Balloon Tamponade for Variceal Hemorrhage

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32.1 Introduction

- Variceal hemorrhage remains a major cause of mortality in those with portal hypertension. Varices can occur in the esophagus, usually distally, or stomach, usually in the fundus.
- Endoscopy with hemostasis technique is the mainstay treatment for esophageal variceal bleeding, while portosystemic shunt placement is the treatment for gastric variceal bleeding. However, these procedures require resuscitation and strategic planning prior to initiation.
- Balloon tamponade remains a useful technique in temporarily arresting hemorrhage until more definitive treatment can be pursued.

32.2 Surgical Anatomy

- The esophagus consists of the upper and lower esophageal sphincters and is approximately ~25 cm long. Varices usually form in the distal third of the esophagus.
- In the stomach, junctional varices from the esophagus tend to form in the cardia and fundus, while isolated gastric varices can form in the fundus and antrum.

32.3 General Principles

- The indication for balloon tamponade should not be for definitive hemostasis but as a temporizing measure until definitive therapy can be pursued via endoscopy, interventional radiology, or surgery.
- Insertion should be performed in the intensive care unit given the high risk of hemodynamic instability.
- This is not a sterile procedure. However, a gown, a mask, and eye protection are recommended as a precautionary method in case of hematemesis.

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32.4 Instruments

- Equipment necessary to perform this procedure should include a balloon tube, lubricant, 50 mL syringe, Kelly clamps, and tape. A traction device is also necessary to sustain tamponade; traditionally, a football helmet is used.
- Sengstaken-Blakemore tube (Fig. 32.1a)—Consists of three ports and both esophageal and gastric balloons. Gastric balloon is approximately 250 mL.
  - Ports: Gastric suction port, gastric balloon inflation port, esophageal balloon inflation port
  - Boyce modification: Additional tube in the proximal esophagus to decrease risk of aspiration
- Minnesota tube (Fig. 32.1b)—A modified version of the Sengstaken-Blakemore tube. Consists of four ports and both esophageal and gastric balloons.
  - Ports: Gastric suction port, gastric balloon inflation port, esophageal balloon inflation port, esophageal suction port (above esophageal balloon)
- Linton-Nachlas tube (Fig. 32.1c)—Consists of three ports and only one large gastric balloon that holds 600 mL of air.
  - Ports: Gastric suction port, gastric balloon inflation port, esophageal suction port
  - Preferred in gastric variceal bleeding

