

A retrospective study on endoscopic missing diagnosis of colorectal polyp and its related factors

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ABSTRACT

Background/Aims: To investigate missing diagnosis of the polyp by colonoscopy, and to reveal the endoscopic, pathological features of missed polyps and related factors inducing missing diagnosis.

Materials and Methods: We reviewed the data of the patients who received colonoscopy twice within 180 days. The missing rate of the colorectal polyps were calculated and the endoscopic and pathological features of the missed polyps were summarized. Possible related factors inducing the missing diagnosis were analyzed.

Results: The missing rate of colorectal polyps in this study was 27.7%, with as high as 11.5% missing rate of advanced polyps. Most missed polyps were those of <5 mm in diameter (55.2%) or flat ones (75.9%). Most of missed polyps are located in the rectum (21.8%), sigmoid (41.4%) and transverse colon (17.2%). No significant correlation was observed between the missing rate and colonoscopic manners ($p>0.05$), neither between the missing rate and operators ($p>0.05$). But number of basal polyps was proved to be significantly correlative with number of missed polyps ($r=0.694$, $p<0.001$).

Conclusion: Polyps of <5 mm in diameter or flat polyps are more likely to be missed in the endoscopy. Most of missed polyps are located in rectum, sigmoid and transverse colon. More basal polyps usually accompany with more polyps missed.

Keywords: Colonoscopy, colonic polyps, colorectal neoplasm, miss rate, diagnosis

INTRODUCTION

Most colorectal cancer (CRC) develops from colorectal polyps, especially adenomas. Resection of colorectal polyps can significantly reduce the incidence of CRC. Recent studies showed that screening colonoscopy with subsequent polypectomy can decrease the incidence of CRC by 76-90% (1,2). So colonoscopy and polypectomy is an effective method to prevent CRC. However, colonoscopy has a high polyp missing rate. For experienced endoscopic operators, the total missed polyps reached 6-24% (3-5) and even missed polyps over 1 cm in size were 6-12% (3,6,7). The missed polyps form potential risk for colorectal cancer development. Therefore, it is important and necessary to reduce the polyp missing rate as low as possible.

Though few studies have made efforts in finding methods to reduce polyp missing rate, we could hardly find

literatures which identifies the related factors in the missing diagnosis of polyp. During the procedure of routine white-light colonoscopy, many factors encounter missing diagnosis: anatomic structure of the large bowel, endoscopic and pathological features of polyps, and experience and colonoscopy skill of operators. If we could determine which factor is related to the missing diagnosis of polyp, it would be helpful for us to find an improved way to overcome it and decrease polyp missing rate in diagnosis.

In addition, the missing diagnosis of colorectal polyp does not gain sufficient attention in China compared to in western countries, and the situation of missing diagnosis of polyp in China has not been investigated so far. Therefore, we carried out an investigation on the patients who received twice colonoscopy during 180 days in recent two years to find out missing diagnosis of colorectal polyps and its related factors.

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MATERIALS AND METHODS

Adoption criteria for study population

(1) Colonoscopy was performed twice in 180 days, and at least one colorectal polyp was found. (2) Both colonoscopy were successfully completed, arriving to ileocaecal valve. (3) The large bowel cleaning was satisfactory.

Exclusion criteria for study population

(1) Record of colonoscopy reports was not adequate. (2) Patients diagnosed inflammatory bowel disease before. (3) History of large bowel operation. (4) The number of total polyps was more than 15 in a single patient.

Collection of data

The missed polyps of each patients were confirmed according to the comparison of both colonoscopy reports, which were diagnosed in the second colonoscopy but were not detected in the first colonoscopy exam. The size, location, pathological diagnosis of missed polyps were from the records of colonoscopy reports. Polyp types referred to both the colonoscopy reports and colonoscopy pictures. Missed polyps = basal polyps (the total polyps found in two colonoscopy) - (polyps found in the first colonoscopy). Polyp Missing rate = (number of missed polyps) / (number of basal polyps). Polyp missing rate of patients = (number of patients with missing polyps diagnosis) / (number of total patient).

Statistical analysis

Statistical analysis was performed using SPSS 13.0 statistical package (SPSS Inc., Chicago, IL, USA). Data was presented as mean±SD. Pearson’s χ^2 test was used to determine the significance of differentiation between different groups or variables. Spearman interclass correlation analysis was used to evaluate the correlation of missed polyps and basal polyps. A two-tailed test was used for all test and a p-value of <0.05 was considered significant.

RESULTS

One hundred and seventy-eight patients meet the adoption standard, including 54 women and 124 men. The mean age of the participants was 56.03±13.54. Mean interval time of twice colonoscopy was 46.7±49.0 days. Of all 178 patients, 227 polyps were found in the first colonoscopy, with 71 polyps resected subsequently. Two hundreds and forty-three polyps were found in the second colonoscopy. Totally 87 polyps in 67 patients were missed in the first colonoscopy. The polyp missing rate was 27.7%. Polyp missing rate of single-person colonoscopy and two-person colonoscopy were 28.5% and 26.2% respectively. The polyp missing rate of patients was 37.6%.

