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Cold Snare Polypectomy Versus Hot Snare Polypectomy in Endoscopic Treatment of Nonpedunculated Colorectal Polyps Larger Than or Equal to 1 cm

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Abstract

Background: In most cases, hot polypectomy is used to treat colon polyps that are more than 1 cm in diameter. Electrocautery-induced damage accounts for the majority of adverse outcomes, including prolonged bleeding, post-polypectomy syndrome, and perforation. We postulated that cold resection of big polyps would be as effective as hot polypectomy while being significantly safer for the patient.

Aim and objectives: The study aimed to compare the rates of intraoperative bleeding, clinically significant postoperative bleeding, and perforation between cold snaring polypectomy and hot snaring polypectomy in patients with non-pedunculated colorectal polyps of 10 mm or larger.

Patients and methods: Prospective research including 60 adult patients was conducted at the Gastroenterology Unit of the Department of Internal Medicine at Al-Azhar University in Cairo, Egypt. Each participant had at least one non-pedunculated colorectal polyp having a diameter of at least 10 mm, and they were randomly assigned to one of the two groups, one receiving a subtotal colectomy and the other receiving a subtotal resection. We performed 30 cold snare polypectomy and 30 hot snare polypectomy procedures.

Result: None of the groups differed significantly from one another in terms of demographics, complete blood count, reason for colonoscopy, treatment, various metrics, or histology outcome (hyperplastic polyp, tubulovillous adenoma, or sessile).

Conclusion: Removal of polyps of less than 10 mm in the colon through cold snare resection points is a safe and effective method. However, larger research, such as for polyps measuring 10 mm in diameter has to be randomized, controlled trials to see if cold snare or hot snare resections are more effective.

Keywords: Cold snare polypectomy, Colorectal cancer, Hot snare polypectomy

1. Introduction

Endoscopic excision of adenomatous polyps from the colon has been demonstrated to greatly decrease the risk of developing colorectal cancer and the death rate due to the disease.¹

In resecting polyps bigger than 10 mm, hot snare polypectomy (HSP) and endoscopic mucosal resection (EMR) are generally considered the gold standard. Electrocautery is used because it makes it simpler to cut through dense mucosal tissue. It eliminates any remaining marginal dysplastic

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tissue, and it stops bleeding immediately by causing a clot to form in the blood vessel. Perforation, delayed bleeding, and postpolypectomy syndrome are all complications of HSP that are caused by electrocautery.²

Cold snare polypectomy (CSP) is a well-established method for removing polyps of less than 10 mm. No electrocautery is required for this procedure. However, it is undeniable that perforation, postpolypectomy syndrome, and prolonged bleeding are all more likely to occur with electrocautery, in addition to increasing the cost and length of the procedure.³ These benefits have not prevented cold snare resection for larger colonic polyps from only being studied in small series since its initial description in 2014.⁴

For the removal of nonpedunculated large colon polyps in recent years, a rise in the use of wide-field piecemeal CSP has been seen. With or without submucosal injection, this technique can be carried out.⁵ When surgical methods are used to eradicate lesions that involve EMR, the risk of perforation is significantly increased. To remove serrated sessile adenomas or polyps greater than 1 cm in size, in the near future, sporadic attempts at CSP may be made.⁶

There is currently a dearth of high-quality evidence regarding the best methods for resecting big polyps. There are no firm recommendations for EMR of big polyps from the American Society for Gastrointestinal Endoscopy or the American College of Gastroenterology. The European Society of Gastrointestinal Endoscopy recommends HSP with or without submucosal injection for polyps ranging in size from 10 to 19 mm, while EMR is advised for polyps measuring more than 20 mm in diameter.⁷

This study aimed to compare the two methods of polyp removal, cold snaring and hot snaring, for patients with non-pedunculated colorectal polyps 10 mm or bigger, in terms of intraoperative bleeding, clinically significant postoperative bleeding, and perforation.

2. Patients and methods

This prospective investigation was conducted at the Gastroenterology Unit of Al-Azhar University's Department of Internal Medicine in Cairo, Egypt. Sixty adult participants were included in the analysis, each of whom had at least one non-pedunculated colorectal polyp with a diameter of at least 10 mm. They were separated into two size-matched groups determined by the polypectomy technique used. One group of patients had a CSP, while the other group had a HSP. The data was

collected and will include patient age, sex, indication for colonoscopy, polyp location, size, morphology (according to Paris classification), polyp characterization, method of polypectomy (CSP vs. HSP), histopathology results including type of adenoma and the resection margin, intraprocedural complications including immediate bleeding and perforation and the methods of their treatments, and colonoscopy-related complications occurring within 14 days including delayed postoperative bleeding and abdominal pain requiring hospitalization.

