AN ANALYSIS OF SURGICAL SHUNTS FOR THE MANAGEMENT OF PORTAL HYPERTENSION AT AGA KHAN UNIVERSITY HOSPITAL

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Background: The objective of our study was to analyze the outcome of surgical shunts for the management of variceal bleeding associated with portal hypertension. **Methods:** This was a retrospective analysis carried out at The Aga Khan University Hospital, Karachi of medical records from Jan 1991 – Dec 2001. The main outcome measures included morbidity and mortality associated with the surgical procedure, and the long term outcome in terms of recurrent bleeding. **Results:** A total of 30 patients underwent a shunt procedure during the study period. The mean age was 35 ± 13.75 years, with 22 (73%) males and 8 (27%) females. The indication for surgery was recurrent bleeding in 23 (77%) patients, and active bleeding refractory to endoscopic therapy in 7 (23%) patients. According to Child-Pugh classification, 19 (63%) patients were classified as Childs' A, 7 (23%) as Childs' B, and 4 (13%) as Childs' C. The surgical procedure included distal splenorenal shunt in 25 (83%), central splenorenal shunt in 3 (10%), and portocaval shunt in 2 (7%) cases. Five patients expired within 30 days of surgical intervention with mortality rate of 16%. Three of these patients were Childs' C, as compared to one each in Childs' A and B, the difference being statistically significant. Similarly, the frequency of encephalopathy and recurrent bleeding was also significantly higher in patients with Childs' class C. **Conclusions:** Surgical shunts may be considered as a reasonable alternative for long term control of recurrent variceal bleeding in patients with good hepatic reserve.

Keywords: Variceal bleeding, Portal hypertension, distal splenorenal shunt

INTRODUCTION

Variceal hemorrhage is a potentially life threatening complication of portal hypertension caused by cirrhosis. It carries a great risk to patient survival, with the initial mortality rate as high as 50%.[1] Furthermore, a history of prior episode of bleeding implies a very high risk for rebleeding, the overall risk being determined by the severity of underlying liver disease, size of the varices, and other associated risk factors of the patient. Each episode of recurrent bleeding is associated with 20% - 30% mortality and this increases to 70% - 90% in severely ill patients.[2,3] In different studies, the overall risk of rebleeding and associated mortality in the first year has been estimated to be around 60% and 30%, respectively.[4-6]

Considering such high rates of morbidity and mortality, prevention and treatment of variceal hemorrhage has become the cornerstone of the management of portal hypertension and cirrhosis. Treatment options for the patients with varicealbleeding have changed dramatically during the last 50 years[7]. These options include pharmacotherapy[8], transendoscopic sclerotherapy and band ligation[9], transjugular intrahepatic portosystemic shunts (TIPS)[10], surgical shunts[11], devascularizationprocedures[12], and liver transplantation[13,14]. There is no single therapeutic modality suitable for all patients, and pros and cons of each option have to be considered before a final decision can be made.

Aggressive hemodynamic resuscitation along with pharmacological support are the primary life-saving measures in the treatment of acute variceal bleeding.[7] This is generally followed by endoscopy when active measures can be taken to control the bleeding. The success rate of endoscopic interventions can be as high as 95%, but the risk of rebleeding remains high; and more importantly, the improvement in patient survival has never been documented despite repeated treatment.[7]

Once active bleeding is controlled, secondary prophylaxis becomes a significant issue for the treating physician. Traditionally, surgical shunts have been used frequently as an elective procedure to prevent recurrent bleeding.[7] The goal of surgical therapy is to maintain the functional reserve of the remaining liver while minimizing recurrent bleeding, without comprising the ability to perform remedial transplantation.[15] This initial enthusiasm with the shunt procedures has been gradually tempered by high procedure related morbidity and mortality in poor risk patients, despite effective control of bleeding and low incidence of recurrence with all shunts.[16-20]

The wider use of interventional endoscopic therapy during the past two decades[21,22] and the introduction of TIPS by interventional radiologist in the 1990s[23] provided less invasive alternatives for poor risk patients. These interventions are cost-effective for patients with significantly compromised hepatic function, and have minimized the use of surgical shunts in these cases[24]. But they have limitations in their long term use; and their efficacy in patients with preserved hepatic function and prolonged expected survival has been questioned.[25] The question which commonly arises is that has the advent of the modern treatment modalities made traditional shunt surgery obsolete? And if not, where in the treatment algorithm do shunts fit in the modern management of portal hypertensive bleeding?[26]

We designed a study at the Aga Khan university Hospital (AKUH), Karachi, to analyze the outcome of surgical shunts for the management of portal hypertension at our institution. This is a single center's experience with an attempt to define the role of surgical shunts at our hospital.

