Ask the *expert*

Polypectomy

Gregory B. Haber, MD

Ask the expert features questions submitted by members, with answers provided by ASGE physician experts. ASGE's Publications Committee identifies authors and topics for the column. In this issue, Gregory B. Haber, MD, responds to questions on polypectomy. Dr. Haber is chief, Division of Gastroenterology, at Lenox Hill Hospital, New York City, N.Y.

Disclosures: Dr. Haber disclosed that he is a speaker for Boston Scientific, Cook Medical, Ovesco Endoscopy AG, Salix Pharmaceuticals, Inc. and Takeda Pharmaceuticals U.S.A., Inc.

1. Q: Which flat sessile polyps require submucosal injection prior to polypectomy, and which can be removed by snare only without injection?

A: A flat polyp by definition is a polyp with a height of less than 2.5 mm above the plane of the surrounding normal mucosa, and a sessile polyp is one with a height of 2.5 mm or above. The greater the height of a polyp, the easier it is to entrap with a snare wire. Paradoxically, it is often the small flat polyps that are difficult to entrap in a snare and frequently frustrate the endoscopist when the lesion is seemingly easy to remove.

The first step in assessing the best technique for removal is to characterize the pit pattern, vascular pattern and topography of the polyp. If the surface is non-granular or there are worrisome features such as central depression, irregular vascularity or loss of the usual structural pattern of sulci or tubules, then the concern for intramucosal cancer is much greater. Similarly, type III polyps with a small, round pit pattern are associated with a higher risk of early cancer, compared with the larger, normal round pits or the stellate pattern of hyperplastic or serrated lesions.

If the polyp has no worrisome topographic features and is 2 to 3 mm in diameter, the most efficient way to remove it is with a cold biopsy forceps, taking one or two bites to ensure complete removal. On the other hand, if the polyp is larger than 3 mm or has changes associated with early cancer, then snare removal is more reliable in ensuring complete excision.

The best way to define polyp margins and achieve complete excision is with a submucosal injection. This raises the lesion, as well as the surrounding normal mucosa, and allows for a small snare to engage the polyp and to remove it with a 1 to 2 mm margin of normal tissue.

The technique I use employs a soft, thin-braided snare with a lengthwise dimension of 15 mm or less. The snare is opened while still inside the accessory channel of the scope, which allows the endoscopist to both: 1) accurately place the tip of the snare above the distal polyp margin (relative to the endoscope) and 2) allow the remaining snare loop to open as the scope is withdrawn proximally.

The snare is then "laid down" over the polyp, and the "heel" of the snare (i.e., the end of the snare emerging from the catheter) is pressed down against the soft submucosal bleb at the proximal side of the polyp as the snare is closed. The submucosal bleb permits the endoscopist to safely take a wide margin of normal mucosa to engage enough tissue to trap the polyp.

An alternative approach, without injection, is to initially suck a small polyp into the accessory channel of the scope for 10 to 15 seconds. The snare is then advanced to push the suctioned tissue out of the channel. This puckers the polyp and surrounding mucosa and elevates it sufficiently for the snare to trap the tissue for resection. This approach tends to work better with a larger diameter accessory channel.

2. Q: Do you think that endoscopists should be concerned that use of cold biopsy forceps or cold-snare polypectomy alone to remove adenomatous polyps may leave behind residual adenomatous tissue?

A: The evidence published to date implies that there is no statistically significant increased risk of residual adenomatous tissue, polyp recurrence or procedural complications by cold-snare polypectomy alone. However, comparisons do show a trend toward more bleeding with a cold-snare technique, particularly with polyps larger than 5 mm. The very low risk of bleeding or polyp recurrence following removal of small polyps (which are the ones most commonly cold-snared) would require a large number of randomized patients to show a significant difference in outcomes compared with an alternative technique.

I am personally not comfortable cold-snaring adenomas 5 mm or larger, due to concern about possible recurrence. Current ASGE guidelines recommend follow-up colonoscopy in five years in a patient with a prior finding of one or two adenomas less than 1 cm in size.

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Nevertheless, I worry about possible residual adenoma unrecognized at the time of the index cold-snare polypectomy. This is a personal bias and is not supported by published evidence. On the other hand, the cold-snare technique requires less time than hot-snare polypectomy and has no risk of transmural thermal injury. In that respect, I do feel that cold snaring of hyperplastic-appearing polyps less than 5 mm in size is a reasonable approach.

3. Q: **The use of epinephrine injection into a large polyp to achieve volume reduction and hence facilitate its removal appears to be gaining in popularity among endoscopists. Can you comment on the efficacy and potential adverse effects of this technique?**

A: There are reports that epinephrine injection can shrink large polyps. The technique requires injection of 4 to 8 mL of 1:10,000 epinephrine into the head of a large polyp and then 2 to 4 mL into the stalk. There should be a delay of three to five minutes to allow the vasoconstrictive and tamponade effect to take place. The shrinkage should then allow better visualization of the entire polyp and especially the contour, location and dimensions of the stalk. There is an additional benefit in prevention of postpolypectomy bleeding. I have not adopted this technique in my practice.