2.1. Inclusion criteria

Adult patients aged over 20 years, of both sexes, and individuals who will go through with a diagnostic colonoscopy, only to find out later that they have nonpedunculated colorectal polyps of 10 mm or larger in size.

2.2. Exclusion criteria

Patients taking antithrombotic agents or known coagulopathy, inflammatory bowel diseases, polyps of less than 1 cm, and pedunculated polyps were excluded as there was no intention to investigate whether or not the presence of a big vessel in the stalk feeding the polypoid head increased the likelihood of bleeding following CSP. Patients with colorectal polypectomy during pregnancy and hemodialysis.

All patients were subjected to the following: an informed written medical consent, full history taking, clinical examination, and laboratory investigations.

2.3. Subgroup analysis for proximal versus distal polyps

Subproximal analysis for proximal colon versus distal colon. Of the 104 polyps, 21 were located in the proximal colon (proximal to splenic flexure, and the eight-polyp resection causing intraprocedural bleeding appeared in the proximal colon. Four out of five case of postpolypectomy bleeding occurred in the sigmoidal colon and rectum. Both intraprocedural and delayed postpolypectomy bleeding are done by HSP.

2.3.1. Equipment

An anesthetist used propofol, fentanyl, alfentanil, and midazolam to sedate the patients. Colonoscopes (Olympus CV-190 series; Olympus Medical Systems, Tokyo, Japan), cold snares (captivator cold snare), and hot snares (captivator) were used for polypectomy. With the use of submucosal injectate,

consisting of a mixture of gelofusine and methylene blue, with or without adrenaline (1 : 100 000) depending on the preference of the proceduralist For HSP, ERBE Endocut was utilized.

2.4. Statistical analysis

To compare the means of the different groups, the χ^2 test and the Mann–Whitney U test were utilized. The median and interquartile range were utilized to depict the nonparametric data. The impact of factors on late-term complications following polypectomy was analyzed using multivariate logistic regression. SPSS statistics, version 23 (SPSS Inc., IBM Corp., Armonk, New York, USA) was used for all statistical testing. Taking ethics into account: Following the Declaration of Helsinki, this research was carried out with the authorization of the Al-Azhar University, Faculty of Medicine's Research Ethics Committee.

3. Results

Table 1 demonstrates that no statistically substantial variations existed between the groups examined concerning the selected demographic variables (sex, age in years) (Figs. 1 and 2; Table 2).

According to Table 2, the primary presenting symptoms of (diarrhea, loose stools, hemoglobin drop, blood-tinged stool, constipation, microcytic hypochromic anemia, bleeding, rectum, abdominal distention, bleeding per rectum, weight loss, anastomosis, use of laxatives, pallor, iron-deficiency anemia, follow-up) did not differ in a statistically meaningful way across the groups between the studied groups.

No statistically significant differences in polyp, polyp location (ascending colon, transverse colon, descending colon, distal sigmoid colon, sigmoid colon, cecum, rectum), polyp number, polyp/polyp size (from 1 to 2 cm, >2 cm), polyp morphology (Par3 class) (0-Iia, sessile (Is), Is, flat + sessile

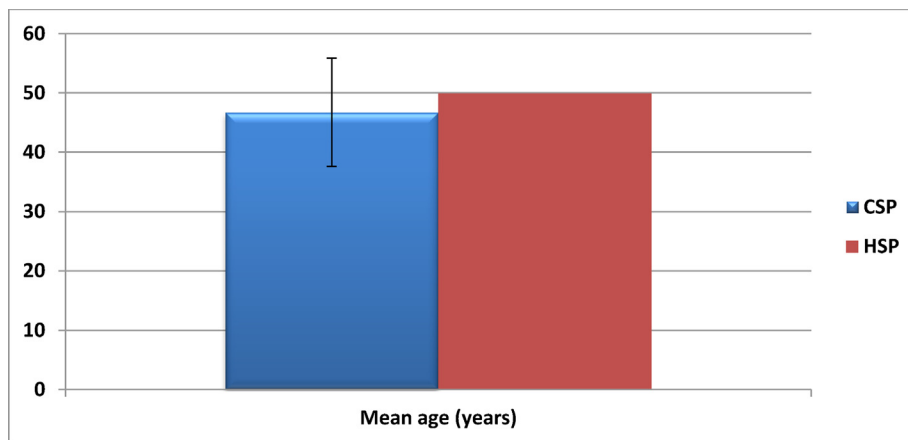


Fig. 1. Comparison between the two studied groups according to mean age ($N = 30$).

