

## Original Article



# Practice Patterns of Colorectal Polypectomy in Pediatric Endoscopic Specialists in South Korea: A Nationwide Survey Study

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### Conflict of Interest

The authors have no financial conflicts of  
interest.

## ABSTRACT

**Purpose:** Total colonoscopy is recommended if colorectal polyps are clinically suspected. This study aimed to investigate the performance status of pediatric colonoscopic polypectomy in Korea.

**Methods:** We surveyed pediatric endoscopic specialists who perform colonoscopic polypectomy in Korea using a questionnaire of 13 questions on pediatric colonoscopic polypectomy performance status.

**Results:** The survey was conducted at 45 institutions, and 32 specialists (71.1%) responded. Among the respondents, 31.2% (10/32) said colonoscopy was performed in all age groups, while 12.5% (4/32) said sigmoidoscopy was performed in all age groups. Meanwhile, 56.2% (18/32) said that sigmoidoscopy was performed in young children, while colonoscopy was performed in older children. Among them, 38.9% (7/18) believe that 4–6 years were young, and 44.5% (8/18) believe that 7–9 years were young. Regarding surveillance examinations, 21.9% (7/32) said they would perform a surveillance colonoscopy or sigmoidoscopy in the future if less than five juvenile polyps were found in the colon. Meanwhile, if less than five adenomatous polyps were found in the colon, 93.8% (30/32) said they would perform surveillance colonoscopy or sigmoidoscopy in the future.

**Conclusion:** More than half of the pediatric endoscopic specialists in Korea choose between a colonoscopy and sigmoidoscopy depending on the patient's age, contrary to the generally accepted recommendation of total colonoscopy if colorectal polyps are suspected in children and adolescents. In this survey, most pediatric endoscopists used the age range of 4–9 years as the reference age.

**Keywords:** Colonic polyps; Colonoscopy; Sigmoidoscopy; Pediatrics

## INTRODUCTION

Colorectal polyps are the most common cause of isolated lower gastrointestinal bleeding in children [1]. They frequently present with painless rectal bleeding and are diagnosed between 2 and 5 years of age [2]. Juvenile polyps (JPs) are the most common colorectal polyps in children, accounting for 70–80% of the pediatric colorectal polyps and typically appearing as a solitary polyp [3,4]. More than 90% of solitary polyps were found in the left colon,

while multiple polyps are common in the proximal colon [2,5-7]. Because polyps in the right colon have the potential of neoplastic malformation, colonoscopic polypectomy is generally recommended when a polyp is suspected in childhood [3,5,8-10].

To date, there has been no evaluation of the performance status of colonoscopic polypectomy in children with clinically suspected colorectal polyps and subsequent surveillance colonoscopy in real-world practice. Therefore, this study aimed to use a questionnaire to investigate the performance status of pediatric colonoscopic polypectomy and surveillance colonoscopy among pediatric endoscopic specialists in Korea. We aimed to compare questionnaire variables across groups to examine correlations between variables.

## MATERIALS AND METHODS

### Survey

A survey was conducted in August, 2022 at 45 Korean institutions that perform pediatric colonoscopic polypectomy. Sex, age group of the pediatric endoscopic specialists, the number of years that the pediatric endoscopic specialists had performed colonoscopic polypectomy, the geographic region of the institution, the initial examination (colonoscopy or sigmoidoscopy) performed when a polyp was clinically suspected were all included in the questionnaire. We investigated the performance of a total colonoscopy if a polyp was identified in the left colon, the performance of an esophagogastroduodenoscopy (EGD) according to the number of polyps observed in the colon, the performance of EGD if five or more polyps were observed in the colon, and surveillance based on histology findings of less than five polyps in the colon.

We compared questionnaire variables across the groups based on the age of pediatric endoscopic specialists, duration of colonoscopic polypectomy practice, and geographic location of the participating institution.

