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Original Article

Colonoscopy surveillance of colorectal polyp recurrence in two years after the first polypectomy

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Abstract: Background and aims: Colonoscopic polypectomy and regular surveillance of colorectal polyps are important to prevent colorectal cancer. We aimed to evaluate the clinical characteristics of colorectal polyp and assess the predictive factors of colorectal polyp recurrence in 2 years after the first polypectomy. Methods: Total 194 patients with colorectal polyps underwent follow-up colonoscopy within 2 years after initial colonoscopy polypectomy in our hospital were retrospectively investigated. The age of patients at the diagnosis of colorectal polyps, as well as the initial size, number, location, and pathological type of polyps were analyzed in patients with polyp recurrence (recurrence group) and those without (no-recurrence group). Results: The mean interval of surveillance colonoscopy was 18.57±8.42 months. The recurrence rate of colorectal polyps was 71.6% within 2 years. There were significant differences between the recurrence group and the no-recurrence group in terms of age of patients at diagnosis, as well as the number and location of polyps (P=0.01, 0.007 and 0.004, respectively), however, there was no significant difference in pathological type and risk stratification of polyps (both P>0.05). Nevertheless, neoplastic-polyp and high-risk patients significantly benefited from colonoscopy polypectomy compared with nonneoplastic-polyp and low-risk patients. However, 19.4% nonneoplastic-polyps and 15.5% low-risk patients might be overlooked by guideline. Logistic regression analysis revealed that the age of patients at diagnosis and the initial number of adenomas ≥3 were independent risk factors of polyps recurrence within 2 years after the first polypectomy. Conclusion: The recurrence rate of colorectal polyps was 71.6% within 2 years after the first polypectomy. The age of patients at diagnosis of colorectal polyps and the initial number of adenomas ≥3 were independent risk factors of polyps recurrence within 2 years.

Keywords: Colorectal polyp, polypectomy, colonoscopy surveillance, recurrence, predictive factors

Introduction

Colorectal polyp is any mass of tissue arising from the intestinal wall and protruding into the lumen of the colon or the rectum. Polyps are often considered as benign growths however the malignant transformation of some polyps remains a major concern. Most colorectal cancers (CRCs) are believed to develop from a previously benign adenomatous polyp. Removal of polyps by endoscopy polypectomy can interrupt the process from adenoma to carcinoma and thus is an effective treatment to prevent CRC. According to the literatures, the polyp recurrence rates vary greatly from 28-93% in different studies [1-3]. Therefore, periodic colonoscopy surveillance after the first polypectomy is necessary for the polyp recurrence.

Current evidence indicates that some characteristics present at index colonoscopy account for a high risk of polyps recurrence at colonoscopy surveillance after the first polypectomy, such as the age of patients, the initial size, number, location, and histologic features of polyp. Of these characteristics, the most important risk factors for recurrence of polyps were the advanced adenomas, multiple adenomas (≥3), adenomas size ≥10 mm, or age ≥60 years [4-6]. The evidence of other factors for an increased risk of adenoma recurrence is inconclusive, such as race, sex, lifestyle, eating habits and disease history, etc. Nevertheless, the recurrence of colorectal polyps remains controversial.

The present study aimed to evaluate the clinical characteristics of colorectal polyp at the initial

Table 1. Demographic and clinical characteristics of patients with colorectal polyps detected by colonoscopy

Characteristic		N	%
Gender	Female	65	33.5%
	Male	129	66.5%
Age	<50	80	41.2%
	50-	61	31.4%
	60-	53	27.3%
History of DM	Yes	21	10.8%
	No	173	89.2%
History of NAFLD	Yes	39	20.1%
	No	155	79.9%
History of HLP	Yes	23	11.9%
	No	171	88.1%
Polyps number	<3	108	55.7%
	≥3	86	44.3%
Polyps size	<1 cm	126	64.9%
	1 cm-	55	28.4%
	2 cm-	13	6.7%
Polyps site	Proximal	41	21.1%
	Distal/rectal	97	50.0%
	Proximal and distal	56	28.9%
Polyps histology	Non neoplastic	31	16.0%
Risk stratification	Neoplastic	163	84.0%
	Low-risk	71	36.6%
	High-risk	123	68.6%
Total		194	100%

Note: N, The number of patients; DM, Diabetes mellitus; NAFLD, Non-alcoholic fatty liver disease; HLP, Hyperlipemia.

polypectomy and assess the predictive factors of colorectal polyp recurrence in 2 years after the first polypectomy.