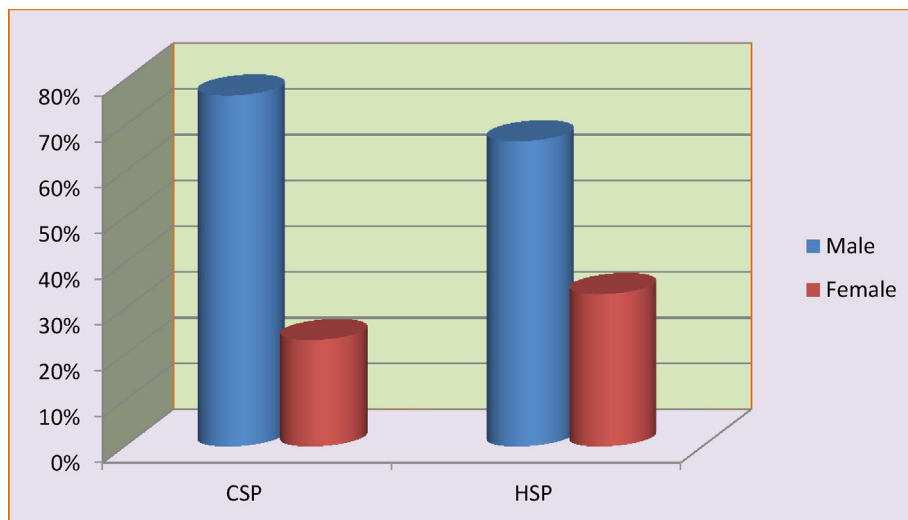


Fig. 2. Comparison between the two studied groups according to sex ($N = 30$).

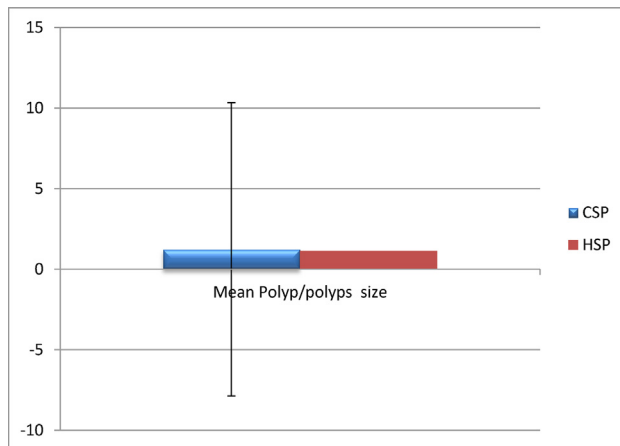


Fig. 3. Comparison between the two studied groups based on polyp size.

OII + Is, OIIa + Is), and prophylactic clipping were found between the groups in this study (see Table 4; Fig. 3).

In Table 5 that was just presented, none of the differences concerning the various parameters (submucosal injection, type of resection, retrieval, residual tissue on biopsy, procedure time/min, intraprocedural hemorrhage) were found to be statistically significant.

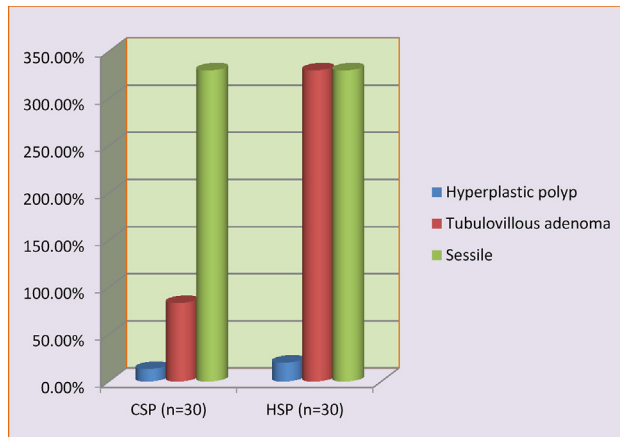


Fig. 4. Comparison between the two studied groups according to histopathology results, (hyperplastic polyp, tubulovillous adenoma, sessile).

Table 1. Comparison between the two studied groups according to demographic data.

