Effectiveness and safety of thin vs. thick cold snare polypectomy of small colorectal polyps: Systematic review and meta-analysis

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ABSTRACT

Background and study aims Cold-snare polypectomy (CSP) is considered the standard of care for resection of colorectal polyps ≤10 mm. Data on the efficacy of CSP performed with thin-wire snares compared0 with thick-wire snares are conflicting. We performed a meta-analysis comparing complete resection (CR) and adverse event rates of CSP using thin-wire and thick-wire snares.

Patients and methods Comparative studies of adult patients with ≧1 colorectal polyp(s) ≦10 mm who underwent CSP with thin-wire or thick-wire snares were included. We collected data on study, patient, polyp, and snare characteristics. The primary outcome was CR rate. Secondary outcomes were polyp retrieval rate, intraprocedural bleeding, delayed post-polypectomy bleeding, deep mural injury or perforation, patient discomfort, total sedation, and procedure time. We used random-effects models to calculate risk ratios for outcomes. We performed risk of bias assessments, rated the certainty of evidence, and assessed publication bias for all studies.

Results We included four randomized controlled trials (RCTs) and two observational studies including 1316 patients with 1679 polyps (826 thin-wire CSPs and 853 thick-wire CSPs). There was no significant difference between thin-wire CSP (92.1%) and thick-wire CSP (87.7%) for RCTs (risk ratio [RR] 1.05, 95% confidence interval [CI] 0.94–1.16) or observational studies (78.1% versus 79.6%, RR 1.03, 95% CI 0.99–1.08). There were no significant differences in polyp retrieval rate or intraprocedural bleeding. There were no cases of delayed bleeding or perforation.

Conclusions We found no differences in CR rates for CSP between thin-wire and thick-wire snares. CSP, regardless of snare type, is safe and effective for resection of small colorectal polyps.

Introduction

The effectiveness of colonoscopy in preventing colorectal cancer (CRC) and associated death is dependent on the identification and complete removal of pre-cancerous polyps [1]. For small (≤10 mm) colorectal polyps, cold snare polypectomy (CSP) has emerged as the standard of care for resection [2, 3]. CSP is effective and carries a low risk of adverse events compared with hot snare polypectomy (HSP) [4, 5, 6].

Incomplete resection of polyp tissue can occur following both CSP and HSP which is an important contributor to the development of post-colonoscopy CRC [7]. Higher success of complete resection (CR) with CSP has been theorized to be dependent upon both operator technique and snare type. Early studies of CSP have reported incomplete resection rates (IRRs) ranging from 5% to 35% [7, 8, 9]. In contrast, more recent studies have determined that complete resection rates of greater than 98% are attainable when endoscopists aim to capture a 2-mm margin of normal tissue and subsequently examine the cold snare defect margin for residual polyp [10, 11, 12]. In addition to improved endoscopic techniques, dedicated thin-wire cold snares with no current-carrying capacity have been designed in an attempt to improve complete resection rates. The caliber of these snares ranges from 0.18 mm to 0.30 mm and are composed of monofilament or braided wires [13, 14, 15, 16, 17], whereas traditional thick-wire current-carrying snares have calibers ranging from 0.40 mm to 0.47 mm [13, 18, 19]. Data on the efficacy derived from randomized trials and the effectiveness from real-world observational studies comparing thin- and thick-wire snares for CSP are conflicting [9, 20, 21, 22].

Given the lack of consistent supporting evidence and an absence of CSP snare choice recommendations made by endoscopy societies, we performed a systematic review and meta-analysis (MA) of studies comparing completeness of resection and adverse event (AEs) rates of CSP using thin-wire and thick-wire snares for colorectal polyps ○ 10 mm.

Methods

We conducted this systematic review and MA according to the Preferred Reporting Items Systematic Reviews and Meta-analyses (PRISMA) statement [23]. Our protocol was registered a priori on PROSPERO (CRD42022357424). Ethics approval was not required for this study given the lack of patient-specific data being collected.

