Colonic polypectomy (with videos)

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The role of colonoscopic polypectomy in the prevention of colorectal cancer is now well-established. Resection of adenomatous colonic polyps reduces colorectal cancer incidence[1] and mortality.[2] Despite this proven effectiveness, polyp resection techniques and outcomes remain understudied, and the potential for improvement in efficacy and safety is high. Advances in endoscopic and electrosurgical technology have allowed the role of endoscopic resection to expand, reducing the reliance on surgery for early cancer and larger or more complex lesions. The optimum resection technique for any given polyp is quick, ensures complete adenoma removal, and minimizes adverse events. Variations in polyp size, morphology, histology, and location mean that there cannot be a "one-size-fits-all" approach to resection technique and that polypectomy must be tailored to the characteristics of the lesion, based on the best available evidence. This review will focus on the technical aspects of endoscopic resection in the colon, highlight areas in which evidence is lacking, and comment on future directions in research.

GRADING OF EVIDENCE

In conducting this review, electronic databases, including MEDLINE/PubMed and the Cochrane Library, were searched for English-language manuscripts by using the keywords "colonoscopy" AND "colon OR colonic OR colorectal" AND "polyp OR neoplasm OR neoplasia" AND "polypectomy OR resection." Studies were included for review if they were well-designed, prospective trials or systematic reviews. Where these were not available, evidence was assessed from large, prospective, observational trials and case series or reports from recognized experts. Each study was assessed according to the GRADE guidelines (Table 1.), and, where sufficient evidence was available, a recommendation was made based on an overall review of the strength of the evidence.[3] Two reviewers independently reviewed the available evidence for each practice point, then arrived at a consensus agreement. Each section of the review contains a summary box of the key findings, an indication of the strength of the evidence supporting that finding, and an indication of whether the statement is strong or weak, based on the available evidence. Existing guidelines were reviewed by searching the National Guideline Clearinghouse for evidence, specifically on the technical aspects of colon polyp resection. Polyp surveillance strategies and the associated evidence are beyond the scope of this review. Before-resection endoscopic assessment of the target lesion is a pivotal component of polypectomy practice but is covered extensively elsewhere so is not addressed in this review.[4] Polypectomy is a technical skill, so there are several aspects that are difficult to objectively study. There is increasing evidence that technique has a strong influence on polypectomy outcomes. As a result, we have provided technical tips to guide endoscopists on achieving efficient and safe excision of lesions. These are not primarily evidence based but are derived from the literature and our own experience, observation, and insights into the understanding of best-practice polypectomy.

A total of 2547 articles were identified by using the search strategy. Titles were initially screened, and 630 articles were deemed relevant for review. Article abstracts were individually evaluated for inclusion. A total of 410 were excluded. The complete texts of the remaining 220 were obtained for the articles that were deemed potentially relevant. In addition, a manual recursive search of the reference sections of the selected studies was performed to identify other

Abbreviations: APC, argon plasma coagulation; ASGE, American Society for Gastrointestinal Endoscopy; CT, Computed tomography; DP, diminutive polyp; EMR, Endoscopic mucosal resection; ESD, endoscopic submucosal dissection; EUS, Endoscopic ultrasound; PRR, polyp retrieval rate; SC-1, first surveillance colonoscopy; SC-2, second surveillance colonoscopy; SSP, sessile serrated polyp.

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TABLE 1. GRADE system for rating the quality of evidence for guidelines[3]

Quality of evidence	Definition	Symbol
High quality	Further research is very unlikely to change our confidence in the estimate of effect.	⊕⊕⊕⊕
Moderate quality	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.	⊕⊕⊕◯
Low quality	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.	⊕⊕◯◯
Very low quality	Any estimate of effect is very uncertain.	⊕◯◯◯

potentially relevant articles. The full manuscripts of these articles were reviewed in detail to prepare a standardized evidence table and generate focused recommendations.

