

How we resect colorectal polyps <20 mm in size

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## Abstract

We review our approach to resection of colorectal polyps <20 mm in size. Careful inspection of all lesions is appropriate to assess the type of lesion (adenoma vs serrated) and evaluate the risk of cancer, which is highly associated with lesion size. Polyp resection is in the midst of a “cold revolution,” particularly for lesions <10 mm in size, but also for some larger lesions. Cold forceps are sometimes appropriate for 1- to 2-mm lesions that can be engulfed in one bite, but we use cold snaring for almost the entire set of lesions <10 mm. For 10- to 19-mm conventional adenomas, we rely primarily on hot snare resection. Endoscopic mucosal resection (EMR), preferably en bloc, is appropriate for bulky nongranular conventional adenomas and nongranular adenomas with depression in this size range. For sessile serrated polyps 10 to 19 mm in size our approaches differ to some extent, with one of us using primarily “cold EMR,” and the other using primarily hot EMR technique.

## Introduction

Colorectal polyps and flat lesions <20 mm in size constitute 95% of all colorectal neoplasms, and therefore comprise the overwhelming majority of resections performed by colonoscopists. For high-level detectors, about 80% of lesions are  $\leq 5$  mm in size, and 90% are <10 mm in size<sup>1</sup>. The risk of cancer in lesions  $\leq 5$  mm in size is negligible, is far below 1% in lesions for 6 to 9 mm in size, and is about 1% to 2% in lesions 10 to 19 mm in size<sup>1</sup>. Essentially all benign colorectal lesions <20 mm, with an exception of certain lesions extending into the appendix or terminal ileum, are endoscopically resectable, with lower risks and costs than surgical resection. Referral of benign lesions <20 mm in size for surgical resection is a particularly problematic use of resources and puts patients at unnecessary risk. Thus, the modern colonoscopist must be proficient in the safe and effective resection of these colorectal lesions.

If lesions in this size range defy resection, they should be referred to a center with expertise in endoscopic resection, and not to surgery.

#### Definitions

Lesions 1 to 5 mm in size are “diminutive,” those 6 to 9 mm in size “small,” and lesions 10 to 19 mm in size are here called “medium-size” lesions. Lesions  $\geq 20$  mm in size are “large,” and lesions  $\geq 30$  mm in size are may be called “giant.”

#### Polyp assessment and prediction of pathology

For optimal decision-making in polypectomy, the surface of all lesions should be assessed for evidence of deep submucosal invasion before resection. In addition, endoscopic differentiation of serrated polyps from conventional adenomas can affect the approach to resection (see below). Last, the lesion should be accurately delineated. For all these aspects of optical diagnosis, high-definition endoscopes and (virtual) chromoendoscopy have proven their merit.

#### Basics of technique

Polypectomy technique is in the midst of a “cold revolution,” and this is particularly true for polyps  $< 10$  mm in size as well as for some larger lesions. Cold resection, ie, resection without application of electrocautery, is safer than hot resection (with electrocautery), and has a negligible risk of delayed bleeding and perforation.

Like for other aspects of colonoscopy and polypectomy performance, rates of complete polyp resection vary by at least 3-fold among endoscopists<sup>2,3</sup>. The Direct Observation of Polypectomy Skills (DOPyS) scale is designed to assess the quality of polypectomy technique<sup>4</sup>. Practitioners can use the

DOPyS scale to assess their own polypectomies. The fundamentals of high-quality polypectomy are accurate optical diagnosis of the lesion, rotation of the lesion to the 5 or 6 o'clock position, maintenance of optimal distance of the colonoscope tip from the lesion, accurate placement of the snare so that it captures a margin of normal tissue on all sides of the polyp, and washing and inspection of the site after transection. Knowing the principles of effective resection does not mean that an endoscopist has the hand-eye skills to make effective polypectomy happen. Further, effective detection of polyps and effective performance of polypectomy are not well correlated<sup>3</sup>.

#### Diminutive polyps

The primary tool for resection of diminutive polyps is the cold snare. A diminutive-sized snare (around 10-mm diameter) that is stiff and thin will facilitate accurate placement and tissue grasping. Including 1 to several mm of normal tissue around the circumference of the lesion is crucial to ensure complete resection (Figure 1). We use cold snaring as the preferred approach for all lesions 1 to 5 mm in size, though cold forceps are acceptable for polyps 1 to 2 mm in size, particularly if they are flat, very hard to grasp, and cannot be rotated to the 5 o'clock position<sup>5</sup>. A general rule is to never use cold forceps to piecemeal resect because piecemealing with forceps is less effective than snare resection and less efficient. Hot snaring has no role in the resection of diminutive polyps, nor do hot forceps. Electrocautery subjects the patient to unnecessary risks of bleeding and perforation, and hot forceps are frequently ineffective in completing resection<sup>6</sup>. Currently hot forceps have only one role in polyp resection, and that is for hot avulsion of flat or fibrotic residual polyp during endoscopic mucosal resection<sup>7</sup>.

