

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

Section Editor: Todd H. Baron, MD

Cold Snare Resection of Large Duodenal and Colonic Polyps



Cyrus Piraka, MD
 Chief and Fellowship Program Director
 Section of Advanced Therapeutic Endoscopy
 Division of Gastroenterology
 Henry Ford Hospital
 Detroit, Michigan

G&H What defines a large polyp, and how are such polyps typically managed?

CP A large polyp can be defined simply by size, commonly at least 10 mm, or by a size that is large enough to require more advanced resection techniques. The techniques that are needed to resect a polyp that is 12 mm are often not the same as those that are needed to resect a polyp that is 35 mm. In both cases, the polyp must be treated with the intent of complete removal of all neoplastic polyp tissue with a margin of normal tissue in order to eliminate the potential of progression to cancer. For polyps that are 15 to 20 mm in size, endoscopic resection is often undertaken with a submucosal injection lift-and-snare cautery resection with the intent of en bloc removal. Despite this intent, one may still occasionally encounter a sliver of polyp tissue that was not captured with the snare that then necessitates piecemeal resection. For nonpedunculated polyps larger than 15 to 20 mm, the risk of perforation with attempted en bloc snare cautery resection increases; therefore, such polyps are often managed with piecemeal submucosal injection lift-and-snare cautery resection.

G&H How does cold snare resection compare to conventional endoscopic mucosal resection for the removal of large polyps?

CP When people think of cold snare resection, it is typically in the context of the simple use of a small, stiff snare without a submucosal lift for polyps up to 10 mm in size.

For polyps larger than that, the technique of cold snare resection ends up being a variation on standard snare cautery endoscopic mucosal resection (EMR). Submucosal lifting is still often done, but a smaller, stiffer snare is typically used for pure mechanical resection of tissue without the application of cautery for piecemeal resection.

G&H What is the rationale behind choosing cold snare polypectomy vs hot snare polypectomy?

CP The rationale behind using cold snare polypectomy is to eliminate, or attempt to eliminate, the adverse events that are associated with hot snare polypectomy. Historically, physicians have believed that cautery for polyp resection could potentially reduce the risk of bleeding by sealing off blood vessels. A wide array of literature now demonstrates that cautery likely increases the risk of bleeding, particularly delayed bleeding. The purported mechanism is that cautery itself may coagulate or may burn the wall of an arterial branch that then sloughs off after 1 to 2 weeks, unroofing a blood vessel and causing bleeding. Delayed bleeding is associated with more significant morbidity (eg, anemia, transfusions, hypotensive and hypovolemic shock, need for repeat procedures or even surgery) than immediate bleeding, which is usually easily treatable endoscopically. Cold snare resection, in effect, should virtually eliminate the risk of delayed bleeding. Numerous published studies in the literature to date have shown that in patients who are not coagulopathic, the risk of delayed bleeding is essentially 0, even for large

duodenal polyps, which are known to carry a significantly higher risk of delayed bleeding than colonic polyps. In a series I conducted with my colleagues in which we used cold snare resection to remove 15 duodenal polyps larger than 1 cm (including one that was 6 cm), only 1 patient experienced delayed bleeding, and that patient was on warfarin. Significant immediate bleeding is also rare with cold snare resection, as it appears to be very difficult to cut through a major arterial branch without the use of cautery. Venous oozing is common when not lifting with dilute epinephrine, but it appears to be mostly inconsequential. Nonetheless, any serious bleeding that does occur can be treated right away.

With the exception of pedunculated polyps, cautery is not necessary to cut through tissue for the removal of the majority of flat and sessile polyps, as long as individual pieces that are taken are not too large. Cold snare resection removes tissue usually down to at least the muscularis mucosa, and often the submucosa. Cautery is often considered as being helpful to ablate microscopic tissue at the margins of the resection that may otherwise be incompletely resected, but the literature does not support this notion, and cautery may ultimately provide a false sense of reassurance that the polyp is treated when it is not.

Perforation of bowel during polypectomy also appears to be a cautery-related phenomenon, as a large amount of energy is needed to actually cut through the muscularis propria. The risk of postpolypectomy coagulative syndrome is also eliminated with cold snare resection, given the lack of cautery used.