Eligibility criteria

We included observational or interventional studies that met all of the following criteria:

1. **Patients** were adults (age ≥18) undergoing colonoscopy and found to have one or more polyp(s) ≤10 mm.
2. The **intervention** was polypectomy (en bloc or piecemeal) with a thin-wire braided or monofilament snare dedicated for CSP (thickness 0.18 mm-0.30 mm). Examples include the 0.18-mm LESIONHUNTER and 0.23-mm Diamond Cut snares (Micro-Tech Endoscopy, Nanjing, China), 0.30-mm Exacto cold snare (Steris Healthcare, Dublin, Ireland), and the 0.30-mm Captivator cold snare (Boston Scientific, Marlborough, United States).
3. The **comparator** was polypectomy (en bloc or piecemeal) with a thicker current-carrying snare (thickness 0.40 mm or 0.47 mm). Examples include the 0.47-mm SnareMaster oval snare and the 0.40 mm SnareMaster soft snare (Olympus, Tokyo, Japan).
4. The **outcomes** included any of the following:
   1. Complete resection rate,
   2. Polyp retrieval rate,
   3. Intraprocedural bleeding (IPB),
   4. Delayed post-polypectomy bleeding (DPPB) up to 30 days,
   5. Deep mural injury (DMI) including perforation,
   6. Patient discomfort scores,
   7. Total sedation used, or
   8. Procedure time.

We excluded studies from the final review that met any of the following criteria: (1) the comparator was either unclear or not considered to represent a thick snare; (2) the comparator was HSP; (3) the study assessed outcomes exclusively in trainees or described CSP learning curves; (4) the study included patients who underwent CSP for upper gastrointestinal lesions.

Search strategy and terms

We designed a comprehensive search strategy with a health research librarian to query the electronic databases MEDLINE (Ovid), EMBASE, PubMed, CINAHL, MEDLINE (Ebsco), Web of Science, TRIP (Turning Research into Practice) and Cochrane Library, from inception through September 15, 2022. We used a combination of free-text and Medical Subject Heading (MeSH) terminology in the search strategy, along with appropriate synonyms and spelling variations. The full electronic search strategy is provided in the Supplementary Materials. We also hand-searched the conference abstracts from 2015–2022 from Digestive Diseases Week, The American College of Gastroenterology Annual General Meeting, and United European Gastroenterology Week.

Study selection and data abstraction

We imported all citations into Covidence (Melbourne, Australia). Two reviewers (RK, SSS) performed initial screening and full-text exclusion and a third author (NF) resolved all discrepancies. Two authors (RK, SSS) then abstracted data in duplicate into standardized forms containing: (1) study identification (e. g., authorship, year of publication, country of origin); (2) study design parameters and risk of bias assessments; (3) endoscopist demographics; (4) patient demographics (e. g., age, sex, comorbidities); (5) descriptions of the intervention and comparators; (6) bowel preparation regimens; and (7) outcomes. We also collected data on relevant subgroups where available. For included abstracts, we attempted to contact study authors to obtain additional information. We emailed first and last authors up to two times, one week apart.

Outcome definitions

Our primary outcome was the CR rate, as we considered complete resection to be the most important clinical outcome with respect to CSP. We defined CR as the absence of any adenomatous tissue on histopathologic examination after CSP, either based on post-polypectomy site margin biopsies or en-bloc specimen examination [20, 22]. Secondary outcomes included polyp retrieval rate, IPB (defined as visible oozing or spurting of blood for >30 seconds or use of a haemostatic agent to control bleeding), DPPB (defined as a bleeding event reported by the patient leading to presentation to a healthcare setting for up to 30 days after the procedure), Sydney classification DMI grade III-V (visible target sign or full-thickness hole) [24], radiographically or surgically confirmed perforation, total sedation used, and procedure time. The secondary outcome of polyp retrieval rate was not included in the initial study protocol but added post hoc.

Risk of bias

Two authors (RK, SSS) conducted risk of bias assessments in parallel for all studies included in the final review. We used the Cochrane Risk of Bias version 2 (RoB 2) and Risk of Bias in Non-randomized Studies of Interventions (ROBINS-I) tools [25, 26] for randomized trials and observational studies, respectively. Discrepancies were resolved by consensus. We created risk of bias figures using the Risk-of-Bias Visualization (robvis) tool [27].

