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Review Article

Esophageal Varices Surgical Management: A Review Article

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Abstract

Background: Esophageal varices bleeding is the 3rd reported cause of upper GI bleeding. Elevated portal pressure and flow lead to lethal severe bleeding as a result from rupture of thin-walled sub-mucosal venous channels in the distal esophagi. Many surgical procedures were developed to manage esophageal varices effectively with limited complications classified as shunting procedures and non-shunting procedures.

Aim: The main objective of this study is to review different approaches in surgical management of esophageal varices.

Conclusion: Surgical management of esophageal varices is suggested for patients who are refractory to clinical, endoscopic and endovascular treatment. Selection of the operation depends on liver function, patency of the splenoportal venous axis, patient's transplant candidature and the availability skilled surgeon.

Keywords: *Esophageal Varices; Shunting Procedures; Portal Pressure; Esophageal Varices Surgical Management*

Introduction

Esophageal varices are dilated submucosal distal esophageal veins as a result to portal hypertension which struggle blood flow to liver thus increases portal venous blood inflow [1,2]. It is a hemodynamic abnormality characterized by sudden bleeding episode; about a third of all patients with esophageal varices show bleeding episode [3]. 50% of cirrhosis patients have esophageal varices and 5 - 15% show recently formed varices or worsening of varices every year. The frequency of variceal bleeding in patients with a history untreated EVs varies from 16 to 75.6 percent [4].

Portal vein has over 1500 ml/min of circulating blood which lead to elevated portal venous pressure if there is an obstruction [5]. Increased venous pressure causes development of collaterals which divert blood from the portal venous system to the inferior and superior

vena cava then drain into the azygos vein and lead to the development of esophageal varices. Varices enlarge and then rupture causing severe hemorrhage [6].

Severe bleeding from varicose veins in the esophagus which is secondary to liver disease is a significant surgical emergency, as the patient may bleed to death.

Esophageal varices bleeding is the 3rd reported cause of upper GI bleeding. Varices may be difficult in diagnosis and further complicated by poor general condition of the patient because of liver disease [7]. Elevated portal pressure and flow lead to lethal severe bleeding as a result from rupture of thin-walled sub-mucosal venous channels in the distal esophagi [8]. If the varicose veins bleed, the chance of rebleeding is greater than 50% and rebleeding is correlated with a high mortality rate. Early detection of esophageal varicose veins before the first incident of bleeding is important [9].

The main management strategy of esophageal varices involves primary prevention, management of bleeding, and secondary prevention provided through pharmacological, endoscopic, interventional and surgical methods [10]. Many surgical procedures were developed to manage esophageal varices effectively with limited complications classified as shunting procedures and non-shunting procedures [11].

Surgical management is typically reserved for cases of constant or repeated bleeding where bleeding is not managed after two sets of variceal injections, high re-bleeding and mortality due to further injection attempts; in this category, emergency surgery is the best choice [12].

The main objective of this study is to review different approaches in surgical management of esophageal varices.

Pre-operative care

Full investigation and assessment of liver disease and function is essential. Level of malnutrition, regulation of ascites, encephalopathy level, prothrombin time, serum albumin concentration and serum bilirubin concentration indicate complication risk and mortality after surgery [13]. Patients with end-stage liver disease are at high risk of major complications and mortality caused by surgery. Acute liver failure may lead to severe coagulopathy, encephalopathy, adult respiratory distress syndrome, acute renal failure, and sepsis [14].

Emergency surgery, advanced age, and cardiovascular disease are all determinants to complicated outcome. Optimal preparation that identifies the typical features of advanced liver disease can minimize the risk of complications or mortality after surgery. Preparation should include correcting coagulopathy, minimizing pre-existing encephalopathy, avoiding sepsis, and optimizing kidney function [15].

Coagulation irregularity must be resolved, especially in the case of hypersplenism, and renal function should be measured, controlled and optimally preserved before after and after the operation [16]. Preoperative angiography may be needed if devascularization will be performed. vaccination against pneumococcal infection must be considered if splenectomy will be performed to maintain low-dose penicillin cover for the perioperative period and for at least 2 years afterwards [17].

Surgical management

Decompressive shunts are the safest choice to avoid the rebleeding of esophageal varices, and can control emerging bleeding, while emergency shunts are rarely suggested [18,19]. Devascularization operations are suggested in patients with esophageal varices and unsuitable PSS anatomy. Shunting procedures are prohibited in patients with severe thrombosis of the mesenteric venous system, but non-shunting procedures don't have those restrictions [20].

Shunting procedures

There are several shunting operations for the management of esophageal varices (nonselective shunt and selective shunt) [21]. The aim of shunting is to decrease the occurrence of variceal hemorrhage by decreasing the pressure in the portal system with a portal-systemic shunt but carries a high risk of postoperative encephalopathy, especially after nonselective shunt. Even in selective shunt, loss of shunt selectivity occurs occasionally which lead to postoperative encephalopathy [22,23].

Selective shunt procedures as distal spleno-renal shunt (DSRS) or left gastric venous-caval shunt (Inokuchi shunt), aim to decrease portal pressure and reduce esophageal variceal pressure thus decreasing hemorrhage [24].

Distal spleeno-renal is a shunt operation developed in to prevent bleeding and hyperammonemia [25]. DSRS operation involves anastomosis of the distal end of the splenic vein to the left renal vein. It also involves devascularization of left gastric artery and vein [26]. Although DSRS has been reported to prevent recurrence of bleeding effectively, it doesn't eradicate the risk of hyperammonemia. DSRS shunt stenosis lead to inadequate variceal decompression, and increased risk of bleeding recurrence. Repeat angiography should be performed in cases of bleeding or varices recurrence after DSRS to determine the cause of the recurrence [27,28].

