

Splenocaval versus mesocaval shunt with artificial vascular graft for the treatment of Budd-Chiari syndrome

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BACKGROUND: Budd-Chiari syndrome (B-CS) is a disease with a poor prognosis, and the results of medication are not satisfactory. Surgical treatments are widely used to depress portal hypertension and hypertension of the inferior vena cava. Splenocaval shunt is usually applied to treat intrahepatic portal hypertension, but we used this method to treat patients with B-CS successfully.

METHODS: The clinical data of 72 B-CS patients (type II), including 26 patients treated with splenocaval shunt (splenocaval group) and 46 patients with mesocaval C-shape shunt (mesocaval group) were analyzed retrospectively.

RESULTS: The platelet count of the splenocaval group increased significantly after operation ($P < 0.05$). Free portal pressure (FPP) significantly decreased in both groups after operation ($P < 0.05$), but no significant difference was seen between the two groups ($P > 0.05$). Twenty patients in the splenocaval group and 36 in the mesocaval group were followed up for 6 months to 3.5 years, showing the effective rates of 90.0% and 91.7% respectively in the two groups. The occurrence of hepatic encephalopathy was 5.0% and 5.6% respectively in both groups, but there was no recurrent hemorrhage.

CONCLUSIONS: Splenocaval shunt can effectively control B-CS, decrease FPP, prevent upper gastrointestinal hemorrhage, and eradicate hypersplenism. Its efficacy is similar to that of mesocaval shunt in treatment of B-CS.

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KEY WORDS: hepatic veins;
thrombosis;
splenocaval shunt;
mesocaval shunt

Introduction

Budd-Chiari syndrome (B-CS) is a disease with a poor prognosis, and the results of its physical management are not ideal.^[1-6] But most patients with B-CS can achieve a long-term survival after surgical treatment, and their life-quality is satisfactory.^[7,8] Dozens of operative methods can be chosen according to the condition of patients,^[9-11] but splenocaval shunt is preferred to treat intrahepatic portal hypertension.^[12] With this method, we treated 26 patients with B-CS from June 1999 to December 2002, and the results were satisfactory.

Methods

Patients

Seventy-two patients with B-CS were divided into splenocaval group and mesocaval group according to their surgical treatment. In the splenocaval group consisting of 26 patients, 14 were men and 12 women, aged from 14 to 55 years (average, 32.5 ± 8.2 years). In the mesocaval group comprising 46 patients, 26 were men and 20 women, aged from 16 to 58 years (average, 34.6 ± 7.8 years). There were no significant differences between the 2 groups in age and gender. In the 72 patients, the shortest history of the disease was 3 months and the longest, 8 years. According to Xu's typing,^[2,13] all patients belonged to type II. Their main symptoms included upper gastrointestinal hemorrhage (hematemesis or melena) and weariness (72 patients), belly swelling (70), hepatomegaly and poor appetite (68), splenomegaly (60), and ascites (59). Six patients had been subjected to balloon dilation of the inferior vena cava (IVC) and stent placement. Five patients were associated with abdominal compartment syndrome (ACS). All the 72 patients were diagnosed by IVC angiography using Seldinger's method and/or percutaneous transhepatic venous angiography.

Platelet count

Blood samples from the vein were drawn before

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and 10 days after operation for counting platelet using an auto-blood cell analyzer produced by Mairui Medical Equipment Company, China. The reagents used were also from this company.

Treatment

Splenocaval shunt was performed in the patients who were laid in plane, using an upper left abdominal lateral–median incision or a left lower rib arch incision. FPP was measured via the right gastroepiploic vein, and the spleen was removed, without injury to the lienal vein near the spleen hilum. A forceps was used to clip the lienal vein and dissociate the tail of the pancreas while turning it to the right forward. After that, the stem of the lienal vein was separated for about 2 cm to find the IVC. With the 1 cm diameter artificial vessel with circle, shunt was performed between the IVC and the lienal vein, between the IVC and artificial vessel in a side to end fashion, between the lienal vein and artificial vessel in an end to end manner using interrupted, everting and quilted techniques. FPP was measured again. Mesocaval shunt was referred to the reported method.^[14]

Treatment effects

The results of treatment were defined excellence for the absence of clinical symptoms and ascites, unpalpable liver; improvement for less ascites, and liver deflated; no improvement for existing or worsening of symptoms.

Statistical analysis

SPSS 11.0 was used in quantitative analysis of variables which were expressed as mean \pm SD, and the means of 2 samples were compared by Student's *t* test. The variables were compared by the chi-square test. The level of $\alpha = 0.05$ was considered significant.

Results

Platelet count before and after operation

The platelet count in the splenocaval group increased significantly after operation ($P < 0.05$), and it was not significantly different from that in the mesocaval group ($P > 0.05$) (Table 1).

Change of FPP before and after operation

FPP in the two groups decreased significantly ($P < 0.05$), but there was no significant difference between them ($P > 0.05$) (Table 2).

