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A comparative analysis of colonoscopy findings in a Chinese and American tertiary hospital

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Original Article

ABSTRACT

Background/Aims: To compare the colonoscopy findings of a tertiary Chinese hospital with those of an American tertiary hospital.

Materials and Methods: Hundred consecutive colonoscopies performed in August 2008 at the First Affiliated Hospital of Nanchang University in China and at the Emory University Hospital, United States of America, were investigated. The endoscopic findings and the histopathology results were statistically compared.

Results: The average age of Chinese patients who underwent colonoscopy in this study was 45.23±15.38 years, whereas that of American patients was 55.38±12.11 years; no difference in sex ratio was observed (p=0.202) between the two populations. Screening colonoscopy accounted for 38% of patients in the American group and zero patients in the Chinese group. Polyps and diverticula were the most common findings in both groups. Abnormal findings in the American patients were three times higher than those in the Chinese patients. Proximal colon polyps were more common in the American group. Conversely, proximal colon diverticula were more common in the Chinese group. The prevalence of non-neoplasm lesions was not different between the two groups (p=0.232); the prevalence of adenomas significantly increased in patients who were more than 50 years old in both groups and was higher in the American group (p=0.038).

Conclusion: The prevalence of bowel diseases in American patients was higher than that in Chinese patients. Polyps and diverticula were the main bowel abnormalities in both groups. Chinese patients lacked awareness of colonoscopy screening and should be enhanced aged 50 years old or older, because the prevalence of advanced neoplasia was increased in this age group in both groups.

Keywords: Screening colonoscopy, colorectal cancer, polyps, diverticular disease

INTRODUCTION

In the United States, colorectal cancer (CRC) is the third most common cancer and the second leading cause of cancer death. In 2012, it is estimated that 143,460 persons will be diagnosed with CRC and 51,690 of them will die from this disease (1). In China, CRC is the fifth leading cause of cancer death and has an upward trend (2). CRC has created a huge health burden in every country. The natural history of the development of CRC needs 5–10 years; this is the best time for a colonoscopy screening and is also a good time for interventional treatment. If colon adenomas can be identified and treated at an early stage, it may greatly reduce the incidence of CRC.

In Western countries, recommendations and guidelines for routine CRC screening have been advocated and implemented for decades, whereas in the Eastern world a routine CRC screening program has not been formulated yet. There are many tools for CRC screening, including fecal occult stool test (FOBT), fecal immunochemical stool testing (FIT), double-contrast barium enema (DCBE), computed tomographic colonography (CTC), flexible sigmoidoscopy (FS), and colonoscopy (3). Colonoscopy, however, is recognized as the best CRC screening tool for high-risk individuals (4).

We recently observed and compared the endoscopic suites of a Chinese and an American hospital. Every-

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day, approximately 90% of subjects underwent colonoscopies at the American hospital, whereas only 10% underwent colonoscopies at the Chinese hospital. To compare the endoscopic results from these two different geographical areas, we investigated 100 consecutive patients enrolled in two hospitals during the same time period and compared their age, gender, indications, and colonoscopy and pathological findings.

MATERIALS AND METHODS

Study population

A retrospective prevalence study was conducted on subjects who underwent a complete colonoscopy at the First Affiliated Hospital of Nanchang University in China and the Emory University Hospital in the United States of America. We investigated 100 consecutive patients who underwent a complete colonoscopy in August 2008. Both hospitals used the Olympus CF-Q260AI endoscope (Olympus, Tokyo, Japan), and colonoscopists had over 10 years of experience. The endoscopic reports and medical records of all the 200 patients were obtained from their electronic medical records. The study was retrospective and based on file records, so it did not require approval by the ethics committee.