Demographic data	CSP (N = 30) [n (%)]	HSP (N = 30) [n (%)]	Test of significance	P
Sex				
Male	23 (76.7)	20 (66.7)	$\chi^2 = 0.739$	0.390
Female	7 (23.3)	10 (33.3)		
Age (years)				
Minimum–maximum	21.0–68.0	28.0–66.0	$t = 1.057$	0.295
Mean \pm SD	46.73 \pm 12.38	49.90 \pm 10.77		
Median (IQR)	46.0 (38.0–56.0)	49.50 (42.0–59.0)		

χ^2 , χ^2 test; CSP, cold snare polypectomy; HSP, hot snare polypectomy; IQR, interquartile range; t , Student's t test.
P: P value for comparing between the two studied groups.

Method of intervention, method of intervention 1 (hemoclips), method of intervention 2 (angiography), and method of intervention 3 (surgery) showed no statistically substantial variance between the groups investigated (Table 6).

Table 7 shows that intraprocedural perforation, delayed postpolypectomy hemorrhage, and post-polypectomy syndrome did not differ between groups.

The results of the histopathological analysis (hyperplastic polyp, tubulovillous adenoma, sessile) demonstrate no statistically significant differences between the groups tested (Fig. 4, Tables 1–7).

4. Discussion

Cancer of the colorectal colon is the second most common type of cancer to result in mortality worldwide. Colonoscopy has evolved into a major screening test, and the removal of polyps during colonoscopies has become a successful method of treatment for lowering the risk of developing colon cancer. This is accomplished by obstructing the transformation of precancerous adenomas into cancerous carcinomas.⁸

The present investigation led us to the conclusion that there was not a significant difference in demographic data (such as sex and age in years) between groups.

In agreement with our study, Zauber et al.⁹ reported that the study included 97 participants, split evenly between 49 people who underwent CSP and 48 people who underwent HSP. There were no substantial distinctions between the groups concerning histological subtype, dysplasia grade, demographics, colonoscopy indications, rates of intubation of the cecum, or rates of intubation of the terminal ileum ($P = 0.151$ and 0.591 , respectively).

This study did not find any evidence of substantial changes between groups defined by the absence or presence of a family history of colorectal cancer.

However, Vakil et al.¹⁰ stated that conventional adenomas were once thought to be the precursor

Table 2. Comparison between the two studied groups according to main presenting symptoms.

Main presenting symptoms	CSP (N = 30) [n (%)]	HSP (N = 30) [n (%)]	χ^2	P
Diarrhea	6 (20.0)	1 (3.3)	4.043	^{FE} P = 0.103
Loose stool	1 (3.3)	0	1.017	^{FE} P = 1.000
Hemoglobin drop	0	1 (3.3)	1.017	^{FE} P = 1.000
Blood-tinged stool	1 (3.3)	0	1.017	^{FE} P = 1.000
Constipation	9 (30.0)	11 (36.7)	0.300	0.584
Microcytic hypochromic anemia	1 (3.3)	0	1.017	^{FE} P = 1.000
Bleeding	0	1 (3.3)	1.017	^{FE} P = 1.000
Rectum	0	1 (3.3)	1.017	^{FE} P = 1.000
Abdominal distention	1 (3.3)	2 (6.7)	0.351	^{FE} P = 1.000
Bleeding per rectum	7 (23.3)	3 (10.0)	1.920	0.166
Weight loss	2 (6.7)	3 (10.0)	0.218	^{FE} P = 1.000
Anastomosis	0	1 (3.3)	1.017	^{FE} P = 1.000
Abdominal pain	3 (10.0)	11 (36.7)	5.963*	0.015*
Use of laxatives	1 (3.3)	0	1.017	^{FE} P = 1.000
Pallor	1 (3.3)	1 (3.3)	0.0	^{FE} P = 1.000
Iron deficiency anemia	3 (10.0)	1 (3.3)	1.071	^{FE} P = 0.612
Follow-up	1 (3.3)	1 (3.3)	0.0	^{FE} P = 1.000

CSP, cold snare polypectomy; HSP, hot snare polypectomy.

Table 3. Comparison between the two studied groups based on polyp characteristics.

