

OBSERVATIONS ON SOME ANOMALIES OF THE SIGMOID COLON

By C. K. Tan

SYNOPSIS

Anomalies of the sigmoid colon had been observed by surgeons, radiologists and anatomists to be of common occurrence. Such anomalies are of surgical significance for they can be the cause of potentially lethal acute emergencies such as volvulus and internal hernia which will necessitate immediate surgical intervention to save life. Botsford *et al* (1967) noted that 78.3% of their patients with colonic volvulus presented with volvulus of the sigmoid flexure while Scott (1965) reported a comparable incidence of 85% in Northern Iran.

Radiological studies have also shown that most of the anomalies of the colon were confined to the sigmoid colon. Thus a knowledge of these variations would be useful when interpreting barium enema films. In the dissection hall, Kanagasuntheram and Loo (1970) had also noted a high incidence of anomalies of the sigmoid colon in the cadaver.

The purpose of this paper is to extend the study of Kanagasuntheram and Loo (1970) by making similar observations not only in the dissection hall but also in the autopsy room and by reviewing barium anemata films and the clinical incidence of the pathology of the sigmoid colon in a local hospital.

MATERIAL AND METHOD

The point at which the colon crosses the left side of the pelvic brim to enter the pelvis was taken as the commencement of the sigmoid colon and the rectosigmoid junction opposite the 3rd sacral vertebra was taken as its termination (Bacon and Recio, 1962; Davies, 1967). The extent of the sigmoid colon was also verified by tracing the sigmoid arteries and the superior rectal artery. The sigmoid colon was regarded as redundant when its entire length could not be contained in the true pelvis and a large part of it had been displaced out of the pelvis into the abdomen. Slight degrees of displacement due to distension was accepted as normal.

Observations were made on twenty-seven cadavers in the dissection hall and on forty-four bodies at autopsy at the Outram Road General Hospital Mortuary. Photographs of the anomalies were taken and line drawings were made from them to illustrate clearly the variations. Films of barium enema X-rays carried out at the Outram Road General Hospital during the period January to September, 1971, were reviewed at the X-ray Department and line drawings were made from those cases with evidence of redundancy of the sigmoid colon.

Data of all patients admitted to the Outram Road General Hospital during 1967 and 1968 were obtained at the Central Medical Records Office and

the cards of those patients who presented with sigmoid colon pathology were removed for further analysis.

OBSERVATIONS

1. Dissection Hall Findings

Out of the twenty-seven cadavers examined, anomalies in the sigmoid colon were observed in eight of them, giving an incidence of 29.6%. The anomalies can be divided into three groups:

Group 1: Redundancy of the sigmoid colon

Group 2: Reduction of the Mesosigmoid

Group 3: Megacolon

Out of the eight cases of anomalies, five showed redundancy of the sigmoid colon, an incidence of 18.5%.

Group 1: Redundancy of the Sigmoid Colon

Cases 1, 2 and 3 (Figs. 1, 2 and 3)

The sigmoid colon was seen to skirt across the sacral promontory to the right iliac fossa where it formed a long loop of varying tortuosity before entering the true pelvis on the right side.

Cases 4 and 5 (Figs. 4 and 5)

The proximal part of the sigmoid colon was in its usual anatomical position in the pelvis. But the rest of it became tortuous and dilated so that a greater part of it was displaced out of the pelvis into the abdomen before it returned into the pelvis to become continuous with the rectum.

