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Original Article

Increasing detection rate of proximal serrated polyps in a large hospital of China over a 10-year period

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Abstract: The epidemiology of proximal serrated polyps (PSPs) and right colon cancer (RCCs) in the Chinese population is seldom reported. We conducted a retrospective review of a large database of colonoscopy for clinical indications during the 10-year period between 2005 and 2014. A total of 22318 colonoscopies were included. 2.7% had RCCs and 7.7% had left colorectal cancers (LCRCs). RCCs had younger age (55.9 years) and higher proportion of poorly differentiated cancer (20.8%), compared with that of LCRCs (58.9 years and 10.4%, respectively, both $P<0.001$). The proportion of RCCs in all CRCs showed a decrease trend during the 10-year period. The overall PSP detection rate was 4.7%. The PSP detection rate rose from 2.5% to 5.1% ($P<0.05$) during the 10-year period. After review of serrated polyps, 10.3% of PSPs were re-classified as sessile serrated adenomas (SSAs). The overall detection rate of SSA was 0.6%. The proportion of SSA in PSPs in last five-year (11.9%, 2010-2014) was significantly higher than that in the first five-year (7.8%, 2005-2009, $P<0.05$). The epidemiological and histological characteristics of RCCs in the Chinese patients were different from those of Western population. The use of new endoscopic techniques may have contributed to the increased detection rate of PSPs. Another important reason might be attributed to increased endoscopist and pathologist awareness of the appearance and significance of PSPs.

Keywords: Proximal serrated polyps, sessile serrated adenoma, epidemiology, colorectal cancer, Chinese

Introduction

Colonoscopy provides incomplete protection from colorectal neoplasia, especially in the right colon [1, 2]. 5.4% of patients developed "interval cancers" within 5 years of prior endoscopy, which were 3 times more likely to occur in the right colon [3]. Probably one important reason for this is related to proximal serrated polyps (PSPs) [1]. Some PSPs, such as the sessile serrated adenoma (SSA) and its precursors microvesicular hyperplastic polyp (MVHP), are now understood to have malignant potentials [4, 5]. There were reports of MVHP that are likely to bypass the SSA stage and progress rapidly to cancer [6]. PSPs are increasingly recognized as a new qualitative detection target in colonoscopy [7]. However, in contrast to conventional adenomas, the published literature on the epidemiology of PSPs is seldom reported, especially in the Chinese population.

Screening colonoscopy is widely performed in Western countries in 50+ year old individuals. Much data about the epidemiology of colorectal cancer (CRC) or polyps came from screening colonoscopy [8, 9]. In fact, many colonoscopies were performed in symptomatic patients, and young patients under 50 years. The prevalence of CRCs and polyps in this population is unknown.

Moreover, screening colonoscopy is not widely practiced in developing countries such as China. The majority of the Chinese patients underwent colonoscopy because of clinical indications or symptoms. However, the prevalence of CRCs and colorectal polyps in symptomatic patients of the Chinese population is seldom reported.

Furthermore, as the definition and identification of serrated lesions (especially for SSA) have not been well established in China, we knew little about the epidemiology of these lesions. In this study, the prevalence of CRCs and PSPs (including hyperplastic polyps (HPs) and SSAs) were investigated in a medical cen-

Table 1. Clinicopathologic characteristics of patients with colorectal cancers

	RCC (n=605)	LCRC (n=1722)	*P* value
Gender			
Female	255 (42.1%)	711 (41.3%)	>0.05
Male	350 (57.9%)	1011 (58.7%)	
Average age (year)	55.9	58.9	<0.001
Location			
Cecum	51 (8.5%)	NA	<0.05†
Ascending colon	282 (46.6%)	NA	
Hepatic flexure	104 (17.1)	NA	
Transverse colon	168 (27.8%)	NA	
Splenic flexure	NA	50 (2.9%)	<0.05†
Descending colon	NA	125 (7.3%)	
Sigmoid colon	NA	348 (20.2%)	
Rectum	NA	1199 (69.6%)	
Histological grade			
Moderately and well-differentiated	479 (79.2%)	1543 (89.6%)	<0.001
Poorly differentiated	126 (20.8%)	179 (10.4%)	

RCC, Right colon cancer; LCRC, Left colorectal cancer; NA, Not applicable. †, *P* value among RCC and LCRC groups, respectively.

ter of China over a 10-year period for colonoscopy in symptomatic patients.

