

Clinical Research

Feasibility of Rescue Colonoscopy Using a Short-type Enteroscope (SIF-H290S) without Overtube after Incomplete Colonoscopy: A Single-center Retrospective Pilot Study

Yorinari Ochiai, Hiroyuki Odagiri, Junnosuke Hayasaka, Takayuki Okamura, Yugo Suzuki, Yutaka Mitsunaga, Kazuhiro Fuchinoue, Masami Tanaka, Kosuke Nomura, Satoshi Yamashita, Akira Matsui, Daisuke Kikuchi and Shu Hoteya

Department of Gastroenterology, Toranomon Hospital, Tokyo, Japan

Abstract

Objectives: Recently, a newly designed short-type single-balloon enteroscope (SBE), SIF-H290S, has been developed with a smaller outer diameter and a longer working length than conventional colonoscopes. It has passive bending and high-force transmission, making insertion easier. However, it is difficult to perform rescue colonoscopy with an SBE after incomplete colonoscopy in the same session. Therefore, this study evaluated the feasibility of consecutive rescue colonoscopy using SIF-H290S without overtube after incomplete colonoscopy.

Methods: This was a single-center retrospective study. We included 19 rescue colonoscopies (19 patients) with SIF-H290S without overtube performed by 11 endoscopists in the SIF group and 38 rescue colonoscopies (38 patients) using a small-caliber colonoscope (PCF-PQ260L) were randomly selected for the control group from procedures performed by the same 11 endoscopists. We compared the cecal intubation rate and other outcomes, such as insertion time, between the two groups.

Results: The median age of the patients was 72 and 69 years, with 8 and 26 males in the SIF and control groups, respectively. The median body mass index was 21.6 and 22.7 kg/m² in the SIF and control groups, respectively. There were no significant differences in the patient backgrounds between the groups, except for the reason for incomplete colonoscopy ($p = 0.048$). The cecal intubation rate was 78.9% (15/19 procedures) and 92.1% (35/38 procedures) in the SIF and control groups, respectively.

Conclusions: This study revealed the real-world experience and feasibility of rescue colonoscopy using SIF-H290S, which could be a potential rescue device option after incomplete colonoscopy.

Keywords

rescue colonoscopy, SIF-H290S, enteroscope, cecal intubation rate, incomplete colonoscopy

J Anus Rectum Colon 2022; 6(4): 282-288

Introduction

Colonoscopy is currently recommended as a direct visualization screening test for colorectal cancer[1], and follow-up colonoscopy is recommended as a surveillance measure after polypectomy[2]. The advantages of colonoscopy not only include high sensitivity for detecting colorectal cancers

and precancerous lesions but also simultaneous single-session diagnosis and treatment[3]. The European Society of Gastrointestinal Endoscopy and American Society of Gastrointestinal Endoscopy guidelines include cecal intubation rate as a key indicator of quality improvement in endoscopy[3,4]. A complete examination of the colon and rectum is fundamental to any colorectal cancer screening pro-

gram[5]; however, incomplete colonoscopy has been reported in approximately 10% of patients[6-8]. Previous studies have reported that factors, such as age, female sex, high or low body mass index (BMI), bowel preparation, history of prior abdominal surgery or pelvic surgery, colonic loops or angulation, and diverticular disease, are associated with incomplete colonoscopy[7,9]. Additionally, advanced neoplasia was missed by incomplete colonoscopy in 4.3% of patients[8].

Some rescue devices have been reported to achieve cecal intubation after incomplete colonoscopy with a standard colonoscope, including upper endoscopes, small-caliber colonoscopes[10,11], single- or double-balloon endoscopes[12,13], and enteroscopes without overtube[14,15].