Materials and methods

Patients

The study enrolled total 194 patients with colorectal polyps who underwent follow-up colonoscopy within 2 years after initial colonoscopy polypectomy from January 2012 to August 2015 at the Affiliated Futian Hospital of Guangdong Medical College. Those patients with advanced colorectal neoplasia (an adenoma ≥1 cm, the presence of high-grade dysplasia ≥25% villous architecture) were re-detected 3-to 6-month after polypectomy to make sure that the polyps were removed completely. We divided the 194 patients into group of patients with polyp recurrence (recurrence group) and group of those without polyp recurrence (no-recurrence group) based on the observation at follow-up colonoscopy after the first endoscopy polypectomy in 2 years. Patients were divided into high-risk and low-risk groups according to the 2012 U.S. surveillance guideline after each colonoscopy: the patients with the polyp diameter <10 mm, <3 adenomas; adenomatous polyps were classified as low-risk group in our study while those with three or more adenomas, at least one adenoma ≥1 cm, at least one polyp with villous components were considered as high-risk group. In the present study, the exclusion criteria were as follows: patients with colorectal cancer, inflammatory bowel disease, familial polyposis coli, colorectal surgery, or poor bowel preparation.

All patients consented to participate in the present study. The study protocol conformed to the ethical guidelines of the 1975 Declaration of Helsinki and was approved by the Institutional Review Board of the Affiliated Futian Hospital of Guangdong Medical College.

Methods

All patients were given a routine bowel preparation with multiple small dose of compound polyethylene glycol electrolyte powder for excellent/good/moderate bowel preparation [7]. Colonoscopy was performed fulfilled successfully by experienced endoscopists who had each performed at least 3,000 colonoscopies with Q-206 electronic colonoscopy (Olympus Optical Co., Ltd., Tokyo, Japan). Endoscopic observation was more than 6 minutes during withdrawal in all patients and endoscopic resection was performed when polyps were detected. The age of patients at the diagnosis of colorectal polyps, as well as the initial size, number, location, and pathological type of polyps were analyzed.

Statistical analysis

All statistical analysis was performed with SPSS for Windows software version 19.0 (SPSS Inc., USA). Data were presented as mean ± standard deviation or median (range). Univariate analysis of outcome variables was undertaken using the Chi-square test. Age, polyp size, location, and the number of polyps were

Table 2. Comparison of demographic and clinical characteristics between recurrence group and the no-recurrence group

Variable	No-recurrence group (n, %)	Recurrence group (n, %)	X^2	*P*-value
Age (years)				
<50 y	19 (9.8)	61 (31.4)	9.297	0.010
50 y-60 y	26 (13.4)	35 (18.0)		
≥60 y	10 (5.2)	43 (22.2)		
Number of polyps				
<3	39 (20.1)	69 (35.6)	7.223	0.007
≥3	16 (8.2)	70 (36.1)		
Size of largest polyp				
<1 cm	39 (20.1)	87 (44.8)	1.200	0.549
1 to 2 cm	13 (6.7)	42 (21.6)		
≥2 cm	3 (1.5)	10 (5.2)		
Pathological type				
Non neoplastic	11 (5.7)	20 (10.3)	0.924	0.336
Neoplastic	44 (22.7)	119 (61.3)		
Polyps location				
Proximal	17 (8.8)	24 (12.4)	11.019	0.004
Distal/rectal	31 (16.0)	66 (34.0)		
Proximal and distal	7 (3.6)	49 (25.3)		
Risk stratification				
Low-risk	25 (12.9)	46 (23.7)	2.595	0.136
High-risk	30 (15.5)	93 (48.0)		
Total	55 (28.4%)	139 (71.6%)		

included in a logistic regression analysis to identify the independent risk factors of colorectal polyp recurrence. A *p*-value of <0.05 was considered statistically significant.

Results

The characteristics of patients and polyps

From January 2012 to August 2015, 194 polypectomy patients (129 men and 65 women, average age, 52.02±12.44 years old) in our hospital received a follow-up colonoscopy within 2 years (mean interval 18.57±8.42 months).

The clinical characteristics of these patients were summarized in **Table 1**. There were 139 patients (71.6%) detected with polyps recurrence within 2 years after the first polypectomy. Of those 139 patients with polyps recurrence, only 1 patient (59-year-old,) was detected with multiple polyps at the initial endoscopy and developed into adenocarcinoma (0.5%). The percentage of patients with diabetes, hypertension and non-alcoholic fatty liver disease is 10.8%, 20.1%, 11.9%, respectively.