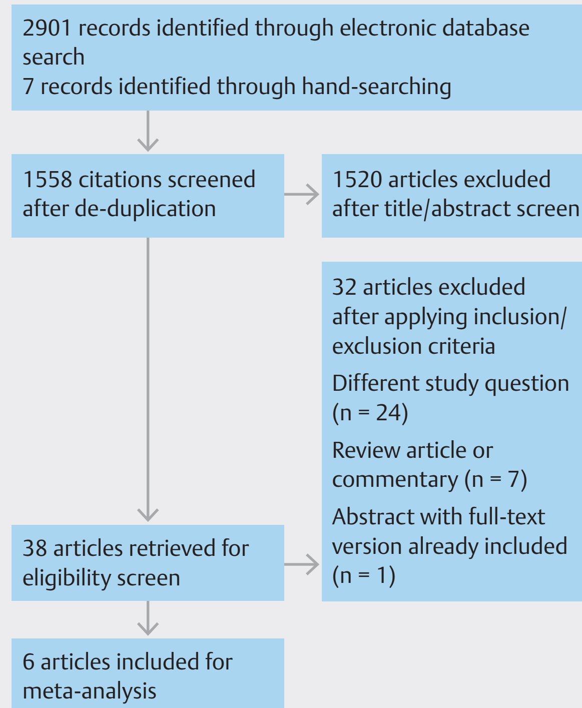
Statistical analyses and certainty of the evidence

We conducted the MA using DerSimonian and Laird random effects models [28]. We calculated risk ratios (RRs) from pooled data from observational and interventional studies separately and generated forest plots with RRs and corresponding 95% confidence intervals (CIs). We used the I^2 test to measure and report statistical heterogeneity. To assess publication bias, we performed visual inspection of funnel plots. We planned to conduct sensitivity analyses by (1) removing each study individually; (2) only including studies without high risk of bias; and (3) only including studies where endoscopists took biopsies from margins of resected polyps to assess for incomplete resection. We planned to perform subgroup analyses where possible on patient subgroups (e. g., age, sex, comorbidity), presence or absence of endoscopist training for CSP, presence of trainees at the time of the procedure, polyp size and polyp histology (adenomatous and sessile serrated lesions [SSLs]). Finally, we assessed the certainty of evidence using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) framework.

Results

Study selection

We identified 2901 records through an electronic database search and an additional seven records from hand-searching, 1558 of which remained after de-duplication. After title and abstract screening, there were 38 articles retrieved for full-text review, six of which were included in the MA (▶ **Fig. 1**).



▶ **Fig. 1** Study flow diagram.

Characteristics and quality of included studies

Of the six included studies, four were randomized controlled trials (RCTs) [20, 22, 29, 30] and two were observational (cohort) studies [9, 21]. Three randomized trials were published in full manuscript form [20, 22, 29]. One randomized trial was published in abstract form, for which supplemental information was gathered through email correspondence with study authors [30]. All studies were published in 2015 or later (▶ **Table 1**). There were 1316 unique patients with 1679 polyps included, 853 of which underwent thick-wire CSP and 826 of which underwent thin-wire CSP (▶ **Table 2**). For thick-wire snares, three studies used a 0.47-mm snare [9, 20, 22], one study used 0.40-mm and 0.47-mm snares [21], 1 study used a 0.43-mm snare [30], and one study used a 0.40-mm snare [29]. For thin-wire snares, five studies used a 0.30 mm snare [9, 20, 21, 22, 30] and one study used 0.23 mm snare [29]. Study quality varied from a low risk of bias to some concerns for RCTs and from a low to moderate risk of bias for observational studies (Supplementary Materials). Summaries of findings and the overall certainty of evidence using GRADE are available in ▶ **Table 3** for RCTs and ▶ **Table 4** for observational studies.

Complete resection rate

Endoscopists were explicitly instructed to position the polyp near the bottom of the screen (approximately 5–8 o'clock) in five studies [9, 20, 21, 22, 29], to capture a rim of normal tissue

▶ **Table 1** Summary of baseline characteristics of studies included in the meta-analysis.

