Gastroesophageal Varices

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Disease Demographics

- Gastroesophageal varices are a manifestation of portal hypertension which, in developed countries, is primarily due to cirrhosis of the liver.
- Gastroesophageal varices are the most important portosystemic collateral pathways because their rupture and hemorrhage is the most deadly, acute complication of cirrhosis and portal hypertension.
- Patients with cirrhosis develop varices at an approximate rate of 8% per year, and the frequency of varices is higher in patients with more severe liver disease.

Clinical Presentation

- Gastro-intestinal (GI) hemorrhage is the primary manifestation.
- Variceal hemorrhage can be massive and patients often present with large volume hematemesis and hemodynamic instability.
- Patients with variceal hemorrhage may or may not have other signs of cirrhosis or portal hypertension, such as spider nevi, jaundice or ascites.

Patient Evaluation

- The differential diagnosis of acute upper GI hemorrhage is broad and includes, peptic ulcer disease, gastritis, esophagitis and varices. Less common causes include aortoenteric fistulae, gastric mucosal tears (*Mallory-Weiss*), and benign or malignant tumors of the upper GI tract.
- Appropriate resuscitation begins with intubation for airway protection if the patient has altered mental status. There should be a low threshold for intubation as vomiting of blood is frequent, aspiration is possible and airway protection facilitates upper endoscopy.
- The gold standard in the diagnosis of varices is esophagogastroduodenoscopy (EGD). Based upon consensus conference, it was recommended that the size classification be as simple as possible (2 grades; small and large, with the cutoff being a diameter of 5mm).
- Given the accuracy of endoscopy and the utility of classifying varices, EGD is recommended in all patients with cirrhosis to determine the presence of varices.
- Elective evaluation of portal hypertension can also include estimating portal pressure using the wedged hepatic venous pressure (WHVP). The procedure is performed by catheterizing the right jugular vein and guiding a balloon-tipped catheter under fluoroscopic control through the right atrium and IVC into the main right hepatic vein. The free hepatic venous pressure (FHVP) is measured by maintaining the tip of the catheter ‘free’ in the hepatic vein, at 2–4 cm from its opening into the IVC. The balloon is then inflated and the wedged pressure measured.
    - The WHVP closely reflects the actual portal venous pressure in patients with cirrhosis. The pressure in the hepatic vein (non-wedged or free hepatic venous pressure (FHVP)) is subtracted from the WHVP; giving the hepatic venous pressure gradient (HVPG; normal is 3 – 5 mmHg).

    - The WHVP and therefore the HVPG is elevated in sinusoidal causes of portal hypertension (cirrhosis) but not pre-sinusiodal causes (primary portal vein thrombosis).
    - Elevation of a single measurement is prognostic for future variceal hemorrhage; repeat measurement can be useful to gauge response to therapy (beta-antagonists) or progression of liver disease. However, this technique is limited by variability in experience with its use.
    - Variceal hemorrhage typically occurs with a HVPG > 10 mmHg.
- Diagnostic imaging is not generally useful in diagnosis, managing, or prognostication in patients with gastroesophageal varices.

Role of Conservative Management

- Supportive care includes: restoration of circulating blood volume, correction of coagulopathy, systemic antibiotic treatment, prevention and treatment of acute kidney injury, artificial nutritional support, and prevention of hepatic encephalopathy.
    - Antibiotic treatment is not just peri-procedural and should generally be continued for 2 – 10 days. It is considered important to prevent spontaneous bacterial peritonitis and clinical trials have shown reduced mortality associated with antibiotic use.
- Upper endoscopy is central to the diagnosis and management of esophageal varices. Endoscopy is necessary for the diagnosis and is central to the management of variceal hemorrhage.
- Endoscopic band ligation (EBL) is the first line therapy for variceal hemorrhage and is successful in over 70% of cases. This method has replaced sclerotherapy as the primary endoscopic method of hemorrhage control.
- Vasoactive drug therapy increases the success of endoscopic hemostasis, reduce blood transfusion needs, and decrease short-term (7 day) mortality. Somatostatin (250 µg bolus followed by 250 µg/hr infusion) reduces wedged hepatic venous pressure and hepatic blood flow. Combined therapy with EBL and vasoactive drugs increases the success over either therapy alone.
- In rare circumstances where the initial endoscopy is not successful in controlling bleeding, placement of a Sengstaken-Blakemore (SB) tube can be done for temporary control. Its reported effectiveness is 40 – 90% for initial control of hemorrhage, but recurrent bleeding is common. However, tamponade of varices with an SB tube can facilitate stabilization of hemodynamics and permit either a second attempt at endoscopic control or other methods of definitive treatment.
    - SB tube use is associated with severe complications that include aspiration and esophageal perforation/rupture. Aspiration most commonly occurs during insertion. Esophageal rupture occurs if the gastric balloon is inflated in the esophagus. Later perforation occurs due to prolonged esophageal balloon inflation.
    - To minimize the risk of complications SB tube placement and use must follow a standard set of guidelines. First, they should only be placed in an intubated patient. Second, lavage and drain the stomach to minimize aspiration risk. Once