### Statistical analysis

All statistical analyses were performed using R version 3.2.3 (<http://www.r-project.org>) for categorical variables. Chi-squared test or Fisher's exact test was used for statistical comparisons between the groups. Numbers and percentages were used to report comparative data for categorical variables. Statistical significance was defined as a  $p$ -value  $\leq 0.05$ .

### Ethics statement

The Institutional Review Board (IRB) of Kyungpook National University Chilgok Hospital approved this study, and informed consent was waived as the study was conducted via an online questionnaire survey (IRB Number 2021-12-036).

## RESULTS

### Questionnaire answers

Of the 45 institutions where the survey was requested, 32 (71.1%) responded. **Fig. 1** shows the geographic locations of the 32 institutions, and **Table 1** shows the pediatric endoscopic specialists' baseline information.

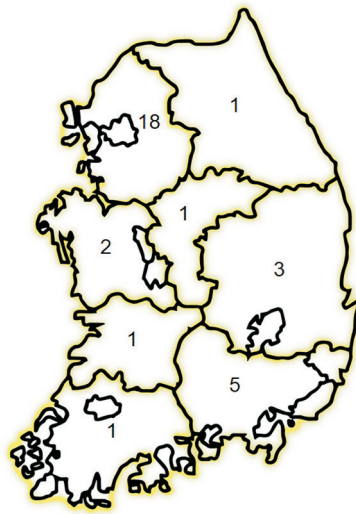


Fig. 1. Geographic distribution of Korean institutions that answered the questionnaire.

**Table 1.** Baseline demographic characteristics of the pediatric endoscopic specialists performing colonoscopic polypectomy

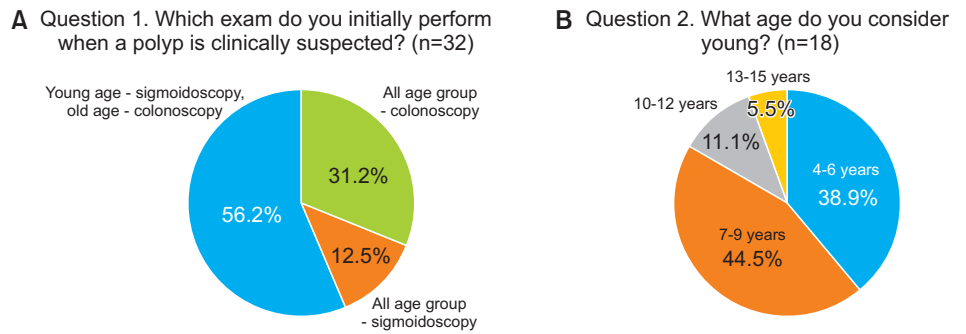
Variable	Pediatric endoscopic specialists (n=32)
Male	15 (46.9)
Age group (yr)	
30–39	13 (40.6)
40–49	12 (37.5)
50–59	3 (9.4)
≥60	4 (12.5)
Duration of colonoscopic polypectomy practice (yr)	8 (4–14)

Values are presented as number (%) or median (interquartile range).