Study ID	Study design	Country	Multi-center	Snares (brand, wire thickness)		Patients, male n (%)	Definition of complete resection	Risk of bias*
				Thick-wire	Thin-wire			
Din 2015	Observational	United Kingdom	No	Olympus, 0.47mm	Steris, 0.3mm	74 (66)	Resection bed margin histology	Moderate
Dwyer 2017	Observational	Australia	No	Olympus, 0.40 and 0.47mm	Steris, 0.3mm	115 (64)	Resection bed margin histology	Low
Horii 2023	RCT	Japan	Yes	Boston Scientific, 0.4mm	Micro-Tech, 0.23mm	132 (69)	Resected polyp margin histology	Some concerns
Horiuchi 2015	RCT	Japan	No	Olympus, 0.47mm	Steris, 0.3mm	41 (54)	Resected polyp margin histology	Some concerns
Jung 2018	RCT	Korea	No	Boston Scientific, 0.43mm	Steris, 0.3mm	Not stated	Resected polyp margin histology	Some concerns
Sidhu 2022	RCT	Australia, Canada	Yes	Olympus, 0.47mm	Steris, 0.3mm	379 (57)	Resection bed margin histology	Low

M, male; F, female; P, proximal; L, left; RCT, randomized controlled trial; H, hyperplastic; S, sessile serrated lesion; A, adenoma; N, not stated
*Risk of bias assessed using the Cochrane Risk of Bias version 2 (RoB 2) and Risk of Bias in Non-randomized Studies of Interventions (ROBINS-I) tools 25,26 for randomized trials and observational studies, respectively.

▶ **Table 2** Summary of polyp characteristics of studies included in the meta-analysis.

	Snare	Polyps, n	Size >5mm, %	Proximal location*, %	Morphology, % (Ip/Isp/Is/IIa)†	Histology, %		
						Hyperplastic	SSL	Adenoma
Din 2015	Thick-wire	72	–	68	0/0/91.7/8.3	30.6		54.2
	Thin-wire	89	–	57	0/0/87.6/12.4	21.3	2.2	81.6
Dwyer 2017	Thick-wire	173	51	43	–	13	9	78
	Thin-wire	126	41	29	–	17	17	66
Horii 2023	Thick-wire	128	54.7	50	0/19.5/67.2/13.3	–		
	Thin-wire	126	54.8	50.8	0/16.7/70.6/12.7	–		
Horiuchi 2015	Thick-wire	112	59.8	43.7	10.7/0/72.3/17	9.8	5.4	84.8
	Thin-wire	98	66.1	40.8	8.2/0/68.4/23.4	9.2	5.1	85.7
Jung 2018	Thick-wire	47	–	–	–	–	–	–
	Thin-wire	48	–	–	–	–	–	–
Sidhu 2022	Thick-wire	321	36.1	30.5	–	14.1	10.3	58.2
	Thin-wire	339	40.7	29.2	–	12.1	10.3	64

SSL, sessile serrated lesion.
* Polyp location proximal to the splenic flexure.
†The Paris Classification [31] for gastrointestinal polyps: Ip, pedunculated; Isp, subpedunculated; Is, sessile; IIa, slightly elevated.

in five studies [9, 20, 21, 22, 29], and to inspect the resection bed after CSP to ensure removal of any endoscopically visible residual tissue in four studies [9, 20, 21, 22]. CR was assessed based on histological examination of the resected polyp sample in three RCTs [20, 29, 30], and based on histological examination of biopsies from polyp resection sites in one RCT and two observational studies [9, 21, 22]. The pooled estimates from included RCTs showed no significant differences between the CR rate for thin- and thick-wire snares, at 92.1% versus 87.7%, respectively (relative risk [RR] 1.05, 95% CI 0.94–1.16). Heterogeneity was considerable, with an I^2 of 75%. The pooled estimates from included observational studies showed no significant differences between the CR rate for thin- and thick-wire snares, at 78.1% versus 79.6%, respectively (RR 1.03, 95% CI 0.99–1.08). Results for the primary outcome of CR rate are shown in ▶ **Fig. 2**.

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▶ **Table 3** Summary of findings table for outcomes among randomized trials.

