

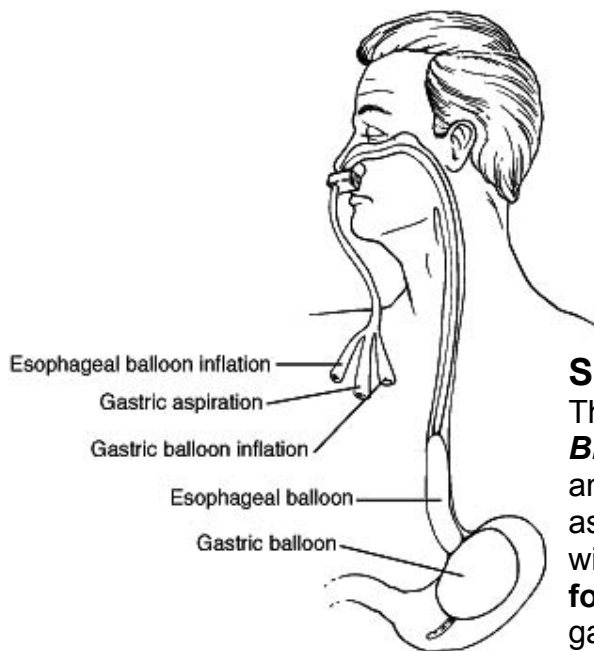
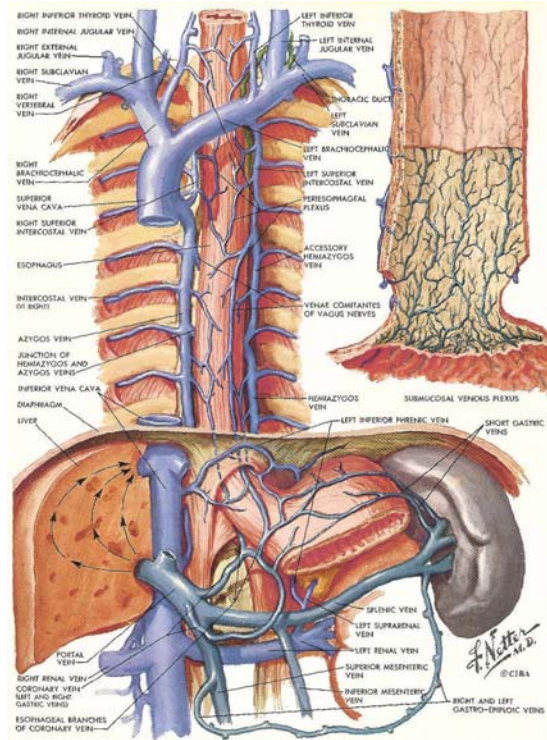
# MINNESOTA TUBE PLACEMENT

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## WHY TAMPONADE?

The vessels that feed the esophageal varices originate from the abdomen and enter the chest through the diaphragm around the gastro-esophageal junction.

By inflating a balloon inside the stomach and pulling it tight against the diaphragm, the balloon acts as a “tourniquet” stopping the blood flow from the veins around the stomach to the varices in the esophagus. This is called “**tamponade**”.



**Sengstaken Tube - 3 lumens**

## SENGSTAKEN OR MINNESOTA TUBE?

They are both similar devices. The **Sengstaken-Blakemore** tube has only 3 lumens (two balloons and the gastric aspiration port); it has no esophageal aspiration port so an NG tube must be placed together with the Sengstaken tube. The **Minnesota** tube has **four** lumens: 1 for the esophageal balloon, 1 for the gastric balloon, 1 to aspirate from the esophagus above the esophageal balloon and 1 to aspirate from the stomach. In most cases there is no need for an

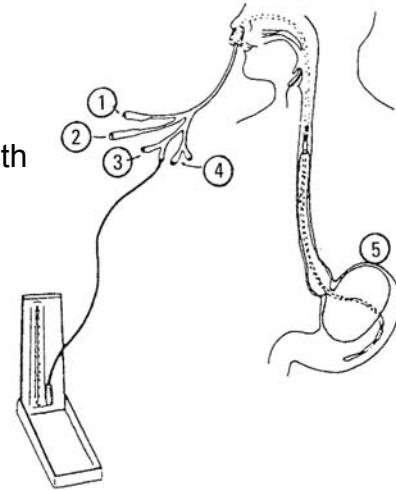
additional NG tube. The Minnesota tube already has the “Y connectors” built in and there is no need to set those up. Finally, the gastric balloon is larger in the Minnesota tube than in the Sengstaken-Blakemore tube

