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ABOUT COVER

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The primary aim of World Journal of Gastrointestinal Endoscopy (WJGE, World J Gastrointest Endosc) is to provide scholars and readers from various fields of gastrointestinal endoscopy with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

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EDITORIAL

Cold snare polypectomy: A closer look at the efficacy and limitations for polyps 10-20 mm in size

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Abstract

Current guidelines recommend cold snare polypectomy for polyps less than 10 mm in size. Conversely, endoscopic mucosal resection is still the preferred technique for larger polyps. Concerns regarding cold snare polypectomy for larger polyps revolve around the difficulty in conducting en-bloc resection (resulting in piecemeal removal), and the potential for local residual polyp tissue and a high rate of recurrence. On the other hand, cold snare technique has the advantages of shortening procedure time, reducing delayed bleeding risks and lowering cost of treatment. Numerous ongoing and recent studies are focused on evaluating the risks and benefits of this technique for polyps larger than 10 mm, with the goal of providing clear guidelines in the near future. The aim of this editorial is to provide our readers with an overview regarding this subject and the latest developments surrounding it.

Key Words: Colon polyp; Polypectomy; Cold snare polypectomy; Hot snare polypectomy; Endoscopic mucosal resection; Sessile serrated lesion; Adenoma

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Core Tip: Guidelines recommend using cold snare polypectomy for polyps under 10 mm, while endoscopic mucosal resection is still favored for larger ones. Concerns about cold snare technique for bigger polyps include difficulties in complete resection and higher recurrence rates. However, it offers shorter procedure times, less bleeding risk, and lower costs. Ongoing studies aim to clarify its effectiveness for larger polyps, with updated guidelines expected in the future.



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INTRODUCTION

Colorectal cancer ranks among the leading contributors to cancer-related deaths worldwide. Evidence indicates that endoscopic resection of colorectal polyps not only reduces the occurrence of colorectal cancer but also lowers associated mortality rates[1-3]. Endoscopic polyp resection can be accomplished using biopsy forceps and snares. The principal objective of a successful resection is to achieve complete removal, ensuring no residual polyp tissue is left behind and minimizing the risk of recurrence during follow-up. This should be done with minimal procedural complications, including intra-procedural and post-procedural bleeding and perforation, while also prioritizing efficiency in procedural time and cost-effectiveness. These objectives must be carefully considered when selecting the tool and technique for endoscopic polyp resection. Recommendations for resection methods are provided in guidelines tailored to different types and sizes of polyps.

OVERVIEW OF POLYPECTOMY TECHNIQUES WITH FOCUS ON COLD SNARE POLYPECTOMY

Biopsy forceps and snares serve as the primary instruments for conducting endoscopic polyp resection. When electrocautery is applied in conjunction with these tools, the technique is referred to as hot forceps polypectomy or hot snare polypectomy (HSP), in contrast to cold forceps polypectomy (CFP) and cold snare polypectomy (CSP), which involve resection without electrocautery.

Endoscopic mucosal resection (EMR) is a technique involving injecting a solution into the submucosal space to separate mucosal lesion from underlying muscularis propria and subsequently removing the lesion by snare. Typically, electrocautery is utilized during EMR procedures. However, multiple reports suggest that performing cold snare EMR without electrocautery is both safe and effective, with no significant occurrences of bleeding or perforation noted [4,5].

Prior to initiating CSP, it is crucial to precisely delineate the borders and size of the polyp. This step is particularly important when dealing with polyps that extend proximally to a fold and when managing sessile serrated lesions (SSL), where delineating the borders may be challenging. In such cases, using a transparent cap or retroflexion in the cecum (to visualize the mucosa proximal to the fold), near-focus imaging if available, and/or the injection of contrast agents like methylene blue or indigo carmine can help in identifying the borders for polypectomy[6].

