

Research Article

Warren shunt - significance in present time, an experience at tertiary care hospital in India

Mohd. Shahbaaz Khan*, Prokash Sanki, Uday Narayan Sarkar,
Subhankar Bhattacharya

Department of Cardiothoracic and vascular surgery, S.S.K.M. Hospital, Institute of Postgraduate Medical Education and Research, 242 AJC Bose Road Kolkata-70020, India

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*Correspondence:

Dr. Mohd. Shahbaaz Khan,

E-mail: mohdshahbaazkhan@yahoo.com

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ABSTRACT

Background: Portal hypertension is the presence of portal venous pressure more than 10 mm Hg. Surgery was the only treatment available for portal hypertension in the earlier times and the mortality rates were very high. In present times, about 10-15% of patients require surgery. Here we study the significance of the distal splenorenal shunt (Dean Warren shunt).

Methods: We studied a total of 45 patients of portal hypertension admitted at SSKM Hospital, IPGMER, Kolkata, over a period of 5 years. This study includes the patients, ranging in age from 5 to 20 years and comprising of 5 women and 40 men. All patients were having non cirrhotic extra-hepatic portal.

Results: All of the patients survived postoperatively and are in follow-up without any complication and doing well.

Conclusions: Warren's shunt is a good alternative of liver transplantation, especially for the developing countries where the facilities for liver transplantation and post-operative care are not available or good enough. It has very good results and low complication rates.

Keywords: Portal hypertension, Warren shunt

INTRODUCTION

Portal hypertension is the presence of portal venous pressure more than 10 mm Hg. Esophagogastric varices do not bleed until portal pressure exceeds 12 mm Hg, and then they bleed in only one third to one half of patient.¹ Portal hypertension was recognized by the Greeks and was highlighted by Shakespeare in his character of Falstaff.^{2,3} Surgery was the only treatment available for portal hypertension in the earlier times and the mortality rates were very high. In present times, about 10-15% of patients require surgery. With the development of the endoscopic treatment i.e. sclerotherapy, surgery no longer remains the first line of treatment in portal hypertension.

Shunts have been attempted since 1877 wherein Eck ligated the portal vein and connected the visceral end to the vena cava. It commonly became known as Eck Fistula.⁴ Nicolai Eck was a Russian Army surgeon and performed an end-to-side portocaval shunt in an animal model. Vidal, a French surgeon is credited with performing the first portal systemic shunt in man in 1903. In mid- 1940's a portocaval shunt was devised by Whipple and Blakemore and many other procedures were tried as mesocaval shunts by Drapanas, selective variceal decompression by Warren and Inochuchi and partial shunts by Sarfeh.⁵⁻⁹ First sclerotherapy was done with rigid oesophagoscope. In the 1980s, three surgeons Johnston, Terblanche and Paquet turned from rigid to

flexible variceal sclerotherapy.¹⁰⁻¹² Another surgeon, Steigmann introduced variceal band ligation. Lebrech and his colleagues in the 1980s used beta-blockers to reduce portal hypertension and this has become the primary treatment for reducing the risk of an initial variceal bleed and first-line treatment for those who have bled.^{13,14} Trans-jugular intrahepatic portosystemic shunt (TIPS) was pioneered by Rösch.¹⁵ Starzl and Calne introduced liver transplantation and revolutionized the management.^{16,17} Transplant has offered treatment for patients with end-stage liver disease and portal hypertension.

Type of surgical procedures

Surgical procedures for portal hypertension can be broadly classified into three groups:

- Porta-systemic Shunts
- Non Shunt surgery - devascularisation
- Liver transplantation.