Recently, a newly designed short-type single-balloon enteroscope (SBE), SIF-H290S (Olympus, Tokyo, Japan), has been developed. Compared with conventional colonoscopes, SIF-H290S has a smaller outer diameter and a longer working length. Additionally, SIF-H290S allows passive bending and high-force transmission, which makes its insertion easier. These new features have been exclusively included in SIF-H290S; therefore, the cecal intubation rate in patients with a difficult colon might be improved with its use. However, it is usually difficult to perform rescue colonoscopy with an SBE after incomplete colonoscopy in the same session. Consecutive rescue colonoscopies using SIF-H290S without overtube after incomplete procedures are considered beneficial because a procedure without overtube is simpler and saves procedure time compared with the standard SBE.

This study aimed to evaluate the feasibility of rescue colonoscopy using SIF-H290S without overtube after incomplete colonoscopy with a standard colonoscope.

Materials and Methods

Study design

This study was a single-center retrospective study.

Patients

Patients who underwent incomplete colonoscopy using a standard colonoscope and patients who underwent rescue colonoscopy using SIF-H290S without overtube in the same session by the same endoscopist were included in the study. A total of 113 colonoscopies (101 patients) were performed with SIF-H290S at Toranomon Hospital between January 2017 and March 2021. Among them, 82 colonoscopies (74 patients) initially performed with SIF-H290S were excluded. The remaining 31 colonoscopies (27 patients) switched to SIF-H290S mid-procedure. Nine colonoscopies (5 patients) without the purpose of cecal intubation (e.g., endoscopic treatments), 1 colonoscopy initially performed using a gastroscopy, and 2 colonoscopies performed by endoscopists

who had never used a small-caliber colonoscope (PCF-PQ 260L [Olympus, Tokyo, Japan]) as a rescue device were also excluded. As a result, 19 colonoscopies (19 patients) were included as the rescue colonoscopies were performed with SIF-H290S without overtube (SIF group). Sixteen colonoscopies were performed by 9 board-certificated fellows of the Japan Gastroenterological Endoscopy Society (experts) and 3 were performed by 2 trainees. In addition, 288 rescue colonoscopies (272 patients) using PCF-PQ260L were performed during the same period. Among them, data from 146 procedures (141 patients) performed by the same 11 endoscopists were extracted. The patients were randomly numbered by one investigator. Subsequently, another investigator randomly selected two times as many patients as in the SIF group. As a result, 38 rescue colonoscopies (38 patients) were randomly selected as the control group, matching the proportion of the endoscopists (experts or trainees) in the SIF group (32 colonoscopies by experts and 6 by trainees) (Figure 1).

Bowel preparation and colonoscopy procedure

All patients underwent bowel preparation with sodium picosulfate hydrate (Nichi-Iko Pharmaceutical Co., Ltd., Toyama, Japan) on the day before the examination and with mosapride citrate (Nichi-Iko Pharmaceutical Co., Ltd.), 2 L of polyethylene glycol-electrolyte lavage solution (EA Pharma Co., Ltd., Tokyo, Japan), and dimethicone (Kissei Pharmaceutical Co., Ltd., Nagano, Japan) on the day of the examination. Scopolamine butylbromide (Sanofi Co., Ltd., Tokyo, Japan) or glucagon (EA Pharma Co., Ltd.) was used intramuscularly before the colonoscopy as an antispasmodic agent to prevent colonic wall spasms. If these agents were contraindicated, no antispasmodic agents were used. In all cases, colonoscopy started with the left-lateral position, and the position changed during the procedure at the endoscopists' discretion. If the patient wished to be sedated, pethidine hydrochloride (Takeda Pharmaceutical Co., Ltd., Tokyo, Japan), midazolam (Takeda Pharmaceutical Co., Ltd.), or diazepam (Takeda Pharmaceutical Co., Ltd.) was used at the endoscopists' discretion. Ambient CO₂ insufflation was conducted during all colonoscopies.

