

A RADIOLOGICAL SURVEY OF DIVERTICULOSIS IN SINGAPORE

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ABSTRACT

Three hundred and sixty one consecutive barium enemas done at a general hospital were reviewed prospectively to determine the frequency and anatomic distribution of diverticulosis in Singapore. The frequency of 28% is comparable to previous American and European studies and higher than previous Asian studies. There was also a predominance of purely right-sided disease with the caecum and/or ascending colon involved in 71% of patients. This anatomic distribution of diverticulosis is quite different from that seen in Caucasian populations where the disease mainly involves the left side of the colon and is probably a function of genetic and racial factors.

Keywords : colon, radiography - diverticulosis, frequency.

SINGAPORE MED J 1991; Vol 32: 218-220

INTRODUCTION

Diverticulosis of the colon is a common disease in developed countries and affects up to 50% of the population past the seventh decade⁽¹⁾. Diverticulosis is much less common in underdeveloped countries in Asia and Africa. The frequency of disease in each developing country varies with its state of economic development and is probably related to change in diet⁽²⁾.

Singapore is a newly developed country and hence can be expected to have an increased frequency of diverticulosis. A recent surgical report locally indicated a high incidence of diverticulitis of the caecum and ascending colon⁽³⁾. This study was done to determine the present frequency of diverticulosis and also to look at the anatomic distribution of the disease in the large bowel.

MATERIALS AND METHODS

Three hundred and seventy three consecutive barium enemas performed at the National University Hospital, Singapore during a one year period between February 1988 and January 1989 were reviewed prospectively. Twelve patients were excluded from the study either because the entire colon was not visualised or there was previous colonic resection. Hence, only 361 barium enema examinations were eventually evaluated.

All barium enemas were performed both as inpatient (25%) and outpatient (75%) by a standard technique. Following barium infusion and air insufflation, intravenous buscopan 20 mg was given, unless contraindicated. Routine spot views obtained of the colon were lateral rectum, oblique sigmoid, erect splenic and hepatic flexure and caecal views. Overcouch films obtained were supine, prone angled sigmoid view and both lateral decubitus views.

Wilcoxon (Rank sums) test was used to analyse the difference in mean values. P values of less than 0.05 were considered significant.

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RESULTS

Of the 361 examinations evaluated, diverticula were found in 102 patients (28%). Of the patients affected, there were 59 women (58%) and 43 men (42%). The age range was 24 to 85 years with a mean age of 57 years. Fifty-two of the patients (51%) were more than 60 years of age while 9 patients (9%) were less than 40 years of age. With regards to racial distribution of diverticulosis, 90 patients (88%) were Chinese, 3 (3%) were Malays, 5 (5%) Indians and 4 (4%) patients were Caucasian.

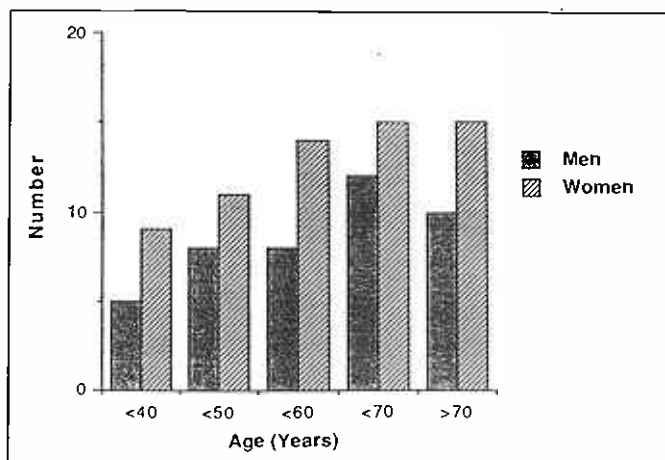
Clinical Presentation

The presentation of these patients were change of bowel habit (44), abdominal pain (25) bleeding per-rectum (23) and others (Anaemia 2, increased CEA level 2, abdominal mass 1, suspicious of polyp/screening for patients with family history of polyposis 5).

Site and Distribution of Diverticula

Right-sided disease (involvement of the caecum, ascending colon and/or the hepatic flexure) was seen in 72 patients (71%), left-sided disease (sigmoid, descending colon and splenic flexure) was seen in 16 patients (15%) while in 14 patients (14%) diverticula were seen in both left and right sides of the colon. The mean age of right-sided disease was 54 years while that of the left-sided disease and both sides involvement were 62 and 67 years respectively. The frequency and distribution of diverticulosis in various age groups is shown in Fig. 1 and it showed increased frequency as age increased.

