

Banding of Esophageal Varices

Mehret Dessalegn and Richard Davis

Introduction:

Band ligation is one of the mechanical hemostatic procedures used to control both upper and lower GI bleedings. Endoscopic band ligation is done by using the endoscope as a delivering instrument to control bleeding or prophylactically band vessels to prevent subsequent bleeding. Band ligation for esophageal varices is more effective than sclerotherapy, with a lower complication rate. It is also easier to use and train sustainably in a low-resource setting.

Indications include:

- Oesophageal varices with acute hemorrhage
- Other lesions amenable to band application such as a Dieulafoy lesion
- Prophylactic band application for chronic esophageal varices patients to minimize. Risk of re-bleeding (therapy combined with B blockers for a maximized effect)

Band ligation for esophageal varices is more effective than sclerotherapy with a lower complication rate and ease to train and practice in a low resource setting.

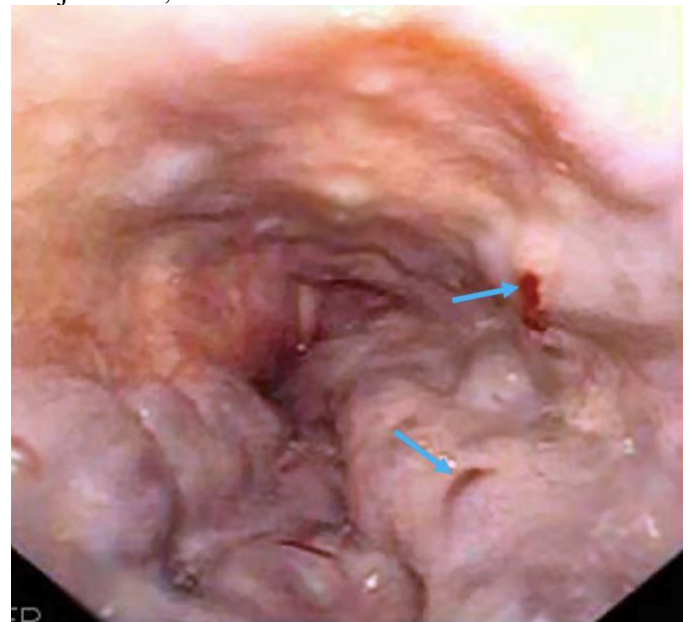
The procedure is performed with a device affixed to the end of the endoscope which is loaded with ready to deploy bands. The device provides a chamber into which the targeted tissue is suctioned creating a pseudopolyp. A band is then applied to the base of the tissue. Multi-band ligating devices allow for application of more than one band per passage of the endoscope.

The operation proceeds in deliberate steps:

- Resuscitation, including IV access and typing and crossmatching of blood if appropriate
- Anesthetic selection: general anesthesia is appropriate for patients with acute hemorrhage
- Initial endoscopy to survey the esophagus, stomach, and duodenum and to plan the placement of the bands. Visualization will be limited once the banding device is in place.
- Loading of the banding device onto the scope.
- Endoscopy and placement of the bands
- Repeat endoscopy with the device removed to assure proper placement of the bands (optional.)

Steps:

1. Patient needs to be stabilized, started on fluids, blood transfusion started before patient is on table, more blood prepared in case there is a need to transfuse on table.
2. Preanesthetic evaluation. For the patient with acute hemorrhage, general anesthesia is preferred.
3. OGD is done without the device in place, to identify the variceal columns and properly grade them for subsequent intervention. Look for stigmata of recent or active bleeding, such as a small red dot on the surface of the varix. If none are visible, bands will be applied to the column of varices that bulges the most, closest to the gastroesophageal junction. Orient the locations for banding, as on a clock face. Memorize their position relative to the gastroesophageal junction, which is a reliable landmark.