Colonoscopes

SIF-H290S and PCF-Q260L have the same distal tip (9.2 mm) and insertion tube outer (9.2 mm) diameters. However, the working channel, working length, and position of the forceps channel differ between the two (3.2 vs. 2.8 mm, 1,520 vs. 1,680 mm, and 8 o'clock vs. 5 o'clock, respectively). Both colonoscopes have a passive bending portion, which is shorter in SIF-H290S, and the length of the angle portion of SIF-H290S is shorter than that of PCF-PQ260L (Figure 2). Regarding image quality, SIF-H290S produces a higher resolution image (high-definition image) than PCF-

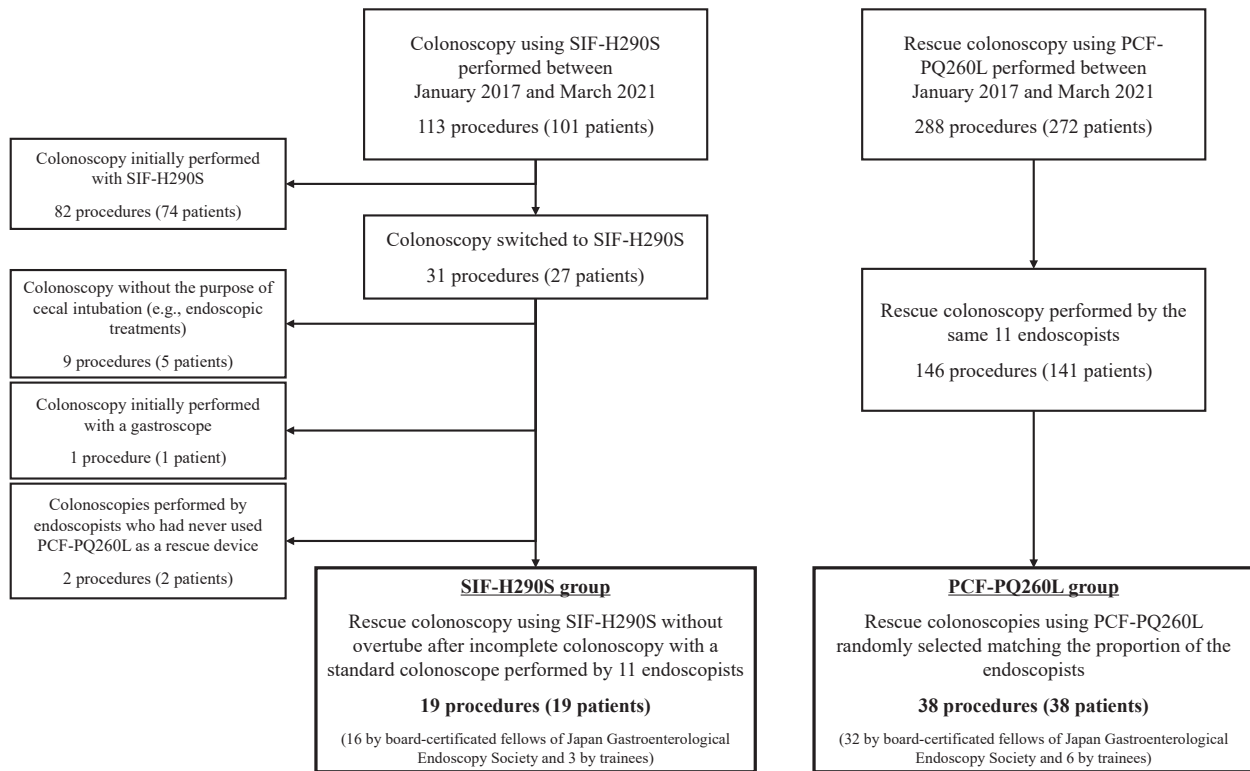


Figure 1. Flowchart of the selection process of the study participants in the SIF-H290S and PCF-PQ260L groups.