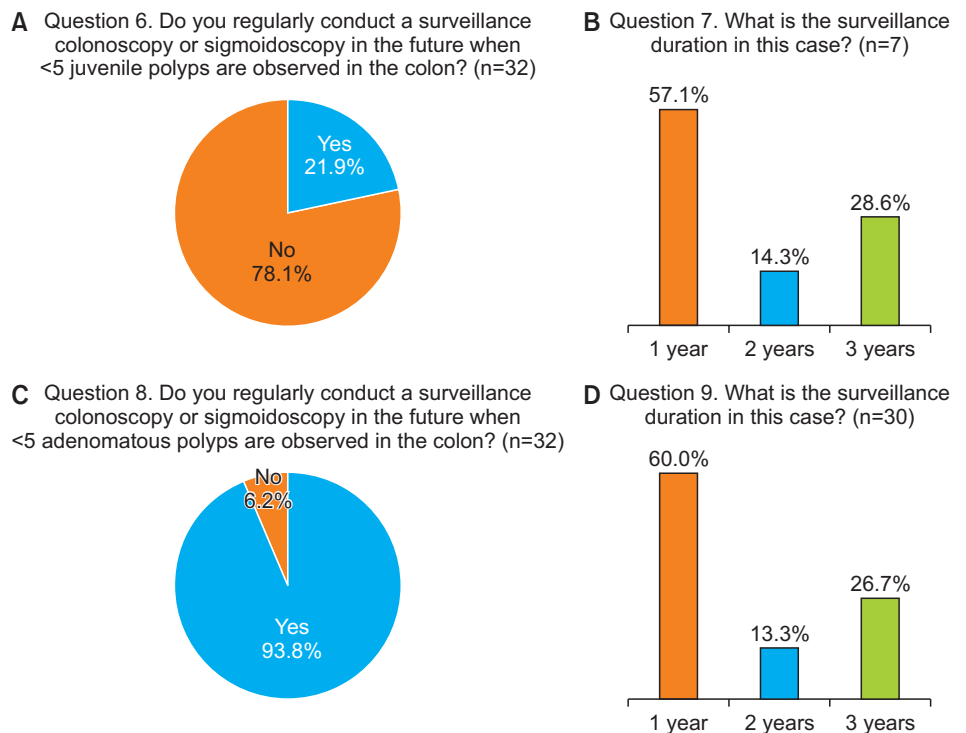
We asked which examination was initially performed if a polyp was clinically suspected, 31.2% (10/32) said that colonoscopy was performed in all age groups. However, 12.5% (4/32) said that sigmoidoscopy was performed in all age groups. Meanwhile, 56.2% (18/32) said that sigmoidoscopy was performed in young children, while colonoscopy was performed in older children. Among them, 38.9% (7/18) said that 4–6 years were young, 44.5% (8/18) said that 7–9 years were young, 11.1% (2/18) said that 10–12 years were young, and 5.6% (1/18) said that 13–15 years were young (Fig. 2).

When a polyp was found in the left colon, 13.6% (3/22) of the 22 endoscopic specialists said that they initially performed a sigmoidoscopy in children of young age and colonoscopy in children of old age before performing total colonoscopy. Regarding EGD, 9.4% (3/32) said that they performed EGD if one polyp was found in the colon, while 96.9% (31/32) said that they performed EGD when more than five polyps were found in the colon.

Regarding surveillance examination, 21.9% (7/32) said that they would perform a surveillance colonoscopy or sigmoidoscopy in the future if less than five JPs were found in the colon. Of all the specialists, 57.1% (4/7) said that the surveillance duration was 1 year. Meanwhile, if less than five adenomatous polyps were found in the colon, 93.8% (30/32) said that they would perform a surveillance colonoscopy or sigmoidoscopy in the future (Fig. 3).



**Fig. 2.** Performance status of colonoscopic polypectomy in children with clinically suspected colorectal polyps among pediatric endoscopic specialists in Korea. (A) Answers to the question “Which examination do you initially perform when a polyp is clinically suspected?” (B) Answers to the question “What age do you consider young?” among those who had said that they performed colonoscopy or sigmoidoscopy according to age in question 1.



**Fig. 3.** Performance status of surveillance colonoscopy among pediatric endoscopic specialists in Korea. (A) Answers to the question “Do you regularly perform a surveillance colonoscopy or sigmoidoscopy in the future if less than five juvenile polyps are found in the colon?” (B) Answers to “What is the surveillance duration?” among those who had answered yes in question 6. (C) Answers to question “Do you regularly perform a surveillance colonoscopy or sigmoidoscopy in the future if less than five adenomatous polyps are observed in the colon?” (D) Answers to “What is the surveillance duration?” among those who had answered yes in question 8.