Materials and methods

Study design

We conducted a retrospective review of the database of colonoscopy performed in the Endoscopic Center of Affiliated Hospital of Luzhou Medical College, a medical centre covering a population of 60 million people in West China. Colonoscopy was performed for standard clinical indications. The study included consecutive colonoscopies performed between the months of January 2005 and December 2014. Patients with screening colonoscopy, a family history of CRCs or polyposis syndrome, a history of colorectal surgery, inflammatory bowel disease, and failed cecal intubation were excluded from the study.

All colonoscopies were performed using Olympus 260 series colonoscopes (Olympus Medical Systems Corporation, Tokyo, Japan). In the late 5 years since 2010, high-resolution white light endoscopy, narrow band imaging (NBI), magnifying endoscopy, and chromoendoscopy were widely used for inspection of the colon. Chromoendoscopy was performed by direct spraying of 0.2% indigo carmine on the colon mucosa. NBI was used to clarify the nature of the polyp identified by white light.

The proximal/right colon was defined as proximal to the splenic flexure (cecum, ascending colon, hepatic flexure, and transverse colon). The distal/left colorectum included splenic flexure, descending and sigmoid colon, and rectum. Polyp histology was classified as adenoma or serrated. Serrated polyps were classified as HP, SSA, and traditional serrated adenoma (TSA) using the recently updated WHO diagnostic criteria [10]. Originally diagnosed HPs were reviewed and re-classified according to the new criteria.

Statistical analysis

Data are presented as mean and standard deviation for continuous variables and as proportions for categorical variables. Differences in continuous variables were evaluated using Student's t-test for independent samples. Differences in categorical variables were determined by the Chi-square or Fisher's exact tests, as appropriate. Differences were considered significant if $P<0.05$. All significance tests were two-tailed. All statistical tests were performed using SPSS software Version 13.0 (SPSS Inc., Chicago, IL, USA).

Results

Prevalence of RCCs in the Chinese population

A total of 22318 colonoscopies were included (mean patient age 50.1 years; male 50.4%). The symptoms for performing colonoscopy included abdominal pain (61.1%), hematochezia (13.1%), diarrhea (8.3%), abdominal distension (4.4%), constipation (4.1%), weight loss (2.1%), abdominal discomfort (1.8%), and anemia (1.6%).

Of these patients, 605 (2.7%) had RCCs and 1722 (7.7%) had LCRCs. The overall detection

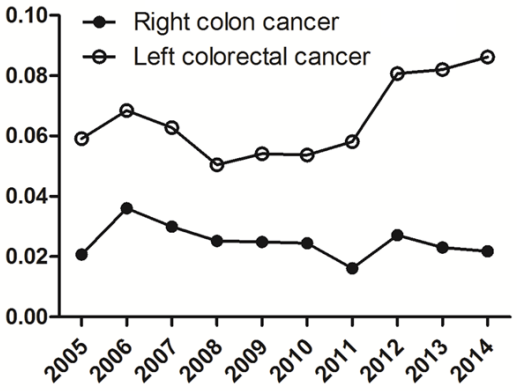

Figure 1. Time trends in the detection rate of right-sided colon cancers and left-sided colorectal cancers in symptomatic patients among the Chinese population for the period between 2005 and 2014.

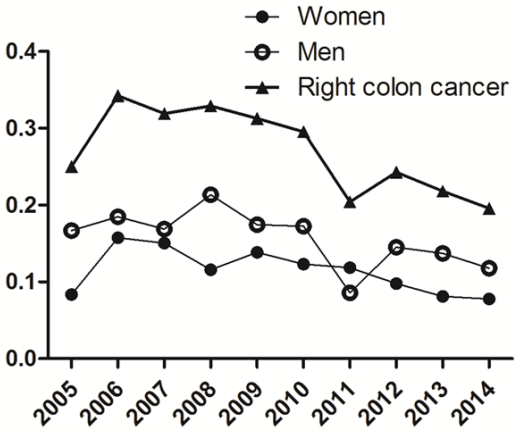

Figure 2. Time trends in the proportions of right-sided colon cancers (Women and Men) expressed as a percentage of all colorectal cancers in the Chinese population for the period between 2005 and 2014.

