systemic circulation. Her past medical history was notable in that she had had three abdominal operations: an appendectomy at 50 years of age, an operation for peritonitis

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Table 1. Preoperative data of this patient

WBC	1400/mm³	GOT	61 IU/l
RBC	256×10⁴/mm³	GPT	31 IU/l
Hb	9.2 g/dl	γGTP	14 IU/l
Ht	27.0%	T. Bil	1.3 mg/dl
Plt	3.0×10⁴/mm³	ChE	66 U/l
T.P.	5.7 g/dl	NH3	137μg/dl
Alb	2.6 g/dl	Bleeding time	9 min 30 sec
BUN	27 mg/dl	Prothrombine time	90%
Cre	1.0 mg/dl	Serum hyaluronic acid	1295 ng/ml
Na	141 mEq/l	ICG-R15	44.1%
K	4.0 mEq/l	K value	0.05
Cl	108 mEq/l		

Preoperative clinical data; Pancytopenie, hypoalbuminemia, elevation of the serum ammonium, and remarked elevation of the serum hyaluronic acid are shown.

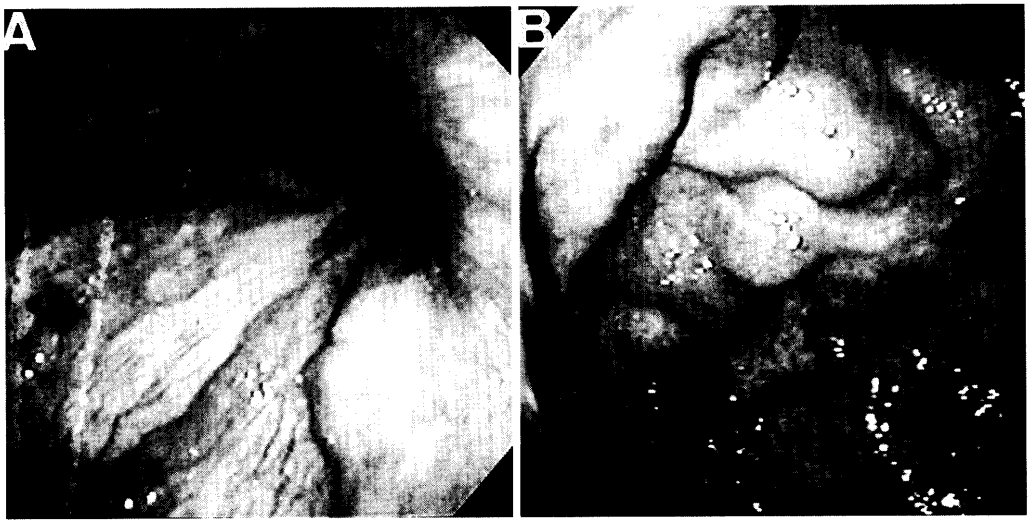

Fig. 1. Preoperative endoscopic findings of esophagogastric varices. **A.** Esophagus; F_2, C_B, Ls, RC (+), **B.** Stomach; F_2, C_B,L_{GCF}, RC (-).

at 52 years, and a high anterior resection for rectal cancer at 66 years.

Physical examination on admission revealed palmar erythema, ascites, pretibial edema, splenomegaly, and abdominal operative scars but not jaundice.

Clinical data concerning the staging of the cirrhosis are listed in Table 1. This patient was class C by Child's classification. Her Child-Pugh score was eight. Serum hyaluronic acid was very high at 1295 ng/ml. Pancytopenia was shown. GIF revealed the esophagogastric varices (Fig. 1) and type IIc of the early gastric cancer with suspected submucosal invasion (Fig. 2). Balloon-occluded retrograde transvenous obliteration failed for a large gastrorenal shunt (Fig. 3).

Subsequently the patient underwent a splenectomy and a left gastric venous-caval shunt using an interposed graft from the right superficial femoral vein after blocking the connection between the right and left gastric vessels. Portal pressures were measured at laparotomy, after the splenectomy, and after the shunt. Data were 340 mmH_2O, 280 mmH_2O and 300 mmH_2O, respectively. Simultaneously, a partial gastrectomy of the antrum anterior wall was performed. Gastric mucosa of pericancerous lesions were marked by clips preoperatively. After gastrotomy,

Fig. 2. Preoperative endoscopic finding of gastric cancer. IIc type of early gastric cancer is demonstrated (*black arrow head*).