Fig 1 - Frequency of diverticula in various age groups



Right-Sided Diverticular Disease

In the 72 patients with right-sided disease, a solitary diverticulum was seen in the caecum or ascending colon in 25

patients (35%) while the rest had multiple diverticula (Fig 2, Table I). Associated muscular hypertrophy with luminal narrowing and haustral bands of the right colon was seen in only 5 patients, 2 of whom had solely right-sided disease while the other 3 had both right- and left-sided disease. In one patient, radiological features of diverticulitis of the ascending colon,

Fig 2 – Barium enema showing multiple diverticula of the caecum and ascending colon. No diverticula were demonstrated on the right side of the transverse colon. TC – Transverse colon; C – Caecum.

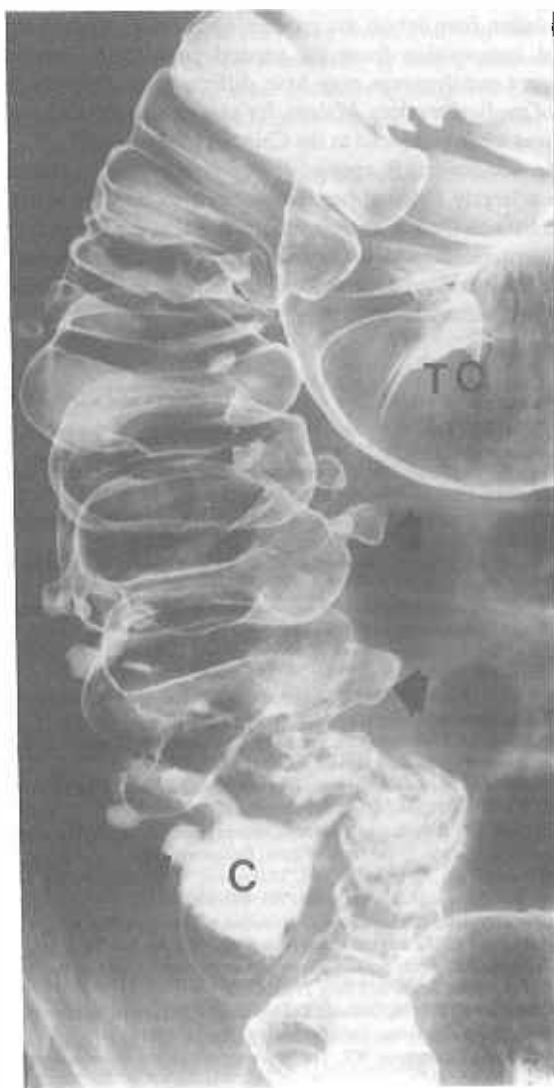
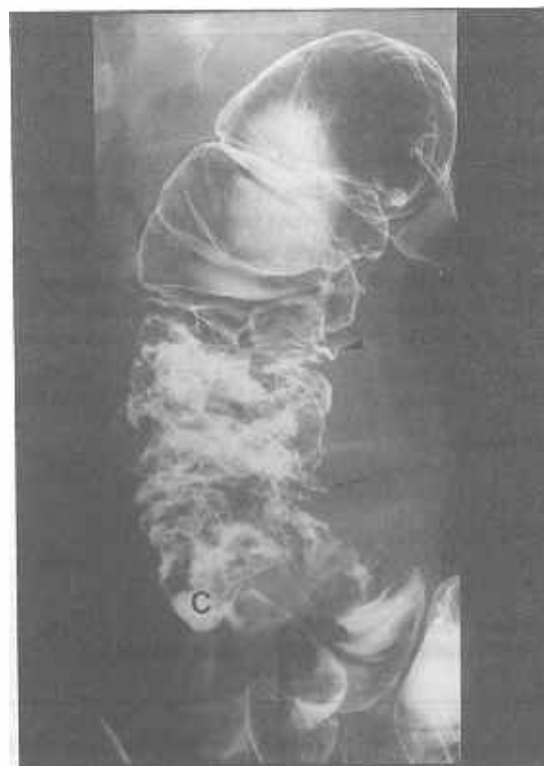


Fig 3 – Right-sided diverticulitis in a 32 year old man with right iliac fossa pain. Note irregular diverticula (arrow) which are not smooth and rounded, and small sealed off leak of barium from another diverticulum (arrow head). C – Caecum.



namely : irregular diverticula which are not smooth and rounded, and small sealed off leak of barium from another diverticulum were detected (Fig 3).