rate of CRCs in male was 6.2%, significant higher than that in female (4.2%, P<0.001). The clinicopathologic characteristics of patients with RCC or LCRC were shown in **Table 1**. The RCCs were more frequently diagnosed in men (57.9%), significantly higher than that in female (42.1%, P<0.001). The average age of RCCs (55.9 years) was younger than that of LCRCs (58.9 years, P<0.001). Moreover, the proportion of poorly differentiated cancers in RCCs (20.8%) was significantly higher than that in LCRCs (10.4%, P<0.001). The rectum was the most frequent site for LCRCs, and ascending colon was the most frequent site in PCCs.

During the 10-year period between 2005 and 2014, the detection rate of LCRCs rose from 5.9% to 8.6%. However, this trend was not observed among RCCs. No significant change was seen in the detection rate of RCCs during this 10-year period (**Figure 1**). Moreover, the proportion of RCCs in all CRCs showed a decrease trend during this period. This fall trend was present in both men and women patients with RCCs (**Figure 2**).

Prevalence of proximal sessile polyps and PSPs

Of 22318 patients, 5483 (26.8%) had at least 1 polyp (mean age 54.8 years; male 61.3%). The prevalence of at least 1 polyp in male was 32.6% (3668/11248), significantly higher than that in female (20.5%, *P*<0.001). The adenoma detection rate (ADR) in total colonoscopies was 13.2% (15.9% for men and 10.5% for women).

9.0% of colonoscopies had at least 1 proximal polyp (mean age 55.1 years; male 61.7%), and 22.8% had at least 1 distal polyp (mean age 54.2 years; male 61.5%). Of 2008 patients with at least 1 proximal polyp, 76.6% were sessile polyps. 56.4% of these proximal sessile polyps were originally diagnosed as HPs. The overall PSP detection rate was 4.7% (mean age 53.9 years; male 58.9%). After review of these slides, 10.3% of these PSPs were re-classified as SSAs (mean age 57.2 years; female 68.7%). The overall detection rate of SSA was 0.6%, and 80.7% of SSAs were located in right colon.

Increasing detection rate of PSPs and SSAs

During the 10-year period, the detection rate of at least 1 proximal sessile polyp rose from 3.4% to 7.8% (P<0.001). Also, the detection rate of at least 1 distal sessile polyp rose from 6.2% to 13.8% (P<0.001). The detection rate of PSPs rose from 2.5% to 5.1% (P<0.05), and distal serrated polyps from 4.3% to 9.7% (P<0.05, **Figure 3**).

Moreover, after review of the slides originally diagnosed as HPs, during the 10-year period, the proportion of SSAs in PSPs rose from 7.1% to 14.5% (**Figure 4**). The proportion of SSA in PSPs in last five-year period (11.9%, 2010-2014) was significantly higher than that in the first five-year period (7.8%, 2005-2009, P<0.05).

Discussion

The prevalence of CRCs in symptomatic patients is seldom reported, especially in the

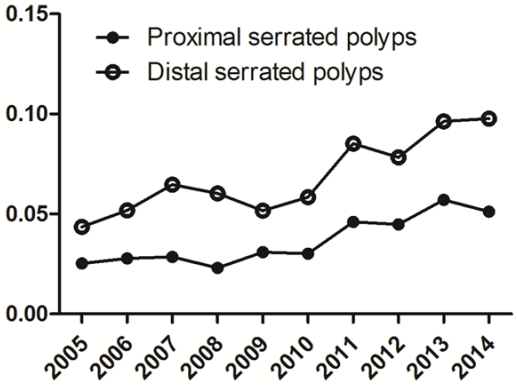

Figure 3. Time trends in the prevalence of serrated polyps in proximal colon and distal colorectum for the period between 2005 and 2014.