Study procedures and definitions

The enrolled patients from the Chinese Hospital and the American hospital were named the Chinese group and the American group, respectively. The inclusion criteria were asymptomatic patients or patients with symptoms, including abdominal pain, diarrhea, constipation, bloody stools, weight loss, anemia, familial CRC, and history of polyps. Patients with incomplete colonoscopy or unsatisfactory bowel preparation were excluded from the study. According to the symptoms, each patient in both groups was further grouped: a) screening group and b) diagnosing group. Each group of patients was stratified by age into groups with age 0-30 years, 31-50 years, 51-70 years, and ≥71 years. The distal colon includes the rectum, the sigmoid, and the descending colon; the proximal colon includes the cecum, the ascending colon, and the transverse colon up to the splenic flexure. Advanced neoplasia was defined as an adenoma ≥10 mm in size, high-grade dysplasia, villous adenoma, or tubulovillous (villous component >25%) and/or invasive cancer. If a patient had multiple lesions, the most severe lesions were used for the statistical analysis of pathology.

Statistical analysis

Database management and all statistical analyses were performed with SPSS 13.0 (SPSS Inc., Chicago, IL, USA). Means and standard errors were used for continuous data, whereas rates and proportions were analyzed as categorical data. Chi-square analysis was used for frequency data. Multivariate logistic regression analysis was used to estimate the risk of colonic polyps, the odds ratio (OR), and 95% confidence interval (CI) for each variable. A p-value of <0.05 was considered statistically significant.

Table 1. Characteristics of Chinese and American subjects who underwent colonoscopy

Characteristic	Chinese	American
Mean age±SD (year)	45.23±15.38	55.38±12.11
Gender		
Male	49	58
Female	51	42
Age group (year)		
≤30	13	6
31-50	51	22
51-70	30	63
≥71	6	9
Underwent repeat colonoscopy	21	52
Screening		
Male	0	21
Female	0	17
Family history	0	10
History of polyps	0	22
Abdominal pain	40	0
Diarrhea	16	4
Constipation	12	2
Mucous (blood) stool	7	0
Hemafecia	5	13
Anemia	0	4
Colitis	5	3
Intestinal tuberculosis	2	0
Other	14	3

RESULTS

Characteristics of study population

The average age of the Chinese subjects was 45.23±15.38 years and that of the Americans was 55.38±12.11 years. The peak age was 30-69 years, which accounted for 80% in the Chinese group, whereas the American group was 40-79 years, which accounted for 90%; among them, patients aged 50-69 years accounted for 65%. The peak age of the Chinese group was 10 years younger than that of the American group. The male-to-female ratio in the two groups was not significantly different (p=0.202). Twenty-one (21%) patients underwent repeat colonoscopy in the Chinese group, whereas 52 (52%) underwent a repeat colonoscopy (p<0.001) in the American group. There were no screening colonoscopy and CRC familial history in Chinese patients. In American patients, there were 38 cases of screening colonoscopy, which represent the most number investigated patients aged over 50 years (21 male and 17 female) (Table 1).

Table 2. Bowel lesions between the Chinese and the American groups

Lesions	Chinese (Age, years)					American (Age, years)				
	≤30	31–50	51–70	≥71	Total	≤30	31–50	51–70	≥71	Total
Polyps	1	12	36	1	50	0	9	56	7	72
Rectum	0	7	2	0	9	0	2	18	0	20
Sigmoid	1	1	24	1	27	0	3	11	1	15
Descending	0	0	0	0	0	0	1	3	0	4
Transverse	0	2	8	0	10	0	1	8	3	12
Ascending	0	1	0	0	1	0	1	9	2	12
Ileocecal junction	0	1	2	0	3	0	1	7	1	9
Diverticulosis					0					34
Rectum					0	0	0	0	0	0
Sigmoid					0	0	2	17	5	24
Descending					0	0	0	4	1	5
Full colon					0	0	0	2	3	5
Mass					5					4
Rectum	0	0	2	1	3	0	0	2	0	2
Sigmoid	0	0	1	0	1	0	0	0	0	0
Descending	0	1	0	0	1	0	0	0	0	0
Ascending	0	0	0	0	0	0	0	1	0	1
Ileocecal junction	0	0	0	0	0	0	1	0	0	1
Hemorrhoids					0					35
Colitis					12					2
Ulcer					3					3
Melanopathy					0			2		2
Lymphoma					0					1
Anal fistula					0					1
Deformation of the ileocecal					0					1
Deformed mouth appendectomy					0					1
Normal colon					61					20