Inokuchi shunt is another type of selective shunt. The gastrohepatic ligament is opened and the left gastric vein after dilatation and engorgement of the left gastric vein is confirmed by splenoportography to identify and dissected 2 cm towards its junction with the portal system or splenic vein [29]. Dissection of the vein should be done carefully to avoid bleeding as increased portal vein pressure cause left gastric vein wall [30]. Anastomosis performed afterward between the distal end of the transected left gastric vein and the inferior vena cava. Splenectomy is done after completion anastomosis. Short of gastric vein ligation is important if splenectomy is not indicated to decrease the collateral circulation from the greater curvature of the stomach [31]. Caval anastomosis operation selection depends on anatomical individuality and difficulty of operation. Left gastric venouscaval shunt may be adjusted in three different ways (left gastric-spermatic (ovarian) shunt, left gastric-adrenal shunt, or left gastric-renal shunt) [32].

Nonselective shunt procedures reduce portal venous pressure and improve esophageal varices as portacaval or mesocaval shunts. Non-selective shunts are more prevalent in patients with liver cirrhosis due to its technical feasibility and early lowering in portal pressure [33]. It is associated with high risk of hepatic encephalopathy due to impaired protein metabolism in the liver causing hyperammonemia. Hyperammonemia patients need specific nutritional care and negatively affect quality of life. Many studies reported high mortality (40 - 50%) associated with portocaval derivation and high rate of encephalopathy (40%) [34]. Mesocaval shunt is usually used to control hemorrhage from esophageal varices in children suffering from hepatobiliary system congenital abnormalities [35]. Mesocaval shunt was recently adjusted, and some studies have described a portacaval or mesocaval interposition shunt with a graft (H-graft mesocaval shunt) [36].

Non-shunting procedures

Simple esophageal transection is rarely conducted in cases of high long-term recurrent bleeding rates of (50%), without some form of devascularization as a definitive, elective procedure [37]. Non-hunting procedures do not change vascular anatomy and hinder possible liver transplantation, but they can induce severe upper abdominal adhesions along with increased bleeding at the time of transplant surgery [38].

When compared with simple transection alone, devascularization operation major complications are those of the esophageal transection, possibly compounded by devascularization ischemia, namely dysphagia, ulceration, and stricture formation but with an extremely low rate of rebleeding and recurrence of varices. Little or no increase in portal-systemic encephalopathy has been reported with all these procedures [39,40].

Esophageal transection: Is a simple effective salvage procedure that doesn't need a specialized physician as management of severe hemodynamic conditions [41]. It is conducted via a vertical gastrostomy on anterior wound and introduction of circular stapler into distal esophagus lumen and is located 1 - 2 cm above esophagogastric transition zone. It is a technically straightforward operation that can be performed in 1 to 2h with little blood loss usually [42]. Different grades of devascularization can be performed with operation advocating ligation of peri-oesophageal collaterals and the left gastric or coronary veins [43].

Portoazygous disconnection: Is a surgical approach that disconnection the venous circulation of the distal esophagus and cardia from the hypertensive portal circulation through separation of all the feeding vessels [44]. It has more restrict use but it is considered as choice for patients who are not applicants for derivations, as patients with portal vein thrombosis or patients in not specialized centers. Azygoportal disconnection operation is selected in patients with cirrhosis [45].

Hassab procedure involve splenectomy as well as cardiac portion of the stomach devascularization and abdominal portion of the esophagus, including the supra-phrenic veins, perihiatal devascularization of the lower esophagus, ligation of the left gastric vessels, devascularization of the proximal half of the stomach, and separation of the stomach from its bed through the abdominal approach [46,47]. Ligating the left gastric artery and splenic artery, portal blood flow was also decreased, thereby decompressing the portal system. Recently, the Hassab operation has been employed in patients with varices limited to the stomach [48].

ET is a popular non-shunting operation for the management of esophageal varices consisting of paraesophageal devascularization, esophageal transection and reanastomosis, splenectomy, and pyloroplasty. Splenectomy with devascularization of the greater curvature is firstly performed [49]. Then, devascularization of the lesser curvature was done from the angle to the esophagogastric junction, and the left gastric artery was ligated and divided [50]. Devascularization of esophagus and cardia is then performed in lesser to the greater curvature. Then, the vagal nerve and paraesophageal vessels were ligated and divided. The esophagus then is transected completely above the esophagogastric junction, and the mucosa is anastomosed with interrupted sutures, performed recently with an autosuture instrument [51]. ET is done through three different methods (transthoracic, thoracoabdominal and transabdominal). Devascularization of the esophagus and the stomach is most wide and comprehensive in the thoracoabdominal method; however, this is the most extreme procedure [52].

The Sugiura operation is a nonshunting approach consists of broad paraesophagogastric devascularization with esophageal transection and splenectomy through successive thoracic and abdominal incisions [53]. Sugiura and Futagawa (1973, 1984) reported impressive operation results which led other surgeons to assess the efficacy of the surgery in Western countries [54]. This huge operation has been adjusted into a one-stage surgery using a transabdominal approach assisted by the use of costal margin and sternal retractors [55]. After division of the crura of the diaphragm, 10 cm of esophagus can be devascularized, a staple transection done via a gastrotomy and the rest of the abdominal part of the operation completed [56].

Conclusion

Surgical management of esophageal varices is suggested for patients who are refractory to clinical, endoscopic and endovascular treatment. Selection of the operation depends on liver function, patency of the splenoportal venous axis, patient's transplant candidature, the availability skilled surgeon and other patient dependent factors.

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