Comparison of cold snare and hot snare polypectomy for the resection of sporadic nonampullary duodenal adenomas

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GRAPHICAL ABSTRACT

Background and Aims: Nonampullary duodenal adenomas can undergo malignant transformation, making endoscopic resection, often by hot snare (HSP) or cold snare polypectomy (CSP), necessary. Although CSP has been shown to be safer for removal of colon polyps, data comparing these techniques for the resection of duodenal adenomas are limited. Our aim was to compare the safety and efficacy of CSP and HSP for the removal of nonampullary duodenal adenomas.

Methods: We performed a retrospective cohort study of patients referred to 2 academic medical centers with a histologically confirmed sporadic, nonampullary duodenal adenoma who underwent endoscopic snare polypectomy between January 1, 2007 and March 1, 2021. Patients with underlying polyposis syndromes were excluded. Outcomes included postprocedural adverse events and polyp recurrence.

Results: Of 110 total patients, 69 underwent HSP and 41 underwent CSP. Intraprocedural bleeding was similar between both groups, but 7 patients in the HSP group experienced delayed adverse events versus none in the CSP group (P = .04). Fifty-four patients had complete polyp resection and subsequent surveillance endoscopies. Multivariate analysis showed polyp size to be associated with recurrence (per mm; odds ratio, 1.11; 95% confidence interval, 1.04-1.20; P < .01). Endoscopic resection technique (HSP vs CSP) was not a predictor of recurrence (P = .18).

Conclusions: HSP led to more delayed adverse events compared with CSP, whereas no significant differences on outcomes were noted, suggesting that CSP is equally effective and potentially safer for the removal of duodenal adenomas. (Gastrointest Endosc 2022;96:657-64.)
endoscopic resection of polyps are hot snare polypectomy (HSP), which involves electrocautery, and cold snare polypectomy (CSP).

Until recently, HSP had been the preferred method for removal of colon polyps because of the belief that electrocautery would prevent immediate bleeding while assisting in eradicating residual polyp tissue at the base.6 Despite the attempts to minimize immediate bleeding, HSP can lead to several clinically significant adverse events, including delayed bleeding, perforation, and cautery-related injury (postpolypectomy syndrome). Recently, CSP has grown in popularity because of studies demonstrating similar efficacy and lower postpolypectomy adverse events compared with HSP in resection of colon polyps ≤15 mm.7,9 Although growing evidence shows the benefits of CSP in the resection of colon polyps, data comparing resection techniques for duodenal adenomas are limited. This is evident in the European Society of Gastrointestinal Endoscopy’s recent recommendations that although CSP can be used for duodenal polyps less than 6 mm, it is considered to be a weak recommendation based on little evidence from prior studies.10

Although HSP has typically been used in the resection of nonampullary duodenal adenomas, a few small studies have shown that CSP can be performed safely as well. Both Maruoka et al11 and Hameda et al12 conducted prospective trials that established CSP as a safe alternative to HSP for duodenal adenomas. However, no study has directly compared the 2 methods in terms of their safety and efficacy for polyp removal. The aim of this study was to compare the safety and efficacy of CSP and HSP for the resection of sporadic, nonampullary duodenal adenomas.

METHODS

Our study base consisted of adult patients (age ≥18 years) from the University of California San Diego Medical Center and Veterans Affairs Hospital San Diego who underwent upper endoscopy with snare polypectomy of a nonampullary duodenal adenoma from January 1, 2007 to March 1, 2021. Patients who underwent alternative methods of polyp removal and those with underlying genetic conditions predisposing them to duodenal polyps (eg, familial adenomatous polyposis syndrome) were excluded. Institutional review board approval was obtained through the University of California San Diego Human Research Protections Program before data gathering.

Subjects were identified using International Classification of Diseases, Tenth Revision codes D13.2 and D13.3 and search of pathology database records for duodenal adenoma. Manual chart review was performed for all patients to confirm the diagnosis of duodenal adenoma; to ascertain patient-related factors, including age, sex, and antithrombotic use, and polyp-related features, such as size, location, presence of high-grade dysplasia, experience level of the endoscopist, resection technique, and complete polyp resection; and to determine patient follow-up for postprocedural follow-up, polyp recurrence, and adverse events.

