Relationship between location, size, morphology and histopathological types of neoplastic colorectal polyps

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Summary

Objective: To evaluate correlations between location, size, morphology and histopathological types of neoplastic colorectal polyps. *Subject and method:* We reviewed endoscopic and histopathologic data from 215 patients undergoing colonoscopy. We categorized colorectal polyps according to anatomic location, size, and morphology. Histopathological features were classified using the World Health Organization (WHO-2019) classification. *Result:* Neoplastic polyps were mostly located in the left colon and rectum. Serrated polyps with dysplasia were not found in right colon. The proportion of colonic polyp with a size larger than 1cm and those with a size smaller or equal 1cm accounted for 85.1% and 14.9%, respectively. The cancer risk of polyps larger than 1cm were higher than those of polyps smaller or equal 1cm. Villous adenoma and serrated polyp with dysplasia were found exclusively in polyps bigger than 1cm (p<0.001). The proportions of sessile adenoma and pedunculated adenoma accounted for 41.9% and 58.1%, respectively. The existence of polyps stalk had no relationship with histopathological types (p=0.127). The cancer risk of villous adenoma was higher than those of other histopathological types (OR = 4.6, 95% CI = 1.9 - 11.3, p<0.001). *Conclusion:* The localization of polyp was mostly in left colon and rectum. Polyp size larger than 1cm and villous adenoma type were closely related to the malignant change in neoplastic polyps.

Keywords: Neoplastic polyps, serrated polyps, dysplasia.

1. Background

Neoplastic polyps are lesions that are at risk of developing into colorectal cancer through mutational pathways [1]. Colonoscopy plays an important role in detecting, assessing the risk of cancer and removing colorectal polyps, especially polyps in the precancerous and early stages of cancer, thereby significantly reduce the incidence and mortality associated with colorectal cancer. In particular, based on the morphological features of polyps such as size and morphology that were recorded during colonoscopy, the colonoscopist can preliminary assess the cancer risk of the lesion [2]. In this study, we evaluated the relationship between location, size, morphology and histopathological results of neoplastic polyps.

2. Subject and method

2.1. Subject

215 patients who underwent colonoscopy and polypectomy at the Institute of Gastroenterology and Hepatology, 108 Military Central Hospital between May 2017 and August 2020.

2.2. Method

Research method: Cross-sectional studies.

Polyp size was estimated by comparing a polyp to the fully opened biopsy forcep (7mm in length).

Received: *29 September 2021,* ***Accepted:*** *3 November 2021*

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All endoscopic features of the colorectal polyps were documented including size, location and morphology.

Histopathological analyses: After being removed, the polyp were fixed in 10% formalin solution, Hematoxylin-Eosin stain, analysis polyp according to WHO-2019 classification and store images in the Pathology Department of 108 Military Central Hospital.

Adenoma was determined as a pre-malignant neoplasm with abnormal glandular epithelium. The identification of adenomas was based on structural and cytological modifications, they were divided into subtypes of adenomas as tubular, villous and tubulovilous adenoma. According to present of lower 25% of villous gland as tubular adenoma; 25 to 75% of villous gland as tubulovillous adenoma; and above 75% of villous gland as villous adenoma [3].

Grading of adenomas: According to WHO-2019 [3], the grading of adenomas are classified 4 level: Low grade dysplasia, high grade dysplasia/ carcinoma in situ and invasive neoplasm. Carcinoma in situ is confined to the mucosa and does not invade the submucosa, equivalent to cancer in layers m1, m2, m3. Carcinoma invasion is confined to the submucosa and does not invade the muscularis propria (T1). Carcinoma invation is divided into 2 types: Superficial submucosa (T1a) and deep submucosa (T1b). T1a: Tumor invaded submucosa within 1000μm; T1b: Tumor invaded submucosa more than 1000μm.

Statistical analysis: All analyses were performed using SPSS version 22.0 software. Chi-squared or Fisher exact tests were used for between-group comparisons. $p<0.05$ was considered to indicate a statistically significant difference.

3. Result

Our research popupation included 215 patients with the mean age of 60.6 ± 11.2 years (range, 17 - 88 years) and the male to female ratio of 2.26 (149:66) (Table 1).

Table 1. Endoscopic features of colorectal adenomas

Endoscopic features		No. of patients (n)	Percentage (%)
Age		60.6 ± 11.2 (17 ÷ 88)	
Sex	Men	149	69.3
	Women	66	30.7
Location	Rectum	83	38.6
	Left colon	105	48.8
	Righ colon	27	12.5
Size (cm)	≤ 1.0	32	14.9
	> 1.0	183	85.1
Morphology	Pedunculated	125	58.1
	Sessile	90	41.9

Of all the polyps, 105 (48.8%) and 83 (38.6%) were found in the left-sided colon and the rectum, respectively. Whereas only 27 of the 215 polyps were in the right colon. In terms of polyp diameter, 85.1% (183/215) of the polyps were larger than 1cm in size. The proportion of pedunculated polyp (58.1%) was relatively higher than that of sessile polyp (41.9%).