#### Resection of small polyps

For 6- to 9-mm lesions, neither cold nor hot forceps play any role. The primary resection tool is again the cold snare. Because a larger piece of tissue may be grasped, it is occasionally necessary to saw through the submucosa with the cold snare, or to guillotine the tissue by pulling it against the end of the colonoscope. This sometimes leaves a cord of submucosal tissue (Figure 2), which consists of submucosa and occasionally muscularis mucosa<sup>8</sup>. This cord does not require biopsy or treatment.

Use of electrocautery is still appropriate for selected small polyps with bulky sessile or pedunculated shape. However, we use cold snaring for almost the entire set of 6- to 9-mm polyps.

#### Resection of medium-size serrated polyps

The safety of cold snaring can be realized in sessile serrated lesions  $\geq 10$  mm in size with effective eradication<sup>9</sup>. High-definition endoscopy is essential to ensure delineation of all serrated pits and their excision with a wide margin. Submucosal injection with a contrast agent before resection (endoscopic mucosal resection; EMR) further improves visualization of serrated pits at the perimeter of the lesion (Figure 3). This technique, called “cold endoscopic mucosal resection” or “cold EMR” can be considered for serrated polyps in the 10- to 19-mm size range. One of us (DKR) uses cold EMR for most medium sized serrated polyps, whereas the other (ED) prefers hot snaring. These variations in practice are consistent with the limited evidence currently available regarding best practice. Other experts use cold piecemeal resection of serrated polyps of  $\geq 10$  mm without injection<sup>10</sup>. Additional studies on this topic are warranted.

#### Resection of medium-size conventional adenomas

Optimal resection techniques for 10- to 19-mm conventional adenomas are still in evolution. In particular, adequate complete resection rates using cold piecemeal resection and cold EMR for conventional adenomas  $\geq 10$  in size are not yet established.

We use a mixture of approaches to adenomas in this size range, depending on their size and morphology.

For medium-size pedunculated lesions, hot snaring is preferred. These lesions should always be resected en bloc, preferably with the snare positioned at least halfway down the stalk, so as to increase the chance of a clear resection margin in the case of unexpected cancer. Many of these lesions are located in the sigmoid colon and snaring can be facilitated by patient rotation or water filling of the sigmoid. For pedunculated lesions, we prefer low-power coagulation using a microprocessor controlled current. Prophylactic therapy of hemorrhage using loops, adrenalin injection or clips is recommended.

Nonpedunculated lesions should be assessed for endoscopic features of deep submucosal invasion, such as ulceration and disruption of the pit and vascular patterns<sup>11</sup>. Lesions with these features are referred for surgical resection. In the absence of these features, certain other endoscopic features such as nongranular morphology (particularly if depression or bulky sessile shape are present) are associated with a higher risk of superficial submucosal invasion<sup>12</sup>. If resected en bloc, patients with such lesions may be able to avoid surgery.

Therefore, nongranular adenomas in the 10- to 19-mm range, particularly if they are bulky or depressed, should be resected en bloc using electrocautery whenever feasible. Submucosal injection (EMR) reduces risk and will often facilitate en bloc resection. For EMR we generally prefer a predominant cutting current with a microprocessor controlled current delivery. Alternative approaches are to use endoscopic submucosal dissection or the endoscopic full-thickness resection device

## Conclusions

The general trend in resection of colorectal lesions <20 mm in size is to rely as much as possible on snaring rather than forceps resection, and this trend applies even for 1- to 5-mm lesions. For lesions <10 mm in size, cold resection without electrocautery is as or nearly as effective as using electrocautery and nearly devoid of risk.

Initial studies of cold techniques indicate they result in effective eradication of serrated polyps  $\geq 10$  mm in size. The authors' approaches to these lesions vary, reflecting the limited evidence available. Controlled trials of hot EMR versus cold EMR versus cold piecemeal resection without injection are needed.