After defining the borders of the polyp, it is essential to attempt to position it optimally for resection. Typically, this involves placement of the polyp at the 5 to 7 o'clock positions to align with the location of the colonoscope's accessory channel, while ensuring a short distance to the polyp. Different manufacturers offer dedicated snares for CSP, featuring similar characteristics designed to facilitate tissue capture, such as a thin, stiff wire with a braided configuration. Opting for a stiff, thin wire snare is optimal for CSP, particularly since many of these polyps display nonpolypoid morphology, where other snares might tend to "slip". In a study comparing the complete resection rates of CSP based on the type of snares employed, the percentage of negative pathologic margins in specimens removed with a dedicated CSP snare was significantly higher than those removed with a conventional snare that can also be used for HSP. This suggests that employing a dedicated snare contributes to achieving a higher complete resection rate[7]. CSP offers advantages across multiple aspects of the procedure, including safety, effectiveness, and procedural efficiency. By avoiding the use of electrocautery, it has the advantage of reducing the risk of delayed post-polypectomy bleeding which can require hospitalization or repeat procedures[8,9]. This not only improves patient safety but also results in cost savings by eliminating the need for prophylactic measures against bleeding, such as clip placement. CSP requires less time than HSP, as it skips the step of preparing equipment for electrocautery application, resulting in shorter overall procedure times and reduced procedure costs. For diminutive (≤ 5 mm) and small (6-9 mm) polyps, CSP achieves comparable complete resection rates to HSP. However, for larger polyps (10-20 mm), there is a potential risk of incomplete resection with CSP, resulting in a higher risk of recurrence. This will be discussed in the next 2 sections, starting with a summary of the current guidelines for polypectomy according to polyp size, followed by an examination of the evidence concerning the safety and effectiveness of CSP for polyps sized 10-20 mm.

CURRENT GUIDELINES FOR POLYPECTOMY

The United States Multi-Society Task Force on Colorectal Cancer advocates for CSP as the preferred method for removing diminutive (\leq 5 mm) and small (6-9 mm) lesions. It advises against the utilization of CFP for diminutive lesions, except in cases where lesions are smaller than 2 mm, where large-capacity forceps polypectomy may be considered if CSP proves technically challenging[10]. This recommendation is based on the consistent high rates of complete resection and the favorable safety profile observed with CSP, as opposed to the higher rate of incomplete resection commonly seen with CFP. Likewise, the guidelines from the Japan Gastroenterological Endoscopy Society recommend the use of CSP for



lesions smaller than 10 mm that are preoperatively diagnosed as adenoma and can be resected completely *en-bloc*. They also consider CFP acceptable for the removal of polyps $\leq 3 \text{ mm}$ in size[11]. The recently updated European Society of Gastrointestinal Endoscopy (ESGE) guideline echoes the recommendations from the United States and Japan, advocating for CSP for removing diminutive polyps (size \leq 5 mm) and sessile polyps between 6 mm and 9 mm, with an additional recommendation to include a clear margin of normal tissue (1-2 mm) surrounding the polyp[12]. However, it differs from other guidelines by advising against the use of cold biopsy forceps excision for diminutive polyps due to its higher rate of incomplete resection. For polyps 10-19 mm in size, which are the focus of our discussion, the United States Multi-Society Task Force suggests CSP or HSP with or without submucosal injection while until recently, the ESGE recommended HSP, with or without injection^[13]. The recently updated ESGE guideline provides specific recommendations for this size category, advocating HSP for nonpedunculated adenomatous polyps of 10-19 mm, piecemeal CSP for SSL without dysplasia of the same size, and suggesting submucosal injection in both cases. For SSL with dysplasia, HSP with en-bloc excision of the dysplastic component is recommended. Additionally, consideration of piecemeal cold snare EMR is suggested for carefully selected flat adenomas of 10-19 mm (granular homogeneous large non pedunculated colon polyps), particularly in the right colon and especially when comorbidity levels are high, to reduce the risks of deep mural injury and delayed post-EMR bleeding[12]. In a practice guideline published recently, the American Gastroenterological Association states that clinicians should be familiar with various polypectomy techniques, such as CSP and HSP and EMR, to ensure effective, safe, and optimal resection of intermediate-size polyps (10-19 mm)[14]. In summary, for polyps ranging from 10 to 20 mm, there's a lack of consensus among guidelines, with recommendations influenced not only by the polyp's size, but also by its morphology and histology as assessed by endoscopic tools during the procedure. This underscores the importance for endoscopists to be acquainted with the Paris classification, which categorizes polyps based on morphology, and with chromoendoscopy techniques (both dye-based and virtual), which aid in predicting histology and invasion depth.