Operative results

In the two groups no perioperative death was found. Twenty patients in the splenocaval group and 36 in the mesocaval group were followed up for 6 months to 3.5 years (average 2.4 ± 0.5 years), and all artificial

Table 1. Comparison of platelet count pre- and post-operation in the two groups ($\times 10^9/L$)

| Group | Cases | Preoperation | Postoperation | <i>t</i> | <i>P</i> |
|-------------|-------|-----------------|------------------|----------|----------|
| Splenocaval | 26 | 80.3 \pm 16.6 | 201.6 \pm 30.2 | 4.876 | <0.001 |
| Mesocaval | 46 | 82.4 \pm 12.5 | 92.5 \pm 12.1 | 1.426 | >0.10 |

Table 2. Comparison of FPP change pre- and post-operation in the two groups (cmH₂O)

| Group | Cases | Preoperation | Postoperation |
|-------------|-------|-----------------------------|-------------------------------|
| Splenocaval | 26 | 42.3 \pm 8.2 [△] | 31.3 \pm 6.2 * [△] |
| Mesocaval | 46 | 41.5 \pm 8.9 | 30.2 \pm 5.8 * |

* : compared with preoperation, $P < 0.05$; Δ : compared with mesocaval, $P < 0.05$.

vessels were patent with an effective rate of 90.0% (18/20) and 91.7% (33/36) respectively. The occurrence of hepatic encephalopathy was 5.0% (1/20) and 5.6% (2/36), respectively, and no hemorrhage recurred. No significant differences were seen in effective rate, recurrent hemorrhage, and incidence of hepatic encephalopathy between the two groups. One patient in the splenocaval group died of hepatic carcinoma 2 years after operation, and 2 patients in mesocaval group died of hepatic encephalopathy one year after operation and renal failure 2 years after operation, respectively.

Discussion

The natural prognosis of patients with B-CS is poor and medication is not satisfactory; but most of the patients can be cured operatively.^[1,15-17] Many operative methods including resection of lesioned membrane, flow transfer, shunt, combined operative methods, and liver transplantation can be selected according to types of lesions and hemodynamic changes.^[13]

Assessment of splenocaval shunt

Splenocaval shunt is mainly applied to treat intrahepatic portal hypertension. With this method, Cai et al^[12] treated 60 patients with portal hypertension, with a recurrence rate of 5.0% for of hemorrhage and hepatic encephalopathy respectively and a 5-year survival rate of 71.7%–77.8%. Portacaval side to side shunt in the treatment of 32 B-CS patients showed that ascites disappeared and liver function recovered in 31 patients.^[15] We used this method to treat 26 B-CS patients and follow-up data showed an effective rate of 90.0%, and an occurrence rate of 5.0% for hepatic encephalopathy, but no recurrent hemorrhage. Compared with mesocaval shunt, splenocaval shunt can equally decrease portal pressure and control upper gastrointestinal hemorrhage while eradicating hypersplenism.

Indications of splenocaval shunt

Verification indications of different operative methods and selection of proper methods are essential to increase the cure rate of the disease, while decreasing its recurrence and complications. Splenocaval shunt transferring the blood flow from the portal system through the lienal vein aims at decreasing the portal pressure and controlling or preventing upper gastrointestinal bleeding. Thus splenocaval shunt is advisable for the type II patients with moderate or severe splenomegaly and hypersplenism, showing the lienal vein more than 0.8 cm in diameter ultrasonographically. In some B-CS patients who are unsuitable for portacaval or mesocaval shunt, splenocaval shunt is also applicable. In some type III B-CS patients with hepatic vein obstruction and lesions of the IVC, this procedure can be performed after interventional treatment of the IVC.

Cautions for splenocaval shunt

In order to protect the lienal vein when dissociating the spleen hilum, a non-traumatic forceps can be used to clip the lienal vein near the pancreas, while preventing the pancreas from injury. The tail and body of the pancreas are dissociated through the natural gap behind the pancreas, and the wound is sutured carefully to avoid the occurrence of lymph leakage. The IVC is side to end anastomosed to the artificial vessel, then the artificial vessel is anastomosed end to end to the lienal vein. After the second anastomosis, the non-injured forceps is released before suturing to rush out the probable thrombus while injecting heparin solution into the lienal vein. In this study thrombus in the lienal vein was found in 21 patients of the two groups; after the above managements, the artificial vessels were patent. Interrupted, everting and quilted techniques are used in anastomosing and knotting after anastomosis, thereby a wide, explicit operative field is ensured and the operators feel easy, steady and swift during operation, warranting even and smooth spans of stitch, edge and stride. After shunt, it is very important to fix the envelope of the pancreas and transverse colon mesentery and to close the hole in the transverse colon. In our study, one patient developed hemorrhage of the abdominal cavity because of severe cough seven days after operation. After hemostasis, blood transfusion and other treatments, the bleeding ceased. The patient recovered and color Doppler showed the artificial vessel was patent. Hence the length of artificial vessel should be 6–8 cm on average, and it must be anastomosed in a moderate relaxation.

Competing interest

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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