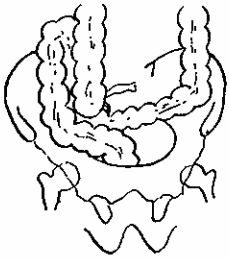


FIG. 1

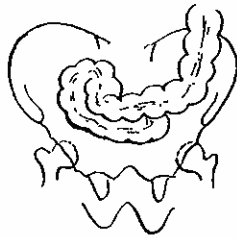


FIG. 2

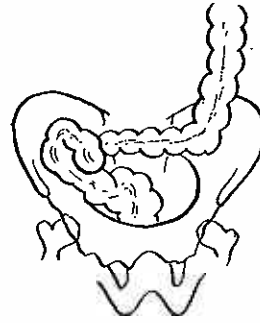


FIG. 9

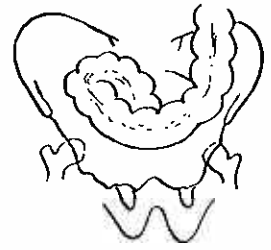


FIG. 10

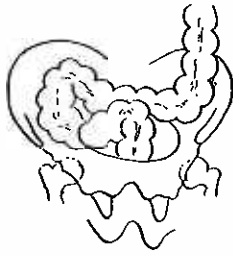


FIG. 3

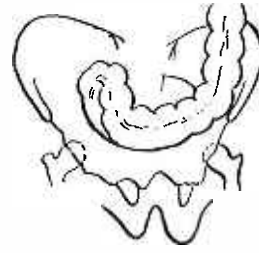


FIG. 11

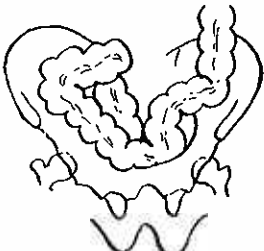


FIG. 4

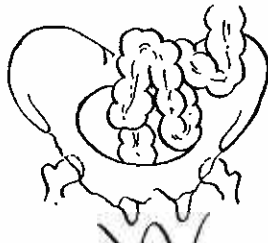


FIG. 5

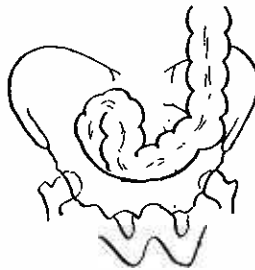


FIG. 12

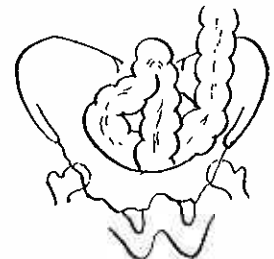


FIG. 13

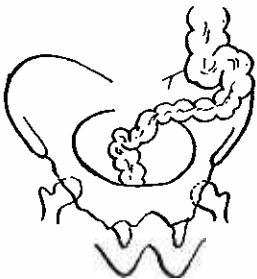


FIG. 6

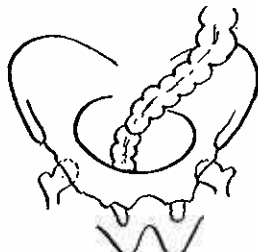


FIG. 7

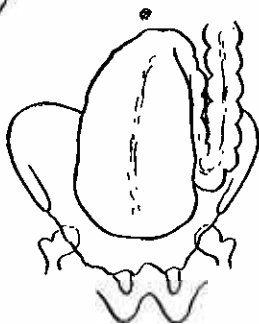


FIG. 8

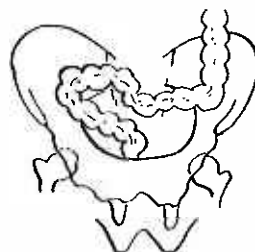


FIG. 14

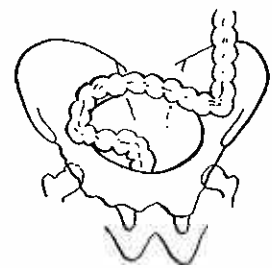


FIG. 15

Group 2: Reduction of the Mesosigmoid

Cases 6 and 7 (Figs. 6 and 7)

Both these cases showed short mesosigmoids as a result of which the colon instead of entering the pelvis at the usual site, left the abdomen and entered the pelvis over the sacral promontory.

Group 3: Megacolon

Case 8 (Fig. 8)

The sigmoid megacolon which was distended in its distal portion extended from the umbilicus to the rectum. The widest diameter was 12.5 cm. The colon was also filled with faecal matter.

2. Barium Enema Findings

Between January and September 1971, 147 barium enema X-rays were carried out at the X-ray Department of the Outram Road General Hospital for a variety of suspected large bowel conditions. Out of the 147 cases, only five showed evidence of redundancy of the sigmoid colon. Line drawings made from these five cases are shown in Figs. 9 to 13. No other anomalies were noted.

Cases 9, 10 and 11 (Figs. 9, 10 and 11) showed displacement of the sigmoid colon to the right iliac fossa whereas Cases 12 and 13 (Figs. 12 and 13) showed an extension of the sigmoid colon into the abdomen.