CSP FOR POLYPS BETWEEN 10-20 MM IN SIZE

Risk of bleeding

The risk of bleeding associated with CSP has been thoroughly investigated in observational and prospective studies, often compared to HSP. Some of these studies looked specifically at CSP for polyps 10-20 mm in size. In a retrospective cohort study looking at complications of CSP vs HSP of polyps 10-20 mm in size, 258 polyps were removed by HSP, with a median size of 15 mm, compared to 346 polyps that were removed by CSP, with median size of 12 mm. In the HSP group, 15 patients presented with post-procedure complications (clinically significant bleeding, post-polypectomy syndrome and abdominal pain) whereas no complications were seen in the CSP group[15]. The major limitation of this study was its retrospective nature and the potential selection bias in the endoscopists' choice of HSP vs CSP for particular polyps. This study was one of 23 included in a recent meta-analysis, which compared CSP and HSP techniques across various polyp sizes [16]. The primary outcome assessed in the analysis was the occurrence of delayed post-polypectomy bleeding. It demonstrated a significant decrease in the incidence of delayed post-polypectomy bleeding with CSP overall, as well as within the subgroup of polyps 10-20 mm in size.

Many studies have assessed bleeding risk with CSP for 10-20 mm polyps but haven't compared it directly with HSP. A prospective study looking at CSP of 474 SSL larger than 10 mm showed a 3% rate of immediate bleeding and no delayed bleeding, irrespective of the use of antithrombotic drugs[17]. This study offered an added advantage by evaluating the risk of bleeding among patients on antithrombotic medications. Limitations of this study include its single-center design and the absence of comparisons to HSP and EMR techniques.

Two systematic reviews looked at the risk of bleeding of cold snaring technique. The first included 8 studies looking at CSP of more than 500 polyps larger than 10 mm. It showed low post-polypectomy bleeding rates (0.7% for intraprocedural bleeding and 0.5% for post procedural bleeding)[18]. In the second review including 7 randomized controlled trials, a comparison between cold EMR and CSP revealed low immediate bleeding rates (1.2% to 1.4%, respectively) and delayed bleeding rates (0.5% to 0.6%, respectively) across polyps of all sizes and no significant differences were observed between the two groups. However, while the subgroup analysis of polyps larger than 10 mm did not show a difference between cold EMR and CSP regarding adverse events, specific data on bleeding were not provided for this subgroup[19].

Complete resection and recurrence rate

When examining complete resection and recurrence rates for polyps larger than 10 mm using CSP, various reports have taken different approaches. Some studies have directly compared CSP and HSP, while others have reported only the rates of complete resection and recurrence in cold snaring technique. Additionally, certain studies have focused on specific types of polyps, such as adenomas and SSL. Furthermore, some studies have compared CSP resection and recurrence rates in polyps of different size categories, including those larger than and less than 10 mm in size.

Pooled risk ratio from a recent updated systematic review including 18 randomized controlled trials with a total of 4317 patients and 7509 polyps favored HSP over CSP regarding the complete histologic resection rate and local recurrence incidence in polyps of all size. There was a trend towards decreased complete resection with larger polyp size although the review did not specifically compare specific size groups^[20].

In a retrospective study looking at resection rates of CSP vs HSP in more than 4000 colonoscopies, the resection rate was similar between CSP and HSP for adenomas sized 5-10 mm (89.4% vs 87.9%) as well as 11-20 mm (81.8% vs 80.9%). In this study, SSL were included in the analysis as adenomas. Completeness of resections was assessed histologically[21]. In polyps 11-20 mm in size, there was a trend towards a higher resection rate in serrated adenomas after HSP, but this was



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not significant (CSP: 66.7% vs HSP: 78.3%, P = 0.61).

A retrospective review of lesions resected by CSP with available follow up data looked at the histological complete resection and the local recurrence rates^[22]. Comparing 74 lesions larger than 10 mm and 480 lesions less than 10 mm in size, significant differences were observed in the *en-bloc* resection rate (93.2% vs 100%), and histopathological complete resection rate (54.0% vs 72.7%). The recurrence rates of these two groups were 5.4% and 1.4%, respectively. In this review, the complete resection rates, both for lesions smaller and larger than 10 mm, were much lower than those reported in other studies.