Duodenal location was defined by segments including D1, D2, and D3. D1 was defined as the duodenal end of the pylorus to the superior duodenal flexure, D2 as the superior duodenal flexure to inferior duodenal flexure, and D3 as the inferior duodenal flexure to approximately where the duodenum crosses the vertebral column. Complete polyp resection was defined as visual confirmation of polyp resection made by the performing endoscopist. Postprocedural follow-up was defined as telephone call, patient messages in the electronic medical record, and office visits with GI or primary care within 30 days of the endoscopy. Delayed adverse events were defined as bleeding or perforation that occurred more than 1 day after polypectomy that necessitated clinic visit, emergency department visit, or hospitalization.

Procedures were performed by 7 endoscopists, 6 of whom were trained in advanced endoscopy and 1 who was a general gastroenterologist. In our cohort, advanced endoscopists performed most procedures (102/110). Examples of polypectomy technique are shown in Figure 1; Figure 1A to C shows a polyp lifted and excised by HSP with the application of clips after polypectomy, whereas Figure 1D to F shows a polyp lifted and excised by CSP with argon plasma coagulation (APC) ablation of margins.

Statistical analysis

Continuous variables were evaluated for normality by using the Shapiro-Wilk test, were described as medians and interquartile ranges, and were compared using the Mann-Whitney U test. Categorical variables are described as counts and percentages and were compared using the Fisher exact test. Both univariate and multivariate logistic regression were performed to identify predictors of duodenal polyp recurrence. For multivariate analysis, backward stepwise elimination was done using a threshold of \( P < .15 \) for inclusion in the final model. Statistics were performed using IBM SPSS for Mac (version 25.0; Armonk, NY, USA).

RESULTS

Among the 110 patients identified in our study cohort, 120 adenomatous duodenal polyps ≥5 mm were resected between January 1, 2007 and March 1, 2021, with 74 polyps (61.7%) undergoing HSP and 46 polyps (38.3%) undergoing CSP (Table 1). There was no difference in median age (68 years vs 72 years, \( P = .39 \)), sex (49.3% male vs 68.3% male, \( P = .07 \)), or antithrombotic use (15.0% vs 12.2%, \( P = 1.00 \)) between patients who underwent HSP versus CSP, respectively. Median polyp size (15 mm vs
12 mm, \( P = .27 \), polyp location, histology, and en-bloc resection rates were similar between both groups. Submucosal lift (66.2% vs 37.0%, \( P < .01 \)) and clips (55.4% vs 30.4%, \( P < .01 \)) were used more frequently in polyps resected with HSP compared with CSP. APC was the only technique used after resection ablation in this cohort, with no difference in APC use (24.3% vs 19.6%, \( P = .54 \)) between the 2 groups. Among the 27 instances where APC was used, in 12 cases APC was used to ablate the margins of the polypectomy site, and in 15 cases APC was used to ablate residual tissue at the polypectomy site. Chronologically, the first CSP resection took place in 2012, with all prior resections being done by HSP (Supplementary Fig. 1, available online at www.giejournal.org). Over the time period of our study, rates of CSP use increased.

There was no difference in intraprocedural bleeding between the HSP and CSP groups (10.1% vs 9.6%, \( P = 1.00 \)). However, patients who underwent HSP had increased rates of delayed adverse events (10.1% vs 0%, \( P = .04 \)). Of the 7 patients who experienced delayed adverse events, 6 had delayed bleeding (4 requiring hospitalization, blood transfusions, or repeat endoscopic evaluation and 2 managed conservatively), and 1 patient developed duodenal perforation requiring surgical repair (Table 2). The patient who experienced a perforation underwent HSP resection of a 15-mm polyp located in D2, which was followed by APC ablation of residual polyp and deployment of 3 clips. Lifting was not done in that patient, and the advanced endoscopist performing the case had over 20 years of experience. The patient presented to the emergency department the same day as his endoscopy; he underwent laparoscopic repair of his defect and recovered well.

On review of patients with delayed adverse events, we found median polyp size was significantly larger in the delayed adverse event group (20 mm vs 15 mm, \( P = .03 \)), and HSP was performed more frequently in the delayed adverse event group (100% vs 60.2%, \( P = .04 \) (Table 2). Clipping and APC were shown to trend toward being associated with delayed adverse events (\( P = .06 \) for both) as well. Given the lack of CSP outcomes in the delayed adverse event group, regression analysis for predictors of delayed adverse events could not be performed.