Cold techniques are not established as effective for conventional adenomas  $\geq 10$  mm. In most 10- to 19-mm conventional adenomas snare resection with electrocautery remains the criterion standard. For nongranular lateral spreading tumors 10 to 19 mm in size, en bloc resection should be the goal, particularly for lesions with features associated with a higher risk of invasive growth.

Pedunculated lesions in the colon are largely conventional adenomas, and when larger than 10 mm they should be removed en bloc by snare resection with electrocautery.

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#### Figure Legends

Figure 1 Proper positioning of the polyp and snare for cold snaring of a diminutive polyp. A, The colonoscope has been rotated so that the polyp position is at 5 o'clock. B, The snare is positioned accurately with a margin of 2- to 3-mm of normal tissue around the polyp ready for capture. C, The snare is closed and the tissue is ready for transection. The *arrows* point to the rim of normal tissue around the polyp ready for the transection.

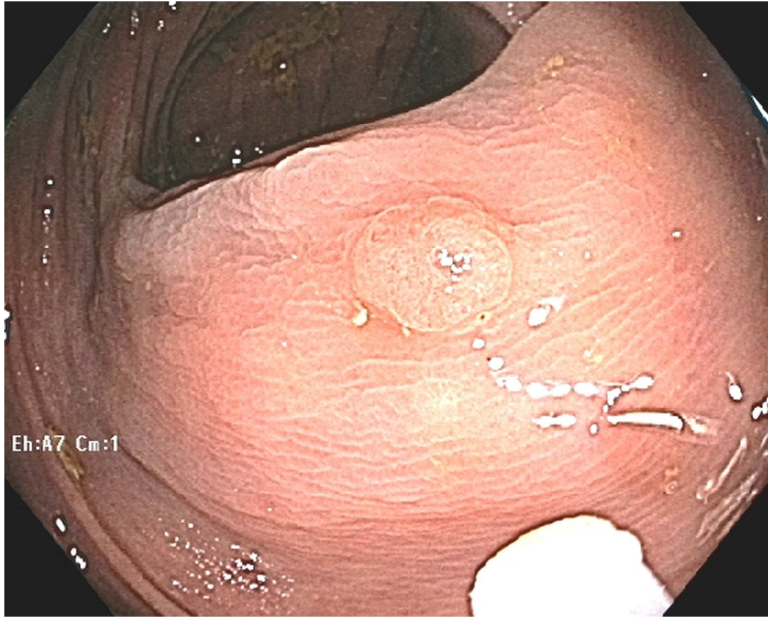
Figure 2. A defect immediately after cold snare resection of a diminutive adenoma (different lesion than in Figure 1). The *red arrow* points to the resected specimen lying unattached at the proximal end of the defect, ready for retrieval. The yellow arrows point to a "submucosal cord," sometimes seen after cold snaring. The cord consists of submucosal tissue and in some cases muscularis mucosa. Cords are commonly seen with cold resection of larger pieces of tissue and/or when larger mechanical force is needed for transection.

Figure 3. Cold endoscopic mucosal resection (EMR) of a 17-mm sessile serrated polyp. A, The lesion seen in white light. B, The lesion seen in narrow-band imaging. C, The lesion after submucosal injection with

