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Anomalous course of the sigmoid colon and the mesosigmoid encountered during colectomy. A case report of a redundant loop of sigmoid colon

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ABSTRACT

Introduction Sigmoid colon constitutes a part of the large intestine that presents several congenital anatomic variations. In particular, the presence of a redundant loop of sigmoid colon is of tremendous importance for surgeons, obstetricians and radiologists, since it is closely related to multiple pathological conditions and functional implications of the neighboring anatomical structures.

PRESENTATION OF CASE: An unusual anatomic variation in position and length of the sigmoid colon and its mesocolon was unexpectedly detected during right hemicolectomy to a 67-year-old Caucasian male patient due to colon cancer. The operation was uneventful. A meticulous review of the literature was conducted as well.

DISCUSSION: A redundant loop of sigmoid colon may go unnoticed or it might lead to urinary, digestive and vascular complications. Its presence is associated with acute and chronic pathological conditions, sigmoid volvulus and serious confusions in radiological diagnosis and instrumentation.

CONCLUSION: Surgeons' thorough knowledge concerning this rare anatomic variation is fundamental and crucial in order to establish a correct diagnosis and assert the appropriate management when performing operations including pelvis and abdomen.

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1. Introduction

Sigmoid colon constitutes a part of the large intestine that presents multiple congenital anatomic variations [1,2]. Such variations though, are of paramount clinical significance since having both functional and pathological implications [1–3]. Indeed the presence of a redundant loop of sigmoid colon is of key importance for surgeons, obstetricians and radiologists as well [1,2]. The present manuscript which has been reported in line with the SCARE criteria [4] describes a peculiar anatomic variation of the sigmoid colon and its mesocolon, due to redundant colon, that was incidentally observed during right hemicolectomy and its clinical significance.

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2. Case report

A 67-year-old Caucasian male patient proceeded to our institution with a 5-month history of vague abdominal pain in the right lower quadrant of the abdomen that progressively became worse. The patient's medical history disclosed intense fatigue during the last 3 months and abdominal discomfort. No previous surgical history existed. His vital signs were within the normal spectrum. Clinical examination was unremarkable without tenderness or any palpable abdominal masses.

Blood tests revealed anemia (Ht: 33% and Hb: 10.4 mg/dL). Computed Tomography (CT) of the abdomen detected malignant lesions of the ascending colon. Subsequent colonoscopy confirmed the CT scan findings. There was no evidence of any anatomic abnormalities of the large intestine (Fig. 1). Additional imaging examinations such as CT of thorax and pelvis were performed and detected no distant lung metastases. Following these, right hemicolectomy was scheduled.

The operation was initiated with a midline incision from the mid-epigastrium to a point about 7–8 cm below the umbilicus.

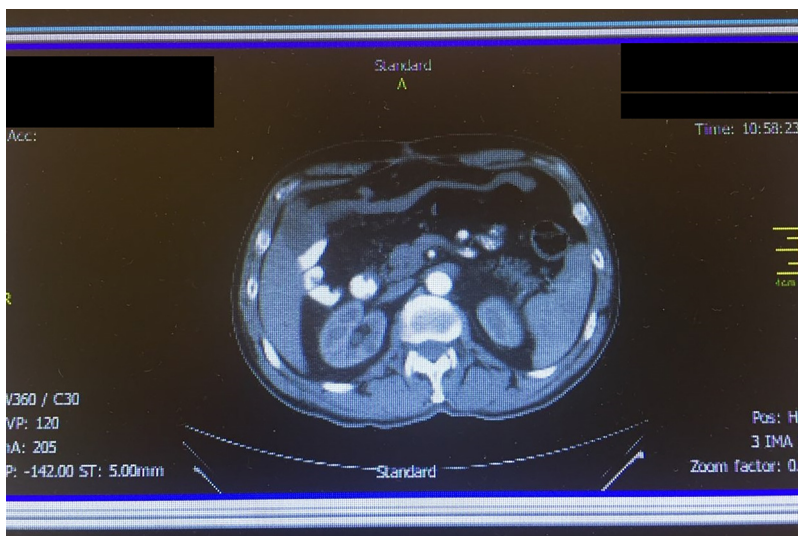


Fig. 1. CT scan of the abdomen without evident anatomic variations.

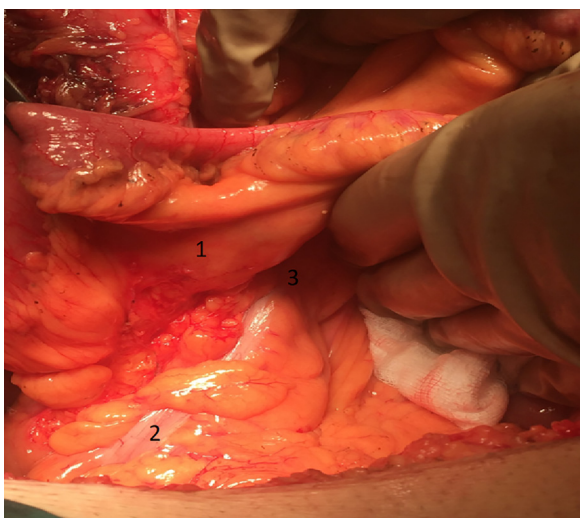


Fig. 2. Exposure of the operative field. (1: mesentery of the small intestine/2: sigmoid colon and accompanying mesosigmoid/3: canal between abdominal aorta and mesentery).