Potential concerns with the epinephrine injection technique include a small risk of tachyarrhythmias for larger-volume injections and the time delay required between the initial injection and performance of polypectomy. One potential strategy to justify the delay is to inject the large polyp on scope insertion and then to come back to the polyp during withdrawal. In my practice, I have relied on clips and endoloops to prevent bleeding following removal of large, pedunculated polyps. The use of epinephrine to expand a polyp stalk may potentially increase the difficulty of a clip or loop application.

4. Q: **Do you recommend placement of a hemoclip or endoloop around the stalk of a large, pedunculated polyp prior to endoscopic resection to reduce the incidence of post-polypectomy bleeding? Is either required if submucosal injection is also performed?**

A: The most secure method to prevent bleeding is mechanical compression with a clip or loop. I do use one of these methods preferentially over epinephrine injection for large polyp stalks; however, all of these methods reduce the incidence of bleeding after a polypectomy.

I have always been concerned that injection of epinephrine alone into large vessels in thick polyp stalks may increase the risk of delayed bleeding once the acute drug-induced vasospasm dissipates. There is evidence in a randomized, controlled trial that a combination of loop plus epinephrine injection is superior to epinephrine injection alone in bleeding prevention. Whether epinephrine injection reduced the risk of complications compared with the loop alone could not be determined by the study design.

Technically, I believe it is easier to deploy clips rather than an endoloop. Clips can be rotated and are applied in full view at the site of deployment. On the other hand, the nylon loop can be difficult to place over the entire head of a polyp, and visualization of the distal end (relative to the endoscope) of the loop is often not possible with large polyps. In principle, the loop should be deployed as close as possible to the plane of the normal surrounding mucosa to allow room for the snare along the stalk below the polyp head and above the loop.

There are three commercially available clips with different arm lengths, stem lengths and ease of rotation. Two of these clip devices allow closure to assess placement prior to deployment, while the third is deployed on closure. Multiple clips can be placed on large stalks for secure closure, and clips can be deployed after polypectomy on the base of the stalk. I only use epinephrine injection in exceptional circumstances, as when a patient has a high bleeding risk or when use of clips results in incomplete defect closure. On rare occasions I have also used an endoloop postpolypectomy deployed around the base of the stalk below the clips for very thick, broad stalks.

5. Q: **Do you recommend injection of saline diluted with methylene blue or epinephrine to identify polyp margins and reduce the risk of complications when removing sessile polyps greater than 1 cm in size? Are there other solutions of potential value for the removal of large polyps?**

A: The basic principle is to use a solution that does not rapidly disseminate, and therefore, maintains the lift of the polyp as long as necessary for snare entrapment. When a sustained lift is desired, as for submucosal dissection or to reduce the need for repeated saline injections, then either a viscous or hypertonic solution may be used.

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My standard solution for submucosal injection of polyps is a mixture of saline, 1:200,000 epinephrine and indigo carmine. The amount of color used should be limited to a few drops per 20 mL syringe. The advantage of the coloring is that the solution diffuses through the submucosa but not the muscularis propria. The visual tracking of the injected fluid permits easy delineation of the margins of the neoplastic lesion. This is especially helpful for serrated lesions that are pale and flat, making it difficult to define the margins.

Blue staining of the submucosa also permits clear definition of the deep cut margin in the submucosa. When the snare cuts into or through the muscularis propria, the wall defect will have a brownish cautery mark indicating a cut into muscle. This has been referred to as a "target" sign, with a central brown muscle defect surrounded by the pale blue stained submucosa.

Other solutions have been used for submucosal injection. There is a Japanese solution, aptly named "Muco-Up," composed of 10 percent glycerol and 5 percent fructose. Other products include hypertonic saline or glucose, hyaluronic acid, the ophthalmologic wetting agent hydroxypropyl methyl cellulose and plasma expanders, such as hetastarch and hydroxyethyl starch.

There is evidence that use of these solutions allows resection of larger pieces during piecemeal resection and the ability to remove polyps en bloc more frequently. Whether the increased cost and effort is worth the potential time saved with fewer cuts is unclear, and it remains to be established whether any of these solutions increase polypectomy completion rates or decrease the frequency of complications.

6. Q: Removal of residual adenomatous tissue after an initial incomplete polypectomy may be challenging, due to difficulty in achieving adequate saline lift as a result of underlying tissue fibrosis. Are there any tips for achieving complete eradication?

A: It is important to attempt complete polypectomy and avoid multiple procedures when possible. If a polyp is considered large and potentially difficult, the endoscopist should initially determine whether it is feasible to remove it entirely in the time allotted during the index endoscopy. If time is inadequate, then the patient should be rescheduled, with adequate time allotted or referred to a more experienced endoscopist. Prior partial resection does result in fibrosis and retraction, making it difficult to achieve a submucosal lift with subsequent fluid injections. The same problem occurs with untreated polyps that are centrally depressed or may harbor intramucosal or mucosal cancer.

