

Juvenile Polyp and Colonoscopic Polypectomy in Childhood

Byung Gee Lee*, Sung Hyun Shin, Young Ah Lee*, Joo Hee Wi, Yeoun Joo Lee, and Jae Hong Park

Department of Pediatrics, Pusan National University School of Medicine, *Good Gang-An Hospital, Busan, Korea

Purpose: This study aimed to evaluate the clinical features of juvenile polyp and the usefulness of polypectomy with entire colonoscopy in children.

Methods: We retrospectively reviewed the medical records of 83 children who were diagnosed with having juvenile polyps.

Results: The mean age of the patients was 6.5 ± 3.7 (range 1.3-14.5 years) years. The male to female ratio was 2.1 : 1. Eighty one patients (97.6%) had hematochezia, of which the observed characteristics included red stool (74.1%), blood on wipe (13.6%). The time interval between the 1st episode of hematochezia and colonoscopy was 8.9 ± 20.4 (ranged 0.1-48.0) months. The most proximal regions of colonoscopic approach were terminal ileum (96.4%). Sixty three patients (75.9%) had a solitary polyp and 20 patients (24.1%) had multiple polyps. The sites of the polyps were rectum (61.4%), sigmoid colon (23.5%). Eighteen polyps (15.1%) were found more proximal locations than rectosigmoid. The polyp size ranged from 0.3 to 5 cm. After the polypectomy, hematochezia recurred in 9 patients. Endoscopic hemostasis was performed in 2 patients due to severe bleeding. All procedures were carried out without using general anesthesia.

Conclusion: Juvenile polyp occurred in a wide range locations and had variable sizes and numbers, suggesting that colonoscopy on the entire colon is necessary. Colonoscopic polypectomy is a simple and useful therapeutic method in children with juvenile polyp. (*Pediatr Gastroenterol Hepatol Nutr* 2012; 15: 250~255)

Key Words: Juvenile polyp, Colonoscopy, Polypectomy, Child

INTRODUCTION

Polyps are the most common causes of colorectal bleeding in children [1,2]. Polyps occur in as many as 1% of children and 90% of these are juvenile polyps [1]. The intermittent indolent rectal bleeding is the main symptom of colonic polyps. Juvenile polyps are generally thought to be hamartomatous le-

sion with little malignant potential. They have been reported to be solitary and rectosigmoid in location in 80-90% of cases [3,4]. However, some of recent studies demonstrated that a significant number of cases of polyps are multiple and proximally located, which suggests the need for total colonoscopy [2,5].

It is difficult to differentiate the hyperplastic polyps and adenomatous ones without histological

Received : September 23, 2012, Revised : October 25, 2012, Accepted : November 6, 2012

Corresponding author: Jae Hong Park, Department of Pediatrics, Pusan National University Yangsan Hospital, 20, Geumo-ro, Mulgeum-eup, Yangsan 626-770, Korea. Tel: +82-55-360-2180, Fax: +82-55-360-2181, E-mail: jhongpark@pusan.ac.kr

Copyright © 2012 by The Korean Society of Pediatric Gastroenterology, Hepatology and Nutrition

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

examinations. Moreover, repetitive bleeding may lead to iron deficiency anemia. Therefore, early detection and polypectomy are necessary for all colonic polyps [6,7]. Fiberoptic colonoscopy is a routine modality for the diagnosis and treatment of colorectal polyps in pediatric patients [8].

Although there have been clinical studies on colonic polyps in children in Korea [9-12], the detail technical descriptions and studies using a large number of patients were far from being sufficient despite recent widespread use of colonoscopy. We, therefore, examined the clinical characteristics of juvenile polyps in children presented at a single institution and studied the effectiveness and complications of colonoscopic polypectomy.