### Comparison of questionnaire variables between the groups

According to the age group of pediatric endoscopic specialists, there was no significant difference in questionnaire variables between those who were <40 years and those who were ≥40 years (**Table 2**).

According to the duration of colonoscopic polypectomy practice, there was no significant difference in questionnaire variables between those who had practiced <10 years and those who had practiced ≥10 years (**Table 3**).

**Table 2.** Comparison between groups divided according to the age group of pediatric endoscopic specialists (n=32)

Variable	<40 years (n=13)	≥40 years (n=19)	p-value
Initially performed examination when a polyp is clinically suspected			0.515
Colonoscopy in all age groups	3 (26.3)	7 (16.7)	
Sigmoidoscopy in all age groups	1 (15.8)	3 (25.0)	
Sigmoidoscopy in young children, colonoscopy in old children	9 (57.9)	9 (58.3)	
Reference age of young children (n=18)			0.798
4–6 yr	3 (33.3)	4 (44.4)	
7–9 yr	5 (55.6)	3 (33.3)	
10–12 yr	1 (11.1)	1 (11.1)	
13–15 yr	0 (0.0)	1 (11.1)	
Surveillance colonoscopy or sigmoidoscopy in the future when less than five juvenile polyps are observed in the colon			0.671
Yes	2 (15.4)	5 (26.3)	
No	11 (84.6)	14 (73.7)	
Surveillance colonoscopy or sigmoidoscopy in the future when less than five adenomas are observed in the colon			0.157
Yes	11 (84.6)	19 (100.0)	
No	2 (15.4)	0 (0.0)	

Values are presented as number (%).

**Table 3.** Comparison between the groups according to the duration of colonoscopic polypectomy practice (n=32)

Variable	<10 years (n=17)	≥10 years (n=15)	p-value
Initially performed examination when a polyp is clinically suspected			0.688
Colonoscopy in all age groups	4 (23.5)	6 (40.0)	
Sigmoidoscopy in all age groups	2 (11.8)	2 (13.3)	
Sigmoidoscopy in young children, colonoscopy in old children	11 (64.7)	7 (46.7)	
Reference age of young children (n=18)			0.634
4–6 yr	3 (27.3)	4 (57.1)	
7–9 yr	5 (45.5)	3 (42.9)	
10–12 yr	2 (18.2)	0 (0.0)	
13–15 yr	1 (9.1)	0 (0.0)	
Surveillance colonoscopy or sigmoidoscopy in the future when less than five juvenile polyps are observed in the colon			0.209
Yes	2 (11.8)	5 (33.3)	
No	15 (88.2)	10 (66.7)	
Surveillance colonoscopy or sigmoidoscopy in the future when less than five adenomas are observed in the colon			0.486
Yes	15 (88.2)	15 (100.0)	
No	2 (11.8)	0 (0.0)	

Values are presented as number (%).

According to the geographical location of the participating institution, there was no significant difference in questionnaire variables between the institutions which were within the Seoul/Incheon/Gyeonggi province and those which were outside the Seoul/Incheon/Gyeonggi province (**Table 4**).

## DISCUSSION

This was the first study to investigate the performance status of colonoscopic polypectomy and subsequent surveillance colonoscopy in children with clinically suspected colorectal polyps in real-world practice among Korean pediatric endoscopic specialists. We discovered that unlike the widely accepted recommendation of total colonoscopy, if colorectal polyps are suspected in children and adolescents, more than half pediatric endoscopic specialists in Korea choose between colonoscopy and sigmoidoscopy based on the patient's age. In our survey, more than half of the pediatric endoscopic specialists considered 4–9 years as the reference age.