Table 2. Histopathological features of colorectal adenoma

Histopathological adenoma		No. of patients (n)	Percentage (%)
Subtypes	Tubular	92	42.8
	Villous	32	14.9
	Tubulovillous	80	37.2
	Serrated	11	5.1
Grade	Low grade dysplasia	113	52.5
	High grade dysplasia +Tis	73	34.0
	Invasive neoplasm	29	13.5
Total		***215***	***100***

Regarding the histopathological features, tubular adenoma (42.8%) and tubulovillous adenoma (37.2%) were the most common subtypes. Low grade dysplasia was identified in 52.5% (113/215) of all polyps, while high grade dysplasia and carcinoma in situ were accounted for 34.0%. 13.5% of patients suffered from an invasive neoplasm.

Table 3. Relation between endoscopic features and histologic types

Endoscopic features		Histological type				p
		Tubular n (%)	Tubulovillous n (%)	Villous n (%)	Serrated n (%)	
Location	Rectum (83)	29 (34.9)	27 (32.5)	20 (22.1)	7 (8.2)	0.020
	Left colon (105)	48 (45.7)	44 (41.9)	9 (8.6)	4 (3.8)	
	Righ colon (27)	15 (55.6)	9 (33.1)	3(11.1)	0	
Size	≤ 1.0cm (32)	26 (81.2)	6 (18.8)	0	0	0.001
	> 1cm (183)	66 (36.1)	74 (40.4)	32 (17.5)	11 (6.0)	
Morphology sessile (90)		42 (46.7)	26 (28.9)	16 (12.8)	6 (4.0)	0.170
Pedunculated (125)		50 (40.0)	54 (43.2)	16 (12.8)	5 (4.0)	

Table 3 shows the relationship between endoscopic features and histological findings. Tubular adenomas and tubulovillous adenomas were more common in any location of colon. Serrated polyps with dysplasia were not found in righ colon. Villous adenomas and serrated polyps were only seen in polyps with a diamater of > 1cm. The distribution of histopathological subtypes were not significantly different between morphological groups of pedunculated and sessile polyps.

Table 4. Relation among location, size, shape and grade of adenomas

Endoscopic features (n)		Grading of adenomas			p
		Low grade dysplasia (n (%))	High grade dysplasia and tis (n (%))	Invasive neoplasm (n (%))	
Location	Rectum (83)	38 (45.8)	33 (39.8)	12 (14.5)	0.592
	Left colon (105)	60 (57.1)	31 (29.5)	14 (13.3)	
	Righ colon (27	15 (55.6)	9 (33.3)	3 (11.1)	

Table 4. Relation among location, size, shape and grade of adenomas (Next)

Endoscopic features (n)		Grading of adenomas			p
		Low grade dysplasia (n (%))	High grade dysplasia and tis (n (%))	Invasive neoplasm (n (%))	
Size	≤ 1.0cm (32)	27 (84.4)	1 (3.1)	4 (12.5)	0.001
	> 1cm (182)	86 (47.0)	72 (39.3)	25 (13.7)	

Morphology	Sessile (90) Pedunculated (125)	46 (51.1) 67 (53.6)	27 (30.0) 46 (39.8)	17 (18.9) 12 (9.6)	0.127

Regarding the grading of dysplasia and invasion, polyps bigger than 1cm has the higher rate of high-grade dysplasia (39.3%) and invasive neoplasm (13.7%) than those of polyps with a diamater ≤ 1.0cm. In addition, the incident of invasive neoplasm in the pedunculated polyps group (9.6%) was lower than sessile polyps group (18.9%). There were no differences in the grading of dysplasia in different sites of the colon.

Table 5. Relation between grade of adenoma and histopathological types

Grade of adenoma	Histopathological types				P
	Villous (%)	Other (%)	OR	95%CI	
Low grade	7 (22.6)	106 (57.6)	1	-	-
High grade and invasive neoplasm	24 (77.4)	78 (43.4)	4.6	1.9 - 11.3	0.001

Comment: Villous subtype had the highest potential of malignancy compared to other types (OR = 4.6, 95% CI: 1.9 - 11.3)

4. Discussion

Colorectal cancer is the third common cancer in the world and the fourth common cancer in Vietnam [2]. Vietnam, similarly to several developing countries in Asia, has been experiencing a significant rise in the incidence of colorectal cancer over the recent decades. The present study has retrospectively analyzed the endoscopic and pathological characteristics of colorectal polyps through the analysis of endoscopic and pathological reports in a single center of 108 Military Central Hospital.