Of our cohort of 110 patients, 102 (92.7%) had procedures that were done by advanced endoscopists with experience ranging from 3 to 20 years, whereas 8 (7.3%) had procedures done by a general gastroenterologist with 15 years of experience. All instances of delayed adverse events and 13 of 14 instances of recurrence occurred among procedures done by advanced endoscopists. Univariate analysis showed no significant difference in rates of delayed adverse events (\( P = 1.00 \)) or recurrences (\( P = 1.00 \)) between the 2 groups.

Of the 110 patients who underwent snare polypectomy of a sporadic nonampullary duodenal adenoma, 104 (94.5%) had some form of postprocedural follow-up with our GI department or their primary care provider. Fifty-four (49.1%) underwent complete polyp resection and
had surveillance endoscopy records available for review, whereas 56 patients were excluded from recurrence analysis (Supplementary Fig. 2, available online at www.giejournal.org). Median follow-up time for first surveillance EGD was 174.0 days (interquartile range, 91, 269.75). Figure 2 depicts the breakdown of recurrence and remission between the 2 groups. At the time of first surveillance endoscopy, 74.1% of patients had no evidence of residual/recurrent adenoma; 80% in the HSP group and 63.2% in the CSP group ($P = .18$). Among the 14 patients (25.9%) with adenoma recurrence, a median number of 1.5 (interquartile range, 1, 3) surveillance endoscopies were performed with eventual adenoma remission occurring in 6.

Among the 54 patients with endoscopic surveillance, 91.4% of patients in the HSP group achieved eventual successful eradication of duodenal adenomas compared with 73.7% in the CSP group by the end of the study period ($P = .08$). Of the 8 patients with residual duodenal adenomas, 3 were in the HSP group and 5 in the CSP group. Two patients in the CSP group were actively undergoing surveillance at the time of our study’s conclusion (Supplementary Table 1, available online at www.giejournal.org). Three patients had microscopic adenomatous tissue on biopsy samples only, and 5 patients had endoscopically visible residual adenoma (all $<$6 mm). These patients may have had eventual remission of duodenal adenomas, but further endoscopies were not performed at our institution.

### TABLE 1. Patient, procedural, and polyp characteristics of duodenal polyp cohort

|                           | Hot snare polypectomy (n = 69) | Cold snare polypectomy (n = 41) | $P$ value |
|---------------------------|-------------------------------|--------------------------------|-----------|
| No. of polyps             | 74 (61.7)                     | 46 (38.3)                      |           |
| Median age, y (IQR)       | 68 (58.5, 76.0)               | 72 (62, 76.5)                  | .39       |
| Male sex                  | 34 (49.3)                     | 28 (68.3)                      | .07       |
| Antithrombotic use        | 9 (13.0)                      | 5 (12.2)                       | 1         |
| Antiplatelet (not aspirin)| 1                             | 1                              |           |
| Warfarin                  | 5                             | 1                              |           |
| Direct oral anticoagulant | 1                             | 2                              |           |
| Low-molecular-weight heparin | 2                             | 0                              |           |
| Direct thrombin inhibitor | 0                             | 1                              |           |
| Intraprocedural bleeding  | 7 (10.1)                      | 4 (9.6)                        | 1         |
| Delayed adverse events    | 7 (10.1)                      | 0                              | .04       |
| Bleeding                  | 6                             | 0                              |           |
| Conservative management   | 1                             | 0                              |           |
| Requiring transfusion, hospitalization, or further endoscopic intervention | 5 | 0 |           |
| Perforation               | 1                             | 0                              |           |
| Median polyp size, mm (IQR) | 15 (10, 20)                  | 12 (5, 20)                     | .27       |
| Location in duodenum      |                               |                                | .21       |
| D1                        | 14 (18.9)                     | 14 (30.4)                      |           |
| D2                        | 43 (58.1)                     | 26 (56.5)                      |           |
| D3                        | 17 (23.0)                     | 6 (13.0)                       |           |
| Histology                 |                               |                                | .38       |
| Adenoma/low-grade dysplasia | 61 (82.4)                  | 42 (91.3)                      |           |
| High-grade dysplasia      | 5 (6.8)                       | 2 (4.3)                        |           |
| Villous/serrated          | 8 (10.8)                      | 2 (4.3)                        |           |
| Resection type            |                               |                                | .33       |
| Piecemeal                 | 39 (52.7)                     | 24 (52.2)                      |           |
| En bloc                   | 35 (47.3)                     | 22 (47.8)                      |           |
| Submucosal lift used      | 49 (66.2)                     | 17 (37.0)                      | <.01      |
| Clips used                | 41 (55.4)                     | 14 (30.4)                      | <.01      |
| Argon plasma coagulation used | 18 (24.3)                 | 9 (19.6)                       | .54       |
| Advanced endoscopist      | 65 (94.2)                     | 37 (90.2)                      | .47       |