MATERIAL AND METHODS

This is a retrospective analysis of the hospital records and includes all the patients who underwent surgical shunts for the management of variceal bleeding associated with portal hypertension over a period of 11 years, extending from January 1991 to December 2001. Medical records of these patients were reviewed. The main variables included demographics, primary diagnosis, Child-Pugh class, indication for surgery, type of surgical procedure, morbidity and mortality associated with surgical procedure, and long-term outcomes in terms of rebleeding. Child-Pugh's class was determined by a numeric grading system that was derived from serum albumin, serum bilirubin, prothrombin time, neuropsychological status and presence or absence of ascites.[27] The Pugh modification of Child's classification is shown in Table 1. The main outcome measures were the mortality and morbidity related to the surgical procedure, as well as the rate of recurrent hemorrhage in the follow up period. Operative mortality was defined as death occurring during the same hospitalization, or within 30 days after surgery if the patient was discharged. Indicators of postoperative morbidity were recurrent bleeding related to portal hypertension, encephalopathy and ascites.

Data was analyzed and compared between the groups using chi-square and Fischer exact tests. Statistical significance was set at $p< 0.05$ in all cases. The data was analyzed using SPSS software statistical package.

RESULTS

Thirty patients underwent surgical shunts for the treatment of portal hypertensive variceal bleeding during the study period. There were 22 males (73.3%) and 8 females (26.7%), with a mean age of 35 ± 13.75 years. The primary cause of portal hypertension was underlying hepatic disease in 25 cases (83%), portal vein thrombosis in 3 cases (10%), and chronic active hepatitis B complicated by portal vein thrombosis in 2 cases (7%). The details are shown in Table 2.

All patients had undergone endoscopy after the initial hospital admission. Twenty patients (66.7%) had combined esophageal and gastric varices, 9 (30%) had esophageal varices alone, while one patient (3.3%) had isolated gastric varices. Active bleeding was present in 9 cases (30%), while 4 patients (13.3%) had only clots. In 17 (56.7%) patients, there was no active bleeding at the time of endoscopy. The past history was significant, as all the patients had at least one prior episode of variceal hemorrhage, which was managed conservatively. Of these episodes, endoscopic intervention was done in 28 patients (93%), including sclerotherapy in 23 patients and a combination of sclerotherapy and band ligation in 5 patients. One patient was managed by band ligation alone

without sclerotherapy. The median number of sessions with endoscopic intervention was 3, ranging from at least one to upto 9 sessions in few cases.

Child class was determined in all cases. Nineteen (63%) patients belonged to Child class A, 7 (23%) to Child class B, and 4 (13%) to Child class C.

Active bleeding was indication for surgery in 7 (23%) patients, while 23 (77%) patients were operated for recurrent bleeding. Elective surgery was performed in 19 (63.3%) patients, while semi-emergency and emergency procedures were performed in 7(23.3%) and 4(13.3%) patients respectively. Twenty five (83%) patients underwent a selective distal splenorenal shunt (DSRS), while non-selective shunts including central splenorenal shunts and portocaval shunts were made in 3(10%) and 2 (7 %) patients respectively. Mean hospital stay was 16 ± 7.13 days, while mean ICU stay was of 2.5±5.1 days.

Operative mortality was 16% (n= 5). Of the patients who expired, 3 belonged to Child class C, while one patient each belonged to Child class A and B, the difference being statistically significant (p value 0.03). Recurrent bleeding was the cause of death in 4 patients while one patient of Child class A succumbed to intra abdominal sepsis. Majority of the complications developed in the peri-operative phase and required either observation alone or short term treatment. The incidence of encephalopathy was 7%, while that of recurrent bleeding was 20%. Two patients in the Child class C developed encephalopathy, while none of the patients in Child class A or B developed neurological deficit (p value <0.01). Similarly, 3 patients in Child class C developed post-operative recurrent bleeding, as compared to one patient each in Class A and B (p value < 0.007). Post-operative ascites developed in 8 patients (26%). Of these, 3 were of Child class A, 3 of Child class B, and 2 of class C.

Mean follow up period was of 26 ± 38.6 months. Shunt patency was checked in 15 patients using Ultrasound Duplex as a diagnostic modality. The shunts were found to be patent in 10 patients while they were thrombosed in 5 patients. Mean time interval between surgery and ultrasound duplex was 10 ± 22.2 months.

Recurrent bleeding developed in 6 cases (20%) in the long-term follow up. The cause of recurrent bleeding was shunt thrombosis in 5 patients, while one patient developed recurrent bleeding secondary to hepatorenal syndrome and coagulopathy. Of these 6 patients, 4 required secondary intervention for the control of bleeding. Two patients underwent an esophageal devascularization procedure, while devascularization combined with portocaval shunting was performed in one patient. One patient was managed by transendoscopic sclerotherapy without surgical intervention.