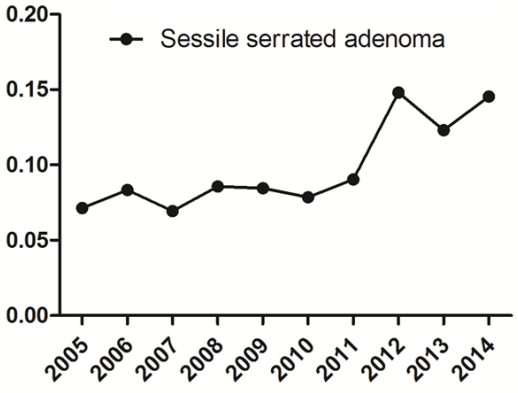

Figure 4. Increasing detection rate of sessile serrated adenomas in proximal serrated polyps after review of originally diagnosed hyperplastic polyps for the period between 2005 and 2014.

Chinese population. At present study, we reported 2.7% of RCCs and 7.7% of LCRCs in symptomatic patients underwent colonoscopy during the 10-year period between 2005 and 2014. In recent years, it's found that interval cancers were 3 times more likely to occur in the right colon than left [3]. Moreover, it has been reported that there is an increasing shift of colonic adenocarcinomas from the left side of the colon to the right in recent years, mainly by North American studies [11, 12].

However, this trend was not seen in our study. Instead, there was a trend toward decreasing percentage of RCCs, and increasing percentage of LCRCs in the Chinese population. One important reason might be that screening colonoscopy was not widely used in the Chinese population, which has been proved to provide protection by removal of the polyps in the left colon with fewer in the right. Other factors, such as differences in genetic factors, lifestyle and dietary factors between West and East may explain this opposite trend of RCCs.

Furthermore, the proportion of poorly differentiated cancer in RCCs was significantly higher than that in LCRCs in the present study. This finding was consistent with a German study which revealed a higher percentage of poorly differentiated cancers in RCCs [11]. These findings imply that patients with RCCs have a worse prognosis. It is worth noting that, in this German study, RCCs were more frequently diagnosed in older women (female 55.3%, mean age 71.0) [11]. By contrary, RCCs in our study were much younger (mean age 55.9), and more common in men (57.9%). These epidemiological and histological discrepancies of RCCs between West and East must be evaluated when making strategies on screening and therapy for RCCs.

The ADR has been accepted as a quality indicators for colonoscopy [7]. The overall ADR in symptomatic patients in our center was 13.2% (15.9% for men and 10.5% for women). These rates were lower than that recommended by the US study, which suggested minimum ADR of 25% for men and 15% for women [13]. However, The ADR in our unit was comparable with that of 14.8% in asymptomatic average-risk subjects undergoing first-time colonoscopy in a single center of Italy [14].

Moreover, recent studies have demonstrated that PSPs are increasingly recognized as a new qualitative detection target in colonoscopy. Identification of serrated lesions by endoscopists can sometimes prove challenging. With respect to endoscopic appearance, PSPs are flat, pale, and share the same color of surrounding mucosa with faint borders. The overall PSP detection rate (PSPDR) in our unit was 4.7%, comparable with suggested minimum PSPDR of 5% for screening colonoscopy by US study [8]. In an asymptomatic screening Korean population, the PSPDR was only 3.1%, despite the high ADR (43.5%) [9]. However, in a recent US study, the PSPDR was 13% [15]. The PSPDR in this study was highly variable and endoscopist dependent (range 1%-18%). Thus, it's likely that a proportion of PSPs may be missed during colonoscopy [16, 17].