Porta-systemic shunts

The aim of porta-systemic shunts is to divert blood flow from portal system to systemic circulation by anastomosing the portal vein or its tributaries i.e. splenic vein or superior mesenteric vein to renal vein or Inferior vena cava in order to reduce pressure in the varices. This can be classified as below;

Classification

Non selective shunts

- Total shunts - portacaval, mesocaval, proximal splenorenal shunt.
- Partial Shunts - Small diameter porta caval (Sarfeh)

Selective shunts - distal splenorenal shunts

The total shunts (>10 mm in diameter) divert all portal flow away from the liver and the major debate has been the effect that this has on hepatic function. Partial shunts are categorized surgically as shunts whose diameter is reduced to 8 mm. Sarfeh and associates in the 1980s systematically reduced the size of polytetrafluoroethylene (PTFE) interposition grafts between the portal vein and the inferior vena cava down to 8 mm diameter, showing that this has a >90% control of variceal bleeding and maintained portal perfusion in 80% of patients.⁹

Selective shunts

There are various types of the selective shunts described and classified as below.

- The distal splenorenal shunt (Dean Warren shunt)
- Inokuchi splenocaval (inferior mesenteric vein to Inferior vena cava)

- Interposition shunts with the left gastric vein to inferior vena cava.

Characteristics of the selective shunts are as follows

- Selective shunts decompress the varices only, and presumably only a part of the portal circulation is decompressed
- Portal pressure and portal flow are not affected much.
- Since the portal perfusion is maintained via the mesenteric supply it reduces the risk of postoperative hepatic encephalopathy, about 15%
- These shunts produce ascites
- It does not interfere with future liver transplant.

Disadvantages

- Since it produces ascites, it is contraindicated in patients with massive intractable ascites prior to the shunt procedure.
- This shunt cannot be done in children who had undergone previous splenectomy due to any reason.

METHODS

We studied a total of 45 patients of portal hypertension admitted at SSKM Hospital, IPGMER, Kolkata, India over a period of 5 years. This study includes the patients, ranging in age from 5 to 20 years and comprising of 5 women and 40 men. All patients were having non cirrhotic extra-hepatic portal hypertension. All patients had at least one episode of variceal hemorrhage, and most had multiple episodes. In all of the patients preoperative endoscopy was done to confirm bleeding varices. Percutaneous splenoportography was performed in all cases to determine the portal pressure, assess the patency of the splenic and portal veins, and define their anatomical relationship. Patients who presented with ascites at the time of admission were put on diuretics and the ascites was controlled before surgery. A preoperative liver biopsy was done in ten patients to rule out acute hyaline necrosis. If this pathologic diagnosis was made, operation was not considered. Classification of patients according to Child's criteria designated 40 as class A, 5 as class B. The prothrombin time was prolonged in 30 patients. Approximately 50 percent of the patients had mild ascites preoperatively. In four patients there was hepatic encephalopathy preoperatively associated with variceal hemorrhage. Clinical profiles of the entire group are summarized in Table 1.

Table 1: Clinical profiles of the entire group.

Type of study	Retrospective
Duration of study	2001-2006
Total number	45
Male	40
Female	5
Child group A	40
Child group B	5

Investigation

All the patients were assessed with routine blood investigations, preoperative endoscopy and Doppler study. Endoscopic findings were as follows;

Table 2: Endoscopic findings.

Characteristics	Number of male patients	Number of female patients
Oesophageal varices	34	2
Both oesophageal and gastric varices	6	3

- Splenic vein diameter
- 7-9 mm- 10 patients (22%)
- 10-12mm- 30 patients (45%)
- 12 mm- 15 patients (33%).

Post-operative complication

- Early- ascites (2 cases- managed with diuretics)
- Late- none.

Surgical technique

A midline abdominal incision was made from xiphisternum to below the umbilicus. The peritoneal cavity was opened. The small bowel was isolated on sponge outside the abdominal cavity and the transverse colon retracted upwards. An incision was made in the peritoneum at the level of the inferior mesenteric vein. Then, vein was traced cephalad towards its communication with splenic vein. This helps in the identification of the splenic vein which lies embedded in the inferior border of the pancreas (Figure 1). The splenic vein was cleared for about 5 cm. the splenic vein should be freed from the pancreatic bed. At this time large bleeding can occur from the damage to the tributaries arising from the pancreas and entering into the splenic vein. The dissection of the splenic vein was continued medially until sufficient length was available for anastomosis (Figure 2). Thus the splenic vein was dissected free as medially as possible. The left gastric vein was ligated. Left renal vein was exposed (Figure 3) by mobilizing duodenum after cutting the ligament of Treitz. Venovenous anastomosis was created between left renal and splenic vein (Figure 4 and Figure 5). The techniques employed for the distal splenorenal shunt is essentially the method described by Warren.¹⁸ There are some important points to note: The splenic vein must be at least 8 mm in diameter to assure long-term patency of the shunt. The small pancreatic branches should be tied and divided or clipped. It is important to dissect the splenic vein proximally enough to prevent kinking when the anastomosis is constructed. Excision of a wedge of retroperitoneal tissue between the splenic and renal veins will also facilitate a gentle arc of the splenic vein for an unobstructed anastomosis. Anterior row of the anastomosis is placed with interrupted sutures to prevent