MATERIALS AND METHODS

Patients

A retrospective study using the medical records was conducted on 83 patients under 18 years of age who were diagnosed with juvenile polyp from histopathologic examinations and underwent colonoscopic polypectomy at the Department of Pediatrics of Pusan National University Hospital between January 2000 and July 2010. Those who have Peutz-Jeghers syndrome, familial adenomatous polyp or juvenile polyposis coli were excluded.

Methods

Each subject was admitted to the hospital the day before the colonoscopic examination, received a soft diet and was administered bisacodyl. Colorectal endoscopic examination was performed using an electronic videoendoscope (type PCF-240I: Olympus Optical, Tokyo, Japan). From the morning of the examination day, colon cleansing was performed using polyethylene glycol and the patient was given midazolam 0.1 mg/kg, demerol 1.0 mg/kg and ketamine 1 mg/kg individually or concomitantly for sedation. All patients successfully reached sedation without complications. Colonoscopic polypectomy was performed with the loop snare technique and polyps were excised using a combination of current

(10 W for solidification and 30 W for excision). The excised polyp was retrieved with a tripod basket or a net catheter and subjected to a histopathologic examination.

The medical record of the patient was reviewed and its data including age, sex, characteristics of hematochezia, period between the first hematochezia and colonoscopy, the number and the locations of polyps, polyp size, pathologic findings, most proximal region of colonoscopic reach, follow-up observation and post-operative complications.

RESULTS

Fifty six (67.5%) of the patients were males and 27 (32.5%) were females, the male/female ratio being 2.1 : 1. The mean age of the patients at the time of diagnosis was 6.5 ± 3.7 (range 1.3-14.5) years.

Of the total 83 patients, eighty one (97.6%) experienced hematochezia, the most frequent being red or dark red hematochezia in 60 patients (74.1%) followed by blood on the used toilet paper after defecation in 11 patients (13.6%), dripping of fresh blood in 6 (7.4%) patients and bloody toilet water after defecation in 4 patients (4.9%) (Table 1).

The mean time interval between the first episode of hematochezia and colonoscopy was 8.9 ± 20.4 (range 0.1-48.0) months.

The most proximal regions of colonoscopic reach were terminal ileum in 80 patients (96.4%), cecum in 3 patients (3.6%).

Sixty three patients (75.9%) had a solitary polyp and 20 patients (24.1%) had multiple polyps. Two

Table 1. Characteristics of Hematochezia

Stool characteristic	No. of patient (%)
Bright or dark red bloody stool	60 (74.1)
Blood on wiping	11 (13.6)
Bright red blood dripping	6 (7.4)
Red color change of the toilet	4 (4.9)
Total	81 (100.0)

polyps was found in 11 patients (13.3%), three polyps in 4 patients (4.8%), four polyps in 3 patients (3.6%) and five polyps in 2 patients (2.4%), totaling 119 polyps in 83 patients.

Of all polyps found, seventy three (61.4%), the largest number of all, were located in rectum. Twenty eight (23.5%) were in sigmoid colon, 8 (6.7%) in descending colon, 1 (0.8%) in splenic flexure, 3 (2.5%) in transverse colon and 6 (5.1%) in ascending colon and cecum (Table 2). Most of multiple polyps (60.0%) were found in rectosigmoid colon.

The size of the polyps varied in the range between 0.3 and 5 cm. Fifty eight (48.7%), the largest number, had diameter between 1-1.9 cm, forty six (38.7%) were less than 1 cm, 13 (10.9%) were between 2.0-2.9 cm, and 2 (3.1%) were larger than 3 cm (Table 3).

All polyps in the study were excised using the loop snare technique. Pre-operative submucosal saline-epinephrine injection was used in 19 patients (22.9%). Hemostasis clip was used pre-operatively in 1 patient (1.2%) and post-operatively in 39 patients (47.0%). Retroflexion endoscopic polypectomy was performed on 6 patients (7.2%) and detachable loop snare was used on 1 patient

(1.2%) pre-operatively.