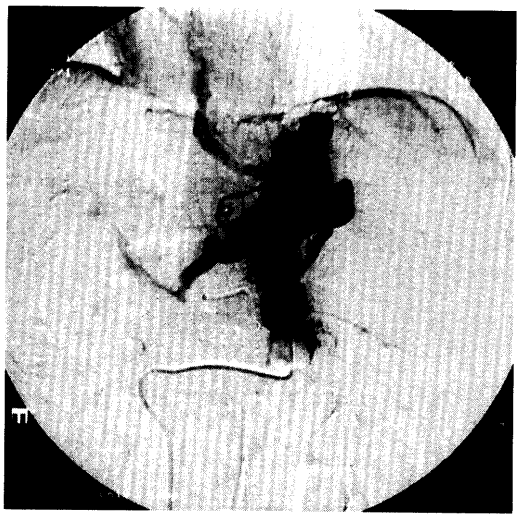

Fig. 3. Gastrorenal shunt graphy by balloon retrograde transvenous obliteration. Left gastric vein and esophageal varices are shown.

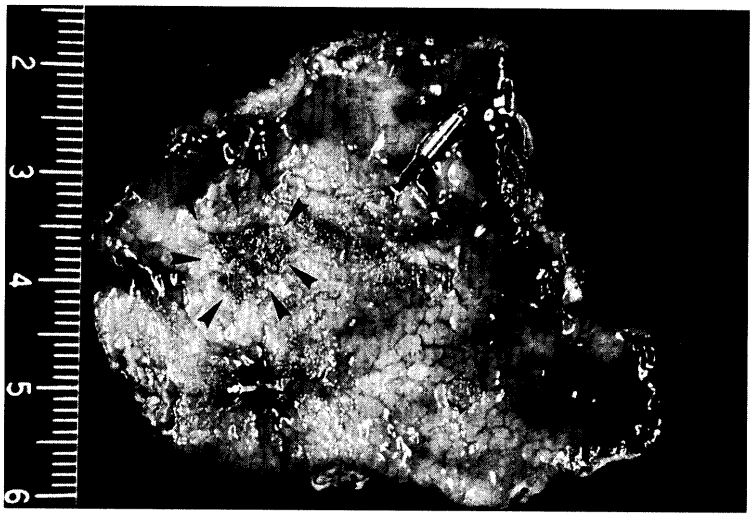

Fig. 4. Resected specimen of stomach. *Black arrow heads* demonstrate the range of IIc type of early gastric cancer.

we determined this cancer to be confined to the mucosa, and an adequate range was resected (Fig. 4). Finally, cholecystectomy was performed.

Histologic examination revealed that the cancer was well differentiated adenocarcinoma and its depth was intramucosa, with neither lymphatic nor venous invasion, and without ulceration. Diameter of the tumor was less than 1 cm.

The patient's postoperative course was uneventful. Postoperative GIF demonstrated the disappearance of the esophagogastric varices 30 days after the shunt operation (Fig. 5).

Postoperative clinical data are shown in Table 2. Pancytopenia was improved. The patient showed no elevation of serum ammonium level. She was discharged 36 days after the operation. One year after the operation, neither gastric cancer nor esophagogastric varices have recurred.

DISCUSSION

Recently a variety of non-surgical methods, such as endoscopic sclerotherapy[6], endoscopic variceal liga-

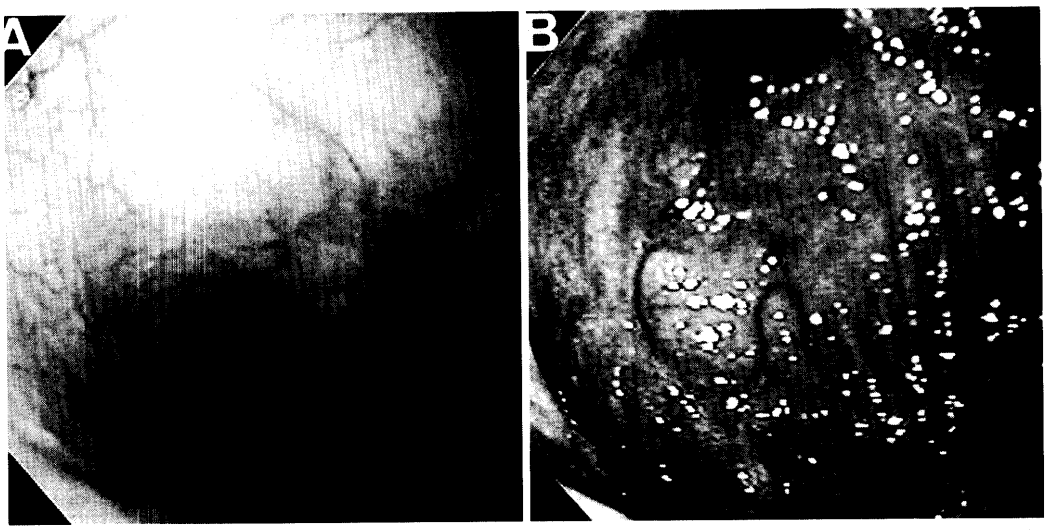

Fig. 5. Postoperative endoscopic findings of esophagogastric varices. **A.** Esophagus, **B.** Stomach. Both esophageal and gastric varices have disappeared by 30 days after the operation.