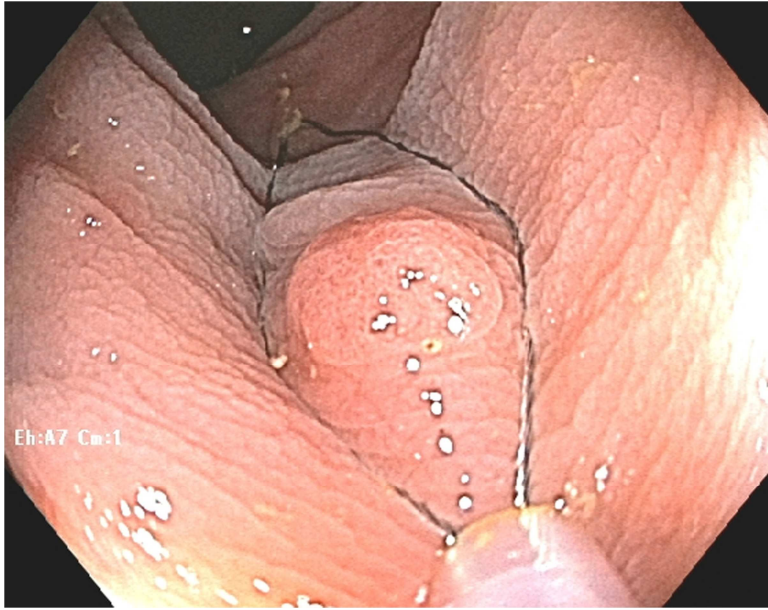


hydroxethyl starch containing indigo carmine. D, The left side shows the developing cold EMR defect after initial snare resection. The *arrows* point to the margin of serrated and normal glands, sharply demonstrated by the submucosal contrast and high-definition imaging. E, The final piece of polyp is about to be resected. The *arrow* points to the margin of serrated and normal glands. A thin wire stiff snare is positioned to remove the remaining serrated polyp and a wide margin of normal tissue. F, The entire cold EMR defect after inspection of the margins to ensure complete resection of the lesion.

