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[原著] Hepatic Artery Bypass Grafting with Right Gastroepiploic Artery

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Hepatic Artery Bypass Grafting with Right Gastroepiploic Artery

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ABSTRACT

The right gastroepiploic artery (GEA) was used as hepatic artery graft in 6 patients with upper bile duct cancer. The pedicle, including GEA and the surrounding tissues, was mobilized along the greater curvature of the stomach. GEA pedicle was raised up beyond the pylorus and was anastomosed to the distal right hepatic artery by interrupted suture technique using 7-0 monofilament nylon. The patients recovered well without any evidence of anastomotic complications of hepaticojejunostomy and without liver dysfunction beyond seven postoperative days. Post-operative angiograms showed good patency of GEA graft. The method of hepatic artery bypass grafting with GEA is very simple and useful following combined resection of the right hepatic artery for surgical treatment of upper bile duct cancer. *Ryukyu Med. J.*, 14 (4) 221~223, 1994

Key words : reconstruction of hepatic artery, gastroepiploic artery, upper bile duct cancer

INTRODUCTION

Recently, radical surgical procedures for upper bile duct cancer, especially tumors at the confluence of the hepatic ducts require resection of the adjacent regional vessels. Resection of the hepatic artery is not rare during surgical treatment of this disease. For the reconstruction of the divided hepatic artery, we employed the right gastroepiploic artery (GEA) as a graft and obtained excellent results in terms of patency and other features.

MATERIALS AND METHODS

Since June 1989, we have performed hepatic artery reconstruction with GEA in 6 cases. The underlying primary diseases were upper bile duct cancer in 4 cases and Klatskin tumor in two.

In most cases of hepatic artery reconstruction, an upper midline or a right subcostal incision was preferred.

Our GEA-freeing manipulation¹⁾ is basically the same as the method of Pym²⁾ and Suma *et al.*³⁾ When GEA is anastomosed to the hepatic artery, it is better to leave sufficient amounts of fatty tissue adhering to the greater omentum. The length of the arterial wall of GEA tip to be exposed is about 2cm before anastomosis and 3-5mm after trimming (Fig. 1).

The vessel is freed until a point near to the

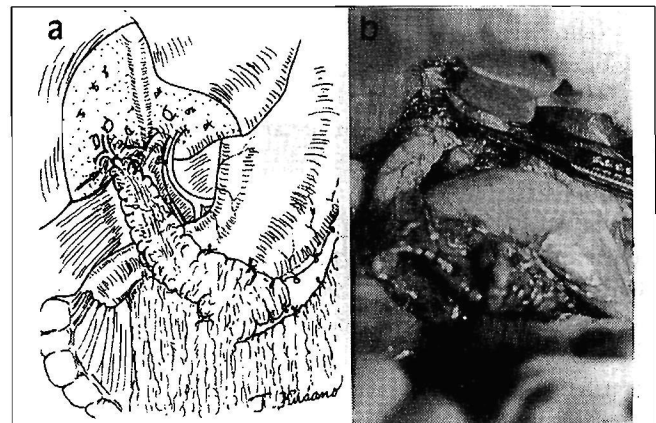


Fig. 1 (a) The schematic diagram showing the end-to-end reconstruction (anastomosed site: →) using GEA. (b) The intraoperative view after reconstruction.

duodenum in the right and up to a point about half from the distal end of the greater curvature. On the side of the graft closer to the transverse colon, a portion of greater omentum (about 5cm wide) has to be attached. This is a key point so that the anastomosed vessel can be highly utilized as an initial graft before the collateral formation takes place in the hepatic hilum. Regarding the optimum tension at arterial anastomosis, a low tension seems to be favorable, considering the length of the graft and the distension of the stomach after meals.

Before the anastomosis, the vascular wall was exposed for about 3cm, and 2-3ml of papaverine hydrochloride (1 mg/ml) was infused with an Angiocut through the exposed GEA wall.

The anastomotic diameter was kept over 2 mm and the suture used for anastomosis was 7-0 Prolene (polypropylene). In the first two cases, the anastomosis was performed with twelve full circumferential interrupted sutures but in all of the subsequent cases, a continuous suture with 2 guy stitches using the loupe glass ($\times 2.5$) was done.

Blood vessels on the hepatic side were also manipulated in similar fashion. In all cases with hepatic hilar resection performed, the Glisson's capsule had to be bored up to a point 1cm proximal from the hepatectomy plane so that about 5 mm vascular stump (needed for anastomosis) could be secured. From our experience, an anastomotic diameter of 2-3 mm could be obtained for the right hepatic artery, and its diameter did not greatly differ from that of GEA.

RESULTS AND DISCUSSION

In intraoperative hepatic blood flow level measured by Laser doppler flowmeter, 20 ml/min/100g liver weight or thereabout was increased from between 40 and 50ml, following the hepatic artery reconstruction using our method. In this series, three out of four cases undergoing post-operative hepatic angiography showed good vascular patency (Fig. 2). The serum level of liver function test improved within seven days after operation and the patients recovered well without any evidence of anastomotic complications (Table 1).

