



# Cold snare polypectomy versus hot snare polypectomy in endoscopic treatment of small polyps

## COLON

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### ABSTRACT

**Background/Aims:** The removal of small colon polyps by hot snare polypectomy (HP) is a commonly used method. Polypectomy with a cold snare (CP) has been increasingly utilized in recent years. Each method has its own advantages and disadvantages. Herein, we explored the efficacy and safety of each method.

**Materials and Methods:** Between January 1, 2012 and June 30, 2012, 97 consecutive patients with small colorectal polyps ranging from 5-9 mm in size were separated into either the CP or HP group. Demographic data, the duration of polypectomy, and pathology reports were recorded.

**Results:** Seventy-seven polyps were removed from 49 patients in the CP group, and 71 polyps were removed from 48 patients in the HP group. There was no significant difference between the groups with respect to gender, age distribution, number of polyps, or indications for colonoscopy. The mean polyp size was  $7.21 \pm 1.4$  mm in the CP group and  $7.56 \pm 1.45$  mm in the HP group ( $p=0.111$ ). There was a significant difference in the mean procedure time between the two groups (CP,  $25.71 \pm 4.3$  sec; HP,  $70.28 \pm 11.3$  sec,  $p<0.001$ ). One patient (1.3/1.4%) from each group developed post-polypectomy bleeding that required treatment. Histological evaluation revealed that 10 of the polyps (6.75%) were advanced adenomas. Pathological examination showed that the polyps were not completely removed in 4 patients (5.13%) in the CP group and 4 patients (5.63%) in the HP group ( $p=0.89$ ).

**Conclusion:** CP is an effective and safe method that shortens the polypectomy duration in small polyps ( $\leq 9$  mm) compared to HP.

**Keywords:** Cold snare polypectomy, small colonic polyps, hot snare polypectomy

### INTRODUCTION

Colorectal cancer is the second leading cause of cancer related deaths in the world. Colonoscopy has become a primary screening test, and polypectomy at the time of colonoscopy has become an effective mode of treatment in reducing the risk of colon cancer development by interrupting the progression of adenoma to carcinoma (1-3). The decision-making process about how to perform a polypectomy is often made during a colonoscopy when a polyp is detected. The general rule is that all potential adenomas should be removed. The method chosen for polypectomy is often related to the appearance and size of the polyp (4). The simplest method for polypectomy is cold forceps removal for small polyps (5). Hot forceps polypectomy is another option for small polyps. The use of hot forceps has

fallen out of favor following polypectomy due to the presence of residual polyp tissue (6). Another choice is snare polypectomy (with an electrocauter), which is the preferred method for the removal of polyps that are 1 cm or larger based on a survey of common gastroenterology practices (5). The purpose of electrocauter in snare polypectomy is to either provide extra power in cutting the tissue or prevent bleeding by coagulation of the tissue (4). However, with this method, there can be perforations, immediate hemorrhage, and delayed post-polypectomy hemorrhage (7). We wanted to determine which method has better outcomes for small colorectal polyps. Therefore, we evaluated the efficiency and safety of cold snare polypectomy compared to hot snare polypectomy of small, sessile colorectal polyps (size of polyps: 5-9 mm).

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## MATERIALS AND METHODS

The study was approved by the Institutional Review Board at İzmir Katip Celebi University Atatürk Training and Research Hospital. All patients signed informed consent forms. The study concept, hypothesis, and design was investigator-initiated, and no financial support or free devices were received.

### Study design

This was a retrospective trial. The study colonoscopist typically uses cold and hot snares to remove polyps that are 5 to 9 mm. Between January 1, 2012 and June 30, 2012, a total of 148 consecutive polyps were identified by a single experienced colonoscopist (F.A) who performed the polypectomy with either the cold snare polypectomy (CP) or hot snare polypectomy (HP) technique. Ninety-seven consecutive patients with small colorectal polyps, ranging from 5-9 mm in size, were separated into either the CP or HP group.

### Patients

The inclusion criteria were patients older than 40 years of age who were scheduled to undergo screening or surveillance colonoscopy and who were found to have at least one eligible polyp. An eligible polyp was defined as a polyp measuring 5-9 mm in size. The exclusion criteria were inflammatory bowel disease and polyposis syndromes.