Fig. 3. Exposure of the operative field. (1: mesentery of the small intestine/2: sigmoid colon and accompanying mesosigmoid/3: canal between abdominal aorta and mesentery).

Surgeons at first explored the abdominal cavity for hepatic, peritoneal, nodal and pelvic metastases. During this surgical step, surgeons incidentally detected abnormal length and position of both sigmoid colon and its mesocolon (Fig. 2). More specifically, the sigmoid colon and the mesosigmoid, originating from the brim of the pelvis, had ascending course to the abdomen and passed through a canal between the mesentery of the small intestine and the abdominal aorta (Fig. 3). Meticulous surgical exposure revealed that the ascending loop of the sigmoid colon and its mesocolon were positioned posterior to the mesentery and then continued as a descending loop, passing between the posterior surface of the mesentery and the anterior surface of both abdominal aorta and inferior vena cava (Fig. 4).

Elongation and disposition of both sigmoid colon and mesosigmoid due to redundant colon encumbers surgical maneuvers during colectomy and poses a severe risk factor for accidental damage or functional disturbance of the neighboring anatomical structures. The terminal ileum, cecum, ascending colon, the proximal half of transverse colon, mesocolon and the half part of the great omentum were dissected off. Careful hemostasis was performed

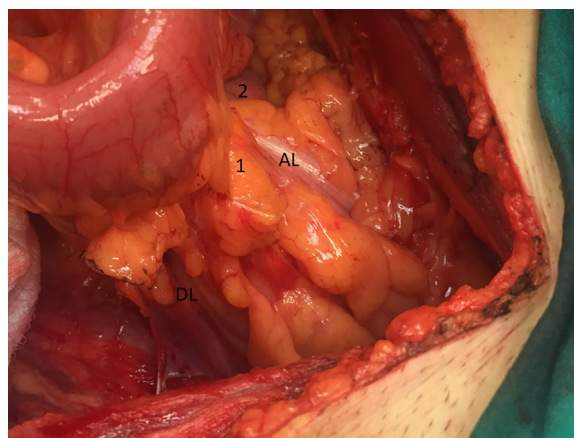


Fig. 4. Detailed exposure of the redundant loop of sigmoid colon (1: mesentery of the small intestine/2: canal between abdominal aorta and mesentery/AL: ascending loop of the sigmoid colon and accompanying mesosigmoid sigmoid colon and accompanying mesosigmoid/DL: descending loop).

and finally the abdomen was closed in routine fashion, without placing drainage.

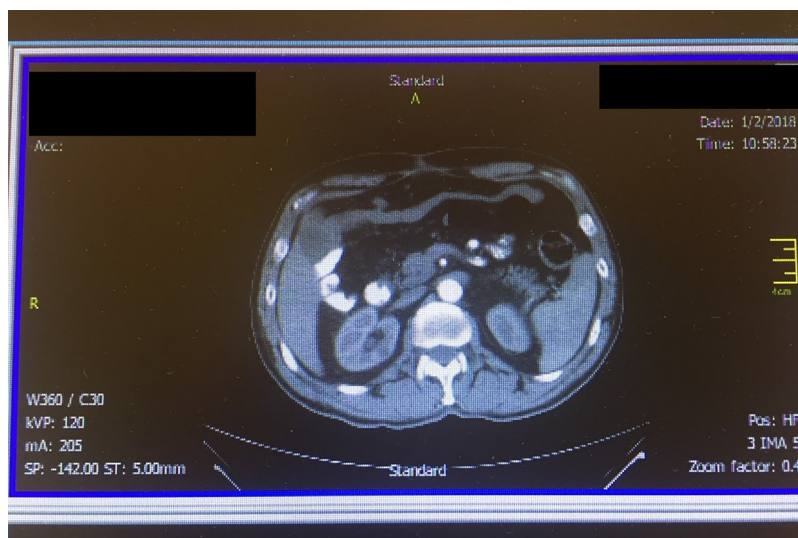


Fig. 5. Postoperative CT scan of the abdomen. Dolichocolon is not evident.

The operation was uneventful. The patient was discharged the 7th postoperative day with instructions. The 10th postoperative day, at the typical follow-up, the patient had no any complication. At the follow-up, two months after the operation the patient disclosed none discomfort and the post-operative CT scan of the abdomen was unremarkable (Fig. 5).

3. Discussion

Sigmoid colon is a part of the large intestine that is forming a loop in the pelvis, positioned over the pelvic organs with an average length of 40 cm. The sigmoid or pelvic colon is suspended by a sigmoid mesocolon that is an inverted V shaped fold of peritoneum, clinging to the posterior pelvic wall. The sigmoid colon constitutes one of the most variable parts of the large intestine [1,2].