3. Autopsy Findings

Out of forty-four autopsies done during a two-week period in November 1971, redundancy of the sigmoid colon was observed in nine of the bodies, giving an incidence of 20.5%.

Cases 14 and 15 (Figs. 14 and 15) showed displacement of the sigmoid colon to the right iliac fossa.

Cases 16 to 22 (Figs. 16 to 22) showed extension of the sigmoid colon into the abdomen after entering the pelvis at the usual site.

4. Clinical Findings

Out of 91,263 patients admitted to the Outram Road General Hospital during 1967 and 1968, there were only eleven cases of volvulus, out of which only one presented with sigmoid volvulus, an incidence of 0.001%.

Table I shows the age, sex and race of the cases studied.

DISCUSSION

This study has shown that anomalies of the sigmoid colon are not rare. The length, form and disposition of the mesentery of the sigmoid colon often show deviations from the usual anatomical

pattern. Three types of anomalies were noted in this series, namely redundancy of the sigmoid colon and its mesentery, reduction of the length of the mesosigmoid, and megacolon.

The abbreviation of the mesosigmoid observed in two cadavers in the dissection hall is believed to be a congenital condition which had probably resulted from excessive fusion of the mesentery to the posterior abdominal wall or an under-development of the mesentery itself. The megacolon observed in one cadaver is believed to be an acquired condition as a result of hypotonia and neuromuscular incoordination. No significant history was obtainable to explain the megacolon.

Redundancy of the sigmoid colon was the commonest anomaly which had attracted the attention of surgeons because of its surgical importance. High incidence of redundancy had been reported by surgeons (Botsford *et al*, 1967; Nay and West, 1967; Scott, 1965), radiologists (Moller, 1926; Kantor, 1934; Oppenheimer and Saleeby, 1939) and anatomists (Kanagasuntheram and Loo, 1970). Two types of redundant pattern can be described from radiological films and from observations made in the dissection hall, namely, displacement of the sigmoid colon to the right iliac fossa and displacement of the sigmoid colon into the abdomen.

Radiologists often report that displacement of the sigmoid colon to the right iliac fossa may be due to adhesions from pelvic inflammatory disease or typhoid (Oppenheimer and Saleeby, 1939). This explanation is valid only if there is a history suggestive of such disease or adhesions are in fact seen at laparotomy. But it would be difficult to explain this anomaly where such evidences are lacking, as seen in the present study. Similar patterns observed by Kanagasuntheram and Loo (1970) in fetuses would suggest the possibility of a congenital origin for this anomaly which would overcome the difficulty of explaining its presence in normal, healthy adults. Furthermore, the observation of this pattern in two infants in the present series would lend support for the congenital theory.

Botsford *et al* (1967) and Scott (1965) reported a high incidence of sigmoid volvulus; they also noted that their patients had redundant sigmoid colon with long mesenteries. Scott (1965) attributed such a high incidence of this condition in Northern Iran to a high residue diet which caused chronic constipation. Such poor bowel habits led to a loading of the colon and predisposed it to twist upon its redundant pedicle. But to imply that high incidence of volvulus could be correlated with high incidence of redundancy of the sigmoid colon is not valid. The present study has shown that in spite of the high frequency of redundancy of the sigmoid