### Procedure

A gastroenterologist, without the help of fellows, performed the procedures. The procedure was a polypectomy with either a cold snare or a hot snare, and all procedures were performed with the Olympus -H180 AL (Olympus, Tokyo, Japan) or Pentax EC-3890 LK (Hoya, Tokyo Japan) The two types of snares used for the polypectomy were the cold polypectomy snare (Exact™, US Endoscopy Ohio, USA) and the hot polypectomy snare (Medwork, H $\ddot{o}$ chstadt, Germany). Both types of snares can be inserted through the channel of standard colonoscopes. All procedures were performed at the outpatient endoscopy center at our institution with deep sedation monitored by an anesthesiologist.

The size of the polyp was measured by visual comparison with the open biopsy forceps. The size, location, and histological evaluation of all polyps were recorded. The time of the polypectomy was measured using colonoscopy video recordings. The time frame when the snare first appeared in the endoscopic video image to the time that the resected polyps were measured was noted as the difference in the time of entry into a channel of the colonoscopy by aspiration. Each polyp was suctioned into the trap after the polyp was transected. To histopathologically examine the resected polyps, they were placed in a formalin container. Expert pathologists evaluated each sample.

Patients were observed in our post-anesthesia care unit as per standard protocols. The exact time of a given bleeding episode

was also recorded for each patient. Intraoperative bleeding was defined as bleeding during the procedure (lasting 1 min or more, which was terminated during the procedure). Early bleeding was defined as hematochezia within 24 h after the procedure, and late bleeding was defined as bleeding in the period 24 h to 30 days after the procedure. The complications and all gastrointestinal symptoms after each polypectomy were recorded. Adverse events were defined with the 2010 American Society for Gastrointestinal Endoscopy consensus criteria (8). Electronic records were reviewed for serious complications, including hospital admission within 30 days of colonoscopy for colonic perforation, colonic bleeding, diverticulitis, postpolypectomy syndrome, and other serious illnesses directly related to colonoscopy.

### Statistical analysis

We used the chi-square or Fisher exact test to compare the success rates between the groups. To compare continuous or discrete variables between the two groups, we used a 2-sample t-test or Mann-Whitney U-test. The criterion for statistical significance was  $p < 0.05$ . Data were analyzed using SPSS 17.0 program (SPSS Inc, Chicago, IL, USA).

## RESULTS

Ninety-seven patients (cold snare polypectomy group,  $n=49$  and hot snare polypectomy group,  $n=48$ ) were included in the study. The patients' demographic characteristics, indications for colonoscopy, cecum intubation rates, and intubation rates of the terminal ileum were similar for both techniques (Table 1). The characteristics of the number and size of the polyps are shown in Table 2. The characteristics of these polyps were similar between the two techniques (Table 2). No significant difference was found between the two groups regarding histological type ( $p=0.151$ ) or degree of dysplasia ( $p=0.591$ ). The mean polypectomy time was significantly shorter in the cold snare group (25.71 sec) than in the hot snare group (70.28 sec;  $p < 0.001$ ) (Table 2). There was no significant difference in the complete retrieval rate of colorectal polyps between the two groups ( $p=0.906$ , Table 2). In two patients in the hot snare group, due to cautery artifacts, it could not be determined whether the polyps were completely removed. One patient (1.3/1.4%) from each group developed post-polypectomy bleeding that required treatment. Homeostasis was provided using sclerotherapy ( $p=0.954$ ). In 10 of the 148 (6.75%) patients with a polyp, advanced adenoma was observed. The median size of the polyps with an advanced adenoma was 8 mm (6-8 mm).

## DISCUSSION

Polypectomy is efficacious in reducing the risk of colon cancer development by interrupting the adenoma-to-carcinoma progression (2). The range of polypectomy practices among clinical gastroenterologists is highly variable. Polypectomy is frequently performed with cold biopsy forceps, and a survey of common practices among endoscopists found that cold forceps polypectomy is the technique of choice for polyps mea-