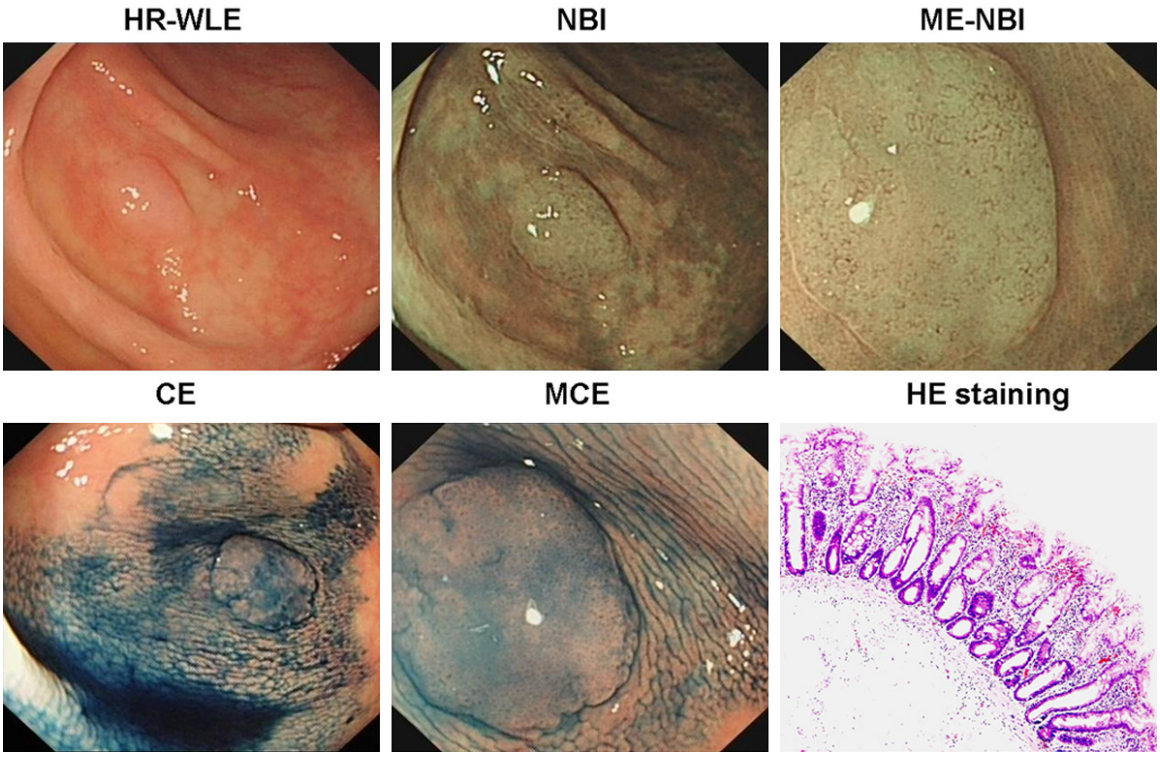

Figure 5. The characteristic appearances of a proximal sessile serrated adenoma using new endoscopic techniques. HE staining showed the basal crypt dilatation of the sessile serrated adenoma. HR-WLE, high resolution white light endoscopy; NBI, narrow-band imaging; ME-NBI, magnifying endoscopy with narrow-band imaging; CE, chromoendoscopy; MCE, magnification chromoendoscopy.

It's worth noting that, however, the PSPDR rose significantly from 2.5% to 5.1% in our unit during the 10-year period between 2005 and 2014. The use of new endoscopic techniques may have contributed to the increase of PSPDR. Since 2010, high resolution white light endoscopy, magnifying endoscopy with narrow-band imaging and chromoendoscopy have been widely used in our unit (**Figure 5**). These new endoscopic techniques have been proved helpful to increase the PSPDR [18, 19].

The overall detection rate of SSAs was 0.6% in the present study, much lower than 2-7% of the prevalence of SSAs reported in Western population undergoing screening colonoscopy [20]. In a Australian study, the prevalence of SSAs was significantly lower in the Chinese (2.0%) when compared with the Caucasians (7.0%) [21]. This low prevalence of SSAs in the Chinese population was also reported in our previous study [22]. However, the proportion of SSAs in PSPs in last five-year period increased significantly compared with that in the first five-year period. One reason for the improved SSAs detection might be the use of new endoscopic techniques since 2010.

Another important reason might be attributed to increased endoscopist and pathologist awareness of the appearance and significance of SSAs, which was an unrecognized entity in our hospitals until 2010, with all lesions before this classified as HPs. In recent years, the increasing PSPDR was also reported in other studies [16, 23]. With increasing multidisciplinary awareness of PSPs and evolving endoscopic technology, we predict that, these efforts will lead to great increases in SSA detection nationwide, and finally reduce RCC prevalence.

Disclosure of conflict of interest

None.

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