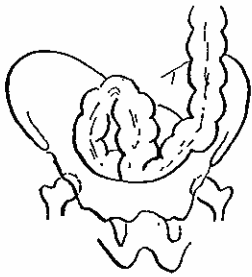


FIG. 16

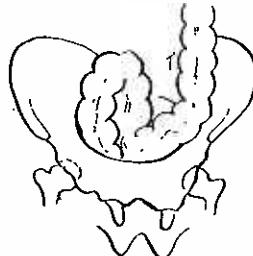


FIG. 17



FIG. 20

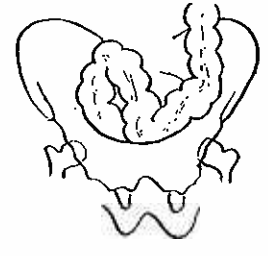


FIG. 21

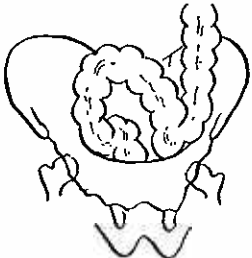


FIG. 18

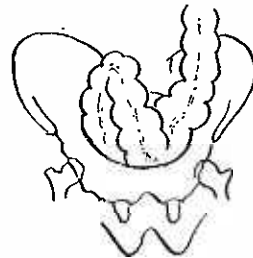


FIG. 19

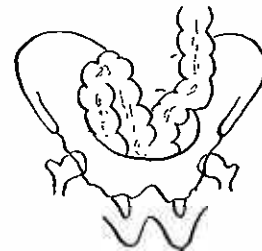


FIG. 22

TABLE I

	Case No.	Sex	Race	Age
Dissection Hall	1	Male	Chinese	62 years
	2	Male	Chinese	70 years
	3	Male	Chinese	78 years
	4	Male	Chinese	69 years
	5	Male	Chinese	64 years
	6	Male	Chinese	61 years
	7	Male	Chinese	64 years
	8	Male	Chinese	56 years
Barium Enema Films	9	Male	Malay	64 years
	10	Female	Chinese	87 years
	11	Male	Chinese	41 years
	12	Male	Malay	23 years
	13	Female	Chinese	23 years
Autopsy Room	14	Male	Chinese	29 days
	15	Female	Chinese	1 day
	16	Male	Indian	50 years
	17	Male	Malay	61 years
	18	Male	Chinese	24 years
	19	Male	Chinese	71 years
	20	Female	Chinese	69 years
	21	Female	Chinese	34 years
	22	Male	Indian	45 years

colon in this country, the incidence of sigmoid volvulus was extremely low. It is possible that differences in our diet as compared with those of the indigenous people of Northern Iran might explain this observation.

The cadavers in whom Kanagasuntheram and Loo (1970) made their observations and the cadavers examined in the present series were not a random sample, for all the cadavers were Chinese males who had died after the age of fifty years. Could hypotonia or neuromuscular incoordination then be responsible for redundancy of the colon? Similarly, the barium enemata findings in this study were also from a selective group of patients because this form of radiological examination was not done routinely but was ordered only in cases of suspected large bowel pathology. However, the observations made in the hospital mortuary provided a wider spectrum of age groups and a random sample for study. Such observations have shown that redundancy of the sigmoid colon may be found in almost every decade of life from infancy to 71 years of age. This would suggest that hypotonia and neuromuscular incoordination are not likely to be the causes of redundancy of the gut and instead would provide further evidence in support of the congenital theory of Kanagasuntheram and Loo (1970).

ACKNOWLEDGEMENTS

I would like to express my grateful thanks to Professors Yahya Cohen and R. Kanagasuntheram for their invaluable guidance and comments in the preparation of this paper which was presented to the Fifth Annual Combined Meeting of the Singapore Surgical Society and the Chapter of Surgeons of the Academy of Medicine, Singapore on 4th December, 1971.

REFERENCES

1. Bacon, H.E. and Recio, P.M.: "Surgical Anatomy of the Colon, Rectum and Anal Canal." J.B. Lippincott Company, 1962.
2. Botsford, T.W., Healey, S.T. and Veith, F.: "Volvulus of the Colon." *Am. Jour. Surg.*, 114, 900, 1967.
3. Davies, D.V.: "Gray's Anatomy." 34th Edition. Longmans, Green & Co. Ltd., 1967.
4. Kanagasuntheram, R. and Loo, S.K.: "Observations on some Anomalies of the Colon". *Sing. Med. Jour.*, 11, 110, 1970.
5. Kantor, J.C.: "Anomalies of the Colon, their Roentgen Diagnosis and Clinical Significance." *Radiol.*, 23, 651, 1934.
6. Moller, P.F.: "The Redundant Colon." *Acta Radiol.*, 6, 432, 1926.
7. Nay, H.R. and West, J.P.: "Treatment of Volvulus of the Sigmoid Colon and Caecum." *Arch. Surg.*, 94, 11, 1967.
8. Oppenheimer, A. and Saleeby, G.W.: "Roentgenologic Studies of the Rectum and Sigmoid." *Surg. Gynaec. Obst.*, 69, 83, 1939.
9. Scott, G.W.: "Volvulus of the Sigmoid Flexure." *Dis. Colon and Rectum*, 8, 30, 1965.