However, hot snare resection should be favored for polyps that are suspicious for early cancer, preferentially with removal of the lesion en bloc. It has yet to be determined which lesions are best approached with cold snare vs hot snare resection, as the cold snare literature is still in its infancy.

G&H What other benefits are associated with cold snare resection of large polyps?

CP Submucosal lifting, especially for sessile serrated polyps, may not be necessary with cold snare resection, although I prefer to use a submucosal lift in all cold snare EMRs to stain the submucosa, help define the margins of the polyp, and instill dilute epinephrine in order to minimize intraprocedural oozing. A large and prolonged cushion is not important in cold snare EMR, as a lift is not used to protect the muscularis propria. Thus, a colloid solution (which can be more expensive than saline) is not required for lifting. Prophylactic clips also do not need to be used, as there is no concern regarding postpolypectomy bleeding in the noncoagulopathic patient. Eliminating cautery and its attendant risks for adverse events reduces

the stress and anxiety that endoscopists may face when resecting a large polyp. This is particularly true in the setting of a large, laterally spreading duodenal polyp.

G&H How is cold snare polypectomy performed?

CP There are variations to the cold snare technique, but overall, the procedure is fairly similar to a conventional hot EMR. As with any EMR procedure, an initial assessment of the polyp is vital. It is often useful to use a clear cap on the tip of the endoscope to help see the extent of the polyp, and it can also aid in stabilizing the polyp for resection or deflecting polyp tissue into view that would otherwise not be visible. A high-definition endoscope is necessary, and the use of narrow-band imaging or similar technology can help in the assessment of the polyp. If it is a nonpedunculated sessile polyp that does not have features suspicious for adenocarcinoma, I would generally consider cold snare EMR for resection. A careful assessment of the polyp is then performed to confirm that all the margins of the lesion can be seen and reached. A lift is not necessary with cold snare EMR, but I prefer to include it in my procedures. The lifting solution that I am currently using is dilute epinephrine (1:500,000) in saline, which appears to be enough to keep any background venous oozing in control during the procedure. Methylene blue or indigo carmine is used for submucosal staining and contrast, as well as to help assess the resection base for residual polyp. Using a small dedicated cold snare, the polyp is resected, often starting at the most challenging end of the polyp and working in overlapping pieces across the lesion. The amount of grabbed tissue should be limited to 10 to 15 mm to ensure that the snare will cut through tissue. Certain types of polyps, such as sessile serrated polyps and even some more bulky, granular-type polyps, tend to be easier to cut through than others. If the cold snare has difficulty cutting through the fibrotic center, the endoscopist should loosen the snare slightly, release the deeper tissue, deflect from the base of the colon or duodenum, and close the snare again. These steps can be repeated to saw through the tissue. Once the polyp is resected, the base and margins are inspected to assess for residual polyp, and the snare can be used to cut through the resection base to clean up any suspected residual polyp tissue. Forceps may also be used to remove small areas of suspected residual polyp tissue. With a cold snare, lateral margins can easily be resected without increasing the risk of immediate or delayed bleeding or perforation.

G&H What factors can impact the endoscopic resectability of colonic and duodenal polyps?

CP The location of the polyp plays a role in its resectability. If a duodenal polyp involves the ampulla, cautery can be used for the ampullectomy followed by cold snare EMR for any laterally spreading portion of the polyp, with the intent to minimize the areas at risk for delayed bleeding. If a polyp descends into an appendiceal orifice and the margins are hidden, or if a polyp extends into the terminal ileum more than half the circumference, surgery may be a better option, as it may be difficult to confirm complete resection of the polyp at follow-up. Appearance is also important to a polyp's resectability. If a polyp looks suspicious for a T1a adenocarcinoma, the patient may be best served with an en bloc resection with endoscopic submucosal dissection or an en bloc lift-and-snare resection with a hot snare. Pedunculated polyps typically also need to be resected with snare cautery rather than cold polypectomy, and occasionally a very bulky, space-occupying polyp may be encountered that will be nearly impossible to resect without the use of cautery.