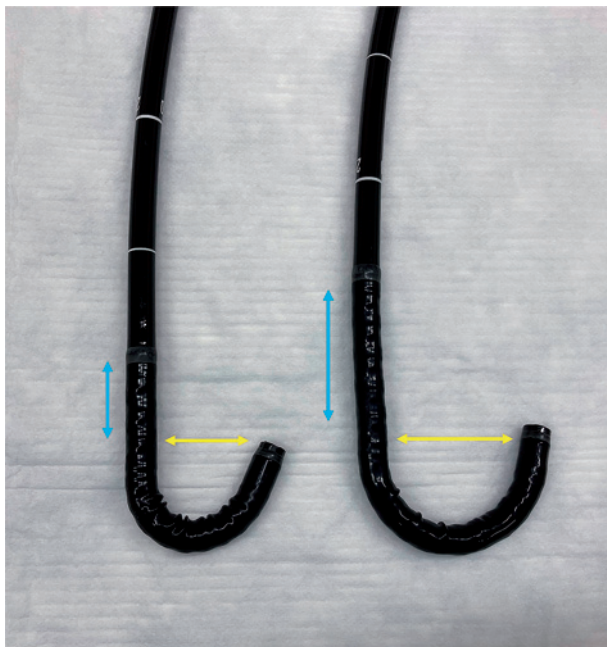


Figure 2. The newly designed short-type single-balloon enteroscope (SIF-H290S; left) and the small-caliber colonoscope (PCF-PQ260L; right). Blue arrow lines indicate the passive bending portion, which is shorter in the SIF-H290S. Yellow arrow lines indicate the length of the angle portion, which is also shorter in the SIF-H290S.

PQ260L (high-quality image). The standard colonoscopes used in this study were from the PCF-Q260 and PCF-H290 series. A comparison of the technical specifications among SIF-H290S, PCF-PQ260L, and the representative standard colonoscope (PCF-H290ZI) is shown in Table 1.

Definition of incomplete and rescue colonoscopies

Incomplete colonoscopy was defined as failure to reach the cecum with a standard colonoscope. Rescue colonoscopy was defined as colonoscopy with SIF-H290S without overtube performed by the same endoscopist in the same session after incomplete colonoscopy.

Study endpoints

We set the primary endpoint as cecal intubation rate. In addition, other colonoscopy outcomes, such as insertion time and intervention, were also evaluated.

Statistical analysis

Chi-squared and Fisher’s exact tests were used for between-group comparisons of qualitative variables, and the Mann-Whitney *U* test was used for comparison of quantitative variables. All statistical analyses were performed using the SPSS software for Windows, version 25.0 (IBM Corp., Armonk, NY, USA). A p-value of <0.05 indicated statistical significance.

Table 1. Comparison between the Technical Specifications of SIF-H290S and Representative Colonoscopes.

| Model | Newly developed short-type enteroscope | Small-caliber colonoscope | Standard colonoscope |
|-----------------------------|--|---------------------------|---------------------------|
| | SIF-H290S | PCF-PQ260L | PCF-H290ZI |
| Distal tip diameter | 9.2 mm | 9.2 mm | 11.7 mm |
| Outer diameter | 9.2 mm | 9.2 mm | 11.8 mm |
| Working channel | 3.2 mm | 2.8 mm | 3.2 mm |
| Working length | 1,520 mm | 1,680 mm | 1,330 mm |
| Waterjet irrigation | No | No | Yes |
| Magnifying function | No | No | Yes |
| Variable stiffness | No | No | Yes |
| Position of forceps channel | 8 o'clock | 5 o'clock | 5 o'clock |
| Tip angulation up/down | 180°/180° | 180°/180° | 180°/180° |
| Tip angulation right/left | 160°/160° | 160°/160° | 160°/160° |
| Field of view (degree) | 140° (WIDE) | 140° (WIDE) | 170° (WIDE) 85° (TELE) |
| Image quality | High-definition image | High-quality image | High-definition image |

Ethical approval

This study was retrospective in nature and was performed according to the ethical principles of the Declaration of Helsinki for medical research involving human subjects. The requirement for informed consent was waived because the data were anonymized. The protocol was approved by the Ethics Committee of Toranomon Hospital (protocol number 2200).