Endoscopic and pathological features

Endoscopic and pathological features of missed polyps were shown in Table 1. As for the missed polyps, proportions of <5 mm, 5~9 mm and ≥10 mm in diameter respectively was 55.2%

(48), 32.2% (28) and 12.6% (11); Flat, semiglobate and pedunculated polyps are 78.2%, 17.2%, 4.6% respectively; Missed polyps in the rectum, sigmoid, descending colon, splenic flexure, transverse colon, hepatic flexure, ascending colon and cecum accounted for 21.8% (19), 41.4% (36), 5.7% (5), 0% (0), 17.2% (15), 1.1% (1), 11.5% (10) and 1.1% (1).

Fifty of the 87 missed polyps were delivered to pathological inspection. Eighteen polyps were diagnosed as inflammatory or hyperplastic. Thirty-one polyps were diagnosed as adenomas, consisting of 3 serrated adenomas, 23 tubular adenomas and 5 villous/tubular-villous adenomas. Ten advanced adenomas (diameter ≥1 cm, or with villous alteration, or high-grade intraepithelial neoplasia) were found, with its missing rate as high as 11.5%. A flat polyp was finally diagnosed as moderate-differentiated adenocarcinoma.

Possible related factors leading to polyps missing diagnosis

Operating manners of colonoscopy, operator’s experience and procedure skills might be correlated with missing diagnosis of polyps. To verify this, we made a statistical analysis (Table 2). Polyp missing rate of single-person colonoscopy was 28.5%, while that of two-person method was 26.2%. With Pearson’s χ^2 test, $\chi^2=0.192$, $p>0.05$; Missing rates of different operators were

Table 1. Endoscopic and pathological features of missed polyps

Endoscopic and pathological features of missed polyps	Missed polyps	Ratio (%)
Diameter		
<5 mm	48	55.2
5~9 mm	28	32.2
≥10 mm	11	12.6
Location		
Rectum	19	21.8
Sigmoid	36	41.4
Descending colon	5	5.7
Splenic flexure	0	0
Transverse colon	15	17.2
Hepatic flexure	1	1.1
Ascending colon	10	11.5
Cecum	1	1.1
Pathological diagnosis*		
Inflammatory or hyperplastic	18	36
Adenomas	31	62
Serrated adenomas	3	6
Tubular adenomas	23	46
Villous/tubular-villous adenomas	5	10
Adenocarcinoma	1	2

*50 of the 87 missed polyps were performed pathological inspection

compared after excluding 9 different operators who examined less than 10 patients in our study. With Pearson's χ^2 test, $\chi^2=3.216$, $p>0.05$; We delaminated the operators into three subgroups by the years of their endoscopic experience: >20 years, 5-20 years, <5 years, standing for rich experience, normal experience and poor experience respectively. With Pearson's χ^2 test: $\chi^2=0.138$, $p>0.05$. Likewise, we graded operators into two subgroups according the average insert time of colonoscopy: >10 mins, and <10 mins, standing for skilled and unskilled respectively. Pearson's χ^2 test got a result of " $\chi^2=1.425$, $p>0.05$ ". None of the three factors above was found to be statistically significant in correlation with polyps missing diagnosis.

We noticed that more missing polyps seemed to happen in patients with more basal polyps. So we made a Spearman analysis of correlation from ranks (Table 3). Spearman's χ^2 was 0.694, $p<0.01$, indicating a significant correlation between missing polyps and basal polyps.

DISCUSSION

Colonoscopy has become the best available method to detect and remove colonic polyps. However, colonoscopy is not perfect in every respect. The screening colonoscopy usually accompanies with high polyp miss rate, ranging from 6% to 28%

Table 2. Statistical analysis of possible factors related to polyp missing diagnosis

Possible related factors	Basal polyps	Missed polyps	Miss rate (%)	X ²	p value
Procedure manners of colonoscopy					
Single-person colonoscopy	207	59	28.5%	0.192	>0.05
Two-person colonoscopy	107	28	26.2%		
Operators of colonoscopy					
Operator1	66	19	28.8	3.216	>0.05
Operator2	39	14	35.9		
Operator3	21	7	33.3		
Operator4	22	4	18.2 ^a	1.342	^a $P=0.347$
Operator5	28	6	21.4		
Operator6	22	7	31.8		
Operator7	48	14	29.2		
Experience of operators					
>20 years	128	36	28.1	0.138	>0.05
5-20 years	163	44	27.0		
<5 years	23	7	30.4		
Average insert time of colonoscopy					
<10 mins	189	57	30.2	1.425	>0.05
>10 mins	125	30	24.0		

Operator 4 had an apparently lower polyp miss rate of 18.2% than others. So we did a Pearson chi square test between operator 4 and other operators, but the differentiation is not statistically significant ($P=0.347$).

(8-12). Even in quality-adjusted back-to-back colonoscopies under the circumstances of adequate withdrawal time, good bowel preparation and high cecal intubation rate, the miss rate for polyps may still reach 17% (11). Other studies focused only on the adenomas reported miss rate from 15% to 24% (13-15). Since the growing evidence shows that non-adenomatous polyps may be predecessors of cancer, the miss rate should not be only paid attention to adenomas (16-18).