**Table 1.** Baseline characteristics, indications, and outcomes in patients with cold and hot snare polypectomy

	CP Group n=49	HP Group n=48	p value
Sex (M/F) <sup>2</sup>	32/17	36/12	0.297
Age, year (±SD) <sup>1</sup>	59.5±14.9	58.3±13.5	0.464
Indications (n/%) <sup>2</sup>			0.930
Anemia	9 (18.4)	14 (29.2)	
Change in bowel habits	5 (10.2)	2 (4.2)	
Diarrhea	4 (8.3)	3 (6.3)	
Abdominal pain	2 (4.1)	2 (4.2)	
Constipation	4 (8.3)	4 (8.3)	
Surveillance for colon polyps	11 (22.4)	13 (27)	
Screening	6 (12.2)	5 (10.4)	
Surveillance for colon cancer	8 (16.3)	5 (10.4)	
Bowel preparation quality (n/%) <sup>2</sup>			0.439
Excellent	11 (22.4)	10 (20.8)	
Good	30 (61.2)	35 (72.9)	
Fair	5 (10.2)	2 (4.2)	
Poor	3 (6.1)	1 (2.1)	
Cecum intubation rate, % <sup>2</sup>	100	100	1.000
Intubation of terminal ileum rate, n (%) <sup>2</sup>	46 (93.8)	46 (95.8)	0.663

SD: standard deviation; n: numbers of patient  
<sup>1</sup>Mean±SD. The differences between the cold and hot snare polypectomy groups were assessed with Student's t-test for continuous variables.  
<sup>2</sup>The differences between the cold and hot snare groups according to the chi-square test for categorical data.

suring 1-3 mm (5). On the other hand, hot snare polypectomy is the preferred method removing polyps that are 1 cm or larger, based on a survey of common gastroenterology practices (4). However, polyps that are 6 to 9 mm in size are removed by different methods, such as hot forceps polypectomy, cold snare polypectomy, or hot snare polypectomy (5). In this study, we evaluated two different methods of resecting polyps that are 5-9 mm. Both methods were highly effective for polyp resection.

In the treatment of small polyps with hot forceps polypectomy, it can be difficult to assess the histologically definitive diagnosis of polyps due to cautery artifacts (9,10). In the study by Goldstein et al. (9), it was reported that the average percentage of polyps in which a definitive diagnosis could not be made because of cytologic artifacts was 16.5% (range, 11.8%-19.3%). The same study reported that polyps smaller than 2 mm were significantly less likely to be definitively diagnosed because of cautery artifacts. Another important point lies in the answer to the question, "is there residual polyp tissue?" A significantly greater percentage of small adenomatous polyps have residual adenomatous epithelium if they are excised without thermal electrocoagulation compared to those resected with thermal

**Table 2.** Comparison of polyps in patients with cold and hot snare polypectomy

	CP Group n=77	HP Group n=71	p value
Location of polyps, n (%) <sup>2</sup>			0.429
Left colon	44 (57)	45 (63)	
Right colon	33 (43)	26 (37)	
Polyps per patient <sup>1</sup>	1.57±1.48	1.48±0.85	0.755
Size of polyps, mm (±SD) <sup>1</sup>	7.21±1.4	7.56±1.45	0.111
Time of polypectomy mean (±SD) sec. <sup>1</sup>	25.71±4.3 (26; 18-39)	70.28±11.3 (70; 51-109)	<0.001
Pathology, n (%) <sup>2</sup>			0.151
Hyperplastic	18 (23.4)	6 (8.5)	
Inflammatory	1 (1.3)	1 (1.4)	
Serrated	0 (0)	1 (1.4)	
Tubular	33 (42.9)	30 (42.3)	
Tubulovillous	23 (29.9)	31 (43.7)	
Villous	2 (2.6)	1 (1.4)	
Intramucosal carcinoma	0 (0)	1 (1.4)	
Dysplasia, n (%) <sup>2</sup>			0.591
Mild	25 (43.1)	22 (34.4)	
Moderate	29 (50)	36 (56.3)	
Severe	4 (6.9)	6 (9.4)	
Complete retrieval rate, n (%) <sup>2</sup>	74 (94.9)	67 (94.4)	0.906
Complications, n (%) <sup>2</sup>			0.954
Bleeding	1 (1.3)	1 (1.4)	
Perforation	0	0	

SD: standard deviation; n: numbers of polyps  
<sup>1</sup>Mean±SD. Differences between the cold and hot snare polypectomy groups were evaluated with the Mann-Whitney U-test for continuous variables.  
<sup>2</sup>Differences between the cold and hot snare groups were evaluated with the Mann-Whitney U-test for categorical data.

electrocoagulation (11). Additionally, in a recent study, it was reported that the presence of advanced neoplasia in polyps ≤5 mm was as high as 8.7% (12). A prevalence of 6.75% of advanced adenoma in small polyps was documented in this study population, which is similar to the literature. In our study, although there was no statistically significant difference between the two methods, in the HS group, the polyps of 2 patients could not be fully evaluated due to cautery artifacts. In the resected polyps, the reason for cautery artifacts is infrequently observed and may pertain to the size of polyps in the 5-9-mm range. Because they cannot be fully evaluated, the polyps were categorized as incompletely removed due to cautery artifacts, and the patients should be evaluated for the necessity of colonoscopy. Therefore, it is important to ensure that the polyps are completely removed. Cold snare polypectomy can be accurately defined, whether the polyps have been completely removed.