a purse-string effect. Once the anastomosis is finished, it is imperative to effect a complete portoazygous disconnection. This entails ligation of the right gastric, umbilical right gastroepiploic, and coronary veins. Special care must be taken when dividing the coronary veins because failure to accomplish this can cause postoperative hemorrhage or encephalopathy.¹⁹



Figure 1: Splenic vein behind lower margin of pancreas.



Figure 2: Medial dissection of splenic vein.

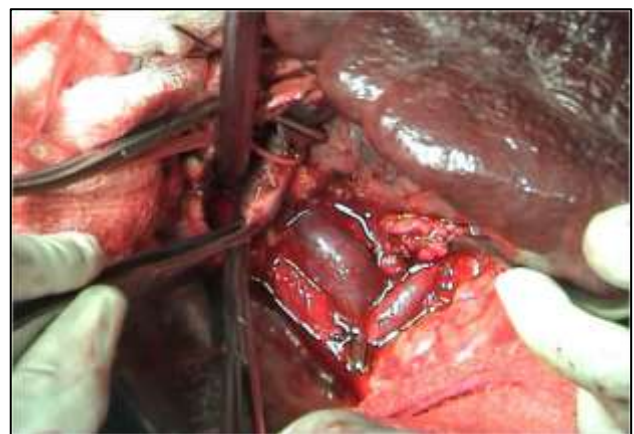


Figure 3: Left renal vein dissection.



Figure 4: Ready for splenic vein and left renal vein anastomosis.



Figure 5: Splenic vein and left renal vein anastomosis complete.

RESULTS

All of the patients survived postoperatively and are in follow-up without any complication and doing well. They have no major complications.

Follow up all the patients are in follow up and followed up every 4 weeks, 3rd month, and 6th month, then yearly.

Investigation

Liver function tests, hemogram, Doppler ultrasound.

DISCUSSION

WARREN and co-workers have developed and studied a distal end-to-side splenorenal shunt.^{20,21} This shunt is designed to provide selective decompression of gastroesophageal venous varices, without significant impairment of hepatic portal venous perfusion, in patients with portal hypertension and hepatic cirrhosis with hemorrhage. The shunt is designed to allow selective decompression of the coronary venous plexus through gastric venous collaterals into the spleen by way of carefully preserve short gastric veins. Flow should then proceed from the spleen down the splenic vein and into the lower pressure systemic renal venous circulation through the distal end-to-side splenorenal shunt. Concomitantly, however, blood from the inferior and