When removing incompletely resected polyps, I generally start resecting regions of the polyp that demonstrate a lift with the fluid injection. These areas are often at the periphery of the polyp and can be resected in the usual fashion, leaving a central area that is tethered down.

I have developed what I refer to as an "avulsion technique" for removal of adherent areas of tissue. This technique utilizes a hot biopsy forceps to grasp the adherent tissue, followed by application of a mechanical force by pulling the tissue away from the polyp base, all while simultaneously applying very short bursts of a cutting current with minimal cautery (to avoid deep tissue injury). Depending on the area of adherent polyp, this may have to be repeated up to 20 times to achieve complete eradication. This technique is tedious and time consuming and requires patience to avoid grabbing too much tissue at one time.

An alternative technique to remove previously treated polyps is to ablate with argon plasma coagulation (APC); however, this method may not treat deeply enough to eradicate the tissue completely. If ablation is chosen, multiple biopsies of the site for pathologic assessment should be obtained prior to treatment to rule out invasive cancer. I prefer to use ERBE pulsed coagulation.

A variation on this technique is to inject the polyp submucosally prior to ablation, which will allow for higher current settings with protection of the muscularis propria. It is important to note that truly fibrotic polyps do not accommodate any substantial submucosal fluid expansion, and therefore, this technique may have limited applicability for most non-lifting polyps.

7. Q: How can one safely remove polyps in difficult locations, such as around the appendiceal orifice or on the ileocecal (IC) valve?

A: Removal of polyps around the appendiceal orifice is entirely dependent on lifting the neoplastic tissue of the polyp away from the appendiceal lumen with a 1- to 2-mm margin of normal mucosa. To achieve the necessary lift, the injection needle must puncture the mucosa in the center of the appendiceal lumen. I empirically administer antibiotics to prevent appendicitis when performing a saline lift in this fashion.

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Polyps involving the IC valve are perhaps the most challenging to remove. It is difficult to identify a polyp along the inferior lip of the valve and to distinguish an adenoma from the villiform pattern of the ileal mucosa. I routinely use a soft cap on the tip of the endoscope when trying to remove an IC valve polyp. This helps to hold the valve open while injecting the submucosa and to splay apart the angles of the valve.

Retroflexion is very useful but difficult within the cecum and usually requires the use of a pediatric colonoscope and occasionally a gastroscope. Achieving cecal intubation with a gastroscope can be challenging and requires shortening and often rotation of the patient to the right lateral position to minimize looping. Injection of the submucosa of the terminal ileum can help to evert the polyp away from the valve orifice. It is common to have fat in the submucosa, and this should not be alarming or misinterpreted as mesenteric fat. Electrical conductivity is impaired with fat, and increased current settings may be necessary to cut through the tissue.

Due to the lack of a flat surface, complete excision of the polyp is more challenging, so the adjunctive use of the "avulsion technique" described above, with a hot biopsy forceps or APC ablation, may be necessary. The thicker wall of the valve is somewhat protective when using these modalities.

Identification of polyps at the hepatic and splenic flexures may be challenging. Retroflexion in the ascending colon and hepatic flexure with an adult or pediatric colonoscope may help to identify polyps missed on forward-view examination. Removal of polyps in these locations can also be difficult, due to problems orienting the colonoscope and snare in an appropriate plane. Many polyps are best removed in the retroflexed position. Switching to a gastroscope in the left colon makes retroflexion much easier to perform.

8. Q: How do you manage antiplatelet therapy before and after polypectomy?

A: If there is no strong contraindication, all anticoagulants and antiplatelet medications should be stopped one week before colonoscopy, and for one week after, if polypectomy is performed. However, this is not an absolute requirement. In patients in whom antiplatelet therapy cannot be stopped, small polyps can be hot-snared if followed by mechanical closure of the defect using clips. These recommendations do not apply to any patient with a pre-existing condition considered at high risk for bleeding (i.e., renal failure, thrombocytopenia or portal hypertension). Polyp characteristics such as increased size, presence in the cecum or right colon or a large stalk also mandate normal platelet reactivity.

When the risk of stopping an antiplatelet drug is prohibitive due to potential embolic events, I prefer to delay the polypectomy until the drug (or drugs) can be discontinued. If the drug cannot be withheld in the foreseeable future, I would consider removal of a high-risk polyp with mandatory mechanical closure and close observation of the patient for 10 days after removal to ensure absence of bleeding.

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ADDITIONAL RESOURCES

- **ASGE Masters Series Course: *Advancing Techniques in Colonoscopy and Colon Emergencies*, June 22–23,** Oak Brook, Ill. Course Directors Kenneth R. McQuaid, MD, FASGE and John L. Petrini, MD, FASGE
- **Endoscopic Learning Library DVD: "Colonoscopic Polypectomy"** Douglas K. Rex, MD, FASGE, DV030 2.75 *CME Credits* Member price: $125; non-member price: $175
- **Endoscopic Learning Library DVD: "Colonoscopy Technique: Basic and Advanced,"** Douglas K. Rex, MD, FASGE, DV029 2.75 *CME Credits*. Member price: $125; non-member price: $175