Colonoscopy findings of patients

In Chinese patients, we detected 50 polyps in 25 patients (11 male and 14 female). In American patients, we detected 72 polyps in 42 subjects (27 male and 15 female), whereas screening accounted for 45% (19/42). The prevalence of polyps in American subjects was higher than that in Chinese subjects (p=0.002). The logistic regression evidenced that age was the main risk factor for polyps in Chinese patients (p=0.017, OR=2.206, 95% CI:1.155-4.216) and American patients (p=0.042, OR=1.945, 95% CI:1.024-3.696). With the advancement of age, the prevalence of polyps increased with the peak age, ranging between 51 and 70 years (Chinese subjects accounted for 72%, whereas American subjects accounted for 77.78%). The prevalence of polyps, however, decreased in subjects aged 71 years or more. The prevalence of proximal colon polyps in Chinese patients was 28% (14/50), lower than that in American patients, which accounted for 45.83% (33/72) (p=0.047).

There was no diverticulosis in Chinese patients. Thirty-four cases of diverticulosis were observed in American patients (18 male and 16 female). Ten of 34 patients had multiple diverticula and were aged over 50 years, accounting for 94.12%; the sigmoid colon diverticula accounted for 70.59% and asymptomatic patients accounted for 88.24%. Hemorrhoids were not observed in Chinese patients, whereas hemorrhoids were observed in 35 American patients, and the combination of two or more than two lesions was hardly observed in Chinese patients. In Chinese patients, 61% had a normal colonoscopy, which were three times that of American patients (19%). In both groups, the disease was mainly concentrated in patients aged between 31 and 70 years (84.62% (33/39) and 70.37% (57/81) and mainly located in the distal colon (69.23% (27/39) and 88.89% (72/81). Distal colon disease of American patients was higher than that of Chinese patients (p=0.008) (Table 2).

Table 3. Pathology between the Chinese and American groups

		American		
Pathology	**Chinese**	**Screening**	**No screening**	**Total**
Non-neoplastic polyps	10	10	11	21
Hyperplastic	6	10	10	20
Inflammatory	1	0	1	1
Unclassified	3			
Adenoma	13	16	24	40
Tubular adenoma	0	10	13	23
Tubulovillous adenoma	0	0	1	1
Adenoma and low grade intraepithelial neoplasia	11			
Unclassified adenomas	2	6	10	16
Adenocarcinoma	4			0
Chronic ivnflammation	8			0
Melanism	1			0
TB suspect	1			0
Chronic inflammation and deposition of schistosome eggs	2			0
Ulcer	1	0	3	3
Lymphoid aggregates	0	1	1	2
Active inflammation	0	0	2	2
Lymphoma	0	0	1	1
Leiomyoma	0	0	1	1
Liparomphalus	0	0	1	1
Normal	0	1	3	4

In the colonoscopy screening of American patients, 19 had 32 polyps (10 polyps in the rectum, five polyps in the sigmoid colon, two polyps in the descending colon, three polyps in the transverse colon, seven polyps in the ascending colon, and five polyps in the ileocecal junction, mainly located in the two poles), accounting for 42.86% of a total of 42 cases and 44.45% of a total of 72 polyps. Eleven cases of diverticulosis were detected, accounting for 32.35% of a total of 34 cases (eight in the sigmoid colon, three in the descending colon, and one in the whole colon, mainly located in the distal colon). Fourteen cases of hemorrhoids, one case of rectum mass, and one case of melanosis coli were detected. Only six of them had a normal colonoscopy, accounting for 15.78% of the total screening cases.