Complications, including bleeding and perforation, are the most common complications of colonoscopy. Therapeutic applications, such as polypectomy, can be observed with the majority of these complications (12-14). In a study by Repici et al. (12), immediate postpolypectomy bleeding requiring endoscopic hemostasis occurred in 18 patients, corresponding to a per-patient and per-polyp bleeding rate of 2.2% (95% CI 1.2%-3.2%) and 1.8% (95% CI 1%-2.6%), respectively. In the same study, although there was no relationship between the localization of polyps, the incidence of the risk of bleeding was related to the size of the polyps (6-9 mm) and the use of an antiplatelet agent. In another study, bleeding was not observed in patients who were not using an antiplatelet agent (15). In our study, there was no perforation, and in both groups, one patient had bleeding that required endoscopic treatment. In our study, the low incidence of bleeding may be because none of the patients were using antiplatelet agents, even though the polyps measured 5-9 mm. Although this study was conducted in a small group, there was no relationship between the size of the polyp and the risk of bleeding. Therefore, studies with more cases using antiplatelet agents are needed to explain this prediction.

Cold snare polypectomy is the most advantageous when the cold snare polypectomy is applied to small polyps around diverticula in the ascending colon or in the cecum because transmural burn syndrome or perforations may arise if hot snare polypectomy is performed in these circumstances (16). Postpolypectomy electrocoagulation syndrome (also known as postpolypectomy syndrome and transmural burn syndrome) occurs after polypectomy with electrocoagulation and is observed in 0.5-1.2% of cases (17). Postpolypectomy syndrome is most common after the removal of large (>2 cm) sessile polyps, which usually require high levels and long durations of thermal energy (17). Inadvertent capture of a piece of normal adjacent mucosa within the snare loop during snare placement over a polyp can cause this syndrome when cautery transects both the mucosa and polyp (18). In our study, perforation, or postpolypectomy electrocoagulation syndrome, was not observed in the hot snare polypectomy group, which may be due to the short duration of thermal energy for the small polyps and/or the small number of polyps in the right colon (the right of the colon wall is thin) in the hot snare group.

The longer duration of the colonoscopy may result in symptoms, such as abdominal pain and abdominal discomfort (19). Many factors have been implicated in influencing the total colonoscopy time. These factors include expertise of the endoscopist, sex, body mass index, age, abdominal waist circumference, abdominal surgery, prior hysterectomy, colorectal resection, complicated diverticular disease, bowel preparation, bowel habits, and therapeutic procedures (20,21). All patients were intubated in the cecum, and terminal ileum intubation was performed in nearly all patients. In our study, the cecal intubation time and total time of colonoscopy were excluded

from the statistical analysis. Therefore, these parameters were thought to affect the real time of the polypectomy. Unlike in another study (15), only the polypectomy time was measured in this study. The mean polypectomy time was significantly shorter with cold snare polypectomy versus hot snare polypectomy ( $p < 0.001$ ). Although this finding was evaluated in our study, a short polypectomy time will shorten the total time of the colonoscopy. In this way, it is clear that the incidence of abdominal symptoms may be reduced after colonoscopy.

There are some limitations to our study. First, due to the retrospective nature of the study, abdominal symptom evaluation could not be performed after the procedure. Second, due to the particularly small number of cases in the right colon, the processing of secondary complications, such as postpolypectomy syndrome, was not clearly evaluated. Third, none of the patients used antiplatelet agents, which would affect the assessment of the risk of bleeding. Therefore, studies with more cases are needed to explain this prediction, including that the method is effective in localization.

In conclusion, bleeding after polypectomy was not a problem for cold snare polypectomy. Cold snare polypectomy is an effective and safe method that shortens the polypectomy duration for small polyps (5-9 mm) compared to hot snare polypectomy.

**Ethics Committee Approval:** Ethics committee approval was received for this study.

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

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