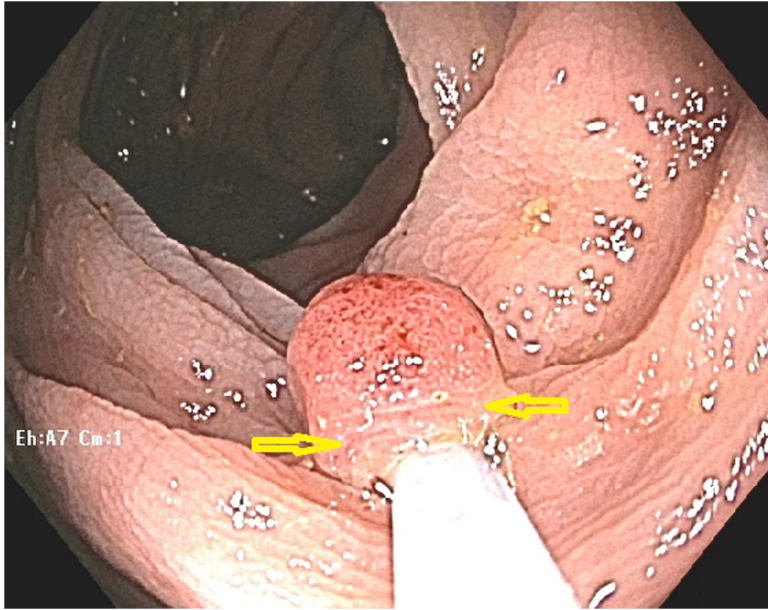
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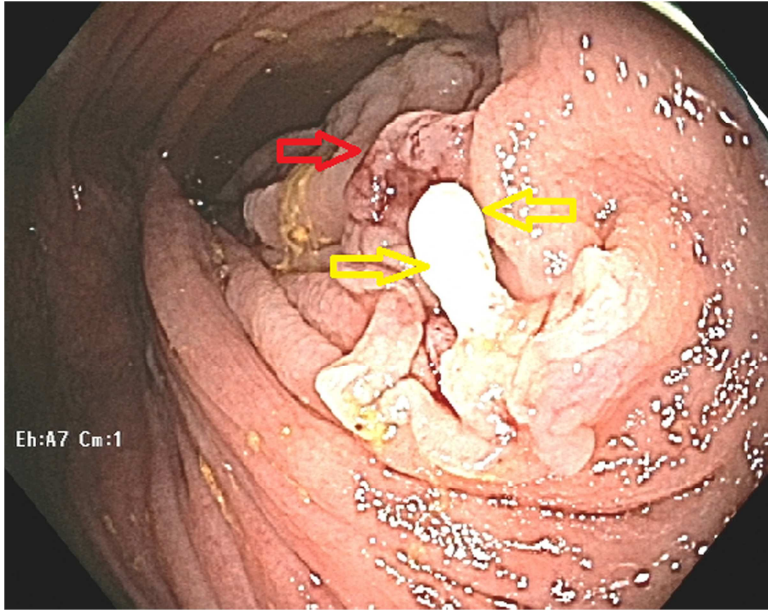
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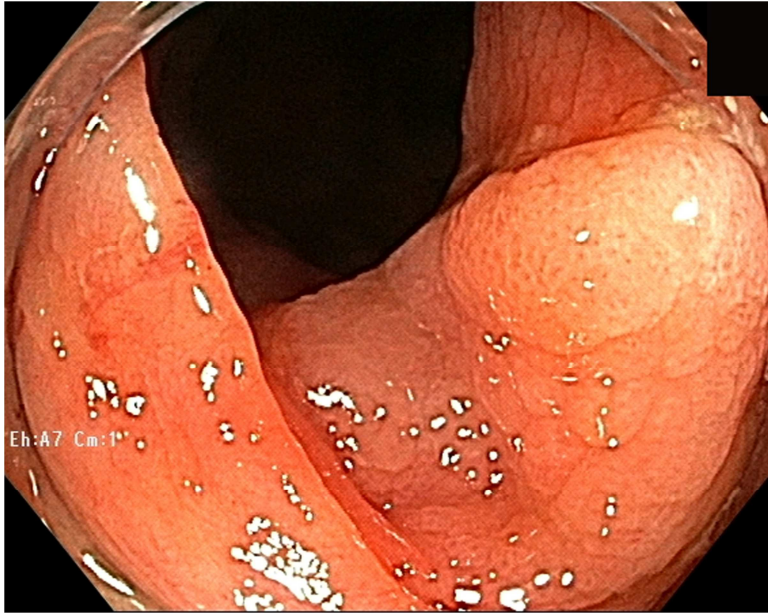
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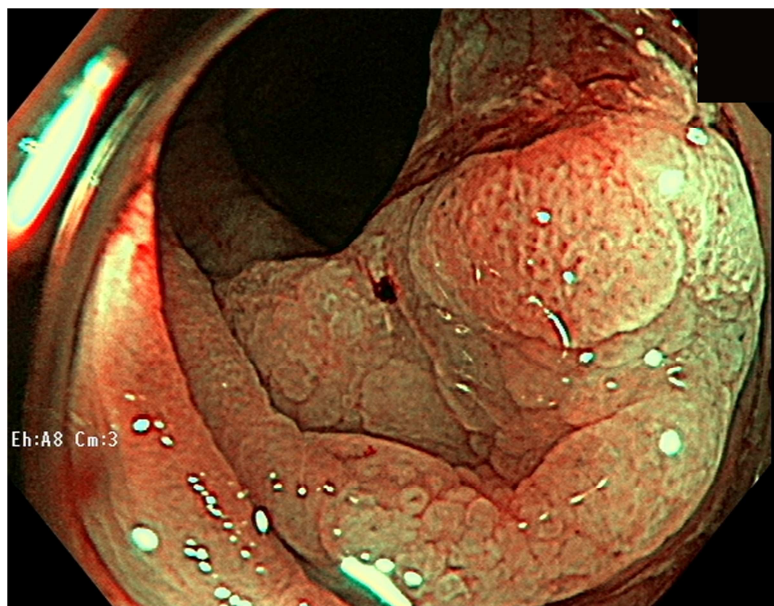
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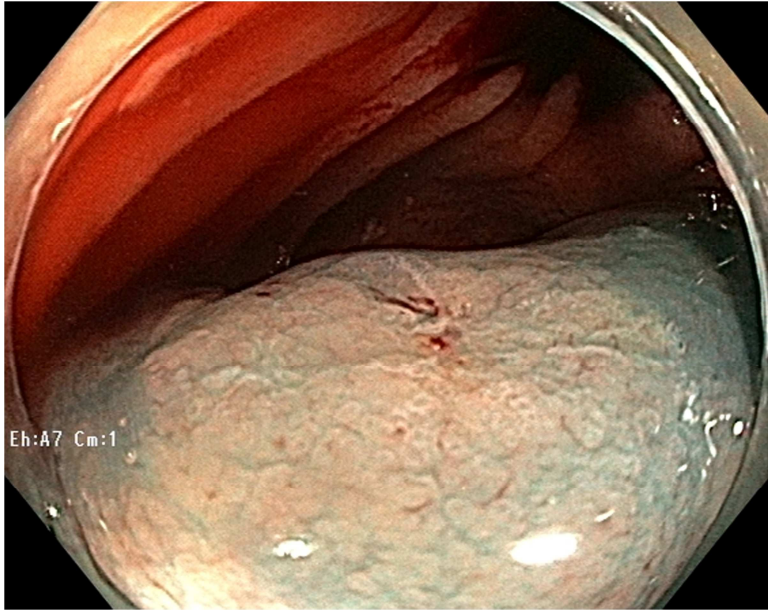
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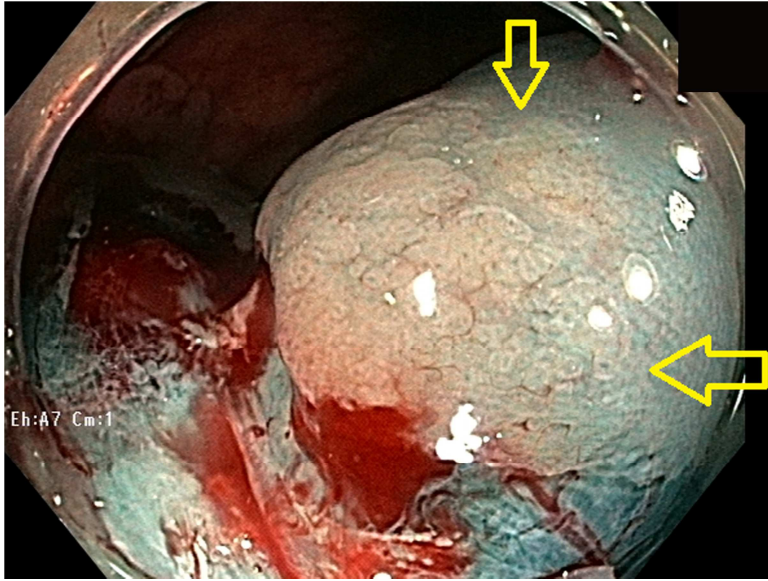