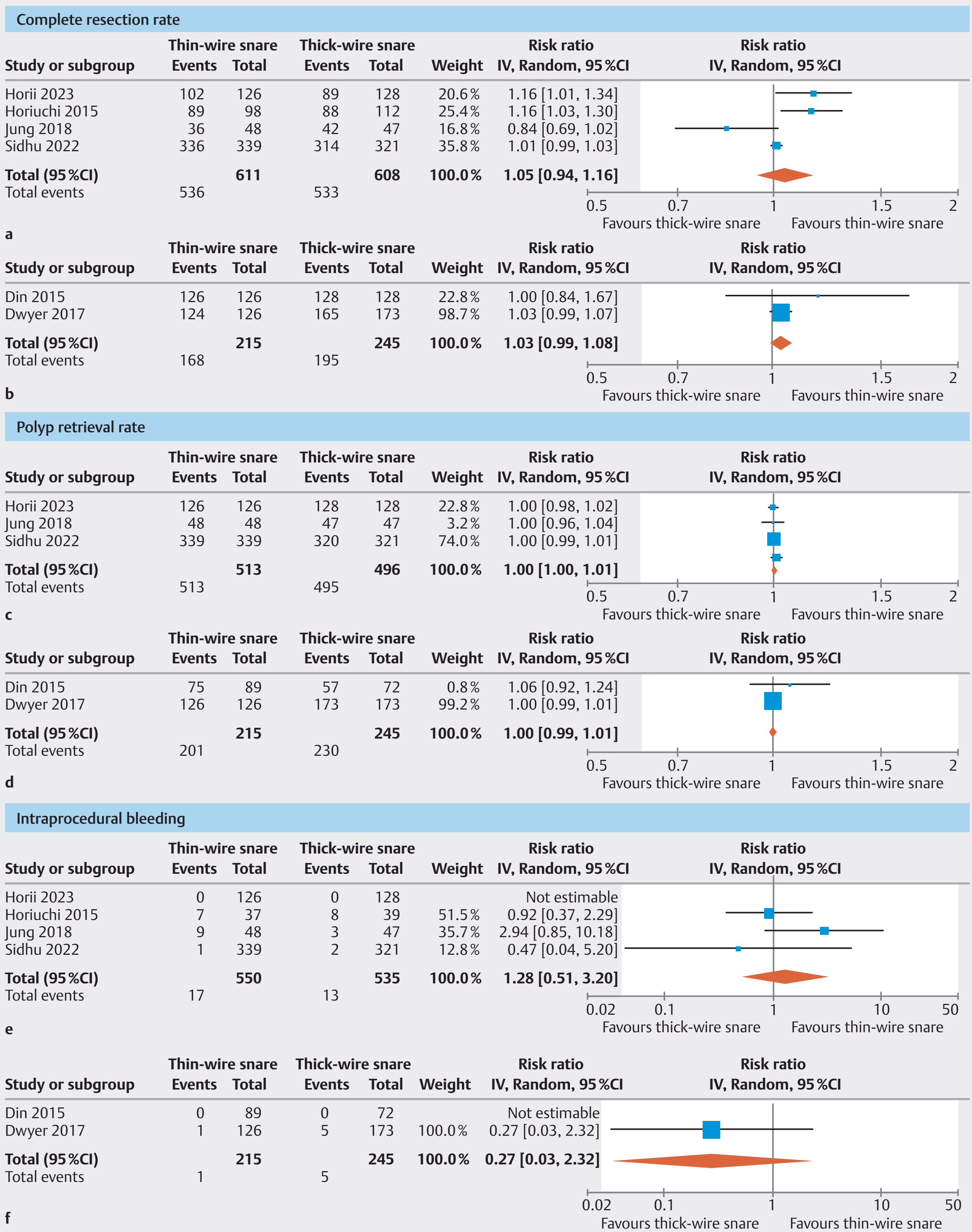
Certainty assessment							N		Effect		Certainty
No. studies	**Study design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Thin-wire snare**	**Thick-wire snare**	**Relative (95% CI)**	**Absolute (95% CI)**	
Complete resection rate											
4	Randomized trials	Not serious	Serious*	Not serious	Not serious	None	563/611 (92.1%)	533/608 (87.7%)	RR 1.05 (0.94–1.16)	44 more per 1,000 (from 53 fewer to 140 more)	⊕⊕⊕○ Moderate
Polyp retrieval rate											
3	Randomized trials	Very serious†	Not serious	Not serious	Not serious	None	513/513 (100.0%)	495/496 (99.8%)	RR 1.00 (1.00–1.01)	0 fewer per 1,000 (from 0 fewer to 10 more)	⊕⊕○○ Low
Intraprocedural bleeding											
4	Randomized trials	Not serious	Not serious	Not serious	Very serious‡	None	17/550 (3.1%)	13/535 (2.4%)	RR 1.28 (0.51–3.20)	7 more per 1,000 (from 12 fewer to 53 more)	⊕⊕○○ Low