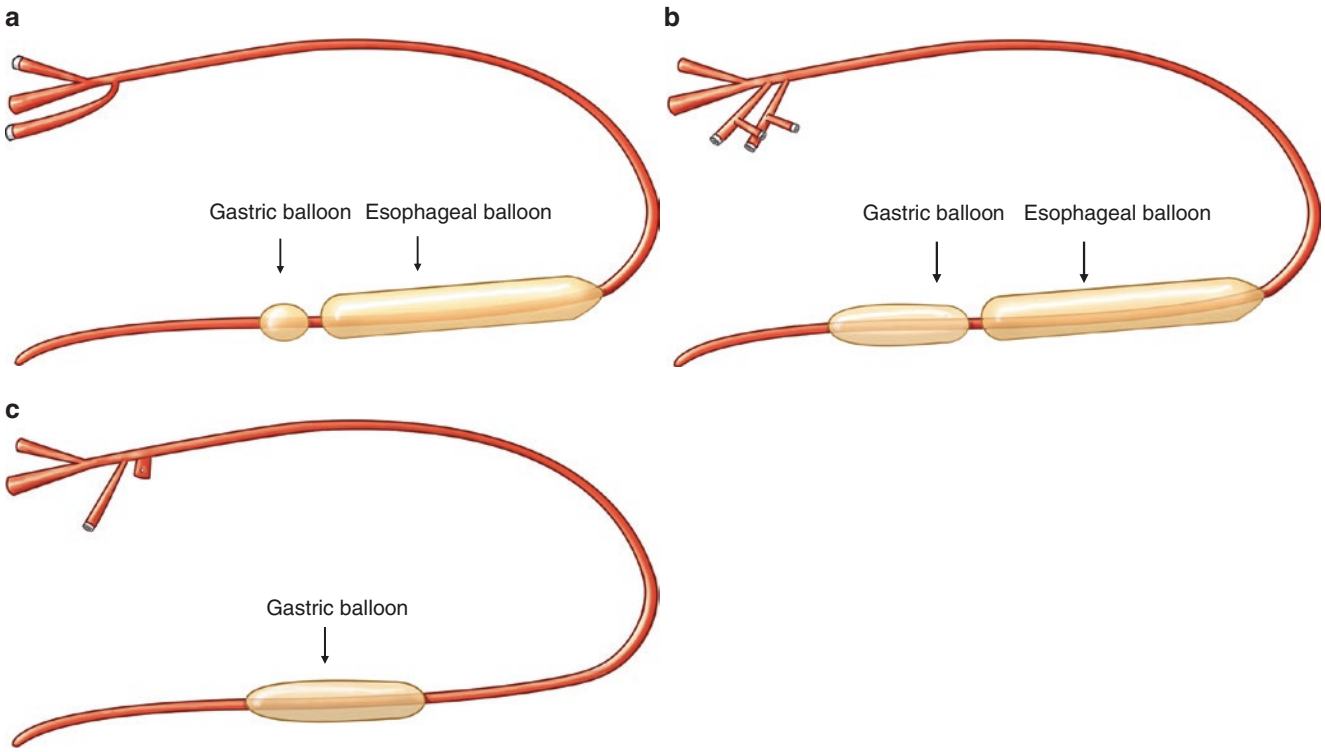

Fig. 32.1 (**a**) Sengstaken-Blakemore tube. Three ports include esophageal and gastric balloon ports and a gastric suction port. (**b**) Minnesota tube. Four ports include gastric suction port, gastric balloon inflation port, esophageal balloon inflation port, and esophageal suction port. (**c**) Linton-Nachlas tube. Three ports include gastric suction port, gastric balloon inflation port, and esophageal suction port

32.5 Positioning

- Airway protection is key. Preferably, the patient should be endotracheally intubated prior to balloon insertion. This will protect the airway from aspiration of blood along with secretions after balloon tamponade. This will also protect the airway from balloon insertion.
- Place the patient supine with the head of bed at 45° to assist with facilitation of balloon tube down the oropharynx into the digestive tract (Fig. 32.2).

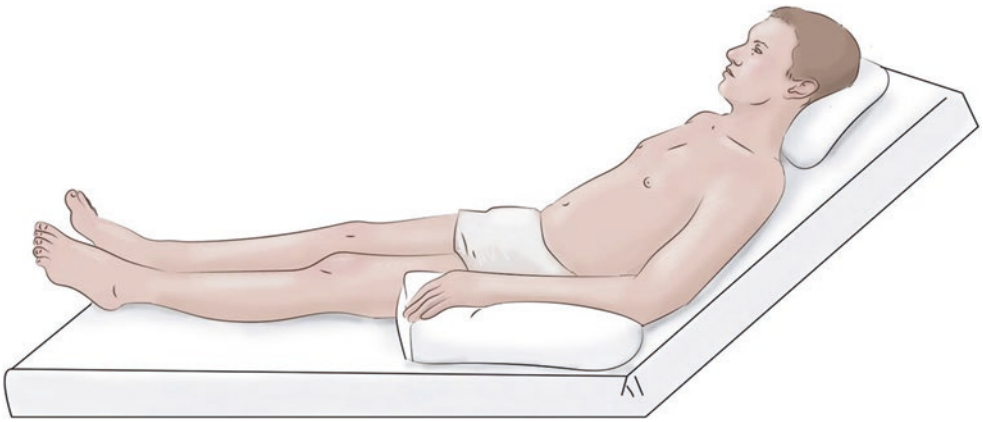

Fig. 32.2 The patient is placed supine with the head of bed at 45° to ease passage of tube into the esophagus