Values are n or n (%) unless otherwise defined.
Univariate analysis of predictors of polyp recurrence showed increasing polyp size (per mm; odds ratio, 1.10; 95% confidence interval, 1.03-1.18; \( P < .01 \)) and high-grade dysplasia compared with low-grade dysplasia (odds ratio, 16.0; 95% confidence interval, 1.59-161.17; \( P = .02 \)) as the only statistically significant variables associated with duodenal adenoma recurrence (Table 3). On multivariate analysis, only polyp size was associated with an increased risk of recurrence (per mm; odds ratio, 1.11; 95% confidence interval, 1.04-1.20; \( P < .01 \)). Resection technique (CSP vs HSP) was not associated with duodenal adenoma recurrence on univariate or multivariate analysis.

**DISCUSSION**

In this retrospective cohort study of 110 patients who underwent endoscopic resection of duodenal adenomas, we found an increased risk of delayed adverse events (bleeding, perforation) among patients who underwent HSP compared with CSP. Efficacy was similar between the 2 techniques with no significant difference in adenoma recurrence risk.

HSP and CSP techniques have been compared in multiple studies examining resection of colon polyps. Our finding of increased delayed adverse events with HSP in duodenal polyp resection is consistent with studies demonstrating increased risk of bleeding and perforation in colon polyp resection when using HSP.\(^{13,14} \) The proposed mechanism for increased risk of delayed adverse events is because of thermal damage to the duodenal wall, leading to an increased risk of perforation and eschar formation, which can result in delayed bleeding. In our study, the rate of delayed adverse events with HSP was 10.1%, whereas our adverse event rate overall was 6.4%, significantly higher than the .6% to 2% described in colon polyps but on par with the 4% to 16% described in resection of duodenal lesions.\(^{15-19} \) The difference between duodenal and colonic adverse event rates can be explained by the thinner and more vascular duodenal wall, which makes polypectomy in this region more prone to adverse events than other regions of the GI tract.\(^{20} \)

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**TABLE 2. Description of patients with delayed adverse events**

| Patient no. | Days after EGD | Adverse event | Intervention |
|-------------|----------------|---------------|--------------|
| 1           | 2              | Bleeding      | Clinic visit, conservative management |
| 2           | 1              | Bleeding      | Hospitalization, transfused 1 unit PRBC |
| 3           | 11             | Bleeding      | Hospitalization, transfused 5 units PRBCs, EGD with clip |
| 4           | 1              | Perforation   | Hospitalization, surgical repair of perforation |
| 5           | 1              | Bleeding      | Emergency department visit, conservative management |
| 6           | 2              | Bleeding      | Hospitalization, EGD with clip |
| 7           | 12             | Bleeding      | Hospitalization, transfused 2 units PRBCs, EGD with clip |

PRBC, Packed red blood cell.
Along with technique, we found median polyp size to be associated with delayed adverse events, with larger polyp sizes significantly associated with delayed adverse events. This is a finding similar to prior studies that have demonstrated increased postpolypectomy bleeding, both immediate and delayed, to be associated with increasing polyp size. Breaking our adverse event rates down further, we saw a 5.5% incidence of delayed bleeding and a 1% incidence of perforation. Tsutsumi et al’s meta-analysis on delayed adverse events after resection of duodenal adenomas noted similar rates for both types of adverse events, with studies showing a 3.5% to 15.8% incidence for delayed bleeding and a 0% to 3.9% incidence rate for perforation.