Anatomic variations in length and position of the sigmoid colon and its mesocolon are closely related to an abundance of acute and chronic pathological conditions, sigmoid volvulus, severe confusions in radiological diagnosis and difficulties in the instrumentation of sigmoidoscopy and colonoscopy as well [1,2,5–7]. Such an anatomic variation is the presence of a redundant loop of sigmoid colon, as in the presented case.

Indeed, both the sigmoid and descending colon are known to present redundant loops that are also reported as dolichocolon in the literature [3,8,9]. A redundant colon is defined as one that is too long to fit into its owner's body without undergoing reduplication [9]. The embryological basis of a redundant loop of sigmoid colon, as in the present case, may be explained by the abnormal elongation of the hindgut and subsequent persistent excessive elongation of the sigmoid colon [10,11].

According to the classification system that has been suggested by Kanagasuntheram and his colleagues, a redundant colon may be collocated into four categories: [10] I: presence of ascending and descending mesocolon, II: presence of double hepatic flexure, III: extension of the sigmoid colon into the abdomen, IV: the sigmoid colon is displaced towards the right side. In the present case though, surgeons' observations simulate the category I and III, due to the presence of both an ascending and descending limb of the sigmoid colon and its accompanying mesocolon.

Preoperative diagnosis of such a congenital malformation is originally radiographic. However, radiographic diagnosis of a redundant colon is not always feasible, as happened in the pre-

sented case, since the distinction of dolichocolon from colon's dilatation is subtle [12].

A redundant loop of sigmoid colon may remain asymptomatic or it may lead to urinary, digestive and vascular complications [2]. In particular, it might cause constipation, indigestion, abdominal discomfort, loss of weight, abdominal pain and tenderness, insomnia and augmented urinary frequency as well [2,3,11,13,14]. Clinical symptoms that patients might mention are non-specific and mimic symptoms related with gastric ulcer, appendicitis or even heart disease [13].

Moreover, the present anatomic variation constitutes a major risk factor of sigmoid volvulus [1–3,6,7,11,15]. Indeed, the redundant loop of sigmoid colon may rotate around its narrow, extended mesocolon and provoke lymphovascular congestion and obstruction, followed by distension of the affected loop of the colon. When such an acute condition is encountered and the colon is viable, sigmoidoscopic decompression constitutes the treatment of choice, with potential efficiency in 40–90% of cases [16].

In addition, it is reported that a redundant loop of sigmoid colon may hinder both the instrumentation and diagnosis of imaging examinations [1,2,11]. More specifically, the anomalous course of the colon encumbers sigmoidoscopy, colonoscopy, barium enema radiographs and it also poses the potentiality of iatrogenic varicocele [1,2].

Furthermore, it is quite evident that a redundant loop of sigmoid colon is a subject of tremendous clinical significance for various clinicians, such as surgeons, obstetricians and radiologists [1,2]. Hence, it is fundamental and crucial for them to be aware of this variation and to pay particular attention to the correlation between gross and clinical anatomy, since their perpetual awareness determines the outcomes of an operation and the accurate radiographic diagnosis.

Finally, it is equally important for the physicians to emphasize to the embryology of redundant colon and to attain the identification of new genes that are related with intestinal development in order to earn information concerning congenital anomalies of the gut.

4. Conclusion

A redundant loop of sigmoid colon is a scarce congenital anatomic variation that is associated with serious chronic and acute clinical and functional implications. This variation is difficultly diagnosed or suspected preoperatively. Its presence though,

complicates surgical maneuvers and radiographic analysis. Thus, thorough knowledge of this malformation is mandatory and pivotal in order to establish precise diagnosis and for its appropriate management.

Conflict of interest

All authors declare that there are not any competing interests.

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Ethical approval

This is a Case Report for which the patient provided written informed consent. Ethical approval has also been provided by the ethical committee of the General & Oncologic Hospital of Kifisia “Agii Anarguri”.

Consent

Written consent for the publication of this case report and accompanying images was obtained from the patient. The consent can be provided to the Editor if he asks so. The written approval of the Ethical Committee of our Institution may be provided to the Editor as well.

Author contribution

Mariolis-Sapsakos and Zarokosta conceived of the study. Nouisios was senior consultant at this case report and participated in its coordination. Nikou, Theodoropoulos and Bonatsos contributed to the acquisition of clinical data, its interpretation and to the preparation of images. Zoulamoglou, Flessas and Boumpa contributed to literature review. Piperos and Zarokosta contributed to the preparation of the manuscript. Mariolis-Sapsakos and Nouisios contributed to the refinement of the case report. All authors have approved the final article.

Registration of research studies

This is a Case Report and according to the Research Registry, its registration is not essential.

Guarantor

The Guarantor who is responsible for the present case report is Theodoros Mariolis-Sapsakos. He coordinated the preparation of the case report and revised it critically for important intellectual content.

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