In coronary artery bypass operation, an internal thoracic artery (ITA) graft has been demonstrated to be useful and its patency is reportedly superior over that of a great saphenous vein graft⁴⁾.

Long term survival rate after this operation has been increasing. Following such a trend, cases requiring reoperation or multiple bypass has been increasing. The use of GEA graft yielded excellent results in such cases^{2,3)}.

In Japan, Suma *et al.*³⁾ used GEA for coronary vascularization. They compared preoperative and post-operative abdominal arteriograms in 30 cases and found that GEA was free of any evidence of arteriosclerosis such as arterial stenosis or wall irregularities. Based on high long patency and the feature that the inner diameter of GEA is close to ITA, Suma *et al.* recommended the usefulness of GEA.

Also in the field of abdominal surgery, cases requiring combined angiectomy have been increasing because malignancy of the liver, pancreas and biliary tract is increasingly treated by an extended operation.

Especially carcinoma of the upper bile duct tends

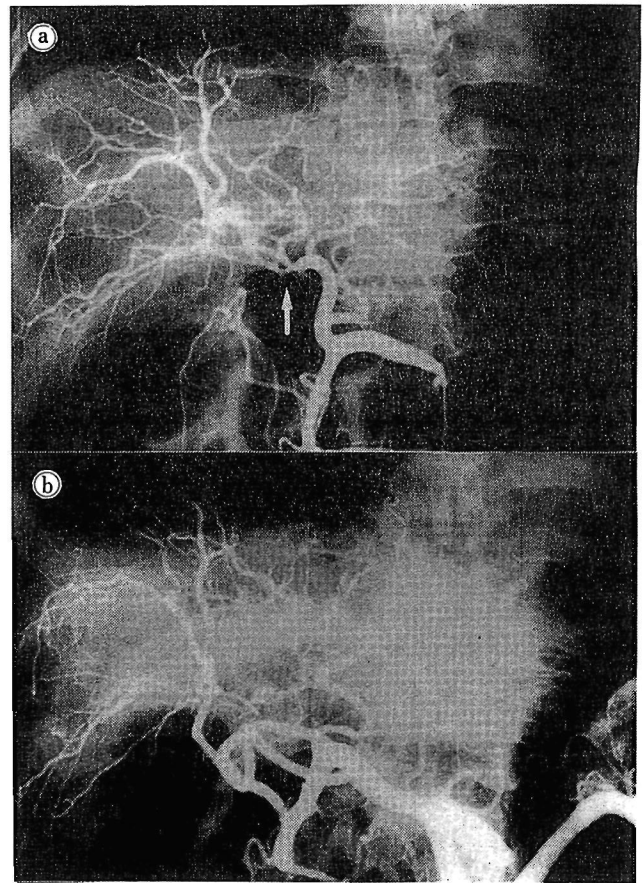


Fig. 2 (a) Preoperative hepatic angiogram showing encasement of the right hepatic artery (\rightarrow).

(b) Postoperative angiogram of the same patient shows sufficient blood flow of the right liver and adequate patency of the anastomosed site.

Table 1 Cases reconstructed by gastroepiploic artery

Age	Sex	Macroscopic Diagnosis	Stage	Patency
1	56 ♂	nodular invasive	II (ss, V ₁)	patent
2	71 ♀	nodular invasive	IV (se, V ₂)	occluded
3	64 ♂	nodular invasive	III (se, V ₁)	patent
4	82 ♀	nodular invasive	III (se, V ₁)	patent
5	52 ♂	invasive	IV (se, V ₁)	—
6	73 ♂	nodular invasive	IV (se, V ₂)	patent

According to general rules for surgical and pathological studies on cancer of biliary tract, —: not examined

to invade extensively along the hepatic duct into the liver parenchyma and adjacent vessels.

Reconstruction of the portal vein has been incorporated into this kind of operation in most medical institutions because the large diameter of the portal vein allows easy reconstruction and its reconstruction

is indispensable for preservation of hepatic function.

On the other hand, reconstruction of the hepatic artery is difficult because of the small diameter and a high likelihood of stenosis of the anastomosed site. For this reason, hepatic artery reconstruction has not been commonly performed. However, unless the hepatic blood flow is secured by hepatic artery reconstruction, the rate of developing post-operative hepatic failure or anastomotic leakage at cholangiojejunostomy rises⁵⁾, therefore, complete reconstruction of the hepatic artery is mandatory.

We first applied hepatic artery reconstruction with GEA to a patient with cancer of the hilar bile duct in June 1989¹⁾. Post-operative patency rate of the vessel is also high. Because collaterals for the hepatic artery are actively formed from the greater omentum and the diaphragm, keeping the patency of the anastomosis over two weeks is sufficient enough to yield satisfactory results⁶⁾.

In one case, where angiography revealed obstruction of the anastomosed area, a reed screenlike shadow of numerous vessels leading to the hepatic hilum was observed. The parameters of hepatic function from these cases also suggested that the anastomosed site remained patent in the early post-operative period.

It was concluded that this technique was quite useful for the reconstruction of the resected hepatic artery especially during extensive radical operation for biliary tract malignancies.

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