Polyp	CSP (N = 30) [n (%)]	HSP (N = 30) [n (%)]	Test of significance	P
Polyp location				
Ascending colon	8 (26.7)	9 (31.0)	$\chi^2 = 2.779$	^{MC} P = 0.920
Transverse colon	8 (26.7)	7 (24.1)		
Descending colon	2 (6.7)	1 (3.4)		
Distal sigmoid colon	0	1 (3.4)		
Sigmoid colon	2 (6.7)	3 (10.3)		
Cecum	9 (30.0)	6 (20.7)		
Rectum	1 (3.3)	2 (6.9)		
Number of polyps				
1	23 (76.7)	26 (86.7)	$\chi^2 = 1.002$	0.317
2	7 (23.3)	4 (13.3)		
Minimum– maximum	1.0–2.0	1.0–2.0	U = 405.0	0.321
Mean ± SD	1.23 ± 0.43	1.13 ± 0.35		
Median (IQR)	1.0 (1.0–1.0)	1.0 (1.0–1.0)		
Polyp/polyp size				
From 1 to 2 cm	16 (53.3)	13 (43.3)	$\chi^2 = 0.601$	0.438
More than 2 cm	14 (46.7)	17 (56.7)		
Polyp morphology (Par3 class)				
0-Iia	19 (63.3)	20 (66.7)	$\chi^2 = 4.624$	^{MC} P = 0.288
Sessile (Is)	0	2 (6.7)		
Is	10 (33.3)	5 (16.7)		
Flat + sessile 0-II + Is	0	1 (3.3)		
0IIa + Is	1 (3.3)	2 (6.7)		
Prophylactic clipping				
No	26 (86.7)	24 (80.0)	$\chi^2 = 0.480$	0.488
Yes	4 (13.3)	6 (20.0)		

CSP, cold snare polypectomy; HSP, hot snare polypectomy.

lesions that led to sporadic colon cancer. Sessile serrated lesions can be divided into noncancerous hyperplastic polyps and cancerous sessile serrated adenomas and traditional serrated adenomas thanks to the serrated pathway. Sessile serrated adenomas are the precursors to about 30% of sporadic colorectal cancers.

This study identified no clinically significant variations between groups concerning the most

common initial symptoms (diarrhea, loose stools, hemoglobin drop, blood-tinged stools, constipation, microcytic hypochromic anemia, rectal bleeding, abdominal distention, rectovaginal bleeding, loss of weight, anastomosis, laxative use, paleness, iron-deficiency anemia, and follow-up).

Moreover, Elliott et al.¹¹ noted that after cold snare resections, 0.7% of patients experienced intra-procedural or immediate hemorrhage (1.3% for

Table 4. Comparison between the two studied groups according to different parameters.

	CSP (N = 30) [n (%)]	HSP (N = 30) [n (%)]	Test of significance	P
Submucosal injection				
No	30 (100.0)	28 (93.3)	$\chi^2 = 2.069$	$^{FE}P = 0.492$
Yes	0	2 (6.7)		
Type of resection				
En block	17 (56.7)	22 (73.3)	$\chi^2 = 1.832$	0.176
Piecemeal	13 (43.3)	8 (26.7)		
Retrieval				
No	0	0	–	–
Yes	30 (100.0)	30 (100.0)		
Residual tissue on biopsy				
No	25 (83.3)	27 (90.0)	$\chi^2 = 0.577$	$^{FE}P = 0.706$
Yes	5 (16.7)	3 (10.0)		
Procedure time (min)				
Minimum–maximum	18.0–50.0	19.0–50.0	$t = 0.0$	1.000
Mean \pm SD	34.10 \pm 9.39	34.10 \pm 8.47		
Median (IQR)	35.0 (26.0–40.0)	34.0 (28.0–40.0)		
Intraprocedural bleeding				
No	27 (90.0)	26 (86.7)	$\chi^2 = 0.162$	$^{FE}P = 1.000$
Yes	3 (10.0)	4 (13.3)		

CSP, cold snare polypectomy; HSP, hot snare polypectomy.

Table 5. Comparison between the two studied groups according to methods of intervention.

Method of treatment	CSP (N = 30) [n (%)]	HSP (N = 30) [n (%)]	χ^2	^{FE}P
Method of intervention 1				
Hemoclips	1 (3.3)	4 (13.3)	1.964	0.353
Method of intervention 2				
Angiography	0	1 (3.3)	1.017	1.000
Method of intervention 3				
Surgery	0	1 (3.3)	1.017	1.000

CSP, cold snare polypectomy; HSP, hot snare polypectomy.

Table 6. Comparison between the two studied groups according to different parameters.

	CSP (N = 30) [n (%)]	HSP (N = 30) [n (%)]	χ^2	^{FE}P
Intraprocedural perforation				
No	30 (100.0)	30 (100.0)	–	–
Yes	0	0		
Delayed postpolypectomy bleeding				
No	29 (96.7)	30 (100.0)	1.017	1.000
Yes	1 (3.3)	0		
Postpolypectomy syndrome				
No	30 (100.0)	29 (96.7)	1.017	1.000
Yes	0	1 (3.3)		

CSP, cold snare polypectomy; HSP, hot snare polypectomy.