Pathological findings of patients

There were 40 specimens of 42 Chinese patients; 13 adenomas of each type (32.50%) and 10 polyps of each type (25%). Because of abdominal pain or hematochezia, four patients with adenocarcinoma underwent colonoscopy. Except for one case, all the others were aged over 50 years (all the subjects experienced their first colonoscopy). In American patients, there were 75 specimens of 78; 40 were diagnosed as adenoma of each type (53.33%) and the other 21 were polyps of each type (28%). Four cases of mass were detected and two cases were detected by screening colonoscopy (Table 3). A total of 28 specimens were taken from 38 patients for screening (lower than the specimens of colonoscopy; possibly taken two specimens but only tested one specimen). Sixteen adenomas and 10 polyps of each type, accounted for 57.14% and 35.71% of the all the specimens, respectively, together accounted for 92.86%. A total of 47 specimens were taken from 62 patients not for the purpose of screening. Twenty-four adenomas and 11 polyps of each type, accounted for 51.06% and 23.40% of the all the specimens, respectively, together accounted for 74.47%.

Adenoma of the patients in the two countries accounted for 35.25% and 53.3%, respectively. The prevalence of adenomas in American patients was higher than that in Chinese patients (p=0.033). The percentage of non-neoplastic lesions for the two countries was not statistically different (70% and 62%, respectively, p=0.232). The prevalence of adenoma in subjects aged over 50 years was higher in American patients than in Chinese patients (p=0.038). The percentage of advanced neoplasia for patients aged over 50 years of the two countries both accounted for 85.7%, higher than that of patients aged less than 50 years (14.3%) (Table 4).

Table 4. Pathology of the age group between Chinese and Americans

	China			America		
Age	**Non-neoplastic**	**No advanced adenoma**	**Advanced neoplasia**	**Non-neoplastic**	**No advanced adenoma**	**Advanced neoplasia**
≤30	20	0	0	6	0	0
31-50	45	5	1	17	4	1
51-70	20	5	5	40	18	5
≥71	5	0	1	5	3	1

DISCUSSION

In this study, Chinese patients who underwent colonoscopy were 10 years younger than American patients, but the prevalence of bowel diseases was one-third of that of American patients. This may be related to the earlier onset of bowel diseases in Chinese people and the high prevalence of functional bowel disease. Polyps, hemorrhoids, and diverticula were the main findings in the subjects who underwent colonoscopy. However, none of the Chinese patients underwent a screening colonoscopy, whereas the American patients had multiple colonoscopy screenings (roughly two times that of Chinese patients). The main reason for this difference may be that the prevalence of CRC and polyps is relatively lower in Chinese people. A survey of Asian Americans showed that about 65.3%–94.0% had never undergone a screening colonoscopy (5). A free community-based CRC screening program in Hangzhou, China showed that 37.2% of people underwent the FOBT, and only 8.5% of the positive findings underwent a subsequent free colonoscopy (6). Unfamiliarity with the concept of CRC screening maybe the reason for low percentage of screening in China.

Colonic polyps are the most common bowel disease, detected in 40% and 38.1% in the Chinese and American groups, respectively, in this study. The prevalence of polyps in the proximal colon of American patients was higher than that of Chinese patients. In Asians, there was pathogenesis of CRC unlike previous nonpolypoid colorectal neoplasms (NP-CRNs). This cancer has flat and depressed lesions, is often located on the right side of the colon, it infiltrates into deeper layers of the bowel wall in the early stage, displays high-grade dysplasia, and lacks K-Ras mutations. A case-cohort study from Taiwan showed that at least 30% of CRCs had occurred *de novo* (7). Because of nonspecific characterization and the flat pattern, it would easily be missed if not carefully looked for (8). For a long time, Western researchers think that such cancer is uncommon in Western populations, whereas with the progress of technology, a high number of NP-CRNs are discovered in Western countries (9-11).