Hematochezia recurred after polypectomy in 9 patients (10.8%). Among them, 8 patients underwent a repeat colonoscopic examination. Hemostasis clip was used on 2 patients due to severe hemorrhage. All patients undertook colonoscopy under sedation without complications. No operation-related complication was reported except for hemorrhage.

DISCUSSION

Until the colonoscopy became a common practice with children, it was believed that most of detected juvenile polyps are solitary polyps with 90% of them occurring in proctosigmoid [13]. However, according to a report by Mestre [14], 50% of juvenile polyp patients had multiple polyps of which 60% were found more proximal locations than proctosigmoid. Other foreign studies reported that 24-58% of patients had more than one polyp and 15-60% of polyps were found at the locations more proximal than proctosigmoid [4,6]. Seo [9] reported that 67% of polyps were found in proctosigmoid, while Cheon et al. [10] reported that all observed cases had a solitary polyp of which 79% were found in proctosigmoid. Kim et al. [11] also reported that 94.4% of observed polyps were found in proctosigmoid. However, total colonoscopy was performed in 28% of the cases, the possibility of the existence of more polyps could not be excluded in this study.

In our study, although 84.9% of polyps were found in rectosigmoid colon, eighteen polyps (15.1%) were found more proximal locations than rectosigmoid. Multiple polyps were found in 24.1% of patients and the number of polyps ranged from 2 to 5. Most of multiple polyps (60.0%) were also found in rectosigmoid colon. Size of the polyps was, in most cases, 1.0-1.9 cm in diameter. Large polyps larger than 3 cm were found in only 1.7% of patients, coinciding with the observations by other studies [9-11].

All patients underwent total colonoscopy, there-

Table 2. Location of Polyp

Location	No. of polyp (%)
Rectum	73 (61.4)
Sigmoid colon	28 (23.5)
Descending colon	8 (6.7)
Splenic flexure	1 (0.8)
Transverse colon	3 (2.5)
Ascending colon and cecum	6 (5.1)
Total	119 (100.0)

Table 3. Size of Polyp

Diameter (cm)	No. of polyp (%)
<1.0	46 (38.7)
1.0-1.9	58 (48.7)
2.0-2.9	13 (10.9)
≥3.0	2 (1.7)
Total	119 (100.0)

fore, multiple polyps could be detected in many patients and polyps could be found in more varied locations. Moreover, the authors could not find out the clinical predicting factors associated with multiple polyps and more proximally located polyps. This emphasizes the necessity for total colonoscopy on all juvenile polyp patients because sigmoidoscopy can result in a failure of detecting polyps.

Juvenile polyp is common in children of age between 2 and 10 years and the mean age at the time of diagnosis is known to be 5-7.4 years [4,6,14-16]. It is rare in children of age under 1 year and over 15 years [17]. In our study, the mean age of the patients was 6 years and there were no children under 1 year old or over 15 years old.

The juvenile polyps have been reported to be more common among males [4]. However, Cynamon et al. [6] reported the same prevalence rate in both genders and Bartnik et al. [17] even reported higher prevalence in females. In Korea, Kim et al. [11] reported higher prevalence in males and Cheon et al. [10] reported similar rates in males and females. In this study, the prevalence ratio between males and females was 2.1 : 1 coinciding with the generally known trend [18].

The most common symptom of juvenile polyp is intermittent mild hematochezia without accompanying abdominal pain, which appeared in 90% of the cases. Seo [9] reported symptoms comprising; stool with fresh blood in 89% of patients, abdominal pain in 50%, diarrhea or mucous stool in 45%, anemia in 29% and constipation in 16%. While Cheon et al. [10] reported rectal bleeding in 100% of patients comprising stool with fresh blood in 84% of patients, blood on used toilet paper in 53% and dark brown or black stool in 16%, with accompanying symptoms of diarrhea in 42% of patients, abdominal pain in 26%, constipation in 11% and anal fissure in 11%. In our study also, almost all patients (97.6%) had hematochezia with blood mixed with stool rather than blood dripping down to the toilet water found in a largest number of patients (74.1%), indicating more patients experi-

enced relatively small amount of bleeding.