Comparison of the clinical characteristics between polyp recurrence and non-recurrence groups

Table 2 illustrates the differences between the polyp recurrence group and the no recurrence group in terms of age, polyp number, polyp location. Compared with the patients whose adenoma were <3, located in the right colon and aged <60 years, those, aged ≥60 years, with polyps number ≥3, the left-sided, had the higher risk of recurrence within 2 years (P<0.05). However, there were no significant difference between the two groups for polyp pathological type and size (both P>0.05).

Comparison of the different pathological types of colorectal polyps at the iniital endoscopy and follow-up endoscopy

In terms of different pathological types, there was no significant difference in recurrence rate between the recurrence or non-recurrence groups in 2 years (P=0.336). Compared with the initial polyps, the new polyps showed a significant improvement in histopathology toward more benign polyps (P=0.002). In addition, there were 19.4% (6/31 cases) of non-neoplastic polyps, while 48.5% (79/163 cases) of neoplastic polyp recurrent as adenoma (P<0.01) (**Table 3**).

Comparison of the different risk stratification of the patients after the initial endoscopy and follow-up endoscopy

In terms of different risk stratification, there was no significant difference in recurrence rate between the recurrence or non-recurrence groups in 2 years (P=0.136). The proportion of high-risk patients after the first endoscopic polypectomy decreased significantly (P=0.016), 65.9% patients (81/123 cases) improve to low-risk or return to the baseline population. However, 34.5% is still high risk and low-risk patients with 15.5% (11/71 cases) turn as a high-risk group according to the follow-up endoscopy (**Table 4**).

Table 3. Compare the pathological types of colorectal polyps between patients with recurrence and no-recurrence at the initial endoscopy and follow-up endoscopy found (cases)

Follow-up found / Initial found	No recurrence	Recurrence		N	x^2	P
		Non neoplastic	Neoplastic			
Non neoplastic	11 (35.5%)	14 (45.1%)	6 (19.4%)	31	9.542	0.002
Neoplastic	44 (27.0%)	40 (24.5%)	79 (48.5%)	163		
Total	55 (28.4%)	54 (27.8%)	85 (43.8%)	194		

Table 4. Compare risk stratification of patients between recurrence and no-recurrence groups at the initial endoscopy and follow-up endoscopy found (cases)

Follow-up found / Initial found	No recurrence	Recurrence		N	x^2	*P-value*
		Low-risk	High-risk			
Low-risk	25 (35.2%)	35 (49.3%)	11 (15.5%)	71	8.125	0.016
High-risk	30 (24.4%)	51 (41.5%)	42 (34.5%)	123		
Total	55 (28.4%)	86 (44.3%)	53 (27.3%)	194		

Note: Low-risk group: <3 adenomas, polyp diameter <10 mm (adenomatous polyps were classified as in our study). High-risk group: three or more adenomas, at least one adenoma ≥1 cm, at least one polyp with villous components.

Table 5. Independent risk factors associated with ploypss recurrence

	OR	95% CI	β *value*	*P* value
Age	1.041	1.011-1.070	0.040	0.006
Sex	1.355	0.657-2.796	0.304	0.411
Number of polyps	2.660	1.195-5.918	0.978	0.017
Size	0.921	0.457-1.860	-0.082	0.819
Polyps location	2.036	1.122-3.697	0.711	0.019
Pathological type	2.173	0.798-5.915	0.776	0.129
Risk stratification	0.666	0.260-1.706	-0.406	0.397

Note: OR: odds ratios of polyps recurrence-related factors; 95% CI, 95% confidence intervals. Reference group: <50 as reference for age; male for sex; <3 for number of polyps; <10 mm for size; proximal for polyps location; non neoplastic for pathological type; low risk for risk stratification.

Independent risk factors of polyps recurrence

Logistic regression analysis revealed that age ≥50 (OR=1.040; 95% CI: 1.012~1.070, P<0.05) and number of polyps ≥3 (OR=2.930; 95% CI: 1.384~6.200, P<0.05) were independent factors of polyps recurrence whereas the sex, location, size, pathological type were not (P< 0.05) in 2 years (**Table 5**).