To our knowledge, this is the first study to compare both HSP and CSP in the resection of duodenal polyps. The incidence of duodenal adenomas is much lower than colon polyps, which may explain the dearth of studies regarding duodenal polyp resection techniques. Maruoka et al and Hameda et al conducted some of the earliest studies for CSP for duodenal adenomas in 2016 and 2017, demonstrating it to be a safe and effective method. Maruoka et al examined outcomes among 30 diminutive nonampullary sporadic duodenal

### TABLE 3. Univariate analysis of predictors of duodenal adenoma recurrence

| Covariate | Odds ratio (95% confidence interval) | P value |
|-----------|-------------------------------------|---------|
| Age       | .98 (.92-1.03)                      | .41     |
| Sex (F vs M) | 1.35 (.40-4.59)                      | .63     |
| Technique (cold snare polypectomy vs hot snare polypectomy) | 2.33 (.67-8.12) | .18 |
| No. of polyps excised (multiple vs 1) | 3.00 (18-51.45) | .45 |
| Anticoagulation (yes vs no) | .69 (.07-6.78) | .75 |
| Intraprocedural bleeding (yes vs no) | .44 (.05-3.98) | .46 |
| Portion of duodenum |                               |         |
| D2 vs D1 | .74 (.12-4.57)                      | .75     |
| D3 vs D1 | 1.25 (.16-9.54)                     | .83     |
| Histology |                                       |         |
| High-grade dysplasia vs low-grade dysplasia | 16.0 (1.59-161.7) | .02 |
| Villous/serrated adenoma vs low-grade dysplasia | 1.33 (12-14.38) | .81 |
| Resection type (piecemeal vs en bloc) | 2.20 (5.2-9.18) | .28 |
| Submucosal lift (yes vs no) | .73 (18-2.88) | .65 |
| Clips (yes vs no) | 1.35 (36-5.09) | .66 |
| Argon plasma coagulation (yes vs no) | 1.03 (29-3.68) | .96 |
| Polyp size, mm |                                       |         |
| 1.10 (1.03-1.18) | .<.01 |
| Advanced endoscopist vs general GI | .68 (0.05-8.18) | .76 |

### TABLE 4. Comparison of patients with and without delayed adverse events after endoscopic snare resection of duodenal adenomas

| Median polyp size, mm (interquartile range) | Delayed adverse events (n = 7) | No delayed adverse events (n = 103) | P value |
|--------------------------------------------|--------------------------------|------------------------------------|---------|
| Hot snare polypectomy                      | 20 (15, 30)                   | 15 (10, 20)                        | .03     |
| Submucosal lift used                       | 7 (100)                       | 62 (60.2)                          | .04     |
| Clips used                                 | 5 (71.4)                      | 60 (58.3)                          | .7      |
| Argon plasma coagulation used              | 6 (85.7)                      | 48 (46.6)                          | .06     |
| Resection type                             | 4 (57.1)                      | 23 (22.3)                          | .06     |
| Piecemeal                                  | 6 (85.7)                      | 56 (54.4)                          | .13     |
| En bloc                                    | 1 (14.3)                      | 47 (45.6)                          |         |

Values are n (%) unless otherwise defined.
adenomas (<6 mm) that were resected with CSP and found no delayed adverse events (bleeding, perforation) or adenoma recurrence. Although the most recent endoscopic guidelines still limit official recommendations for CSP to polyps ≤6 mm, studies now suggest polyps ≥10 mm can be safely removed by CSP as well. Choksi et al.25 examined 15 patients who underwent CSP for duodenal polyps >1 cm (mean size, 24 mm) and demonstrated that CSP was safe, with only 1 hospitalization for postprocedural bleeding in a patient on warfarin. Dang et al.26 found that among their cohort of 43 patients with ≥10-mm duodenal adenomas, piecemeal CSP led to an eradication rate of 89% and only 1 episode of postprocedural bleeding.