The risk of polyp missing diagnosis is related to polyp features (the size, appearance and location etc.) and examination factors (operating manner, procedure skills and operator's experience etc.). Polyps smaller than 10mm in diameter, in flat appearance, located in the left colon and with multiple ones, are usually associated with higher polyp miss rates (10). Adequate withdrawal time (19-21), dynamic patient position changes during colonoscopy withdrawal (22), and delayed insertion time (12) may be helpful for getting higher polyp detection rate. Cap-fitted colonoscopy might be helpful for inspection of the colonic mucosa behind the semilunar folds and was proven to be favorable by the study of Hewett DG (23). Endoscopy examination by retroflexion in the proximal colon and rectum was also studied. But this remains controversial, as Hewett DG and Harrison M came to a different conclusion (24,25). The study on the relationship between operator factors and polyp miss rate has not been reported. So we take the operator factors (procedure skills and operator's experience) as the possible factors related to the polyp missing diagnosis in our study.

Besides, the colonoscope technique is an independent factor affecting the endoscopy examination. New colonoscope techniques have been used to help reduce the missing rate. Wide-angle (170°) colonoscope was expected to abate blind zone during colonoscopy procedure, but this was still limited in reducing polyp missing rate (26). High definition colonoscopy (27), Narrow-band imaging (NBI) (8,28,29), and Autofluorescence imaging (AFI) (30,31) have been carried out to highlight colorectal polyps from normal mucosa to raise polyp detection rate. Though these three colonoscope techniques showed great significance in predicting polyp's pathological diagnosis,

Table 3. Spearman analysis of correlation from ranks for missed polyps and basal polyps

Correlations				
	Basal polyps	Missed polyps		
Spearman's rho	Basal polyps	Correlation Coefficient	1.000	.694**
		Sig. (2-tailed)	.	.000
		N	178	178
	Missed polyps	Correlation Coefficient	.694**	1.000
		Sig. (2-tailed)	.000	.
		N	178	178

**Correlation is significant at the 0.01 level (2-tailed).

it was unsure whether they could increase the colorectal neoplasm detection rate.

Our study showed the missing rate of colorectal polyps was 27.7%. More important, 31 of 50 (62%) missed polyps were diagnosed as adenoma, which means majority of missed polyps had the possibility of growing into adenocarcinoma. Regarding this possibility and the reported polyp missing rate of 6-28%, it is highly significant for us to reduce the polyp missing rate.

Polyps less than 5 mm in size were the group to be most easily missed, though polyps of more than 10 mm in diameter was not rare in our cases. As for the polyp appearance, flat polyps were most frequent of missing diagnosis. Polyps could be missed in every part of the large bowel, but rectum, sigmoid and transverse colon were the important parts that most missing polyps are located in. This fact may be partly because of left-lateral position as for its routine patient posture during endoscopy. With this position, rectum and sigmoid is in the lower part of the body and enteric cavity is collapsed. So the polyps may hide in the curly mucous folds, more likely leading to missing diagnosis. Likewise, the unfixed sigmoid or transverse colon usually has lots of twinkles which could harbor missing polyps. So, it may be feasible for us to decrease polyp missing rate by altering patient's posture dynamically during colonoscopy withdrawal to keep observing bowel distension, which is in agreement with the study by James E (8). While the fact that only 11.5% missed polyps located in ascending colon may be a good explain for the limited help of retroflexed observation in the proximal colon, as the conclusion of Harrison M (13). To our study, more basal polyps accompanied with more missing polyps. This enlightens us that extra care should be taken in colonoscopy operation for patients with multiple polyps. The follow-up interval should be shortened for them.

We had expected to find out that operating manners, experience or procedure skills might affect the polyp missing diagnosis. However, no significant difference was observed neither between two procedure methods nor between different operators. We refer operator's working years in colonoscopy to reflect their experience, while the average insert time of colonoscopy to reflect colonoscopy skills. We delaminated operators into three subgroups by their colonoscopy experience: >20 years, 5-20 years, <5 years, standing for rich experience, normal experience and poor experience respectively. Compassion analysis of the three subgroups was carried out by Pearson's χ^2 test and no significance of differentiation was obtained. Operators were graded into 2 subgroups according the average insert time of colonoscopy: >10 mins, and <10 mins, standing for skilled operators and unskilled operators. No significant difference was reached here. The unskilled operators (>10 mins) seem to have a lower polyp missing rate (24.0% vs 30.2%), though the difference was not statistically significant. This abnormal result hint that longer examination time may be more important than colonoscopy skills in avoiding missing diagnosis of polyps.

In conclusion, colonoscopy usually follows with high polyp missing rate. Polyps of <5 mm in diameter or flat polyps are found more often to be missed. Most of missed polyps are located in the rectum, sigmoid and transverse colon. More basal polyps usually accompany with more polyps miss. Operator's experience and colonoscopy skills may not be important in reducing the polyp missing rate. Dynamic patient position changes during colonoscopy withdrawal and enough withdrawal time may help improve colorectal polyp detection rate.

Conflict of Interest: No conflict of interest was declared by the authors.

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