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Cold versus hot snare polypectomy for pedunculated colorectal polyps: A systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 July 2026 and was last updated on 14 July 2026.

INTRODUCTION

Review question / Objective Population: Patients with pedunculated colorectal polyps (0-Ip morphology).
Intervention: Cold snare polypectomy (CSP).
Comparison: Hot snare polypectomy (HSP).
Outcomes: Primary: delayed post-polypectomy bleeding (DPPB), immediate post-polypectomy bleeding (IPPB), and perforation. Secondary: complete resection rate, polypectomy time, and titanium clip use.
Study design: Comparative studies (randomized controlled trials and retrospective cohorts).

Objective: To compare the safety and efficacy of CSP versus HSP for resection of pedunculated colorectal polyps, with a focus on bleeding risks and other procedural outcomes, to inform clinical practice and guideline development.Cold snare polypectomy (CSP) decreases the risk of delayed postpolypectomy bleeding (DPPB) in patients with pedunculated colorectal polyps measuring ≤10 mm; however, head-to-head comparisons with hot snare polypectomy (HSP) remain scarce. This meta-analysis compared their safety.

Condition being studied Colorectal polyps are abnormal growths arising from the mucosal lining of the colon or rectum. Among these, pedunculated polyps (0-Ip) are characterized by a spherical or lobulated head attached to a distinct stalk containing a central vascular core. While most colorectal cancers develop from adenomatous polyps, pedunculated morphology poses a unique therapeutic challenge because the stalk's prominent blood supply increases the risk of bleeding after endoscopic removal. These polyps are commonly detected during screening colonoscopy, and their complete and safe resection is essential to prevent malignant progression. However, the optimal polypectomy technique for pedunculated lesions—particularly small-to-medium sized ones—remains debated, given the trade-off between preventing immediate versus delayed bleeding complications.

METHODS

Participant or population His systematic review will include patients undergoing colonoscopy who are found to have pedunculated colorectal polyps (0-Ip morphology), irrespective of age, sex, race, or nationality. The polyp size is predominantly limited to ≤10 mm (four studies), with one additional study including polyps with a stalk ≤5 mm and a head size ≤15 mm. Included patients may be receiving antithrombotic therapy (e.g., antiplatelet agents or anticoagulants) or may not be on such treatment. Patients with hereditary polyposis syndromes (e.g., familial adenomatous polyposis), inflammatory bowel disease-associated polyps, or established colorectal cancer will be excluded.

Intervention The intervention of interest in this systematic review is cold snare polypectomy (CSP). This technique uses a snare to mechanically encircle and resect pedunculated colorectal polyps without the application of electrocautery current, relying entirely on physical transection for polyp removal. The CSP procedure involves advancing the snare through the working channel of the colonoscope, positioning the snare loop around the stalk of the polyp, and then mechanically tightening the snare to sever the stalk, without using any high-frequency electrocautery for hemostasis. This intervention will be compared against the control intervention—hot snare polypectomy (HSP)—which uses the same snare-based resection steps but simultaneously applies high-frequency electrocautery current during the cutting process to achieve both resection and immediate hemostasis. This review will synthesize and compare the safety and efficacy outcomes of these two snare-based polypectomy techniques for pedunculated colorectal polyps.

Comparator The comparator in this systematic review is hot snare polypectomy (HSP). This technique, when used for resecting pedunculated colorectal polyps, involves placing a snare around the polyp stalk and applying high-frequency electrocautery current simultaneously with mechanical cutting to achieve both resection and immediate hemostasis. HSP is the standard technique for endoscopic resection of pedunculated colorectal polyps and is recommended as the preferred resection method for pedunculated polyps by multiple national and international guidelines. This review uses HSP as the reference benchmark to evaluate the comparative safety and efficacy of CSP relative to this established standard of care, specifically by comparing the two techniques across outcomes including delayed bleeding, immediate bleeding, perforation, complete resection rate, procedure time, and hemostatic clip use.

Study designs to be included This systematic review will include comparative studies, including:1. Randomized controlled trials (RCTs) — irrespective of whether blinding was employed;2. Non-randomized comparative studies, including prospective or retrospective cohort studies.The following study types will be excluded: case reports, case series, cross-sectional investigations, review articles, animal studies, basic research, and single-arm studies without a control group. No language restrictions will be applied.