superior mesenteric veins continues to perfuse the liver through the intact portal vein.²¹ The effectiveness of distal splenorenal shunt in decompressing esophageal varices is indicated by lack of recurrent upper gastrointestinal bleeding in the follow-up data now available from Warren's series.²⁰ Distal splenorenal shunt proposed by Warren and associates in 1967. Despite the theoretic advantages of this procedure over total portacaval shunting; the surgeons have been slow to accept the Warren shunt. Technical difficulty in the splenic vein dissection, causing significant operative blood loss, is one reason for this reluctance. Ascites represents a relative contraindication to the procedure. Technically, the Warren shunt is a demanding procedure and may take twice the operating time that a portacaval or interposition mesocaval shunt requires, and therefore it has not been recommended for use in cases of uncontrollable massive variceal hemorrhage. In cases where bleeding is slowed but an emergent operation is indicated, the Warren shunt should be considered only if the patient's condition is stable enough for adequate preoperative evaluation to be done, including visceral angiography with venous phase visualization. This is particularly important if reversed portal flow is documented because in such a situation the benefits of the distal splenorenal shunt in preserving hepatoportal flow cannot be realized and a more expeditious shunt procedure must be employed. Before carrying out a distal splenorenal shunt, adequate preoperative evaluation and preparation of the cirrhotic patient is mandatory. In a patient who is bleeding, initial attempts at pharmacologic control of the portal hypertension with or without the addition of balloon tamponade should be made. Medical preparation is an essential feature in the management of patients who are scheduled for a distal splenorenal shunt. The risk of this operation is determined largely by the patient's preoperative status. A patient in whom gastroesophageal varices develop has a 50 percent to 80 percent chance of dying with the first variceal hemorrhage, and after the first hemorrhage the prognosis fails to improve.²² Despite the effectiveness of portacaval shunting in controlling variceal hemorrhage, its efficacy in prolonging survival has been clearly disclaimed in three prospective randomized studies.²³⁻²⁵ These controlled studies have shown that patients with shunts die of liver failure while the medically treated patients succumb to bleeding. Indeed, the incidence of hepatic encephalopathy was approximately equal in the medically and surgically treated groups. However, severe disabling chronic encephalopathy is more common in those patients who were treated with portacaval shunt. Warren showed that in patients who have had portacaval shunts, maximum urea synthesis rates are significantly reduced shortly after operation, while in those who are treated with the distal splenorenal shunt there is little change. The findings in our small series of distal splenorenal shunts as well as those of larger series reported in the literature have suggested that the Warren shunt can be done with an operative mortality as low as that of a total shunt.²⁶⁻²⁸ Moreover, it is equally as

effective as the total shunt in preventing recurrent hemorrhage and has a lower risk of encephalopathy than the total shunt. Whether the Warren shunt will prolong life in cirrhotic patients in whom hemorrhages have occurred is not known because no substantial randomized studies, comparing medically treated patients with those in whom Warren shunts were done, have been reported. However, in a series of 42 patients with postnecrotic cirrhosis in whom distal splenorenal shunt was done, Zeppa reported an 88 percent probability of survival for six years calculated on an actuarial basis.¹⁹ This is at least twice the rate reported for patients with postnecrotic cirrhosis treated with a total shunt. On the other hand, the survival rate of alcoholic patients was no better than in those treated with a total shunt. These preliminary data suggest that postnecrotic cirrhotic patients may represent a subset of patients in whom there is prolonged survival following distal splenorenal shunt.

Postoperative complications

Among the complications in the surviving patients, ascites has been predominant. In almost all patients ascites developed after operation and cleared within two months. One patient had intractable chylous ascites which gradually subsided after nine months of medical management. Encephalopathy has not been a problem, although two patients had acute encephalopathy in the immediate postoperative period that was easily controlled with neomycin. None has had chronic encephalopathy characterized by persistent neuropsychiatric symptoms such as flapping tremor, alterations in sleep rhythms or mental deterioration. Normal activities were resumed in most cases. To date none of the survivors in this series has had significant upper gastrointestinal hemorrhage. One patient had a small hemorrhage on two occasions (5 months and 12 months postoperatively) which was treated conservatively and diagnosed by endoscopy as gastritis. Postoperative evaluation of varices by upper gastrointestinal series in most patients had disclosed that although varices persist for a significant period of time after operation (6 to 12 months), they eventually decrease in size. In previously published series as in our experience, documented recurrent variceal hemorrhage has not been apparent, thereby indirectly attesting to the fact that the distal splenorenal shunt is not only large enough to decompress the varices but also has long-term patency.²⁶⁻²⁸ The necessity of carrying out a complete portal-azygous disconnection at the time of shunting has been emphasized by Warren." Failure to completely separate the portal and gastro esophageal areas into two distinct venous water sheds can lead to recurrent hemorrhage and encephalopathy.

CONCLUSION

Warren's shunt is a good alternative of liver transplantation, especially for the developing countries where the facilities for liver transplantation and post-

operative care are not available or good enough. It has very good results and low complication rates.

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