CI, confidence interval; RR, risk ratio.
*One study which favors thick-wire snare, one study which favors thin-wire snare, and two studies found no difference between thin-wire snare and thick-wire snare
†Endoscopist participants in all studies were not blinded to group.
‡Few events of intraprocedural bleeding and very wide confidence intervals.

▶ **Table 4** Summary of findings table for outcomes among observational studies.

Certainty assessment							N		Effect		Certainty
No. studies	**Study design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Thin-wire snare**	**Thick-wire snare**	**Relative (95% CI)**	**Absolute (95% CI)**	
Complete resection rate											
2	Observational studies	Very serious*	Serious†	Not serious	Not serious	None	168/215 (78.1%)	195/245 (79.6%)	RR 1.03 (0.99–1.08)	24 more per 1,000 (from 8 fewer to 64 more)	⊕○○○ Very low
Polyp retrieval rate											
2	Observational studies	Very serious*	Not serious	Not serious	Not serious	None	201/215 (93.5%)	230/245 (93.9%)	RR 1.00 (0.99–1.01)	0 fewer per 1,000 (from 9 fewer to 9 more)	⊕○○○ Very low
Intraprocedural bleeding											
2	Observational studies	Very serious*	Not serious	Not serious	Serious‡	None	1/215 (0.5%)	5/245 (2.0%)	RR 0.27 (0.03–2.32)	15 fewer per 1,000 (from 20 fewer to 27 more)	⊕○○○ Very low

CI, confidence interval; RR, risk ratio.
*One study at moderate risk of bias, one study at low risk of bias.
†One study favors thick-wire snare, one study found no difference between thin-wire snare and thick-wire snare.
‡Few events of intraprocedural bleeding and very wide confidence intervals.



▶ **Fig. 2** Forest plots of primary and secondary outcomes. **a** Complete resection rate for randomized trials. **b** Complete resection rate for observational studies. **c** Polyp retrieval rate for randomized trials. **d** Polyp retrieval rate for observational studies. **e** Intraprocedural bleeding for randomized trials. **f** Intraprocedural bleeding for observational studies.

Secondary outcomes

For the secondary outcome of polyp retrieval rate, pooled estimates from included RCTs showed no significant differences between thin- and thick-wire snares (100.0% versus 99.8%, RR 1.00, 95% CI 1.00–1.01). There was also no significant difference between thin- and thick-wire snares for polyp retrieval rate among observational studies (93.5% versus 93.9%, RR 1.00, 95% CI 0.99–1.01). For IPB rates, there were no differences between thin-wire snares and thick-wire snares among RCTs (3.1% versus 2.4%, RR 1.28, 95% CI 0.51–3.20) or observational studies (0.5% versus 2.0%, RR 0.27, 95% CI 0.03–2.32). We did not conduct meta-analyses for DPPB, DMI, or perforation, given all six included studies reported no events meeting these criteria. We did not conduct meta-analyses for the outcomes of total sedation used or procedure time given only one study reported on procedure time and none reported on total sedation used [20].