The mean duration of symptom in previous reports was 12-16 months [6]. Studies in Korea reported the mean duration being 7.6 months [10] and 5 months [11] indicating that diagnosis was usually delayed because many patients did not seek treatment early enough since most of them had only small amounts of bloody stool without accompanying abdominal pain.

The solitary juvenile polyp that appears in most of children is a hyperplastic polyp that is less likely to develop to malignant tumor. However, multiple juvenile polyps are known to have higher risk of adenomatous change to a cancer precursor [4,16,19]. Since cancerous changes were observed in 5% of solitary polyp cases as reported by Poddar et al. [4] and repetitive bleeding may lead to iron deficiency anemia, all polyps may require early detection and excision [6,7].

Juvenile polyps can be excised easily using a loop snare because most of them are pedunculated polyps. However, for those with short or thick necks or sessile typed polyps, use of pre-operative submucosal saline-epinephrine injection [20], hemostasis clip [21] or detachable snare [22,23] will be effective for the prevention of hemorrhage during excision. Loop snare technique was used in all cases in our study with pre-operative submucosal saline-epinephrine injection given to 22.9% of patients, hemostasis clip used pre-operatively in 1.2% of patients and post-operatively in 47.0% of patients. Detachable snare was used in 1.2% of patients. Retroflexion endoscopic polypectomy was performed on 7.2% of patients because of location of the polyp close to the anal margin and inability of direct approach.

No cases of complications caused by the use of drugs for sedation have been reported in Korea [9-11]. Also in this study, all patients underwent colonoscopy and colonoscopic polypectomy under sedation without any complications.

Possible complications of polypectomy include hemorrhage and intestinal perforation. Intestinal perforation were not occurred in this study.

However, hematochezia recurred in 9 patients and repeat colonoscopy was performed on 8 patients of whom 2 patients had severe hemorrhage at the sites of polypectomy and hemostasis clips had to be used. Hemorrhage in other patients stopped spontaneously after conservative treatments. The authors did not revealed the causes of rebleeding after polypectomy in this study. In a study with adult patients, size and numbers of polyps, and skill level of procedure were independent risk factors for delayed bleeding after polypectomy [24].

Since the recurrence rate of solitary juvenile polyp is very low at 4.5% according to Poddar et al. [4], follow-up colonoscopy is not recommended except in the case of recurrence. However, recurrence rate of polyps is 17-37.5% with highest risk in patients with more than five polyps, follow-up colonoscopic examination must be performed every 2-3 years [4]. Since the possibility of the existence of juvenile polyposis coli cannot be ruled out in such patients, the first diagnostic colonoscopy must be performed on the entire colon in patients suspected with polyps.

In conclusion, juvenile polyp occurs in a wide range locations and had variable sizes and numbers, suggesting that colonoscopy on the entire colon is necessary in patients with painless intermittent hematochezia. Colonoscopic polypectomy is a simple, safe and effective therapeutic method in children.

ACKNOWLEDGEMENTS

This work was supported by a 2-Year Research Grant of Pusan National University.