REMOVAL OF DIMINUTIVE AND SMALL POLYPS

Diminutive polyps (DP) are defined as polyps ≤5 mm in size and are extremely common, occurring in 60% to 70% of patients undergoing screening or surveillance colonoscopy.[5] They have a low prevalence of advanced histologic features.[5,6] Although resection of DPs by using cold biopsy forceps is attractive, based on ease, accessibility, and safety, this method has been associated with significant rates of incomplete resection. Complete resection by cold biopsy forceps occurred in only 39% when the adequacy of resection was assessed by performing EMR of the polypectomy site.[7] Another study examined the DP cold biopsy forceps site at endoscopy 1 to 4 weeks after the index resection. Residual adenoma was present in 29%.[8] In contrast to this, a similar recent study has shown that when performed in conjunction with chromoendoscopy and with careful washing and post-resection examination, complete resection was achieved in 90% of DPs and 100% of polyps <3 mm in size.[9] The key concern regarding cold biopsy forceps is that a number of bites may be required to remove the polyp, and immediate bleeding and traumatic disruption of the mucosal surface may interfere with the assessment of the adequacy of resection after that.[10] A median of 2 bites typically is required for complete resection with standard-size biopsy forceps,[7,9] and although using "jumbo" forceps has been shown to reduce the number of bites required for visual eradication of a polyp,[11] no studies have been performed to examine the effectiveness of complete resection for this type of forceps.

Hot biopsy forceps techniques may provide an advantage over cold biopsy forceps polypectomy because of the penumbra of thermal ablation created beyond the focus of tissue excision. However, rates of incomplete resection range from 17% to 22%,[12,13] and the thermal effect results in difficulty with histologic interpretation of the resected specimen.[14-17] It is recommended that hot biopsy forceps are used with a low power, peak voltage limited current, and thought that brief application may reduce thermal injury; however, in practice the majority of studies are performed with a coagulating current, and application time inherently varies.[18,19] Considerable lateral and deep thermal injury can occur with hot biopsy forceps. An in vivo porcine study showed that residual target tissue beneath the hot biopsy forceps ulcer occurred in 15%, lateral mucosal injury was unpredictable, and transmural injury occurred in nearly a third of cases.[15] Observational studies have demonstrated a high delayed bleeding rate associated with hot biopsy forceps use.[19,20] A survey of hot biopsy forceps use by U.S. endoscopists in 13,081 procedures suggested high rates of delayed bleeding (0.41%) and perforation (0.05%), particularly in the right side of the colon.[21] Unquestionably, removal of DPs should be safe. Because of its ineffectiveness and high adverse event rates, hot biopsy forceps cannot be recommended for removal of DPs.

Cold-snare polypectomy has emerged in recent years as a safe and efficient way to remove diminutive and small (≤9 mm) polyps, with lower rates of incomplete resection than biopsy techniques[22] and few adverse events.[23-25] The excision should include a 1- to 2–mm rim around the polyp to ensure complete removal (Videos 1 and 2; available online at www.giejournal.org). Intraprocedural bleeding is common; however, this is typically self-limited and does not result in clinically significant bleeding even in anticoagulated patients.[26] Cold-snare polypectomy is safe for lesions up to 9 mm in size, with negligible rates of bleeding.[23] Cold-snare polypectomy of lesions >6 mm in size is associated with a residual protrusion in the center of the defect (Fig. 1). This is not associated with short-term sequelae; however, the protrusion may contain muscularis mucosa, indicating incomplete mucosal resection. This aspect requires further research. Early follow-up should be considered when the polyp contains high-grade dysplasia.[27] A 2003 survey of U.S. endoscopists showed that 80% used hot snare polypectomy for lesions 7 to 9 mm in size[28]; however, it is likely that in contemporary practice this has decreased substantially. No published studies have examined the rate of incomplete resection in cold-snare polypectomy of small polyps, although some preliminary data suggest that incomplete resection rates