Predominance of right colon location of diverticulosis has not changed in East Asia of Taiwan for over 20 years

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ABSTRACT

Diverticular disease of colon is more common in the left colon in western countries, previous reports suggested that it is more common in right colon in Asians. The present study was carried out to evaluate whether westernized diet in Taiwan increased the incidence of diverticulitis of the left colon over a 20 year period. Charts of 174 patients admitted to Hospital with diagnosis of diverticulosis coli from 1983 to 1989 (period I) were reviewed. From October 2003 to December 2015 (period II), 4,131 double contrast barium enema (DCBE) was reviewed to see if there is any shift of predominance of diverticula from right to left colon. Distribution of diverticula was in right colon only in 66.67% of patients and left colon only in 17.24% of patients during period I. 1,251 (30.3%) patients were found to have diverticulum(a) period II. There were 561 males and 690 females. Age ranged from 26 to 92 years old, 66.3% patients were found to have diverticulum(a) only in the right colon, and 13.0% were found to have diverticulum(a) only in the left colon. The study suggested that the predominance of diverticulum(a) in right colon did not change despite increased popularity of westernized diet in Taiwan over years.

Key words: Diverticulosis, diverticulum, diverticula, double contrast barium enema, right colon, left colon.

INTRODUCTION

Diverticular disease of colon was reported to be more common in left colon in western countries. Previous reports, however, had suggested that diverticular disease of colon is more common in the right colon in Asians (Lee, 1986; Chia et al., 1991). It had also been postulated that right colonic diverticulosis is congenital, and sigmoid diverticular disease were likely to be the result of raised intraluminal pressure, likely attributable to inadequate dietary fiber intake (Coode et al., 1985; Fong et al., 2011; Burkitt et al., 1972, 1974).

Globalization has resulted in marked lifestyle changes, especially diet, in the Taiwanese population. The change of lifestyle has been reflected in rising incidence of obesity, cardiovascular disease, and colorectal cancer, etc. in Taiwan.

The aim of the study was to evaluate whether westernized diet increased the incidence of diverticular disease of the left colon over a period of 20 years. We performed a prospectively designed and retrospectively analyzed clinical study. The study was approved by the Institutional Review Board of the Mackay Memorial Hospital (Taipei, Taiwan).

METHODS

In this study, diverticulum(a) only in the right colon was defined as evidence of diverticulum(a) only involving colon "proximal" to the splenic flexure, while diverticulum(a) only in the left colon was evidence of diverticulum(a) only involving colon "distal" to the splenic flexure. The whole study was divided into two parts.
Part I study

Charts of 174 patients who were admitted to Mackay Memorial Hospital with diagnosis of diverticulosis coli from January 1983 to 1989 were reviewed. Location of distribution of diverticulum (a) was recorded according to the medical records. It is a retrospective study and difficult to reflect the true incidence of diverticular disease in this period.

Part II study

Deiverticulosis can be diagnosed by means of barium enema, colonoscopy, computerized scan, ultrasound and intraoperative examination. Among them, double contrast barium enema is the most sensitive and accurate diagnostic tool for diverticulosis. That is the reason we electively used double contrast barium enema detected diverticulosis for our study.

From October 2003 to October 2015, 4,131 double contrast barium enema (DCBE) ordered by a single surgeon was prospectively reviewed to see if there is any shift of predominance of diverticulum(a) from right colon to the left colon. Excluded from the study were patients who had DCBE in another hospital, who had single contrast BE, who were found to have diverticulum(a) using other means (e.g. colonoscopy, surgery, pathology), and who had previous colectomy. The collected data including the patient’s age, gender, indication for DCBE, distribution, and number of diverticulum(a) were collected from the clinical records. Multiple diverticula was defined as any patients who had two or more diverticula in the colon.

RESULTS

Part I study

Distribution of diverticula was mainly in the right colon only in 116 of 174 patients (66.67%), left colon only in 28 of 174 patients (16.09%), and both sides of colon in 30 of 174 patients (17.24%) during the period of 1983 to 1989. In the group of patients with diverticulum(a) only in the right colon, multiple diverticula were present in 122 patients (73%) and single diverticulum was present in 45 patients (27%). In the group of patients with diverticulum(a) only in the left colon, multiple diverticula were present in 27 patients (82%) and single diverticulum was present in 6 patients (18%). (Table 1)

Part II study

There were 4,131 patients who came in for DCBE during the period of 2003 to 2015. There were 1,646 males (39.8%) and 2,485 females (60.2%). Age ranged from 17-92 years old, with an average age of 54.3 years old. There were 1,251 (30.3%) patients found to have diverticulum(a) in the colon, of which 561 were males and 690 were females. Male patients were more likely to have diverticulum(a) than females (34.1% vs 27.8%). Age ranged from 26 to 92 years old, with an average of 58.7 years old. Patients were older in the group with diverticulum(a) than without diverticulum(a) (58.7 vs 54.3 years old). There were 830 (66.3%) patients found to have diverticulum(a) only in the right colon, 162 patients (13.0%) were found to have diverticulum (a) in the left colon and 259 (20.7%) found to have diverticulum(a) in both sides of the colon. In the group of patients with diverticulum(a) only in the right colon, multiple diverticula were present in 613 patients (74%) and single diverticulum was present in 217 patients (26%). In the group of patients with diverticulum(a) only in the left colon, multiple diverticula were present in 128 patients (79%) and single diverticulum was present in 34 patients (21%). (Tables 1 and 2).