DISCUSSION

Diverticulosis of the colon has become increasingly prevalent in the United Kingdom, United States and other economically developed countries, over the past few decades. Diverticulosis has been described as “a disease of western civilization” as its increased frequency is probably related to the lack of dietary fibre⁽¹⁾. With increased consumption of refined foods as a community develops economically, the frequency of diverticulosis increases. The frequency of the disease in the developed countries has risen from 5% to 45% since 1920⁽⁴⁾ while the disease is said to be rare in the less developed countries in Africa and Asia.

In Singapore, a newly developed country, the frequency of diverticulosis of the colon, as shown by this present study is 28%. This contrasts with a study done more than 20 years ago where only 10 cases of diverticulitis were found in 1,500,000 inhabitants over a five year period⁽⁵⁾. The increasing frequency of diverticulosis in Singapore was first noticed in a recent autopsy review where the incidence was found to be 19%⁽⁶⁾. There has been a marked increase in the economic prosperity of Singapore over the last 20 years from a third world economy to one of the newly developed countries in Asia and with this has occurred the increasing adoption of a diet of refined foods, low in fibre. It has been said that diverticulosis takes about 40 years to develop and a community would have to depart from its traditional eating habits for half a lifetime⁽¹⁾. However, we found a largely right-sided predominance of the location of the disease in the colon. The frequency in this series of purely right-sided involvement was 71%. In most other studies

**Table I
Distribution of right-sided diverticula (72 patients)**

No. of diverticula	Caecum alone	Ascending colon alone	Caecum/ Ascending colon and hepatic flexure	Total
1	11	14	0	25
1 - 5	6	9	11	26
>5	1	2	18	21
	18	25	29	72

Table II
Frequency of diverticulosis

Country/ Year	Type of study	No. in study	Freq. of disease	Freq. of right-sided disease
UNITED STATES				
Smith (1959) ¹⁵	Barium enema	1016	21.8%	2%
JORDAN				
Fatayer (1983) ¹⁶	Barium enema	274	4%	0.0%
JAPAN				
Sugihara (1984) ¹⁷	Barium enema	1839	13.3%	68.6%
THAILAND				
Vajrabukka (1980) ¹⁸	Barium enema	289	4.2%	66.7%
HONG KONG				
Coodes (1985) ¹⁹	Autopsy	200	5%	70%
SINGAPORE				
Lee (1986) ⁶	Autopsy	1014	19%	66.3%
Current study	Barium enema	361	28%	71%

previously reported from the United Kingdom and United States, the frequency of right-sided disease is uncommon and ranges from 1% - 5%⁽⁷⁻⁹⁾. In 95% of patients with diverticular disease, the sigmoid colon is the principal site of involvement⁽¹⁰⁾.

Right-sided diverticula are said to be of two types⁽⁹⁾. The first type starts in the left colon and progresses to the transverse and ascending portions of the colon. The second type consists of solitary or multiple diverticula of the caecum and ascending colon. Right-sided diverticula are more often than not solitary, suggesting that they are probably congenital lesions⁽¹¹⁾. Right-sided diverticular disease is said to occur in a younger age group and tend to be close to the ileocaecal valve⁽⁹⁾. Our study showed 35% of the right-sided disease were solitary and it occurred in a younger age group as compared to those with left-sided disease (54 vs 62 years, $p < 0.001$).

It has been said that most right-sided diverticula are true diverticula and contain all layers of the intestine. Lauridsen et al reported that up to 75% of caecal diverticula to be true diverticula⁽¹²⁾ but other workers have showed that right-sided diverticula tend to be false diverticula deficient in muscularis propria^(13,14). Most true diverticula are congenital while the majority of false diverticula are acquired. In this series there were 25 patients (35%) with a solitary right-sided diverticulum while the rest had multiple diverticula. In a previous study of right-sided diverticulitis in Singapore, treated surgically, 19 of 21 cases had a false diverticulum while only 2 had a true diverticulum⁽³⁾.