Table 2. Postoperative data of this patient

WBC	5040/mm³	GOT	90IU/l
RBC	324×10⁴/mm³	GPT	35IU/l
Hb	11.1g/dl	γGTP	36IU/l
Ht	33.8%	T.Bil	1.3mg/dl
Plt	16.7×10⁴/mm³	ChE	182U/l
T.P.	7.0g/dl	NH3	111μg/dl
Alb	3.6g/dl	Prothrombine time	96%
BUN	14mg/dl	ICG-R15	42.3%
Cre	0.7mg/dl		
Na	136mEq/l		
K	4.2mEq/l		
Cl	102mEq/l		

Postoperative clinical data; Pancytopenia and hypoproteinemia have improved. Serum ammonium level is not elevated.

tion[7], and interventional radiology[8,9,10], have become more widely used in the treatment of esophagogastric varices. The necessity for surgical treatment following unsuccessful non-surgical treatments and the detection of gastric malignancies and peptic ulcers increases gradually during the period of postoperative or post-therapeutic endoscopic observation.

It is sometimes difficult to determine the most appropriate treatment for gastric cancer with concomitant esophagogastric varices. It has been reported that a simultaneous operation for such patients is clearly associated with high morbidity and mortality rates. Carrying reported that five of seven patients who underwent simultaneous surgery for varices and gastric cancer died[4] and that only one of three patients who had undergone totalgastrectomy with splenectomy remained alive for 1 year 4 months. Two patients who underwent distal partial gastrectomy together with selective shunt operation, either left gastric-renal shunt or distal spleno-renal shunt, died of liver failure at 1 and 2 months after the operation, respectively, although their cirrhotic stages were Child A and Child B. Six nonsurgically treated patients who had received laser therapy, chemotherapy, irradiation for gastric cancer, and endoscopic injection sclerotherapy for esophageal varices, died of dissemination fo metastasis, inoperative hepatoma, variceal bleeding, or liver failure. Takeda et al.[11] reported a case of successful total gastrectomy for an early gastric cancer located in the middle third of the stomach two months following sclerotherapy, because of the severe esophageal injuries from the EEA stapler, and commented that the abdominal esophagus was difficult to suture due to marked fibrosis in the esophageal adventia. However, there have been no reported cases successfully undergoing both gastric operation and simultaneous selective shunt operation. To the best of our knowledge from a perusal of the literature by the Medline, this report is the first such case successfully treated.

In our case, the patient's hepatocellular function was assigned to Child's C grade, and the Child-Pugh score was 8. For the following reasons, we performed partial gastrectomy with cholecystectomy. First, her condition was considered risky for the operation. Second, our intraoperative diagnosis of the depth of the invasion of the gastric cancer located in the

antrum was limited to the mucosa. Histological examination of the resected specimen also revealed that the cancer was confined to the mucosa and had neither lymphatic nor venous permeation and was without ulceration. Moreover, the diameter of the cancer was less than 1 cm. Retrospectively, the indication of this case was sufficient to warrant endoscopic mucosal resection. Recently in Japan, early gastric cancers confined to the mucosa have been treated with endoscopic mucosal resection, partial gastrectomy, or distal partial gastrectomy[12,13]. Therefore, we believe our judgment to have been justifiable.

We chose the Inokuchi shunt operation rather than the distal splenorenal shunt with splenopancreatic and gastric disconnection (DSRS with SPGD), because DSRS with SPGD exacerbates a deficiency of the gastric blood flow by the dissection of both lesser and greater curvatures. In addition, the risk of postoperative leakage of gastric suture might increase. Inokuchi et al. reported that the shunt patency was 86.8%, with 5- and 10-year survival rates of 69.8% and 55.3% , respectively[1] and that this technique could preserve the good gastric blood flow. Therefore, we chose this operation.

Operative blood loss was 850 ml and operation time was 12 hours. These data did not differ greatly from those described in Korenaga's report[4]. Moreover, the cirrhotic stage of our patient was Child C. Our patient was further aided by intensive care, including a respirator for three days after operation.

Advanced and upper gastric cancer may require total gastrectomy without preoperative endoscopic injection sclerotherapy. Following sclerotherapy, its mortality rate increases due to increased anastomotic leakage. Arakawa et al.[14] have reported contraindications for esophageal transection that included patients who immediately underwent sclerotherapy and then had to wait for surgery for more than 3-6 months.

In conclusion, if postoperative management is carried out carefully, a selective shunt operation for esophagogastric varices together with partial gastrectomy can be effective against early lower gastric cancer and allow the avoidance of variceal bleeding and the discomfort of endoscopic therapy.

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