In terms of efficacy, 74.1% of patients had remission.at the time of first follow-up, and 83.3% had remission after multiple endoscopies. We found no significant difference in rates of polyp recurrence between the HSP and CSP groups. When comparing our results with existing studies, we found that our rates of efficacy fall within previously described ranges. For example, Sohn et al.17 demonstrated a recurrence rate of 8.7% in their retrospective study of 24 patients who underwent EMR for duodenal adenomas, whereas Tomizawa and Ginsberg27 showed a recurrence rate of 23% when looking at their cohort of 162 patients who underwent the same procedure. Increasing duodenal polyp size was associated with an increased risk of recurrence on multivariate analysis, a finding seen in prior studies of colon polyps.28,29 In our study, for every 1-mm increase in polyp size, the risk of recurrence was increased by 15%. Although only 6 of 14 patients with polyp recurrence eventually achieved remission, all patients experienced decreases in polyp size. Of the 8 patients with continued recurrence, 3 had only microscopic adenomatous tissue detectable and the other 5 had sub-10-mm residual polyps. Although a higher proportion of patients in the HSP group underwent eventual eradication of their polyps, some of this difference may be explained by several patients in the CSP group who were actively undergoing polyp surveillance at the time of our study’s conclusion.

It should be noted that although our study focused on snare polypectomy for sporadic nonampullary duodenal lesions, other methods for polyp removal have demonstrated safety and efficacy as well. In particular, underwater EMR and cap-assisted EMR both demonstrate good efficacy and safety and may be the preferred method of resection at certain institutions.30 This highlights the still- unanswered question of which method of polyp removal is optimal for these polyps, a question that may only be answered by future randomized controlled trials.2

Several limitations may be considered in interpreting our findings. First, this is a retrospective study with inherent limitations such as a reliance on previously collected data that did not include certain types of information such as electrosurgical generator settings or types of cold snare used. Second, our data spanned 14 years, and we were not able to control for changes in technology or technique that may have impacted adverse events and recurrence rates. In particular, we noted a chronologic difference in technique used, with significantly more instances of HSP used early in our study period. This in part is because of the more recent popularization of CSP, and we note our first case in 2012. Although this is a limitation we were unable to manage, there were no significant differences in the baseline characteristics between the CSP and HSP groups. Third, of the 110 patients we identified, only 54 had repeat surveillance endoscopies at our facilities, limiting our assessment of efficacy. Fourth, with only 7 instances of delayed adverse events, our statistical analyses on this outcome were limited, and we may not have had adequate power to assess for all significant associations. Despite these limitations, our study represents one of the largest cohorts of duodenal adenomas and, to our knowledge, the only study comparing CSP and HSP resection of duodenal adenomas.

In conclusion, our study demonstrates that CSP has fewer delayed adverse events compared with HSP and is equally efficacious for the resection of sporadic, nonampullary duodenal adenomas. Although larger prospective trials are needed to compare the safety and efficacy of CSP and HSP for the resection of duodenal adenomas, our study suggests that CSP should be more widely considered for the resection of duodenal adenomas.

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Abbreviations: APC, argon plasma coagulation; CSP, cold snare polypectomy; HSP, hot snare polypectomy.

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Supplementary Figure 1. Distribution of hot and cold snare polypectomies across study period. HSP, Hot snare polypectomy; CSP, cold snare polypectomy.

Supplementary Figure 2. Flowchart depicting reasons for exclusion of 56 patients from recurrence analysis.

1One case due to sedation-related desaturations which terminated case early, one case with duodenal spasm post-polypectomy.
2Proximity of resected polyps and residual polyps precluded accurate determination of recurrence
| Patient no. | Date of index EGD | Original polyp size (mm) | Technique used | No. of subsequent endoscopies | Date of most recent surveillance | Most recent surveillance finding |
|------------|------------------|--------------------------|----------------|-------------------------------|---------------------------------|---------------------------------|
| 1          | 4/23/16          | 35                       | HSP            | 1                             | 2/28/17                         | 5-mm adenoma                    |
| 2          | 7/10/13          | 4-8 mm × 4               | CSP            | 1                             | 7/13/15                         | Diminutive adenoma              |
| 3          | 4/30/18          | 20                       | CSP            | 2                             | 1/28/21                         | Focal microscopic adenoma       |
| 4          | 2/11/20          | 30                       | CSP            | 1                             | 10/6/20                         | 6-mm adenoma                    |
| 5          | 7/23/08          | 30                       | HSP            | 1                             | 5/5/09                          | Microscopic adenoma             |
| 6          | 3/26/13          | 40                       | HSP            | 1                             | 10/1/13                         | Microscopic adenoma             |
| 7          | 5/23/12          | 50                       | CSP            | 1                             | 1/16/13                         | Microscopic adenoma             |
| 8          | 2/26/18          | 12                       | CSP            | 1                             | 2/26/18                         | 4-mm adenoma                    |

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