This predominance of right-sided diverticulosis has been noted previously in oriental populations (Table II)^(6,15-19). In

Caucasians in Hawaii, 5% have diverticular disease of the right colon while of the orientals in Hawaii, 60% of the diverticulosis occurs in the right side⁽⁷⁾. Another characteristic of diverticulosis localised in the right colon is that haustral defects are much rarer here than in the descending colon and the majority have no caliber or haustral defects associated⁽¹⁴⁾. This present study confirms this.

The racial distribution in our country is Chinese 76.2%, Malays 15%, Indians 7.0% and others 1.8%. In our study, Chinese was over-represented while the Malays under-represented. This does not constitute definitive evidence for the existence of higher frequency of diverticulosis among Chinese locally because of two potential sources of bias. Firstly, the population from which the patients were drawn could vary in racial composition from the general population. Secondly, different racial groups may have different thresholds in their use of medical services. Malays, for example, underuse hospital services when compared to the Chinese and Indians⁽²⁰⁾.

In conclusion, it appears that diverticulosis in countries with a largely Oriental population tends to be right-sided, in contrast with Caucasian populations and that the anatomic site of diverticulosis is probably related to racial or genetic factors while the increased occurrence of the disease may be related to change in dietary habits.

REFERENCES

1. Parks TG: Natural history of diverticular disease of the colon. *Clin Gastroenterol* 1975; 4: 53-69.
2. Painter NS, Burkit DP. Diverticular disease of the colon, a 20th century problem. *Clin Gastroenterol* 1975; 4: 3-21.
3. Tan EC, Tung KH, Tan L, Wee A. Diverticulitis of caecum and ascending colon in Singapore. *J R Coll Surg Edin* 1984; 29: 372-6.
4. Hughes LE: Post mortem survey of diverticular disease of the colon. *Gut* 1969; 10: 336-51.
5. Kyle J, Adesola AD, Tinckler LF, De Beaux J. Incidence of diverticulitis. *Scand J Gastroenterol* 1967; 1: 77-80.
6. Lee YS: Diverticular disease of the large bowel in Singapore - An autopsy series. *Dis Colon Rectum* 1986; 29: 330-5.
7. Peck DA, Labat R, Waite VC: Diverticular disease of the right colon. *Dis Colon Rectum*, 1968; 11: 49-54.
8. Magness LJ, Sanfelippo PM, Van Burden JA, Judd ES. Diverticular disease of the right colon. *Surg Gynaecol Obstet* 1975; 140: 30-2.
9. Beranbaum SL, Zausner J, Lane B: Diverticular disease of the right colon. *AJR* 1972; 115: 334-50.
10. Ferrucci JT. Diverticular disease in radiology of the colon. Dreyfuss JR, Janower ML eds. Williams & Wilkins: Baltimore, 1980.
11. Bahabozorgui S, DeMuth WE, Blakemore WS. Diverticulitis of the ascending colon. *Am J Surg* 1968; 115: 295-300.
12. Lauridsen J, Ross FD. Acute diverticulitis of caecum: Report of 4 cases and review of 153 surgical cases. *Arch Surg* 1952; 64: 320-30.
13. Williams KL. Acute solitary ulcers and acute diverticulitis of the caecum and ascending colon. *Br J Surg* 1960; 47: 351-8.
14. Weissman A, Clot M, Grellet J. Double Contrast Examination of the Colon. Principles and Practice. Springer-Verlag: Berlin, 1985.
15. Smith CC, Christensen WR. The incidence of colonic diverticulosis. *AMJ* 1959; 82: 996-9.
16. Fatayer WT, A-Khalaf MA, Shalam A, Toukan AU, Dakar MR, Amaout A. Diverticular disease of the colon in Jordan. *Dis Colon Rectum* 1983; 26: 247-9.
17. Sugihara K, Muto T, Morioka Y et al. Diverticular disease of the colon in Japan: A review of 615 cases. *Dis Colon Rectum* 1984; 27: 531-7.
18. Vajrabukka T, Saksomelai K, Jimakon P. Diverticular disease of the colon in a Far-eastern community. *Dis Colon Rectum* 1980; 23: 151-4.
19. Coode PE, Chan KW, Chai YT. Polyps and diverticula of the large intestines: a necropsy survey in Hong Kong. *Gut* 1985; 26: 1045-8.
20. Ministry of Health Research and Evaluation Section. Patient profile and morbidity 1981. Ministry of Health, Singapore.