G&H What is the incomplete resection rate with piecemeal resection?

CP There are a lack of adequate prospective data on the rates of incomplete resection following piecemeal resection, although the rates likely depend on the size and type of polyp and prior resection status. In the previously mentioned retrospective series of 94 large colon polyps (12-60 mm) removed with cold snare EMR, residual polyp was found in 9.7% of cases that had follow-up; of the polyps that were 20 mm or larger, the residual polyp rate was 18.4%. These rates are similar to those reported in a retrospective series of conventional EMR of large polyps, but further prospective, randomized data are needed to confirm that similar groups are being compared when assessing the 2 techniques. In our study, we found that the median polyp size in patients who had residual polyp at follow-up was significantly greater than in patients who did not (37.1 vs 19.1 mm; $P < .001$). Furthermore, every polyp with residual tissue was at least 20 mm in size, 3 of 7 polyps had prior partial resection, and 5 polyps had advanced histology (tubulovillous adenomas). A study of cold snare EMR of large sessile serrated polyps that were at least 10 mm in size showed a residual polyp rate of less than 1%. The residual polyp rate in the duodenum appears to be higher than that of the colon, which is to be expected for larger polyps.

G&H Are there any patients in whom cold snare polypectomy is contraindicated?

CP There are no absolute contraindications for the use of cold snare polypectomy for large polyps. In general,

patients should avoid the procedure if they cannot undergo sedation or a colonoscopy or upper endoscopy for other medical reasons. Careful consideration should be given to patients who have a suspected T1a adenocarcinoma, as other techniques may be better for polyp resection. The same principle applies to pedunculated polyps, ampullectomies, and esophageal EMR, as cold snare polypectomy may not be sufficient.

G&H What follow-up is needed?

CP Follow-up in most cases is 3 to 6 months for large polyps requiring piecemeal resection, similar to the follow-up for hot snare EMR with piecemeal resection. It is unclear what follow-up is needed for polyps that are 15 to 18 mm in diameter that have been removed piecemeal without cautery, but if prospective data are similar to what has been found retrospectively (ie, residual polyp rates are very low), follow-up in these cases could likely be longer than 3 to 6 months. Until there are more data to guide us, it makes sense to follow guidelines for hot snare EMR.

G&H What are the priorities of research in this field?

CP More prospective research is needed to better demonstrate the efficacy of cold snare resection across multiple centers and among various endoscopists, as well as for the different subtypes of polyps. It would be helpful to compare the efficacy of cold snare EMR to hot snare EMR in a randomized study. The appropriate follow-up needs to be better defined, and cost-effectiveness studies comparing cold snare resection to hot snare resection would also be helpful.

Dr Piraka has no relevant conflicts of interest to disclose.

Suggested Reading

Burke C, Kaul V, Pohl H. Polyp resection and removal procedures: insights from the 2017 Digestive Disease Week. *Gastroenterol Hepatol (N Y)*. 2017;13(9)(suppl 2):1-23.

Choksi N, Elmunzer BJ, Stidham RW, Shuster D, Piraka C. Cold snare piecemeal resection of colonic and duodenal polyps ≥ 1 cm. *Endosc Int Open*. 2015;3(5):E508-E513.

Piraka C, Saeed A, Waljee AK, Pillai A, Stidham R, Elmunzer BJ. Cold snare polypectomy for non-pedunculated colon polyps greater than 1 cm. *Endosc Int Open*. 2017;5(3):E184-E189.

Repici A, Hassan C, Vitetta E, et al. Safety of cold polypectomy for <10 mm polyps at colonoscopy: a prospective multicenter study. *Endoscopy*. 2012;44(1):27-31.

Tate DJ, Awadie H, Bahin FF, et al. Wide-field piecemeal cold snare polypectomy of large sessile serrated polyps without a submucosal injection is safe. *Endoscopy*. 2018;50(3):248-252.

Tutticci NJ, Hewett DG. Cold EMR of large sessile serrated polyps at colonoscopy (with video). *Gastrointest Endosc*. 2018;87(3):837-842.