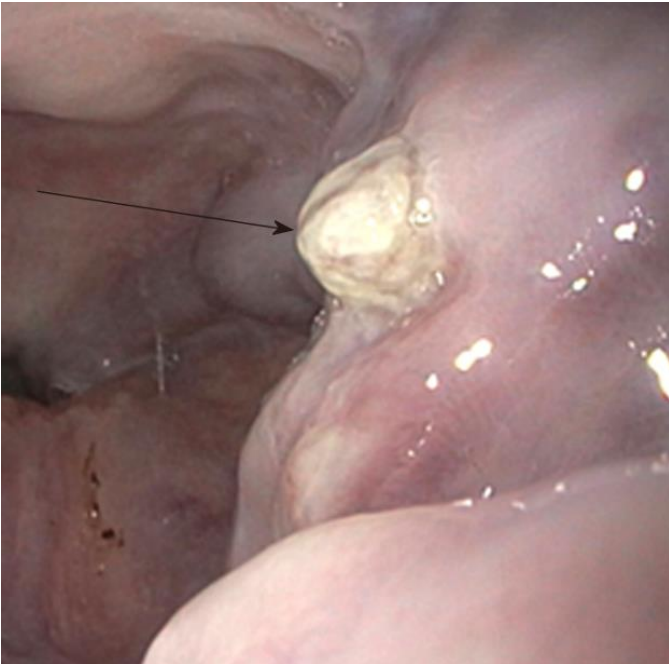


Sites of recent bleeding appear as red dots at the center of the varices ("Red Wale Spots") Source:

https://en.wikipedia.org/wiki/Esophageal_varices

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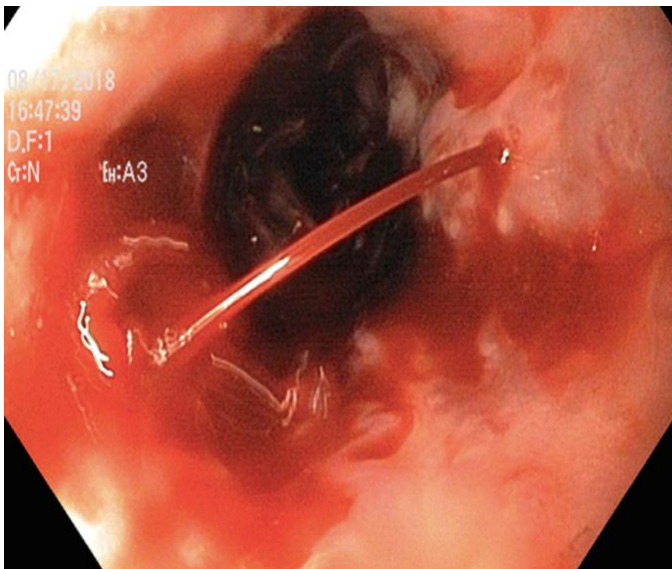
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Platelet-fibrin plug (“White Nipple Sign”) Source: *World J Gastrointest Pharmacol Ther* 2019;10(1):1-21
<https://www.wjgnet.com/2150-5349/full/v10/i1/1.htm>



No stigma of recent bleeding. Bands will be applied to these two columns of varices, to the largest bulging area that is closest to the gastroesophageal junction (Blue Arrows.)



Active bleeding from a varix. This lesion may be difficult to find once the banding device is in place, as visualization and suction will be limited. Source: *World J Gastrointest Pharmacol Ther* 2019;10(1):1-21
<https://www.wjgnet.com/2150-5349/full/v10/i1/1.htm>

4. Pass the scope to the stomach and the duodenum to identify any other pathology, check for gastric varices, assess presence of blood in the stomach and irrigate and suction for a better view. Carefully assess the posterior duodenal bulb, the most common location of life-threatening peptic ulcer hemorrhage.
5. Once the position of the columns to be banded is identified and memorized, withdraw the scope
6. The banding device is then loaded onto the scope. It is helpful for all of the team to be familiar with this process so that it can be done quickly when a patient is unstable. The surgeon must be able to perform every step unassisted, in case the on-call personnel is not able to prepare the device. The steps for loading the device are explained later in this chapter.
7. Insert the scope and device into the esophagus. Locate the previously identified variceal columns. If visualization and orientation are difficult, go to the gastroesophageal junction and withdraw the scope, trying to orient them as they were seen before the device was placed.