A systematic review looking specifically at non pedunculated polyps larger than 10 mm including more than 500 polyps removed with CSP technique showed an excellent complete resection rate of 99.3% but this was defined as macroscopic resection. Overall pooled residual rates of polyps of any histology, adenomas, and SSLs were 4.1%, 11.1%, and 1.0%, respectively, during a follow-up period ranging from 154 to 258 days[18].

A meta-analysis comparing cold EMR and CSP, complete resection was similar in both groups for polyps < 10 mm and polyps > 10 mm in size[19]. It included 7 RCT and a total of 2287 polyps, and complete resection was defined as either no residual lesion in biopsy samples performed after polypectomy or when muscularis mucosae was present under the tumor along more than 80% of the tumor's horizontal dimension.

A prospective observational study compared incomplete resection rate of small (5-10 mm) and large (10-15 mm) polyps removed with CSP[23]. A total of 440 polyps were removed. The overall incomplete resection rate was 2.27%, with no significant difference between the 2 groups [1.98% for small (5-9 mm) vs 3.45% for large (10-15 mm) polyps]. The incomplete resection rate was defined as the proportion of incomplete resections indicated by presence of residual neoplasia on biopsy taken from resection margins.

A multicenter prospective observational study looking at effectiveness and safety of CSP and cold EMR for polyps 10-19 mm in size showed an incomplete resection rate of 2% and a recurrence rate of 1.7% (median follow up of 9.7 months). Most polyps removed were adenomas and with Paris 0-IIa morphology. Incomplete resection was defined as residual polypoid tissue on biopsies taken from resection margins^[24].

A prospective study on the safety and efficacy of CSP without submucosal injection for SSL ≥ 10 mm looked at 474 SSL from 300 patients. The complete resection rate, defined as lack of residual serrated tissue on biopsy from margins after polypectomy, was 98.8% and no recurrence was detected after a median follow up period of 7 months[17].

A retrospective study looking at CSP for SSL 10-20 mm in size showed recurrence rate of 5% (median follow up period of 18 months)[25]. Another retrospective study included 615 SSL larger than 10 mm and showed recurrence rate of 7.8% (median follow up period of 24 months)[26].

In summary, the data regarding the safety of CSP for polyps between 10 mm and 20 mm in size is quite convincing. The evidence indicates a favorable outcome in terms of intra-procedural bleeding and delayed bleeding rates, demonstrating CSP's superiority over HSP in many cases. However, the data regarding the complete resection rate and recurrence rate is less compelling. This is primarily due to significant heterogeneity among the studies investigating these parameters. This heterogeneity can be attributed to several factors. Firstly, there is a lack of standardized definition for complete resection among studies, with some relying on histological assessment while others use macroscopic appearance or residual tissue presence on biopsies from resection margins. Secondly, most studies lack consistent analysis of outcomes based on polyp histology and morphology. Lastly, variations in follow-up periods across studies also play a role in the observed heterogeneity.

Future prospective trials should agree on the standard definition of complete resection and the optimal follow up duration to determine recurrence. They should always incorporate polyp size, morphology and histology when analyzing outcomes and standardize polyp size measurement during colonoscopy. Once more reliable data is available about effectiveness of CSP, cost effective analysis should be performed comparing CSP and HSP.

Based on the current available data, and pending further comparative studies on polypectomy techniques, experts in the field suggest that flat polyps (Paris IIa or IIb) and serrated lesions 10 to 20 mm in size can be effectively and safely removed with cold resection whereas bulky polyps of this size with sessile morphology and adenomatous histology are less likely to be effectively removed using cold resection [14]. Endoscopists should always consider the risk of incomplete resection and recurrence when considering CSP for polyps 10-20 mm in size and when in doubt, should opt for HSP to avoid these risks.

CONCLUSION

The ideal technique for resection of polyps 10-20 mm in size remains a subject of debate, leading to discrepancies in recommendations across different guidelines. CSP presents an attractive option due to its favorable safety profile, as well as its efficiency in terms of time and cost. However, further studies focusing on specific polyp morphology and histology are required to ascertain whether CSP is comparable to HSP in achieving complete resection and recurrence rates.

FOOTNOTES

Author contributions: Chaptini LA conceived the original idea, designed the editorial framework, reviewed the literature, and wrote the final version; Jalloul S and Karam K gathered data and reviewed literature used in the editorial.

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