## WHEN SHOULD TAMPONADE BE USED?

Tamponade is used almost exclusively to stop bleeding from varices. Rarely, it has been used to stop bleeding from Mallory-Weiss tears. Because there are potential significant complications associated with tamponade, it is only used it when all other methods to stop bleeding (octreotide, banding, sclerotherapy etc.) have failed, or if the bleeding is so severe that it is not possible to have a clear field to perform endoscopic therapy.

## SUPPLIES NEEDED

Minnesota tube  
Basin with water  
KY Jelly  
4 Kelly-type clamps with no teeth or tape placed over the teeth  
Two large sump-type syringes  
Manometer with appropriate tubing and connector  
Extra pair of disposable scissors  
Foam pad that comes with tube or Football helmet  
(Depending on physician's preference)  
A stack of 4X4 gauze that does not need to be sterile  
Roll of cloth tape  
Sharpie permanent marker pen



**Minnesota Tube - 4 lumens**

## PATIENT PREPARATION

In almost all circumstances, patients that require tamponade should be intubated to protect the airway. This also allows for more intense sedation and control of the patient. If possible, the patient should be placed on the left lateral decubitus position, although the tube can be placed while the patient is supine.

## TUBE PREPARATION

1. Both balloons should be tested by immersing them in water and inflating each balloon with air to observe for air leak. If no leak is present, deflate both balloons completely.
2. Some physicians use gastric balloon pressure monitoring for inflation. If desired:
  - a. attach the manometer to the gastric balloon port with the narrow lumen, occlude the other side of the gastric balloon port with a Kelly clamp.
  - b. Fill up the sump-tip syringe with air, insert the syringe in the gastric balloon port with the wide lumen, unclamp the Kelly clamp and insufflate air, clamp the port again and remove the syringe.
  - c. Repeat step b until 100cc of air is insufflated, note the manometer's pressure reading and write it down (100cc = X mmHg). Insufflate more air until 200cc is in the balloon, then note the pressure reading in the manometer. Repeat this step with 300, and 400cc volume, each time noting the manometer's reading.
  - d. Deflate the gastric balloon completely and replace the plastic pegs in the ports.
  - e. There **is no need** to repeat this process with the esophageal balloon!
3. Deflate the esophageal balloon completely and place the white plastic pegs in the ports.
4. Lubricate the tube including both balloons.

## INSERTING THE TUBE

1. With the patient preferably in the left lateral decubitus, or supine, the physician inserts the tube through the mouth to a depth of 45cm or deeper. It should slide smoothly without a sensation of “kinking”.

2. ***For physicians who do not use the gastric balloon pressure monitoring:***

- a. Have an assistant place a stethoscope over the epigastric region
- b. Remove the white peg from the gastric balloon port that has the larger lumen
- c. Using the sump-tip syringe, insufflate 60 to 100 cc of air. The assistant should hear the insufflation sound over the epigastric area.
- d. Continue insufflating air, while keeping count of the number of cc’s of air used. After approximately 200cc, the physician who placed the tube should gently tug on it until he/she feels resistance. Continue insufflating air up to a volume of 450cc.

3. ***For physicians who prefer pressure monitoring for gastric balloon inflation***

- a. Attach the manometer to the gastric balloon port with the narrower lumen.
- b. Insert the sump-syringe in the other gastric balloon port, insufflate air, clamping the port in between “syringe refills”.
- c. Once 100cc of air is insufflated, check the manometer’s reading, it should not exceed the amount recorded previously during tube preparation by more than 15mmHg.
- d. Insufflate an additional 100cc of air and re-check the manometer’s reading. Again, it should not exceed the reading obtained during tube preparation by more than 15mmHg.
- e. Repeat this step with 300cc and 400cc volume.

4. Once the balloon is inflated with 450 cc of air, double clamp the gastric balloon port site and place the white pegs on both sides of the port.