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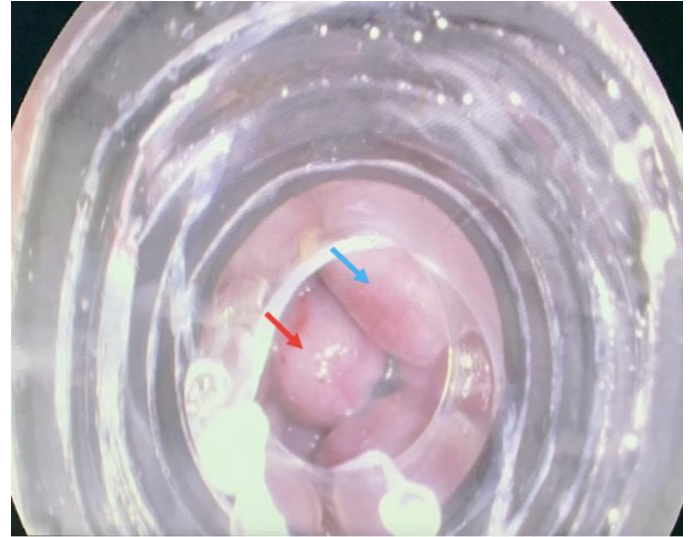
Visualization with the banding device in place is more difficult. In case of disorientation, return to the gastroesophageal junction (dark area seen distally in this photo.)

8. Go to the identified column and suction it into the cup lumen. Once it enters in well, you will see only mucosa up close. Release the band by rotating the controlling wheel at the proximal end of the working port. The tension on the wheel will increase noticeably as the string pulls the rubber band, then it will decrease suddenly when the band is released from the device and applied. Release the suction to let the banded segment fall out of the cap



Demonstration of the banding device using a pink balloon. *Left:* Engaging suction draws the mucosa into the lumen of the device. *Right:* When the controlling wheel is rotated, the band is pulled downwards to the neck of the pseudopolyp. The operator feels a release in tension on the wheel when this

occurs, as the band is released. *Inset:* During deployment, the mucosa enters the device and covers the lens of the scope, blocking the operator's view.

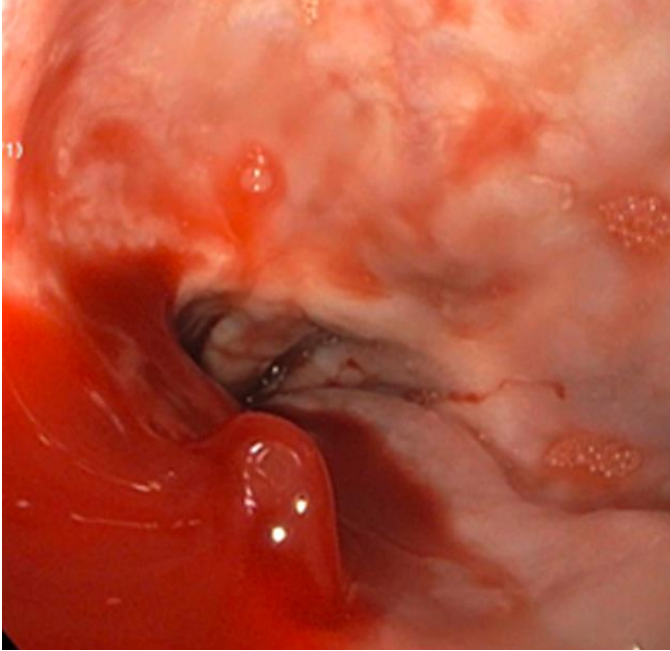


Pseudopolyp with band at base after successful application (Red Arrow.) The next column (Blue Arrow) will now be banded, more proximally.

9. Proximal banding on the same column could be applied as needed
10. Once all the identified columns are banded withdraw the scope
11. It is optional to repeat the endoscopy without the device on the scope, with better visualization to assess the banding.
12. In patients with acute bleeding there is often an excessive amount of blood in the esophagus and it can be difficult to assess the band placement with the limited visualization caused by having the device in place. An esophageal stent can be placed and left in place until the patient is hemodynamically stable (up to two weeks) followed by endoscopy and banding of the varices at the location of the previous bleeding, if this can be located, or else just above the gastroesophageal junction.