Results

Patient characteristics

Patient characteristics, indication for colonoscopy, anti-spasmodic, sedation, and information about colonoscopy using a standard colonoscope are summarized in Table 2. The median age of the patients was 72 and 69 years, and there were 8 and 26 males in the SIF and control groups, respectively. The median BMI was 21.6 and 22.7 kg/m² in the SIF and control groups, respectively. No significant differences in patient characteristics were noted between the groups, except for the reason for incomplete colonoscopy ($p = 0.048$). This was possibly because there were more patients with pain (31.6%) in the SIF group, whereas there were more patients with a long colon (28.9%) in the control group.

Main outcome

The main outcome and other findings related to rescue endoscopy are summarized in Table 3. The cecal intubation rate was 78.9% (15/19 procedures) in the SIF group and 92.1% (35/38 procedures) in the control group, showing a non-significant difference ($p = 0.206$). The cecal intubation rates of the experts were 75% (12/16 procedures) and 90.6%

(29/32 procedures) in the SIF and control groups, respectively ($p = 0.201$). In contrast, the cecal intubation rate of the trainees was 100% (3/3 procedures and 6/6 procedures) in both the SIF and control groups. The median time of first colonoscopy, the cecal intubation time, withdrawal time, and total time were also not significantly different between the groups. Additionally, endoscopic findings, adenoma detection rate, and endoscopic intervention (polypectomy, biopsy, or marking) showed no significant differences between the two groups. No complications were noted in both groups.

Failure cases of rescue colonoscopy using SIF-H290S

Rescue colonoscopy failed in four patients (Supplementary Table 1). The reasons for this failure included a long colon in one patient, pain in one patient, and adhesion in two patients. Regarding backgrounds, two patients had one or several histories of incomplete colonoscopy using a standard colonoscope. In addition, one patient had a large intrapelvic malignant lymphoma, and one had severe adhesion after total hysterectomy.

Discussion

This retrospective study evaluated the feasibility of rescue colonoscopy using a short-type enteroscope, SIF-H290S, without overtube. The cecal intubation rate of rescue colonoscopy in the SIF group was 78.9%, which was not significantly different compared with the cecal intubation rate in the control group in which a small-caliber colonoscope, PCF-PQ260L, was used.

To the best of our knowledge, this is the first report of rescue colonoscopy using SIF-H290S without overtube. Previous literature has demonstrated the efficacy of PCF-PQ260L as a rescue device after incomplete colonoscopy[11]. Re-

Table 2. Patient Characteristics.