Eligibility criteria Additional inclusion and exclusion criteria

Inclusion criteria:

1. Patients with colonoscopy- and pathology-confirmed pedunculated colorectal polyps (0-Ip morphology);
2. Studies that explicitly compare CSP with HSP;
3. Studies reporting at least one of the following outcomes: delayed bleeding, immediate bleeding, perforation, complete resection rate, procedure time, or clip use;
4. Polyp size ≤20 mm (as the largest polyp in the included studies was 19 mm);
5. Both published and unpublished original studies, without time restrictions on publication.

Exclusion criteria:

1. Polyps of non-pedunculated morphology (e.g., sessile, flat, or laterally spreading);
2. Patients with hereditary polyposis syndromes (e.g., familial adenomatous polyposis) or inflammatory bowel disease;
3. Polyps with confirmed malignancy or invasive carcinoma;
4. Studies that do not provide extractable comparative data between CSP and HSP groups;
5. Duplicate publications (only the most complete or most recent version will be included);
6. Studies for which the full text is unavailable and insufficient information can be obtained after contacting the authors.

Information sources This systematic review will systematically search the following electronic databases from their inception dates through 1 July 2026:

1. Cochrane Library (including the Cochrane Central Register of Controlled Trials);
2. PubMed (including MEDLINE);

3. EMBASE;
4. China National Knowledge Infrastructure (CNKI);
5. Wanfang Data Knowledge Service Platform.

In addition, supplementary searches will be conducted through the following approaches:

· Manual screening of the reference lists of included studies and relevant review articles;
· Searching ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform (ICTRP) for unpublished or ongoing clinical trials;
· Searching Google Scholar for grey literature;
· Contacting study authors when necessary to obtain missing data or clarify study details.

No language restrictions will be applied. All retrieved records will be imported into reference management software for deduplication and screening.

Main outcome(s) The primary outcomes of this systematic review are safety indicators, specifically including:

1. Delayed post-polypectomy bleeding (DPPB) — defined as lower gastrointestinal bleeding occurring 12 hours to 30 days after polypectomy, accompanied by gross hematochezia, a hemoglobin drop >2 g/dL, a blood pressure drop >20 mmHg, or a pulse rate increase ≥20%. The effect measure is the odds ratio (OR) .
2. Immediate post-polypectomy bleeding (IPPB) — defined as oozing from the resection site lasting >30 seconds during the polypectomy procedure. Based on study definitions, this is categorized into two types: ① strict definition (requiring endoscopic intervention); ② broad definition (intervention not mandatory). The effect measure is the OR. In cases of significant heterogeneity, a random-effects model will be used with subgroup analyses.
3. Perforation — defined as full-thickness defect of the colonic wall requiring endoscopic clip closure or surgical intervention. Due to the extremely low event rate, only descriptive analysis will be performed.

All primary outcomes will be extracted directly from each study, with a uniform follow-up period of 30 days post-procedure. Effect estimates will be reported with 95% confidence intervals (CIs) , and the significance level will be set at α=0.05.

Additional outcome(s) The secondary outcomes of this systematic review include the following efficacy and procedure-related indicators:

1. Complete resection rate (CRR) — defined as the absence of visible polyp tissue at the resection margin after polypectomy, confirmed by pathological assessment (e.g., negative margins). If studies use pathological evaluation (e.g., tumor-free margins), data will be extracted accordingly. The effect measure is the OR.
2. Polypectomy time — defined as the interval from snare entry into the endoscopic field to the completion of wound management (including clip closure, if performed), measured in seconds. The effect measure is the mean difference (MD) .
3. Number of hemostatic clips used — defined as the total number of clips deployed for prophylactic or therapeutic purposes during the polypectomy procedure, measured in units. The effect measure is the MD.

All secondary outcomes will be extracted according to the original definitions used in each study. In cases of significant heterogeneity, a random-effects model will be used. For polypectomy time and clip use, sensitivity analyses will be performed to evaluate the robustness of the results. The significance level will be set at α=0.05, and all effect estimates will be reported with 95% CIs. For outcomes with missing data or those unsuitable for meta-analysis (e.g., perforation), only descriptive summaries will be provided.