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Rapid bleeding from an esophageal varix. If the lesion can not be reliably seen at initial endoscopy, finding it with the device in place will be impossible. Consider temporary tamponade of the bleeding with an esophageal stent or a Sengstaken-Blakemore tube. Source: World J Gastrointest Pharmacol Ther 2019; 10(1):1-21 <https://www.wjgnet.com/2150-5349/full/v10/i1/1.htm>

- Ulcer formation: Temporary ulcers will be seen up to 3 weeks after banding, in the location that the ulcers have sloughed. These should heal in a patient with adequate nutrition and hepatic protein synthesis.
- Post banding stricture: This complication is avoided by only banding within the variceal columns, rather than circumferentially.
- Spontaneous bacterial peritonitis (in patients with ascites): All patients with variceal upper GI bleed are given intravenous antibiotics directed against enteric organisms in the acute phase of management.

Guide: Loading the endoscopic banding device on to the endoscope.

1. Pass the String retriever through the proximal end of the working port of the scope. Attach the string to the string retriever at the distal end of the working port. Withdraw the string back through the proximal end.



The string retriever (Red Arrow) is passed through the proximal working port of the scope and used to retrieve the end of the string. It is then pulled through the channel. A biopsy forceps can also be used to retrieve the string.

Pitfalls

- Missed diagnosis of bleeding duodenal ulcer in a patient who coincidentally has varices. Be sure to perform a complete endoscopy before deciding to band varices.
- Inability to control bleeding due to excessive and rapid blood loss. Options at this point include temporary esophageal stent application if one is available, or placement of a Sengstaken-Blakemore tube. In both cases, repeat endoscopy and attempt at banding should be done when the patient stabilizes.
- Dislodged band and rebleed: this pitfall can be avoided by assuring that the mucosa has completely entered the device (and is firmly opposed to the camera lens) when deploying a band.
- Transient dysphagia from narrowed lumen: Patient should be reassured that this will pass once the edema subsides and the pseudopolyp sloughs off

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2. Pass the string retriever through the handle unit and pull the string up to the wheel. There is a rubber seal here that allows use of suction and insufflation during endoscopy without losing pressure.



The string retriever is used to pass the string through handle unit, which has a seal to prevent loss of suction or insufflation during endoscopy. Note that the rubber cap that usually covers the working port of the endoscope has been removed. Other brands of handle units will require the cap to remain in place.

3. Wrap the string around the controlling wheel and load it into the slot, keeping tension on the string



Insert the string into the slot and then tighten the controlling wheel as the string is wrapped around the barrel.

4. Bring the ligating unit loaded with the bands and snugly attach it to the tip of the endoscope, while tightening the string on the control wheel on the other end of the working port. This allows the unit to fit tightly onto the tip of the endoscope while controlling the string tension on the controlling wheel

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The strings pass through the working port, then through the field of view of the scope. If the banding device is rotated improperly (Inset,) strings pass directly in front of the camera and block the view. Rotate the banding device until the strings are as much out of the way as possible.

Guide: Reloading of an endoscopic banding device

Endoscopic banding devices are intended for single use. However, in a resource-limited environment the string and the plastic-silicone device can be chemically sterilized and reused. (See Chapter: Sterilization.) This will be addressed in a subsequent edition of this chapter.

Mehret Enaro Dessalegn MBBS
AIC Kijabe Hospital
Kenya

Richard Davis, MD FACS FCS(ECSA)
AIC Kijabe Hospital
Kenya

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As the string is tightened on the controlling wheel, the ligating unit is fitted onto the tip of the scope and the string is pulled tight. The bands are now ready to be deployed by turning the wheel and applying further tension to the string.

5. Rotate the ligating unit on the tip of the scope to allow good visualization by positioning the strings well. Because of the device in place, the view will now be “tunnel vision.”