Subgroup and sensitivity analyses

Three of four RCTs [20, 22, 29] instructed endoscopists on optimal CSP technique. In this subgroup, there were no differences between the thin-wire and thick-wire arms in terms of pooled CR rates (93.6% versus 87.5%, RR 1.09, 95% CI.98–1.22), polyp retrieval rate (100% versus 99.8%, RR 1.00, 95% CI 1.00–1.01), or IPB (1.6% versus 2.0%, RR 0.85, 95% CI 0.36–1.98), with forest plots provided in the Supplementary Materials. For the subgroup analysis based on polyp histology, we could not perform MA as only one RCT [20] presented outcomes data stratified by polyp histology. Horiuchi et al. reported CR rates of 89% (n = 75/94) for thin-wire snares versus 78% (n = 73/94) for thick-wire snares for adenomas, and 100% (5/5) for thin-wire snares versus 50% (3/6) for thick-wire snares for SSLs [20]. Variable ways in which patient demographics, comorbidities, and polyp size were presented precluded meaningful subgroup analyses for these characteristics. We also could not perform subgroup analyses for the presence of a trainee because none of the RCTs reported trainee involvement, and both observational studies reported trainee involvement.

Removing each study individually did not significantly alter the observed effect on the primary or secondary outcomes. Sensitivity analysis was not done by (a) excluding high risk of bias studies, as none of the four RCTs had high risk of bias or (b) by only including studies where endoscopists took biopsies from margins of resected polyps to assess for incomplete resection, as only one RCT reported doing this [22]. Visual inspection of a funnel plot showed no evidence of small study effects (Supplementary materials).

Discussion

CSP is the standard of care for resection of small (≤10 mm) colorectal polyps [2, 3] due to its superiority over forceps polypectomy and lower risk of adverse events compared to HSP [4, 5, 6]. In this MA of six studies that included 1316 patients and 1679 polyps, there were no differences between thin-wire and thick-wire snares with respect to CR rate, IPB, or polyp retrieval rate. Completeness of histologic resection was high in RCTs, with pooled CR rates of 92.1% and 87.7% for thin- and thick-wire snares respectively. Our results also confirm the safety of this technique, with no reported cases of DPPB or perforation with either type of wire.

The thin-wire design and diamond shape of some dedicated cold snares are hypothesized to enable more effective tissue capture compared to traditional snares capable of both CSP and HSP [3, 15, 17]. Data with respect to CR rate are conflicting among individual studies in our MA. Horiuchi et al. [20] (91% vs. 79%) and Horii et al. [29] (81% vs. 70%) both reported higher CR rates with a dedicated thin-wire cold snare compared with a traditional thick-wire snare. The rates of CR for these studies are in keeping with historical rates ranging between 7% to 35% [9, 32]. Newer studies, however, suggest that a CR rate of >98% is possible with CSP [33]. While the use of a thin-wire snare may contribute, it is possible that technical factors such as a focus on the acquisition of a margin of at least 2 mm of normal tissue and endoscopic examination of the cold snare defect after resection may be more important contributors [10, 12]. While endoscopists in the majority of RCTs assessing this question were instructed to follow optimal techniques, only those in the study by Sidhu et al. received a standard education package and were initially supervised by senior endoscopists to ensure a systematic and uniform approach to CSP, subsequently achieving CR rates of >97% for both the thin-wire and thick-wire groups [22].

Differences in CR rate may also be due to methods of determining histological excision. The studies with resection rates > 95% both determined complete histological excision based on biopsies taken from the polypectomy margin immediately following resection [21, 22]. While margin site biopsies are superior to endoscopic evaluation of completeness of resection [34], they are nevertheless prone to sampling bias. In contrast, studies where histological resection was determined to be complete if the lateral and vertical margins of the en-bloc specimens were free of polyp tissue had lower reported CR rates [20, 29]. This method avoids sampling bias but is potentially affected by an inability to pathologically examine lateral margins due to polyp fragmentation in the endoscope channel [35, 36]. One recent report found that more than two-thirds of polyp margins from CSP samples had lateral margins that could not be assessed [35]. The optimal method of CR assessment remains unclear, as resection margin biopsy and en-bloc specimen evaluation have not been compared directly. Future studies should aim to compare these methods to more definitive assessments of incomplete resection, such as endoscopic mucosal resection of polyp margins [35] or assessment of recurrence on repeat colonoscopy.