Discussion

Guidelines for colorectal cancer screening in the United States as well as China recommend colonoscopic surveillance after polypectomy and risk stratification based on polyp characteristics, including the size, pathological type and number of adenomas. Our study investigated the polyps recurrence in a short intervals of 2 years after polyps resection and showed that the age and multiple polyps are independent factors of polyps recurrence, whereas the size and pathological type were limited in risk stratification for patients.

In consistent with the previous literature, our results also showed that those patients who aged ≥60 years, with adenoma number ≥3, were more likely to detected with polyps recurrence within 2 years. The recurrence of polyps may be attributed to the high missing-rate of polyps, the incomplete resection of the lesions, the different methods of removal, and the individual genetic or lifestyle [9-12]. Thus, improvement of the quality of colonoscopy is one of the important issue of colonoscopic surveillance [13], including decreasing the missing-rate of polyps, complete resection and development of technological methods, etc. In our study, we excluded low-quality of bowel preparation and colonoscopy operator experience. In addition, logistics analysis showed that age and multiple polyps were the independent risk factors for recurrence of polyps, whereas the site was not. Although the recurrence rate of polyp on left semi colon and rectum is higher than on right colon, the recurrent polyps location may change. Thus, it remains controversial that whether the location may affect the recurrence of polyps.

Our study found no difference in recurrence rate between the size and pathologic type of polyps, this is different with prior studies. Our study suggested that the size and pathological types were not the risk factors for the evaluation of polyp recurrence within 2 years. The polyp size and pathological type are the gist for the diagnosis of advanced adenoma, but their usage for risk stratification and endoscopic monitoring are limited. In this study, quality-adjusted colonoscopy with adequate bowel preparation, withdrawal time, quality of endoscopic image, and the experience of endoscopist, was performed to reduce the missing rate, thus, large polyps (large than 10 mm) are rarely missed. Once the polyps were detected, they were treated with high quality of the resection. The major issue lies in that the missing rate increases significantly in smaller sized polyps [11]. It is reported that any sizes of polyps may change into cancerous [14]. Patients with one to two tubular adenomas <1 cm in size, who are considered at low risk for colorectal cancer, had a higher risk of metachronous advanced neoplasia than the group with no adenomas at baseline [15]. Therefore, more attention should be paid to small and diminutive polyps, especially with unfavorable histology. It is worth noting that the pathological types of polyps are different from first-polypectomy and second-polypectomy. In our study, 19.4% of patients with non neoplastic polyps had a relapse as adenomas, meanwhile, 15.5% of low-risk patients became into high-risk population. Thus, pathological types might not be a consistent index used for the prediction of polyp recurrence, as described in the U.K. Colonoscopy Guidelines [16].

The surveillance intervals after polypectomy have not been well defined. Both colonoscopy guidelines recommend surveillance intervals of 3 years after polyps resection for high-risk adenoma while 5-10 years for low-risk adenoma [8]. The U.K. Colonoscopy Guidelines recommended a clearing colonoscopy at one year for high-risk patients, as classified by having five or more small adenomas or three or more adenomas, at least one of which is at least 1 cm. Compared with the United States guideline, British guideline emphasized the necessity for short-term follow-up screening, and suggested that the time interval for 3 years to make proportional high-risk polyps were not appropriate intervention [17]. This is supported by growing evidence that nonadenomatous polyps also are predecessors of cancer [18]. In this study, we suggested a polyp reexamination intervals of 2 years regardless of the polyp size or pathological type, which is feasible for nowadays, under the premise of high quality colonoscopic examination and treatment. We reported a high recurrence rate of colorectal polyps as 71.6% within 2 years after the first polypectomy. Our study highlighted the importance of colonoscopic surveillance for the intervention of colorectal polyps recurrence. Furthermore, this protective effect may be stronger than the interval of 3 to 5 years, and economic benefits is higher than 1 year, without substantially increasing colonoscopy rates.

Our study has several limitations. First, some smaller polyps may be missed we don't know the true adenoma recurrence rate because the missing rate, which is difficult to avoid but need to improve the special technological methods, prevention and control measures to reduce. Second, the number of patients enrolled is small. Further and larger studies of the risks of adenoma recurrence to define surveillance interval with precisely risk stratification are needed.

In conclusion, our study showed that the recurrence rate of colorectal polyps was 71.6% within 2 years after the first polypectomy. The age of patients at diagnosis of colorectal polyps and the initial number of adenomas ≥3 were independent risk factors of polyps recurrence within 2 years.

Disclosure of conflict of interest

None.

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