Table 1: Pugh modification of Child's Classification[28]

Points	**1**	**2**	**3**
Bilirubin (mg/dL)	<2	2-3	>3
Ascites	None	Controlled	Refractory
PT (seconds prolonged)	1-3	4-6	>6
Encephalopathy	None	Controlled	Dense
Albumin (g/dL)	>3.5	2.8-3.5	<2.8

Legend: Child's Class A: score 5 –6, Child's Class B: score 7 – 9, Child's Class C: score 10 –15

Table 2: Etiology of Portal Hypertension

Etiology	**No. (%)**
HCV cirrhosis	11 (36.6)
HBV cirrhosis	07 (23.3)
HBV+HCV cirrhosis	01 (3.3)

Alcoholic cirrhosis	01 (3.3)
Primary biliary cirrhosis	01 (3.3)
Cryptogenic cirrhosis	01 (3.3)
Non-B non-C chronic active hepatitis	03 (10)
Chronic active HBV + Portal vein thrombosis	02 (6.7)
Portal vein thrombosis	03 (10)

DISCUSSION

Management of portal hypertension and variceal bleeding is complicated by the variable degree of hepatic function disruption caused by underlying liver diseases and the number of treatment options available. For patients with recurrent varicealhemorrhage but adequate hepatic function, controversy exists as to the best method of prophylaxis against future bleeding[29,30]. The challenge to the treating physician or surgeon is to determine which therapy or the sequence of treatment is likely to provide the optimal result for an individual patient[30].

Surgical shunts have received renewed interest in the 1990s because of their effectiveness in preventing rebleeding[31]. Bleeding is controlled in 90% to 95% of patients[32]. Surgical variceal decompression can be achieved by total portal systemic shunts or selective shunts. The selective shunts decompress the spleen and gastroesophageal varices but maintain portal blood flow[33]. Selective shunts have survived all new treatment approaches in patients with preserved hepatic function[25].

Distal splenorenal shunt (DSRS) is the preferred method of shunting in patients with good hepatic reserve when performed as an elective procedure. DSRS is superior to other shunts as it maintains hepatic blood flow and avoids extensive hilar dissection[34]. Multiple studies have confirmed the efficacy of splenorenal shunts. In series with number of patients ranging from 32 to 296, perioperative mortality has ranged from 0% to 14%[15,25,35-39]. Shunt patency rates have been 92% to 94%,[35,36,39,40] and the likelihood of rebleeding has been 3.8% to 14%[15,25,35-39]. The rate of portosystemic encephalopathy has been reported to be 5% to 19%.[35-39]

DSRS was the most frequently performed shunt procedure in our series. In our series, 7% of the patients developed encephalopathy in the postoperative period, this is comparable to the other studies as cited above. But the rate of recurrent bleeding was 20%, this rate is higher as compared to the other studies. Another important observation in our study was the frequent development of ascites in patients with preserved liver function after the shunt procedure. This is due to the fact that during the construction of a distal splenorenal shunt the sinusoidal and mesenteric hypertension is maintained and important lymph pathways are transected during dissection of left renal vein. Thus distal splenorenal shunt tends to aggravate ascitesrather than relieve it, and therefore, the patients with intractable ascites should not undergo this procedure[34].

However these shunts require a careful patient selection and patients with good hepatic function are the only suitable candidates for this type of shunts[41]. Patients with advanced liver disease are considered poor candidates for surgical shunts[42], as evident in our series as well. In our series, there was significantly increased incidence of morbidity and mortality in patients belonging to Child class C, as compared to patients with Child class A. The overall mortality in our case series was 16%, which is higher than the reported mortality rate of around 0% to 14% in other series[26,43]. This increased incidence of mortality could be due to the inclusion of patients with advanced liver disease with Child class C in our series.

The management of portal hypertension is further complicated by the non-availability of liver transplantation and TIPS in our part of the world. TIPS is still an evolving modality of treatment and the precise indications for TIPS require definition at this time[44]. Emerging data suggests that the frequency of TIPS revision within the first 12 months ranges from 20% to 50% in patients with longer life expectancy, secondary to high rates of complications including stent occlusion, thrombosis, or stenosis.[45-47] These observations should temper enthusiasm for the use of TIPS in good risk patients who have the potential for long term survival once portal hypertension is controlled.[31]

In a recently published decision analysis in patients with Child class A cirrhosis undergoing TIPS or surgical shunts, the authors concluded that surgical shunts have a role for Child class A or B patients showing excellent outcomes with low morbidity and mortality. The authors also showed that TIPS was an expensive treatment option as compared with surgical shunts in these patients.[48]

TIPS has a role in high risk patients. Patients with advanced liver disease are poor candidates for surgery and these patients should be managed by non-surgical modalities.[49] This is also evident from our series, as there was significantly increased morbidity and mortality in patients with Child class C.

Endoscopic variceal control is also advocated as the treatment modality for patients with good liver function.[50] However there is an increased incidence of rebleeding in such patients. In one study comparing sclerotherapy and DSRS, control of variceal hemorrhage was superior with DSRS (97% versus 41%).[51] Our patients had history of medical management before undergoing surgery. Emergency endoscopic therapy is highly effective, with control of hemorrhage in 85% to 95% of cases, but the long term control of hemorrhage remains a problem with rebleeding rate as high as 50%[34,52]. Repeated sessions add to morbidity of the patients and also increase the overall treatment cost.

We conclude from this study that surgical shunts may be considered as the treatment option for long term control of recurrent variceal hemorrhage in patients with good hepatic reserve i.e. Child class A or early B. This is more desirable in our part of the world, as the prospects of the availability of a liver transplantation as a definitive treatment modality are still remote. For poor risk patients, surgery carries a high morbidity and mortality, and non-surgical modalities might be a reasonable option.

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