DISCUSSION

In western countries, colonic diverticulosis most frequently affects the left colon (Radhi et al., 2011; Munakata et al., 1993; Chan et al., 1998; Miura et al., 2000; Fong et al., 2011; Ihekewaba et al., 1992). The distribution pattern of diverticulosis differs significantly between Western and Eastern populations (Radhi et al., 2011; Munakata et al., 1993; Chan et al., 1998; Miura et al., 2000; Fong et al., 2011; Ihekewaba et al., 1992). While sigmoid diverticular disease predominates in Western populations, the incidence of right side diverticulitis is estimated to be around 2%-7% of all complicated diverticular disease of the colon (Lee, 1986; Chan et al., 1998). The strong association between environmental factors (specifically
dietary habits related to affluence) and the development of diverticular disease was first highlighted by Burkitt in the 1970s (Burkitt and Walker, 1974). Here, epidemiological studies in the United Kingdom showed strong correlation between reduced dietary fiber intake and an increased prevalence of diverticular disease (Burkitt and Walker, 1974). Moreover, the incidence of diverticular disease is low in rural Africa and regions of Asia where diets are high in fiber (Ihekwaba et al., 1992). It had also been noted that non-vegetarians were at greatly increased risk of diverticular disease as compared with vegetarians (Gear et al., 1979). Studies have also shown that migrant populations (Kenyans and Japanese) develop a higher incidence of diverticular disease as compared with their counterparts in their country of origin (Gear et al., 1979; Trowell and Burkitt, 1979). It had also been postulated that right colonic diverticulosis is congenital, and unlike the development of sigmoid diverticular disease which is acquired as a result of raised intraluminal pressure within the colon (Arfwidsson et al., 1964). In Southeast Asia, a barium enema frequency of diverticular disease was found to be 8%-22% (Lee, 1986; Chia et al., 1991; Coode et al., 1985). It affects the right side of the colon in 70%-98% of cases. The distribution pattern of diverticulosis within the colon would depend upon a complex interplay of these environmental and dietary drivers and the genetic predisposition of these individuals. East Asian ethnicity is probably associated with an underlying weakness of the wall of the cecum and ascending colon, thereby resulting in the risk of development of right side diverticular disease.

A total of 1663 DCBE studies performed between January 2001 and August 2002 in Singapore were reviewed retrospectively in a recent report. The report suggested the high prevalence of diverticular disease (45% of the population studied) (Fong et al., 2011). There was an increasing incidence of both LDD and RDD as compared with two decades previously (Fong et al., 2011). There was a positive association of right side diverticular disease (RDD) and left side diverticular disease (LDD) with Chinese ethnicity and increasing age.

Taiwan is an island state and is one of the most highly developed nation in Asia. It has undergone rapid economic growth and changes in the past 30 years. As a result of lifestyle and dietary changes, there is increased incidence of obesity, cardiovascular disease, and colorectal cancer. Being a relatively homogeneous environment, Taiwan offers an ideal model to study the impact of affluence and urbanization on other populations. The changes of increased dietary meat and fat, and reduced dietary fiber, act as powerful drivers for the development of colonic diverticular disease. These same drivers for the development of diverticular disease might switch from traditional higher incidence of right side colon to the left side colon.

Since most patients with diverticular disease of colon are asymptomatic and seldom present for colonic evaluation, it is difficult to ascertain the true prevalence of diverticular disease in the general population. Colonoscopy is now increasingly used in Taiwan to evaluate patients with bowel symptoms. The present study only included patients with result of barium enema studies and are the more sensitive modality for assessment of diverticular disease (Burkitt et al., 1974; Chan et al., 1998). Though there may be some degree of bias in the radiologist with respect to the result of report due to lack of postmortem study, we believe that the best determination of the trend of development of diverticular disease of colon is by comparing the results of the present barium enema studies with those performed in the past. Comparing recent data from 2003 to 2011 with data from 1983 to 1989, it is true that the occurrence of diverticular disease appears to increase with age. From the present study, diverticular disease is still more predominant in the right colon in Taiwan. Changing lifestyle did not affect right side prevalence of diverticular disease in twenty years (66.3% vs 66.7%). Development of sigmoid diverticular disease, which is thought to be acquired as a result of raised intraluminal pressure within the colon attributable to inadequate dietary fiber intake, might not able to explain the persistence of higher incidence of

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<tr>
<td>Diverticulum only in right colon</td>
<td>830</td>
<td>167</td>
</tr>
<tr>
<td>Multiple</td>
<td>613(74%)</td>
<td>122(73%)</td>
</tr>
<tr>
<td>Single</td>
<td>217(26%)</td>
<td>45(27%)</td>
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<tr>
<td>Diverticulum only in left colon</td>
<td>162</td>
<td>33</td>
</tr>
<tr>
<td>Multiple</td>
<td>128(79%)</td>
<td>27(82%)</td>
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<tr>
<td>Single</td>
<td>34(21%)</td>
<td>6(18%)</td>
</tr>
<tr>
<td>Diverticulum in both right and left colon</td>
<td>259</td>
<td>38</td>
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<tr>
<td>Multiple</td>
<td>259</td>
<td>38</td>
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diverticular disease in right colon in Taiwan.

Conclusions

The study suggested that the predominance of diverticulum(a) in the right colon did not change despite increased popularity of westernized diet in Taiwan over 20 years. Food is probably not the only cause of difference of location of diverticula between western and eastern countries.

REFERENCES