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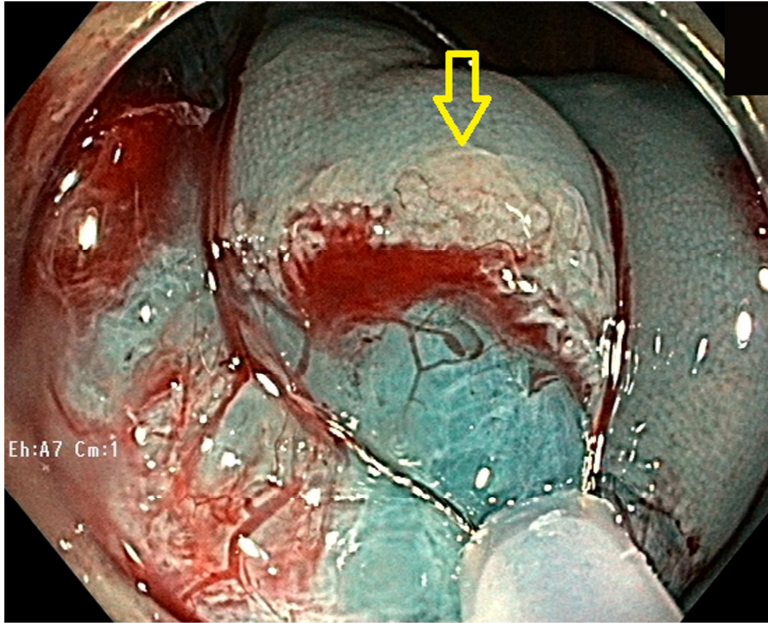


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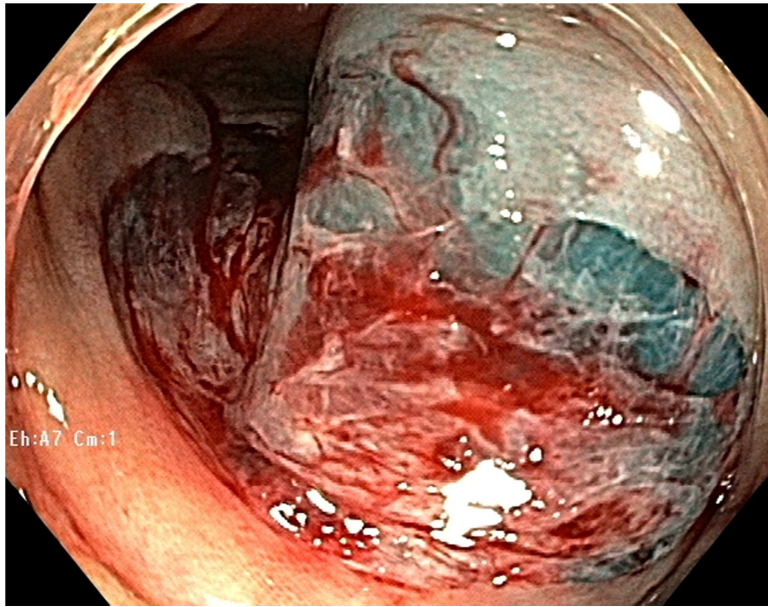




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Acronyms

Mm: millimeters

Vs: versus

EMR: endoscopic mucosal resection

DOPyS: Direct Observation Polypectomy Skills scale

DKR: Douglas K. Rex

ED: Evelien Dekker

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