5. In most cases, the esophageal balloon **IS NOT** inflated during the initial placement of the tube.

## SECURING THE TUBE

The tube has to be under tension and it should be able to be moved to a different part of the mouth at regular intervals to prevent necrosis of the lips. There is usually going to be an endotracheal tube in place as well, so the ability to move the Minnesota tube may be compromised.

There are two well known methods to secure the tube. One uses a football helmet, which is not my first choice. It is extremely cumbersome and restricts access to the patient’s face, mouth and nose.

I prefer to use the foam pad that comes with the tube:

1. While the physician holds the tube under tension; the assistant dries the tube with gauze, then the foam pad is placed very close to the lips, and cloth tape is used to secure it to the tube forming a “ball” of tape over the foam pad.

2. Several 4x4 gauzes are opened and wrapped around the tape covering the foam pad in consecutive layers to create an “ever-enlarging” wad of foam, gauze and tape.
3. Once the “wad” is about 3 inches in diameter, the pressure on the tube can be released and it will rest tight against the lips or preferably against the teeth (to avoid pressure on the lips).
4. The nurse taking care of the patient needs to be cautioned that the tube should be moved slightly to the right or left every 30 minutes.

## **LABELING AND CONNECTING THE TUBE**

With time, the black markings on the tubes may fade away, making it difficult to tell the different ports apart.

1. Each port should be labeled using cloth tape and a permanent marker. Labels should read:
  - Esophageal balloon
  - Gastric Balloon
  - Esophageal suction
  - Gastric suction.
2. The esophageal and gastric suction ports should be connected to wall suction, intermittent, low grade.
3. The gastric balloon port should be **double-clamped** (2 clamps on the “thin” portion of the tube); in addition, the white plastic pegs should be securely placed in each side of the gastric balloon port.
4. If the esophageal balloon is not inflated, the port does not need to be double clamped, but to avoid losing the clamps, place both on the thin portion of the port. Place the white pegs in each port.

***CAUTION:*** *Short individuals may have problems with the esophageal suction port. Because the tube is under pressure and “stretched”, in patients with a short esophagus, the esophageal suction port will actually be in the pharynx or the mouth instead of the esophagus. You will recognize this by hearing the suction sound coming out of the patient’s mouth. In that case, the esophageal suction port should be disconnected from suction and an NG tube should be inserted at a depth of 25 cm from the nares, taped to the nose and attached to suction.*

5. A pair of scissors should be taped on the wall above the bed’s headboard. Should there be any evidence of respiratory distress or high pressures on the ventilator reading that cannot be explained otherwise, the tube should be cut to immediately deflate all balloons. Migration of the gastric balloon into the esophagus can compress the trachea and cause ventilation problems.

## **CONFIRMING TUBE PLACEMENT**

1. As soon as the tube is place and the balloons are inflated, call for a portable X-ray.

2. Ask the technician to obtain a ½ chest, ½ abdomen view, we are most interested in the area just below and above the diaphragm
3. Review the X-ray to confirm abdominal placement of the balloon and its size.
4. The X-ray should be repeated **every 4 hours** as long as the tube is in place. The films must be personally reviewed by the gastroenterologist. Progressive decline in the balloon size indicates a leak and the balloon must be re-inflated.

## **INFLATING THE ESOPHAGEAL BALLOON**

Inflation of the esophageal balloon is the cause of most of complications associated with this procedure. Inflating the esophageal balloon for more than 12-24 hours carries a significant risk of esophageal necrosis. In most cases, inflating the gastric balloon alone is sufficient to stop bleeding.

If the esophageal balloon has to be inflated, it should always be done under pressure control:

1. Attach the manometer to the esophageal balloon port with the narrow lumen.
2. Use the manometer bulb to insufflate air into the esophageal balloon until the manometer reads between 25-40mmHg pressure.
3. Lock the manometer valve and while holding the pressure double clamp the esophageal balloon.
4. Every 2 hours, the balloon should be deflated for 10 minutes and then re-inflated:
  - a. with the manometer attached to the port, unclamp the esophageal balloon port and release the pressure.
  - b. 10 minutes later, re-inflate the balloon with the manometer to the desired pressure
  - c. double clamp the tube again and repeat in two hours.
5. ***Never leave the esophageal balloon inflated continuously for more than 12 hours.***