| | SIF-H290S (N = 19) | PCF-PQ260L (N = 38) | p-value |
|--|--|---|---------|
| Age (years), median [IQR] | 72 [58, 78] | 69 [59, 74] | 0.525 |
| Male, n (%) | 8 (42.1) | 26 (68.4) | 0.056 |
| Height (cm), median [IQR] | 157.9 [153, 166.9] (N = 17) | 162 [157, 170] (N = 33) | 0.436 |
| Weight (kg), median [IQR] | 54 [47.8, 65.9] (N = 17) | 59 [54.5, 69.9] (N = 33) | 0.223 |
| BMI, median [IQR] | 21.6 [19.4, 23.3] (N = 17) | 22.7 [20.5, 25.9] (N = 33) | 0.407 |
| History of previous colonoscopy, n (%) | Successful procedure with a standard colonoscope: 11 (57.9) Incomplete procedure with a standard colonoscope: 1 (5.3) None: 6 (31.5) Other: 1 (5.3) | Successful procedure with a standard colonoscope: 18 (47.4) Incomplete procedure with a standard colonoscope: 2 (5.2) None: 18 (47.4) | 0.388 |
| History of abdominal surgery, n (%) | 10 (52.6) | 14 (36.8) | 0.255 |
| Indications for colonoscopy, n (%) | Screening: 4 (21) Fecal immunochemical test positive: 1 (5.3) Polyp surveillance: 3 (15.8) Follow-up after endoscopic treatment: 3 (15.8) Follow-up after colorectal surgery: 3 (15.8) Others: 5 (26.3) | Screening: 9 (23.7) Fecal immunochemical test positive: 7 (18.4) Polyp surveillance: 3 (7.9) Follow-up after endoscopic treatment: 4 (10.5) Follow-up after colorectal surgery: 4 (10.5) Others: 11 (29) | 0.707 |
| Antispasmodic agents, n (%) | Scopolamine butylbromide: 15 (78.9) Glucagon: 3 (15.8) None: 1 (5.3) | Scopolamine butylbromide: 22 (57.9) Glucagon: 12 (31.6) None: 4 (10.5) | 0.292 |
| Standard colonoscopy used before rescue procedure, n (%) | PCF-H290I: 5 (26.3) PCF-H290ZI: 9 (47.3) PCF-Q260AI: 1 (5.3) PCF-Q260AZI: 3 (15.8) PCF-Q260JI: 1 (5.3) | PCF-H290I: 15 (39.4) PCF-H290ZI: 13 (34.2) PCF-Q260AI: 2 (5.3) PCF-Q260AZI: 2 (5.3) Unknown: 6 (15.8) | 0.377 |
| Location of failure, n (%) | Ascending colon: 3 (15.8) Sigmoid colon: 7 (36.8) Rectum: 2 (10.6) Unknown: 7 (36.8) | Ascending colon: 2 (5.3) Transverse colon: 3 (7.9) Sigmoid colon: 14 (36.8) Rectum: 1 (2.6) Unknown: 18 (47.4) | 0.248 |
| Reason for incomplete colonoscopy, n (%) | Adhesion: 6 (31.6) Sharp angulation: 1 (5.3) Stricture: 5 (26.2) Pain: 6 (31.6) Long colon: 1 (5.3) | Adhesion: 8 (21.1) Sharp angulation: 2 (5.3) Stricture: 5 (13.1) Pain: 2 (5.3) Long colon: 11 (28.9) Unknown: 10 (26.3) | 0.048 |
| Sedation, n (%) | 4 (21.1) | 10 (26.3) | 0.754 |
| Timing of sedation (initial: middle) | 2: 2 | 3: 7 | 0.580 |
| Expert endoscopists, n (%) | 16 (84.2) | 32 (84.2) | - |

BMI, body mass index; IQR, interquartile range

garding enteroscopes, the usefulness of SIF-Q180 as a rescue device has been reported in two studies[14,15]. The passive bending and high-force transmission of the newly developed SIF-H290S indicate its potential to improve the success rates of scope insertion. One study has reported that compared with other short-type SBEs, endoscopic retrograde cholangiopancreatography using SIF-H290S for Roux-en-Y gastrectomy had better outcomes, including procedural success rate and median time to reach the blind end[16]. Although PCF-PQ260L has also passive bending and high-force transmission, SIF-H290S has some advantages, such as larger working channels and high-definition images. Because

of the functions of the device, the scope insertion of SIF-H290S even without overtube would have resulted in improvements. Additionally, rescue colonoscopy using SIF-H290S without overtube can be performed immediately after incomplete colonoscopy with a standard colonoscope in the same session.

The cecal intubation rates between the two groups were not significantly different in this study, although the number of study participants was small. Regarding the main outcome in this study, the cecal intubation rate of rescue colonoscopy using SIF-H290S was 78.9%, which is lower than that reported in previous studies[11,14], although it was

Table 3. Main Outcome and Other Endoscopic Findings.