In this study, the prevalence of advanced neoplasia of Chinese and American patients over 50 years was higher than that of people under 50 years, whereas all the Americans over 70 years had bowel lesions. Diamond et al. (12) reported that the detection rate of adenoma and advanced neoplasia increased with each decade of people aging over 50 years, and that they were higher in men than in women for each decade. There is a wide range of technological options available for CRC screening, such as FOBT, FIT, DCBE, CTC, FS, and colonoscopy. Colonoscopy remains the only method that offers a one-step approach to CRC screening; it can treat polyps and enables other minimally invasive surgical procedures (13). The study of compare different tools for the detection of advanced colonic neoplasia showed that the sensitivities of colonoscopy, CTC, FS, FIT, and FOBT were 100%, 96.7%, 83.3%, 32%, and 20%, respectively. This, high-resolution and low-dose CTC were comparable with colonoscopy for polyps >5 mm, FS could be preferred in patients who refuse to undergo full bowel preparation, and FIT rather than FOBT should be recommended for patients preferred stool tests (14). In this study, the prevalence of proximal colon polyps in Americans who underwent colonoscopy screening was higher than that in Chinese subjects. Therefore, colonoscopy is more appropriate for CRC screening. An American multicenter study showed that the first screening colonoscopy and polypectomy produced the greatest effect on reducing the incidence of CRC in patients with adenomatous polyps (15). In a prospective study by Huang et al. (16), the risk of advanced adenoma 5 years after a normal baseline colonoscopy was lower even if the follow-up population was asymptomatic. Consequently, a screening colonoscopy interval of 5 years is safe for Chinese people aged over 50 years.

Diverticular disease of the colon is very common in Western countries. Up to 50% of individuals aged over 60 years have colonic diverticula mainly in the left-side colon and 10%-25% develop complications, including diverticulitis (17). In the present study, colon diverticula accounted for 42.5% of bowel diseases (34% of total patients). Although colon diverticula were not observed in Chinese patients, according to previous reports, the prevalence of diverticulosis in Eastern countries was relatively low, ranging from 1.8%-12.1% and mainly occurring in the right-side colon, with a high incidence of young people affected (18). The location of the diverticulum was different in Eastern and Western patients. This may be related to a higher intraluminal pressure in the right-side colon. Western people, mainly because of diet habits and constipation, form false diverticula in the left-sided colon (19). In this study, there were 10 cases of diverticulosis complicated with polyps, accounting for 23.8% of total patients with polyps. Some researchers found that colonic polyps, CRC, and diverticular diseases share similar epidemiological features and risk factors, such as age and

low dietary fiber; however, the concrete relationship between these two diseases is still not clear. In some study, patients with diverticular disease had a higher risk of colonic polyps and higher prevalence of neoplasms compared with those without diverticular disease (20-22). Although other researchers found that CRC and diverticular diseases probably form heterogeneous groups and had differences in the colonic tissue architecture, they had no relationship (23,24). About 80%-85% of patients with diverticular diseases are asymptomatic (25), only 10%-20% of whom presented with abdominal pain, diverticulitis, and hemorrhage. In this study, 88.24% of patients were asymptomatic. It seems that colonoscopy screening is extremely important.

In the past, cancers of the upper gastrointestinal tract and liver have predominated in the east, whereas in recent decades, with the change in diet habit and lifestyle, the incidence of CRC in Asian countries has markedly increased. Some of the more developed Asian countries have already reached the incidence of CRC relieved as that in the Western countries (26). In Hong Kong (27), the incidence of CRC increased from 29.6/100000 in 1983 to 57.1/100000 in 2006, whereas in America, because of CRC screening, CRC death rate decreased by 3.0% per year from 2003 to 2007 (28). In this study, the prevalence of bowel diseases in the ages of 31–50 years and 51-70 years were similar in China and the percentage of advanced neoplasia was not different from that in the American group, which was predominant in the age group over 50 years; thus, colonoscopy screening should begin at age 50 years.

In conclusion, the prevalence of bowel diseases was higher in American patients than in Chinese patients. Chinese patients who underwent colonoscopy were 10 years younger than American patients. Polyps and diverticula were the main lesions in both groups. Chinese people should strengthen the idea of health screening colonoscopy, because advanced neoplasia predominates in the age group of over 50 years, and the general population over the age of 50 years should undergo screening colonoscopy.

Ethics Committee Approval: N/A.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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