4.1. General characteristics of patients with colorectal polyps

In the present study, the mean age of patients with polyps was 60.6 year, the youngest was 17 and the oldest was 88. This results was similar to other studies. In fact, patients with polyps accounted for about 25% in people over 50 years old, and this figure increase correspondingly with age. The European and Japanese endoscopic screening guidelines for colorectal cancer all set the initial age of 45 for colonoscopic screening [3, 4]. In addition, the proportion of patients with polyps were higher in men than in women with the ratio of 2.26:1, this could be explained by diet and activities.

4.2. The relationship between location, size, morphology and histopathological subtypes, grade of colorectal polyps

Location: Polyps were more frequently located in the left-sided colon (48.8%) and rectum (38.6%) (Table 1). In subtypes of adenomas, tubular adenomas and tubulovillous adenomas were more common in any location of colon. In our study, serrated polyps with dysplasia accounted for 5.1% of the total polyps and this type of polyp only found in the rectum and left-sided colon. In the study of Bouwen M et al (2014) serrated polyps were found with a lower percentage (2.9%) and only see in the proximal colon [4].

Other studies also showed that the percentage of polyps in the rectum and left-sided colon colon was high, so the rate of histopathological subtypes may also be higher [5].

The high grade dysplasia of adenomas and invasive cancer was more common in the rectum and left colon than in the right colon, but the difference was not statistically significant (p=0.592) (Table 4).

Some studies showed that the sigmoid colon is the part near the end of the gastrointestinal tract, where it is most folded, prone to bacterial infections (because feces often stagnant before being pushed out) so it is easy to form polyps and the rate histopathological subtypes of polyps and the high-grade dysplasia is also higher than other sites.

Therefore, when performing endoscopy at these angle positions, it is necessary to be careful to avoid missing lesions.

Size: Polyps larger than 1cm were associated with high risk cancer. Villous adenomas and serrated polyps with dysplasia were found only in polyps > 1cm in size, but with other histopathological types, they are found in different sizes. The correlation between polyp size and histopathological types was significantly different (p=0.001). The grading of dysplasia: Polyp size ≤ 1cm has low dysplasia (84.4%), Polyp with high-grade dysplasia and invasive neoplasm increasing in size ≤ 1cm: > 1cm were 15.6%: 53.0%, respectively is significant difference (p=0.001).

Our study is similar to some studies [6]. O'Brien et al [2] showed that with polyp size 10mm, the risk of cancer was 1.3%, with polyp size from 10mm to 20mm, the risk of cancer was 9.5% and with polyps > 20mm, the risk of cancer was up to 46%.

Morphology: Histopathological analyses showed that tubular adenomas (54.3%) and tubulovillous adenomas (76.5%) were more common in the pedunculated polyps, while the rate of villous adenomas (54.5%) was more common in the sessile polyps, but the difference was not statistically significant (p=0.017). With the grade of dysplasia and invasive neoplasm, the results showed that the rate of invasive neoplasm was higher in the sessile polyps (58.6%) than pedunculated polyps (41.4%). This difference was not statistically significant with p=0.127.

Histopathological subtypes: The proportions of villous adenomas accounted for about 5 - 15% of adenomatous polyps but the rate of high grade dysplasia and invasive neoplasm was 70.0% in total [7]. In our study, villous adenomas was higher cancer risk than other types (tubular adenomas, tubulovillous adenomas and serrated polyps with dysplasia) with OR = 4.6, 95% Cl: 1.9 - 11.3.

According to the guideline of the American College of Gastroenterology and Europe, the over-50-year-old group should have a fecal occult blood test and colonoscopy screening annually [7, 8]. In Japan, colorectal cancer endoscopic screening can start at an earlier age as 40 and re-perform after 10 years in case of no risk cancer was found [9]. Guidelines also categorized the cancer risk of patients including low risk (adenomas smaller than 1cm, low grade dysplasia) and high risk (adenomas bigger than 1cm, more than 2 adenomas, villous adenomas, high-grade dysplasia). Low risk patients should undergo colonoscopy after 5 years, while the high risk group should re-perform colonoscopy after 3 years, especially patients with more than 10 polyps or serrated polyps are advised to monitor annually.

5. Conclusion

Our study shows that neoplastic polyps were mostly located in the left colon and rectum. Serrated polyps with dysplasia were not found in right colon.

The existence of polyp stalk had no relationship with histopathological types (p=0.127). Polyp larger than 1cm and villous adenoma type were closely related to the malignant change in neoplastic polyps. The cancer risk was higher in villous adenoma in comparison with other histologic types (OR = 4.6, 95%CI: 1.9 - 11.3, p<0.001).

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