REFERENCES

1. Gelb AM, Minkowitz S, Tresser M. Rectal and colonic polyps occurring in young people. *N Y State J Med* 1962; 62:513-8.
2. We JH, Park HS, Park JH. The role of colonoscopy in children with hematochezia. *Korean J Pediatr Gastroenterol Nutr* 2011;14:155-60.
3. Jalihal A, Misra SP, Arvind AS, Kamath PS. Colonoscopic polypectomy in children. *J Pediatr Surg* 1992;27:1220-2.
4. Poddar U, Thapa BR, Vaiphei K, Singh K. Colonic polyps: experience of 236 Indian children. *Am J Gastroenterol* 1998;93:619-22.
5. Lee HJ, Lee JH, Lee JS, Choe YH. Is colonoscopy necessary in children suspected of having colonic polyps? *Gut Liver* 2010;4:326-31.
6. Cynamon HA, Milov DE, Andres JM. Diagnosis and management of colonic polyps in children. *J Pediatr* 1989;114:593-6.
7. Yashiro K, Tanabe M, Iizuka B, Yaguchi T, Hasegawa K, Nagasako K. Polypectomy of a large juvenile polyp in the ascending colon. *Endoscopy* 1984;16:79-80.
8. Park JH. Role of colonoscopy in the diagnosis and treatment of pediatric lower gastrointestinal disorders. *Korean J Pediatr* 2010;53:824-9.
9. Seo JK. Therapeutic colonoscopy in children: endoscopic snare polypectomy and juvenile polyps. *Seoul J Med* 1993;34:285-94.
10. Cheon KW, Kim JY, Kim SW. Solitary juvenile polyps and colonoscopic polypectomy in children. *J Korean Pediatr Soc* 2003;46:236-41.
11. Kim SJ, Kim SM, Kim YJ, Jeong DC, Lee WB, Chung SY, et al. Colonic polyps; experience of 34 cases in two hospitals. *Korean J Pediatr* 2004;47:756-61.
12. Kim HS, Lee CH, Lee KR, Yoo JJ, Park SY, Lim SW, et al. Clinical and endoscopic analysis of juvenile polyps. *Korean J Gastrointest Endosc* 1997;17:485-93.
13. Toccalino H, Guastavino E, De Pinni F, O'Donnell JC, Williams M. Juvenile polyps of the rectum and colon. *Acta Paediatr Scand* 1973;62:337-40.
14. Mestre JR. The changing pattern of juvenile polyps. *Am J Gastroenterol* 1986;81:312-4.
15. Hoffenberg EJ, Sauaia A, Maltzman T, Knoll K, Ahnen DJ. Symptomatic colonic polyps in childhood: not so benign. *J Pediatr Gastroenterol Nutr* 1999;28:175-81.
16. Pillai RB, Tolia V. Colonic polyps in children: frequently multiple and recurrent. *Clin Pediatr (Phila)* 1998;37:253-7.
17. Bartnik W, Butruk E, Ryzko J, Rondio H, Rasiński A, Orłowska J. Short- and long-term results of colonoscopic polypectomy in children. *Gastrointest Endosc* 1986;32:389-92.
18. Durno CA. Colonic polyps in children and adolescents. *Can J Gastroenterol* 2007;21:233-9.
19. Giardiello FM, Hamilton SR, Kern SE, Offerhaus GJ, Green PA, Celano P, et al. Colorectal neoplasia in juvenile polyposis or juvenile polyps. *Arch Dis Child* 1991;66:971-5.
20. Hsieh YH, Lin HJ, Tseng GY, Perng CL, Li AF, Chang

- FY, et al. Is submucosal epinephrine injection necessary before polypectomy? A prospective, comparative study. *Hepatogastroenterology* 2001;48:1379-82.
21. Parra-Blanco A, Kaminaga N, Kojima T, Endo Y, Uragami N, Okawa N, et al. Hemoclipping for post-polypectomy and postbiopsy colonic bleeding. *Gastrointest Endosc* 2000;51:37-41.
22. Iishi H, Tatsuta M, Narahara H, Iseki K, Sakai N. Endoscopic resection of large pedunculated colorectal polyps using a detachable snare. *Gastrointest Endosc* 1996;44:594-7.
23. Matsushita M, Hajiro K, Okazaki K, Takakuwa H, Nishio A. A large juvenile polyp in a 1-year-old child safely removed by colonoscopic polypectomy with a detachable snare. *Gastrointest Endosc* 2000;52:118-20.
24. Bae GH, Jung JT, Kwon JG, Kim EY, Park JH, Seo JH, et al. Risk factors of delayed bleeding after colonoscopic polypectomy: case-control study. *Korean J Gastroenterol* 2012;59:423-7.