32.6 Insertion Techniques

1. Check patency of the balloons prior to insertion. Note which ports correspond to their respective parts of the tube.
2. Lubricate the tube.
3. Insert through the nostril past the oropharynx and esophagus and into the stomach. At least 50 cm should be passed to decrease risk of positioning in the esophagus.
4. Once placed, suction the balloon ports to remove all air.
5. Inflate the gastric balloon port with air, respective of the volume aliquoted by the manufacturer. A sound is usually auscultated over the left hypochondrium in accordance with inflation attempts, indicating proper positioning. Ensure proper placement of the tube given the risk of being kinked in the oropharynx or inflating the gastric balloon inside the esophagus.
6. Clamp the inflation port after each inflation attempt to ensure accurate measurement of air inflation. Use a Kelly clamp to close ports (Fig. 32.4).
7. Pull tube back to ensure tamponade of gastric balloon to the fundus.
8. Secure tube to traction device. The end of the tube can be fastened to the face guard of a helmet (Fig. 32.5). If a helmet is not available, a pulley system can be devised using a Kerlix dressing and a 1 to 2 pound object (i.e., a bag of 500 mL normal saline).
9. Imaging with X-ray to confirm position (Fig. 32.6).
10. In the setting that bleeding is not controlled, one can consider inflating the esophageal balloon, if available (Fig. 32.3).

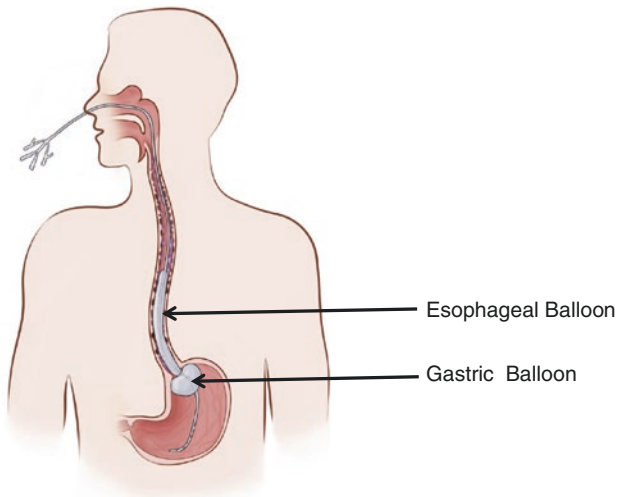

Fig. 32.3 Sengstaken-Blakemore tube with both balloons inflated. Esophageal balloon should only be inflated if bleeding persists significantly after several hours of gastric balloon tamponade

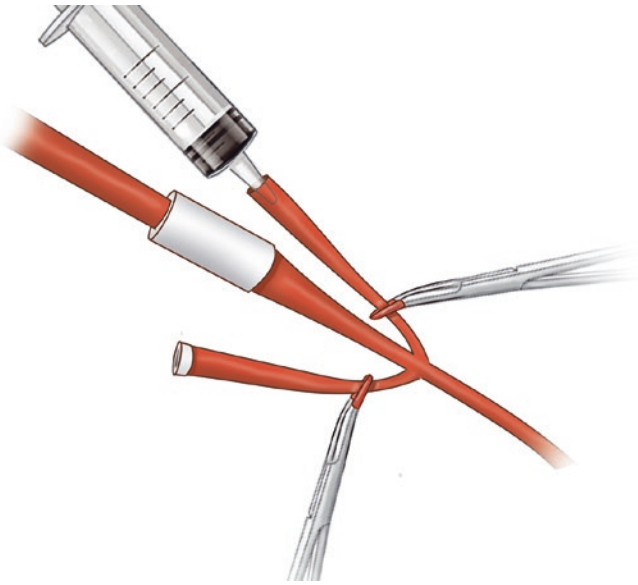

Fig. 32.4 The balloon ports are crucial to clamp after each inflation attempt to ensure volume accuracy