Table 7. Comparison between the two studied groups according to histopathology result.

Histopathology result	CSP (N = 30) [n (%)]	HSP (N = 30) [n (%)]	χ^2	MCP
Hyperplastic polyp	4 (13.3)	6 (20.0)	0.740	0.862
Tubulovillous adenoma	25 (83.3)	23 (76.7)		
Sessile	1 (3.3)	1 (3.3)		

CSP, cold snare polypectomy; HSP, hot snare polypectomy.

polyps ≥ 20 mm). When just EMR studies were taken into consideration, the rate of intraprocedural bleeding was found to be 0.8% for polyps more than or equal to 10 mm and 1.3% for polyps more than or equal to 20 mm. This low incidence indicates that cold snaring may not raise the danger of impending bleeding, despite the fact that it does not deliver instant vascular coagulation like electrocautery does.

No statistically significant differences were detected between the groups in the current investigation regarding general signs (vitality stability) and gastrointestinal tract signs (constipation, blood observed by DRE, pallor, fatigue, abdominal pain, diarrhea).

Also Arimoto et al.,¹² reported that CSP has been linked to a reduction in the risk of bleeding after polypectomy in people who are still using antiplatelet or antithrombotic drugs.

We could not find any statistically significant disparities between the groups regarding indication for colonoscopy (chronic diarrhea, microcytic hypochromic anemia, constipation, bleeding per rectum,

abdominal pain, colorectal carcinoma screening, diverticulosis, screening for IBD, follow-up).

Also Noda et al.,¹³ illustrated that the longer the colonoscopy takes, the greater the risk that the patient will experience symptoms, including abdominal pain and abdominal discomfort.

However Jideh and Bourke¹⁴ reported that compared with HSP, CSP resulted in a considerably reduced mean polypectomy time ($P < 0.001$). Our research did not specifically test this hypothesis, but it stands to reason that a more efficient polypectomy would result in a faster overall colonoscopy. This suggests that colonoscopy may help reduce the occurrence of abdominal discomfort.

No statistically significant differences in polyp, polyp position (ascending colon, transverse colon, descending colon, distal sigmoid colon, sigmoid colon, cecum, rectum), polyp number, polyp/polyps size (from 1 to 2 cm, >2 cm), polyp morphology (Par3 class) (0-Iia, sessile (Is), Is, flat + sessile 0II + Is, 0IIa + Is), and prophylactic clipping were observed between groups in the present investigation.

In agreement with our study Tutticci et al.,¹⁵ noted that two patients in the HS group had incomplete polyp evaluations because of cautery artifacts, but otherwise there was no discernible difference between the two methods. Cautery artifacts in resected polyps are rare to see and may be related to polyps of between 5 and 9 mm in size.

In this study, we found no evidence of a statistically significant difference between the groups. There was no statistically significant difference between the groups studied for intervention methods, intervention method 1 (hemoclips), intervention method 2 (angiography), or intervention method 3 (surgery), as shown in the table below.

Finally Paggi et al.,¹⁶ noted that 16.5% of polyps, on average, had cytologic abnormalities that prevented a clear diagnosis from being made (range: 11.8–19.3%). This number ranged from 11.8 to 19.3%.

In the current study, we found that there was no statistical significance between studied groups regarding different parameters (intraprocedural perforation, delayed postpolypectomy bleeding, postpolypectomy syndrome).

The current investigation concluded that there was no statistically significant difference between the groups that were analyzed in terms of histology results (Hyperplastic polyp, tubulovillous adenoma, and sessile).

The study by Teramoto et al.¹⁷ has shown that postpolypectomy syndrome occurs more frequently following the removal of large sessile polyps (>2 cm

in diameter), which typically require high temperatures for extended periods.

4.1. Conclusion

Removing polyps more than or equal to 10 mm in diameter from the colon using a cold snare device looks to be a secure and effective procedure. However, larger research is required, namely randomized controlled trials comparing cold snare resections to hot snare resections for 10 mm polyps, especially with EMR. Our results imply that cold snare techniques may be a viable option for both HSP and traditional hot EMR for the excision of colon polyps more than or equal to 10 mm in size, but we are still waiting for more definitive data to confirm this.

Conflicts of interest

There are no conflicts of interest.

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