Data management All retrieved records will be imported into EndNote X9 reference management software for unified management. Duplicate records will first be removed using the software's automatic deduplication function. Subsequently, two independent reviewers (YC-L and YH-Y) will screen the records against the pre-established inclusion and exclusion criteria through two phases: title/abstract screening and full-text screening. Any disagreements during the screening process will be resolved through discussion and consensus; if agreement cannot be reached, a third reviewer (JJ-L) will adjudicate.

After screening is completed, the finally included studies will undergo data extraction using standardized data extraction forms. The extracted information will include basic study characteristics (first author, publication year, country, study design), patient characteristics (sample size, age, sex, antithrombotic therapy status), polyp characteristics (number, size, morphology), intervention details (CSP and HSP operational parameters), and all outcome data.

All data extraction will be performed independently and in duplicate by two reviewers, followed by cross-verification. Any discrepancies will be

resolved by referring back to the original articles and reaching consensus through discussion. Extracted data will be organized and coded in Excel spreadsheets (Microsoft Excel 2021) and subsequently imported into RevMan (Cochrane Collaboration) and Comprehensive Meta-Analysis v3 (Biostat) for statistical analysis.

To minimize data entry errors, all data will undergo double-entry and cross-validation. All decisions, screening records, and data extraction forms generated during the review process will be properly archived to ensure traceability and facilitate future verification.

Quality assessment / Risk of bias analysis Two independent reviewers (YC-L and YH-Y) will assess the methodological quality of the included studies, with disagreements resolved through discussion or adjudication by a third reviewer (JJ-L).

· For randomized controlled trials: The Cochrane Risk of Bias tool (RoB 2.0) will be used to evaluate the following domains: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, completeness of outcome data, selective reporting, and other sources of bias. Each domain will be rated as "low risk," "high risk," or "unclear risk."
· For non-randomized studies (retrospective or prospective cohort studies): The Newcastle-Ottawa Scale (NOS) will be employed, assessing three aspects: ① selection of the study population (4 items); ② comparability of cohorts (2 items); ③ assessment of outcomes (3 items). The maximum score is 9 points, with scores ≥7 indicating high methodological quality.

The results of the quality assessment will be presented in tabular format and will be used in sensitivity analyses and subgroup analyses to examine the impact of study quality on the pooled effect estimates.the RCT included were at low risk of bias for randomization, incomplete data or selective data reporting, but which was not blinded. These retrospective studies yielded a high score (≥7) on the Newcastle-Ottawa scale.

Strategy of data synthesis This systematic review will use RevMan (Cochrane Collaboration) and Comprehensive Meta-Analysis v3 (Biostat) for statistical analysis.

Effect measures: For dichotomous variables, the odds ratio (OR) with its 95% confidence interval (CI) will be used; for continuous variables, the mean difference (MD) with its 95% CI will be applied. All tests will be two-sided, and $P < 0.05$ will be considered statistically significant.

Model selection: Heterogeneity will be assessed using the chi-square test (significance level $\alpha = 0.1$) in combination with the I^2 statistic. If $I^2 \leq 50\%$ and $P \geq 0.05$, a fixed-effects model (Mantel-Haenszel method) will be used; if $I^2 > 50\%$ and $P < 0.05$, a random-effects model (DerSimonian-Laird method) will be applied, and sources of heterogeneity will be explored.

Subgroup analyses: For immediate post-polypectomy bleeding, subgroup analyses will be performed according to strict versus broad definitions.

Sensitivity analyses: The leave-one-out method will be used to assess the impact of individual studies on the pooled effect estimates and to test the robustness of the results.

Descriptive analysis: For data unsuitable for meta-analysis (e.g., perforation), only descriptive summaries will be provided.

Publication bias: If ≥10 studies are included, funnel plots and Egger's test will be used to assess publication bias.