| | SIF-H290S (N = 19) | PCF-PQ260L (N = 38) | p-value |
|---|--|---|---------|
| Cecal intubation rate, % | 78.9 (15/19) | 92.1 (35/38) | 0.206 |
| Cecal intubation rate of the experts, % | 75 (12/16) | 90.6 (29/32) | 0.201 |
| Cecal intubation rate of the trainees, % | 100 (3/3) | 100 (6/6) | - |
| Time of first colonoscopy (min), median [IQR] | 10 [4, 14] (N = 6) | 15 [9, 21] (N = 17) | 0.131 |
| Cecal intubation time (min), median [IQR] | 8 [6, 12] (N = 4) | 9 [5, 15] (N = 15) | 0.881 |
| Withdrawal time (min), median [IQR] | 15 [12, 16] (N = 16) | 10 [8, 18] (N = 37) | 0.069 |
| Total time (min), median [IQR] | 45 [28, 50] (N = 13) | 39 [31, 46] (N = 28) | 0.575 |
| Endoscopic findings, n (%) | Normal: 2 (10.5) Adenoma or early cancer: 9 (47.4) Advanced cancer: 5 (26.3) Status after colorectal surgery: 1 (5.3) Others: 2 (10.5) | Normal: 2 (5.3) Adenoma or early cancer: 19 (50) Advanced cancer: 3 (7.9) Status after colorectal surgery: 4 (10.5) Others: 10 (26.3) | 0.241 |
| Adenoma detection rate, % | 68.4 (13/19) | 60.5 (23/38) | 0.560 |
| Polypectomy, n (%) | 4 (21.1) | 4 (10.5) | 0.420 |
| Biopsy or marking, n (%) | 5 (26.3) | 7 (18.4) | 0.509 |
| Complication, n (%) | 0 (0) | 0 (0) | - |

IQR, interquartile range

not significantly different compared with the cecal intubation rate of colonoscopy using PCF-PQ260L. This was possibly because these previous reports excluded patients with a prior colonic surgery and poor bowel preparation and those with high risk of a subsequent endoscopic examination. In contrast, we enrolled all patients who underwent rescue colonoscopy using SIF-H290S, regardless of their background. In this study, rescue colonoscopies failed in four patients. Among them, one patient had a large intrapelvic malignant lymphoma, one had a history of several incomplete colonoscopies, and one had a history of double-balloon colonoscopy due to incomplete colonoscopy using a standard colonoscope. In other words, patient background could contribute to the failure of rescue colonoscopy. Based on these findings, the present results might reflect real-world experiences in daily practice.

This study had some limitations. First, it was a single-center retrospective study with a small sample size, and the procedures performed by trainees were few. Second, the participants had varying backgrounds, which might have introduced patient selection bias. Third, patients' symptoms could not be fully evaluated because of the retrospective design of this study. Finally, the selection of the first and rescue endoscopies, the timing of rescue colonoscopy, and the administration of sedation were at the discretion of various endoscopists. The selection of endoscopy subjectively depends on the endoscopist's proficiency and experience. However, we believe that SIF-H290S without overtube has potential as a rescue device after incomplete colonoscopy. Further accumulation of similar cases and further studies demonstrating the performance of SIF-H290S based on different skill levels of endoscopists are recommended. As selection bias by endoscopists is inevitable in retrospective

studies, a prospective randomized controlled trial is required for the establishment of a more convincing result with less bias.

In conclusion, this study revealed the real-world experience and feasibility of rescue colonoscopy using SIF-H290S. This enteroscope might be a good rescue device option after incomplete colonoscopy.

Conflicts of Interest

There are no conflicts of interest.

Author Contributions

Yorinari Ochiai designed the research study. Yorinari Ochiai wrote the paper. Yorinari Ochiai, Hiroyuki Odagiri, Junnosuke Hayasaka, Takayuki Okamura, Yugo Suzuki, Yutaka Mitsunaga, Kazuhiro Fuchinoue, Masami Tanaka, Kosuke Nomura, Satoshi Yamashita, Akira Matsui, Daisuke Kikuchi, and Shu Hoteya collected and analyzed the data. Yorinari Ochiai and Hiroyuki Odagiri conducted statistical analyses.

Thirteen authors are included in this study because all the authors have contributed to data collection.