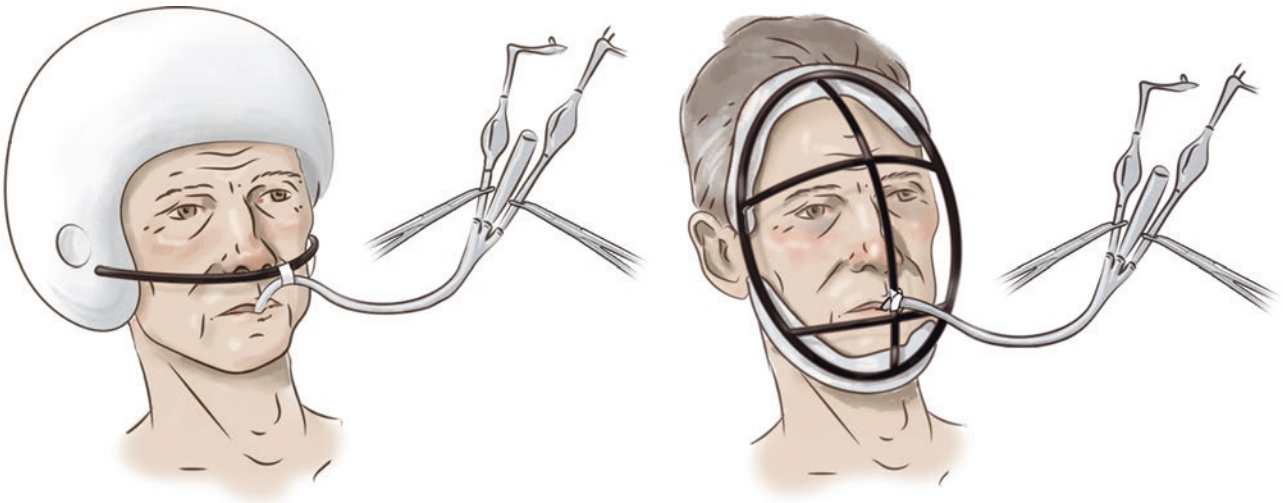

Fig. 32.5 Historically known as the Preston helmet, this allows for traction of the tube to create tamponade

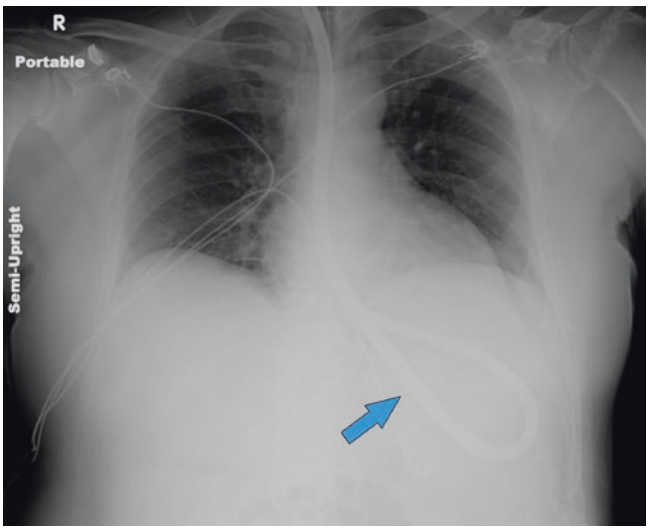

Fig. 32.6 Radiographic confirmation of the tube inside the stomach

32.7 Complications

- Aspiration
- Pressure necrosis
- Esophageal perforation
- Cardiac arrhythmias

32.8 Tips

- Do not forget resuscitative measures including intravenous fluids, blood transfusions, and medications, along with consultations to appropriate services prior to procedure.
- Provide adequate sedation to patients requiring mechanical ventilation along with restraints to prevent pulling of tube.
- When checking the patency of the balloons, consider doing this with the balloon underwater to assess for leaks.
- Never inflate the esophageal balloon before the gastric balloon.
- Esophageal balloon should be deflated 6–12 h prior to deflating gastric balloon.
- Always deflate gastric balloon prior to removal of tube.
- Consider maintaining tube in place after complete deflation in case bleeding recurs and balloon tamponade is again warranted.
- Do not leave tube inflated in place for more than 24–36 h to decrease risk of pressure necrosis.
- Appearance of fresh blood when suctioning the esophageal port can indicate that balloons are not properly inflated or bleeding has recurred.
- Consider taping the ends of the Kelly clamp to decrease damage to the port during clamping.
- If the patient is not to be endotracheally intubated, consider insertion of nasogastric tubes into the mid-esophagus in tubes without esophageal suction ports to decrease risk of aspiration from secretions. Nasogastric tubes can be tied to the tube with sutures to facilitate placement.