We also observed significantly higher CR rates in RCTs compared to those observed in observational studies, regardless of snare type. One factor that potentially explains these differences is the Hawthorne effect, wherein an endoscopist's knowledge of being observed results in a change in behavior. This effect is commonly observed in endoscopic studies, with it potentially being implicated as a mechanism of observed benefit for some endoscopic interventions [37, 38]. In this case, the potential contribution of the Hawthorne effect reinforces the notion above that when one is mindful of optimal CSP technique, high CR rates well above 90% are achievable regardless of snare type. Higher CR rates in RCTs could also be partially explained by the fact that endoscopy experts at tertiary centers are often those recruiting for such studies, with this expertise and cumulative experience potentially separating these performers from those performing CSP in observational studies.

There are several strengths of our study. First, we used a rigorous approach to our MA with robust results with sensitivity analysis. Second, we performed separate meta-analyses for randomized trials and observational studies, identifying important differences in findings between study designs. Combining randomized and non-randomized studies increases statistical heterogeneity and the risk of confounding bias that arises from observational studies [39] and is generally advised against [40]. As an example, a MA on this topic was limited due to the pooling of data from randomized and non-randomized studies [41]. Third, our study includes the most recent studies on this topic, which was not included in prior analyses [41, 42]. Fourth, we performed rigorous quality and risk of bias assessments for both randomized and observational studies.

Our study also has several limitations. First, one study lacked methodological details such as endoscopist training as it was in conference abstract form [30]; however, we were able to obtain additional information directly from study authors, so we decided on including this abstract. Second, statistical heterogeneity was considerable between randomized studies, suggesting that important differences in study populations and/or methodology could have existed between. Indeed, as discussed above, different definitions of histologically complete resection may explain much of the variation in CR rates among studies. Given the relatively small number of studies, we were unable to perform additional analyses to explore this question. Third, we were unable to perform subgroup analysis based on polyp histology (adenomas and SSLs), location (right colon vs. elsewhere), polyp size (< 5 mm, 5–10 mm), or en-bloc resection rates by individual endoscopist, as most studies did not report outcomes stratified by these variables. Fourth, a source of bias within the primary studies is the lack of endoscopist blinding for RCTs. Despite randomization, endoscopist awareness of snare type may systematically introduce bias into the results. Finally, risk estimates for observational studies were not adjusted for potential confounders are sources of bias arising from lack of randomization, allocation concealment, and blinding. Therefore, though these results should be interpreted with some caution overall, we did not identify any significant differences between both thin- and thick-wire snares for CR in CSP.

Our study has important implications for CSP of small colorectal polyps. Despite the hypothesis that thin-wire snares lead to superior CR rates, operator technique and endoscopic evaluation for completeness of resection may be more important, with the available data suggesting this is likely. Using traditional current-carrying snares exclusively may allow endoscopists and assistants to optimize polypectomy technique and become more comfortable with their equipment. In addition, purchasing a smaller range of snares for an endoscopy unit and using fewer individual snares during a procedure may incur cost savings. On the other hand, dedicated thin-wire CSP snares could serve an important role for those first learning the technique. Future studies comparing thin-wire and thick-wire snares should explore factors such as polypectomy learning curves, endoscopist assessments on ease of use and satisfaction, procedure time, and cost. Additionally, different methods of histologic assessment should be compared as they related to recurrence of polyps at surveillance colonoscopy.

Conclusions

In conclusion, in our systematic review and MA of four randomized trials and two observational studies, we found no differences in CR rates, polyp retrieval, and intraprocedural bleeding when comparing thin-wire and thick-wire snares. Importantly, there were no cases of clinically significant delayed bleeding or DMI in any of the included studies. Therefore, our findings confirm that CSP, regardless of snare type, is safe and effective overall for the endoscopic resection of small colorectal polyps.

Conflict of Interest

MJB has received research support from Olympus, Cook Medical, and Boston Scientific. SCG has received research support and personal fees from AbbVie and Ferring Pharmaceuticals, personal fees from Takeda, education grants from Janssen, and has equity in Volo Healthcare. NF has received personal fees from Boston Scientific, Pentax Medical, and AstraZeneca and research support from Pentax Medical. All remaining authors have no relevant conflicts to declare.

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