Approval by Institutional Review Board (IRB)

Protocol number: 2200

The Ethics Committee of Toranomon Hospital

References

1. US Preventive Services Task Force, Davidson KW, Barry MJ et al. Screening for colorectal cancer: US Preventive Services Task Force Recommendation Statement. *JAMA* 2021 May 18; 325(19): 1965-77.
2. Tanaka S, Saitoh Y, Matsuda T, et al. Evidence-based clinical prac-

- tice guidelines for management of colorectal polyps. *J Gastroenterol* 2021 Apr; 56(4): 323-35.
3. Rex DK, Boland CR, Dominitz JA, et al. Colorectal cancer screening: recommendations for physicians and patients from the U.S. Multi-Society Task Force on Colorectal Cancer. *Am J Gastroenterol* 2017 Jul; 112(7): 1016-30.
 4. Kaminski MF, Thomas-Gibson S, Bugajski M, et al. Performance measures for lower gastrointestinal endoscopy: a European Society of Gastrointestinal Endoscopy (ESGE) quality improvement initiative. *U Eur Gastroenterol J* 2017 Apr; 5(3): 309-34.
 5. Rembacken B, Hassan C, Riemann JF, et al. Quality in screening colonoscopy: position statement of the European Society of Gastrointestinal Endoscopy (ESGE). *Endoscopy* 2012 Oct; 44(10): 957-68.
 6. Rex DK, Petrini JL, Baron TH, et al. Quality indicators for colonoscopy. *Am J Gastroenterol* 2006 Apr; 101(4): 873-85.
 7. Shah HA, Paszat LF, Saskin R, et al. Factors associated with incomplete colonoscopy: a population-based study. *Gastroenterology* 2007 Jun; 132(7): 2297-303.
 8. Neerincx M, Terhaar sive Droste JS, Mulder CJ, et al. Colonic work-up after incomplete colonoscopy: significant new findings during follow-up. *Endoscopy* 2010 Sep; 42(9): 730-5.
 9. Witte TN, Enns R. The difficult colonoscopy. *Can J Gastroenterol* 2007 Aug; 21(8): 487-90.
 10. Morini S, Zullo A, Hassan C, et al. Endoscopic management of failed colonoscopy in clinical practice: to change endoscopist, instrument, or both? *Int J Colorectal Dis* 2011 Jan; 26(1): 103-8.
 11. Sato K, Shigiyama F, Ito S, et al. Colonoscopy using a small-caliber colonoscope with passive-bending after incomplete colonoscopy due to sharp angulation or pain. *Surg Endosc* 2013 Nov; 27(11): 4171-6.
 12. May A, Nachbar L, Ell C. Push-and-pull enteroscopy using a single-balloon technique for difficult colonoscopy. *Endoscopy* 2006 Apr; 38(4): 395-8.
 13. Becx MC, Al-Toma A. Double-balloon endoscopy: an effective rescue procedure after incomplete conventional colonoscopy. *Eur J Gastroenterol Hepatol* 2014 May; 26(5): 519-22.
 14. Coppola F, Gaia S, Cosimato M, et al. Enteroscope without overtube for cecal intubation after an incomplete colonoscopy. *Dig Liver Dis* 2011 Jun; 43(6): 475-7.
 15. Purchiaroni F, Conti S, Valerii G, et al. Use of enteroscope without the overtube in incomplete colonoscopies. *Scand J Gastroenterol* 2020 Jan; 55(1): 100-4.
 16. Tanisaka Y, Ryozaawa S, Mizuide M, et al. Usefulness of the "newly designed" short-type single-balloon enteroscope for ERCP in patients with Roux-en-Y gastrectomy: a pilot study. *Endosc Int Open* 2018 Dec; 6(12): E1417-22.

Supplementary Files

Supplementary Table 1.

Please find supplementary file(s);

<http://dx.doi.org/10.23922/jarc.2022-005>

Journal of the Anus, Rectum and Colon is an Open Access journal distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view the details of this license, please visit (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).