the integrity of the balloons is confirmed, the tube is placed orally and advanced into the stomach. The gastric balloon is inflated with 100 ml increments of air (up to a maximum of 500 ml), followed by manometry to check the pressure change from the previous filling. In the event of an increase >15mmHg, indicating potential esophageal position of the gastric balloon, the balloon must be deflated, the tube advanced, and sequential inflation resumed. Once fully inflated to 500 ml, the inflation ort is clamped, the tube is pulled gently until resistance is felt and the end of the tube held in traction. Final positioning of the gastric balloon should be confirmed with a portable radiograph. The esophageal balloon is only inflated if bleeding persists. This balloon is filled to the lowest pressure needed to stop bleeding.

    - An SB tube can generally be left in place for 24 hours after which, the balloons are deflated. They can be re-inflated for another 24 hours if bleeding recurs.
- Portal decompression with a trans-hepatic portosystemic shunt (TIPS) can be used when either a first or second attempt at endoscopic management fails to control hemorrhage. There is evidence that TIPS is particularly effective when the HVPG is greater than 20 mmHg.

Indications for Operative Intervention

- Emergent surgical portosystemic shunts (typically side-to-side portocaval shunt) or esophageal devascularization operations are only indicated when other methods for control of hemorrhage above have failed. Given the success, general safety, and relative technical ease of endoscopic management and trans-hepatic shunting, surgery is almost never indicated.
- However, there are circumstances where the endoscopic-based approach fails and TIPS is not feasible or available.
- Patients with gastric variceal hemorrhage due to left-sided portal hypertension (sinistral) and splenic vein thrombosis can be treated with splenectomy.

Pre-operative Preparation

- Coagulopathy should be reversed and hemodynamics optimized. Portocaval shunt should not involve a large blood loss, although abdominal wall varices may lead to bleeding.
- The patient should receive prophylactic antibiotics if not already receiving them.

Operative Techniques and Intraoperative Considerations

- A side-to-side portocaval shunt is the simplest and safest way to surgically decompress the entire portal system and reliably control variceal hemorrhage. A single center experience has shown higher survival in patients treated with early emergency direct portocaval shunting in comparison to standard endoscopic management. This approach, however has not been reproduced elsewhere and is not standard.

- A modified Sigura operation (esophageal devascularization) can effectively control hemorrhage but is associated with a high post-operative mortality and long term rebleeding rate. The general approach involves devascularization of the greater curvature (splenectomy and ligation of the short gastric vessels) and lesser curvature (division of the left gastric vessels), and the distal 6 – 10 cm of the esophagus. An esophago-esophagostomy is typically included using an EEA stapler that is introduced through an anterior gastrotomy and placed approximately 2cm proximal to the GE junction; effectively ligating the esophageal varices.

Postoperative Management

- A complete/central portocaval shunt has a high risk for hepatic encephalopathy which is almost uniform in patients with variceal hemorrhage. If not already started, patients should be aggressively treated with lactulose to encourage elimination of blood and debris in the GI tract.
- Enteral nutritional support is central to management and should be used rather than parenteral nutrition.

Complications

- Crystalloid resuscitation from shock in patients with liver disease often contributes to the development or to worsening of ascites. However, there is no evidence to support a role for colloid resuscitation in lieu of crystalloid. It is better to minimize crystalloid use in favor of a balanced use of blood products.
- Other complications secondary to chronic liver disease were discussed above and are likely in the post-operative period.

Suggested Reading

- Hwang JH, Shergill AK, Acosta RD, Chandrasekhara V, Chathadi KV, Decker GA, et al. The role of endoscopy in the management of variceal hemorrhage. Gastrointest Endosc. 2014;80(2):221-7.

- Moon AM, Dominitz JA, Ioannou GN, Lowy E, Beste LA. Use of Antibiotics Among Patients With Cirrhosis and Upper Gastrointestinal Bleeding Is Associated With Reduced Mortality. Clin Gastroenterol Hepatol. 2016;14(11):1629-37.e1.

- Tapper EB, Beste L, Curry M, Bonder A, Waljee A, Saini S. Opportunities for Improvement in the Contemporary Management of Acute Variceal Hemorrhage: A Systematic Review of Observational Studies. Clin Gastroenterol Hepatol. 2017.

- Zong GQ, Fei Y, Chen J, Liu RM. Selective double disconnection for cirrhotic portal hypertension. J Surg Res. 2014;192(2):383-9.