Subgroup analysis This systematic review will perform subgroup analyses for the following situations to explore sources of heterogeneity and differences in effect estimates under various conditions:

1. Definitions of IPPB: Subgroup analyses will be conducted according to strict definitions (requiring endoscopic intervention) versus broad definitions (oozing >30 seconds but intervention not mandatory) for immediate post-polypectomy bleeding, to verify whether this factor is a major source of heterogeneity.
2. Antithrombotic therapy: Analyses will be stratified according to whether patients are receiving antithrombotic therapy (antiplatelet or anticoagulant agents), to evaluate the safety profile of CSP across different bleeding-risk populations.
3. Polyp size: If data permit, subgroup analyses will be performed for polyp diameters ≤10 mm versus 10–15 mm, to assess the applicability of CSP across different polyp sizes.
4. Study design: Stratification will be performed according to randomized controlled trials versus retrospective cohort studies, to assess the impact of study design on effect estimates.

Results of subgroup analyses will be presented in forest plots, and P-values for between-group differences will be reported. If a subgroup contains 0.05), suggesting that the heterogeneity was attributable mainly to the different definitions of IPPB. Specifically, in the strict-definition subgroup, the pooled OR was 34.61 (95% CI: 20.30–59.01), while in the broad-definition subgroup, it was 2.96 (95% CI: 1.68–5.22).

Sensitivity analysis To assess the robustness of the meta-analysis results, this systematic review will perform the following sensitivity analyses:

1. Leave-one-out analysis: Each included study will be sequentially excluded, and the pooled effect estimates will be recalculated from the remaining studies to evaluate whether any single study has a decisive impact on the overall results. If the direction or statistical significance of the pooled effect changes after excluding a particular study, the results will be considered sensitive to that study and should be interpreted with caution.
2. Quality-stratified analysis: Based on the quality assessment results, meta-analyses will be repeated by including only high-quality studies (NOS score ≥7 or RoB 2.0 rated as low risk), to examine whether low-quality studies introduce bias into the pooled estimates.
3. Model transformation: For the primary outcomes, meta-analyses will be performed using both fixed-effects and random-effects models. The effect estimates derived from the two models will be compared to assess the impact of model choice on the conclusions.
4. Exclusion of non-randomized studies: Meta-analyses will be repeated by including only randomized controlled trials, to evaluate the influence of retrospective cohort studies on the overall conclusions.

If the sensitivity analysis results are consistent with the main analysis, the conclusions will be considered robust and reliable. If discrepancies exist, they will be carefully interpreted in the Discussion section, and the certainty of the conclusions will be accordingly downgraded. All sensitivity analysis results will be presented as supplementary materials.

Language restriction No language restrictions will be applied. Both English and non-English publications will be included, with translation assistance used as needed.

Country(ies) involved All included studies originate from Asia: Japan (Arimoto et al., Kudo et al.), and China (Li et al., Wang et al.).

Other relevant information This study received no specific funding from any public, commercial, or not-for-profit funding bodies. The authors declare no conflicts of interest. Data sharing is not applicable to this article as no new data were created or analyzed in this protocol stage. Upon completion, the full review will be submitted for peer-reviewed publication and, where possible, made openly accessible to support evidence-based practice and future guideline development.

Keywords Cold snare polypectomy; hot snare polypectomy; pedunculated polyps; delayed post-polypectomy bleeding; meta-analysis.

Dissemination plans The findings of this systematic review and meta-analysis will be disseminated through multiple channels to maximize impact and accessibility. The full manuscript will be submitted for publication in a peer-reviewed, high-impact gastroenterology or endoscopy journal following the PRISMA reporting guidelines. Additionally, key results will be presented at major international gastroenterology conferences (e.g., Digestive Disease Week, United European Gastroenterology Week) to reach a broad clinical audience. A plain-language summary will be prepared for patient advocacy groups, clinical practitioners, and healthcare policymakers to facilitate translation of evidence into practice. Where institutional or funder policies permit, the final accepted manuscript will be deposited in an open-access repository (e.g., PubMed Central, institutional repository) to ensure free and permanent availability. All data extraction forms, analysis scripts, and supplementary materials will be made available upon reasonable request to promote transparency and reproducibility. Finally, we will actively engage with social media and professional networks (e.g., Twitter/X, ResearchGate, WeChat academic groups) to highlight key findings and stimulate academic discussion. This multi-pronged dissemination strategy aims to ensure that the evidence generated reaches diverse stakeholders, thereby contributing to guideline refinement and improved patient care in colorectal polypectomy.

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