**Table 4.** Comparison between the groups according to the geographic location of the participating institution (n=32)

Variable	Within the Seoul/ Incheon/Gyeonggi province (n=18)	Outside the Seoul/ Incheon/Gyeonggi province (n=14)	p-value
Initially performed examination when a polyp is clinically suspected			0.126
Colonoscopy in all age groups	8 (44.4)	2 (14.3)	
Sigmoidoscopy in all age groups	1 (5.6)	3 (21.4)	
Sigmoidoscopy in young children, colonoscopy in old children	9 (50.0)	9 (64.3)	
Reference age of young children (n=18)			0.440
4–6 yr	3 (33.3)	4 (44.4)	
7–9 yr	5 (55.6)	3 (33.3)	
10–12 yr	0 (0.0)	2 (22.2)	
13–15 yr	1 (11.1)	0 (0.0)	
Surveillance colonoscopy or sigmoidoscopy in the future if less than five juvenile polyps are observed in the colon			0.669
Yes	3 (16.7)	4 (28.6)	
No	15 (83.3)	10 (71.4)	
Surveillance colonoscopy or sigmoidoscopy in the future if less than five adenomas are observed in the colon			0.486
Yes	17 (94.4)	13 (92.9)	
No	1 (5.6)	1 (7.1)	

Values are presented as number (%).

The selection of this reference age group may appear arbitrary. According to the 2017 Korean standard growth chart, the median weights for 4 years old are 20 kg for boys and 19 kg for girls, while the median weights for 9 years old are 28 kg for boys and 27 kg for girls [11]. Considering this fact, empirical thresholds have been established and therapeutically implemented with respect to weight and cooperation issues, which are frequently seen as unfavorable to endoscopic performance as compared to adults [12].

There were no significant differences between the age, level of experience, or geographical locations of endoscopy specialists. The treatment patterns of pediatric endoscopy specialists in Korea are standardized to some extent. However, considering that these treatment patterns do not correspond to general recommendations, it would be logical to regard them as inevitable phenomena due to regional variations. A recent Korean study on procedural sedation for pediatric upper gastrointestinal endoscopy reported that only 4.4% of the patients (32/734) underwent the procedure in the presence of an anesthesiologist [13].

Regarding EGD, the majority (96.9%) said that they performed EGD if more than five polyps were found in the colon. This practice contradicts the recently published European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) guidelines on managing juvenile polyposis syndrome (JPS) in children and adolescents [14]. Although the recommendation is weak with low-quality evidence, surveillance of the upper gastrointestinal tract in affected or at-risk patients with JPS in childhood or adolescence is currently not required, unless there is unexplained anemia or upper gastrointestinal symptoms.

Regarding surveillance examinations, 21.9% said that they would perform a surveillance colonoscopy or sigmoidoscopy in the future if less than five JPs were found in the colon. Although it was previously thought that patients with less than three polyps were at a low risk for polyp recurrence, recent evidence suggests that a consistent practice of surveillance colonoscopic polypectomy in children presenting with one or more JPs is essential to determine a patient-specific profile of polyp recurrence and minimize the risk of developing advanced neoplasia, with an initial surveillance period of 1 to 3 years after initial polypectomy

[15]. The ESPGHAN guidelines on managing JPS in children and adolescents has recommended that colonoscopy should remove all polyps >10 mm, and be repeated annually until all polyps >10 mm have been resected [14].

There were some limitations in this study. As the current survey was a self-report form, we could not guarantee the authenticity of the response or the lack of reporting errors because this survey was a self-report form. Furthermore, the response rate (71.1%) could have been higher. However, this survey covered almost every region of South Korea and included most tertiary centers.

In conclusion, unlike the generally accepted recommendation of total colonoscopy if colorectal polyps are suspected in children and adolescents, more than half of the pediatric endoscopic specialists in Korea tended to choose between a colonoscopy and sigmoidoscopy based on the age of the patient. In this survey, most pediatric endoscopic specialists used the age group of 4–9 years as the reference age. Future surveillance endoscopy rates were low. A domestic guideline on pediatric colonoscopic polypectomy is required in Korea.

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