

Mega-Cecum with Short Intraperitoneal Ascending Colon and Retrocecal Terminal Ileum: A Short Review and Case Report

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ABSTRACT

The dissection of the abdominal cavity of an 81-year-old male donor revealed an unusually large cecum, filling the right iliac fossa and most part of the right side of the peritoneal cavity up to the fundus of the gall bladder. It was attached to the parietal peritoneum of the posterior abdominal wall by a short mesocecum. The ileocecal junction was shifted posterolaterally, closer to the posterolateral abdominal wall and the terminal ileum was found running from medial to lateral dorsal to the cecum (retrocecal) to reach the ileocecal junction. The cecum continued into a short intraperitoneal ascending colon with a long ascending mesocolon. The transitional area between the cecum and ascending colon was displaced medially close to the lumbar vertebral column. Since the ileocecal region is one of the common sites of different kinds of gastrointestinal diseases, such a complex variation can cause diagnostic and therapeutic difficulty that could result in failure of treatment as well as iatrogenic injuries during various procedures. Therefore, gastroenterologists, gastrointestinal surgeons and radiologists must be aware of such coexisting variations of the cecum, ileum and ascending colon.

Keywords: Ascending mesocolon; Intraperitoneal ascending colon; Mega-cecum; Mesocecum; Retrocecal terminal ileum

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Received: Jul 02, 2023; **Accepted:** Jul 07, 2023; **Published:** Jul 13, 2023

Citation: Tessema CB (2023) Mega-Cecum with Short Intraperitoneal Ascending Colon and Retrocecal Terminal Ileum: A Short Review and Case Report. *J Anatomical Variation and Clinical Case Report* 1:103.

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INTRODUCTION

The cecum is a part of the large intestine, which is a blindly ending pouch, lying in the right iliac fossa anterior to the iliacus and psoas major muscles. However, the cecum can occupy variable positions between the pelvic cavity and the subhepatic region and it also shows variability in its shape that includes infantile, conical (quadrate), ampullary (adult) and exaggerated ampullary types [1]. Functionally, the cecum is where fluid and electrolyte reabsorption by the large intestine begins and plays a role in the digestion of soluble and insoluble carbohydrates like

cellulose and production of short chain fatty acids [2]. It also serves as a reservoir of anaerobic bacterial population in the colon that are believed to be critical in mitigating response to infection [3]. As compared to the other parts of the GIT, the ileocecal area, that includes the cecum, is an area of physiological stasis, increased absorptive area, decreased digestive function, and abundance of lymphoid tissue and M-cells [4]. The ileocecal region is also the most common area of the GIT involved in various pathological processes. It can be involved in diseases localized to

the specific segment of the bowel, diseases involving the GIT in general, or other systemic diseases [4]. The cecum is often completely covered by peritoneum and peritoneal folds from its posterior aspect create peritoneal recess around the cecum that are potential sites of internal hernias. The commonly described recesses around the cecum are superior ileocecal, inferior ileocecal, retrocecal, and paracolonic recesses [5,6]. Similar to the colon, it is marked by taeniae coli and haustrations but lacks appendices epiploicae that can be used to differentiate it from the colon. One of the variations in its peritoneal relations is a mobile-cecum, which is an anomalous position of the cecum, ascending colon and the terminal ileum due to failure of the right colonic mesentery to fuse with the parietal peritoneum of the posterior abdominal wall [7]. This absence of fixation allows an abnormal intra-abdominal mobility of the cecum and ascending colon, with a potentially wide range of displacement within the abdominal cavity. Mobile-cecum can lead to chronic mobile-cecum syndrome or rarely to acute cecal volvulus [7]. A long floppy mesentery fixed to the retroperitoneum by a narrow base of origin [8,9] and non-anatomical factors like cecal distension may also contribute to the pathogenesis of cecal volvulus, which is the second common gastrointestinal volvulus next to sigmoid volvulus [9]. Different studies have shown that enlargement of the cecum (mega-cecum) with no associated pathology is a common occurrence [10,11] but the mechanism of such cecal enlargement in the absence of a disease is not well understood. However, there are implications that absence of intestinal microbiota and their enzymes, and age can play a role in cecal enlargement [12]. The ascending colon is 15-20 cm long and extends superiorly from the ileocolic junction to the right colic (hepatic) flexure. It is a secondary retroperitoneal

segment of the colon, the lateral, medial and anterior surfaces of which are covered by peritoneum. Its dorsal surface is separated from the retroperitoneum of the posterior abdominal wall by a connective tissue layer known as Toldt's fascia, which attaches the colon to the retroperitoneum and forms the surgical plane used in colonic and mesocolic mobilization [13,14]. However, intraperitoneal ascending colon with ascending mesocolon is found in about 12% of the case. As revealed by a dissection study done on 35 cadavers for segmental colonic length and motility revealed, two-thirds of the cases had mobile portion of the ascending colon, which was significantly more common in females and recommended a revision of the traditional anatomical teaching of this segment as fixed and retroperitoneal [15]. According to the description of Yadav et al. [16], such an intraperitoneal ascending colon can involve in some rare hernia condition like parastomal hernia. This was based on their finding where an intraperitoneal ascending colon was found in a parastomal hernia along with terminal ileum and cecum as contents of the hernia sac. The ascending colon can rarely be absent as it was reported earlier in association with dilated transverse colon and a highly movable cecum [17].

This case report presents an 81-year-old male donor that had three major variations of the gastrointestinal tract that include mega-cecum with mesocecum, short intraperitoneal ascending colon and retrocecal terminal ileum.

METHODS

During the dissection of the abdomen of an 81-year-old male donor, with a consent for education, research and publication, a mega-cecum with a short mesocecum filling the right iliac fossa and the right

aspect of the peritoneal cavity and a short intraperitoneal ascending colon with a long mesocolon and a terminal ileum with retrocecal course were incidentally detected. The transition from the cecum to the ascending colon is determined by the presence of appendices epiploicae on the ascending colon and their absence on the cecum. Photographs of these variant GIT segments were taken and labelled for illustrations.

CASE REPORT

According to the accompanying document, this donor died of severe Alzheimer's dementia, coronary artery disease and chronic obstructive pulmonary disease and had no observable signs of external or internal abdominal injury or surgery. During the opening of the abdomen to dissect the peritoneal cavity, a huge cecum (mega-cecum) filling the right iliac fossa and most part of the right half of the peritoneal cavity, extending

from the pelvic inlet to the RUQ of the abdomen reaching the fundus of the gall bladder, and a short intraperitoneal ascending colon with a long mesocolon were detected (Figure 1). The terminal ileum crossed to the right dorsal to the cecum (retroceally) to reach the ileocecal junction and the ileocecal junction was found to be displaced laterally to the right posterolateral to the cecum (Figure 1 and Figure 2). The cecum had no attachment to the iliac fossa and its mesocecum appeared to be continuous with the long ascending mesocolon which was attached to the parietal peritoneum of the right posterior abdominal wall due to which the cecum can easily be lifted superiorly from the iliac fossa (medial views of Figure 1 and Figure 2). Lifting of the cecum revealed a retrocecal terminal ileum interposed between the iliac fossa and the cecum (Figure 1 and Figure 2).

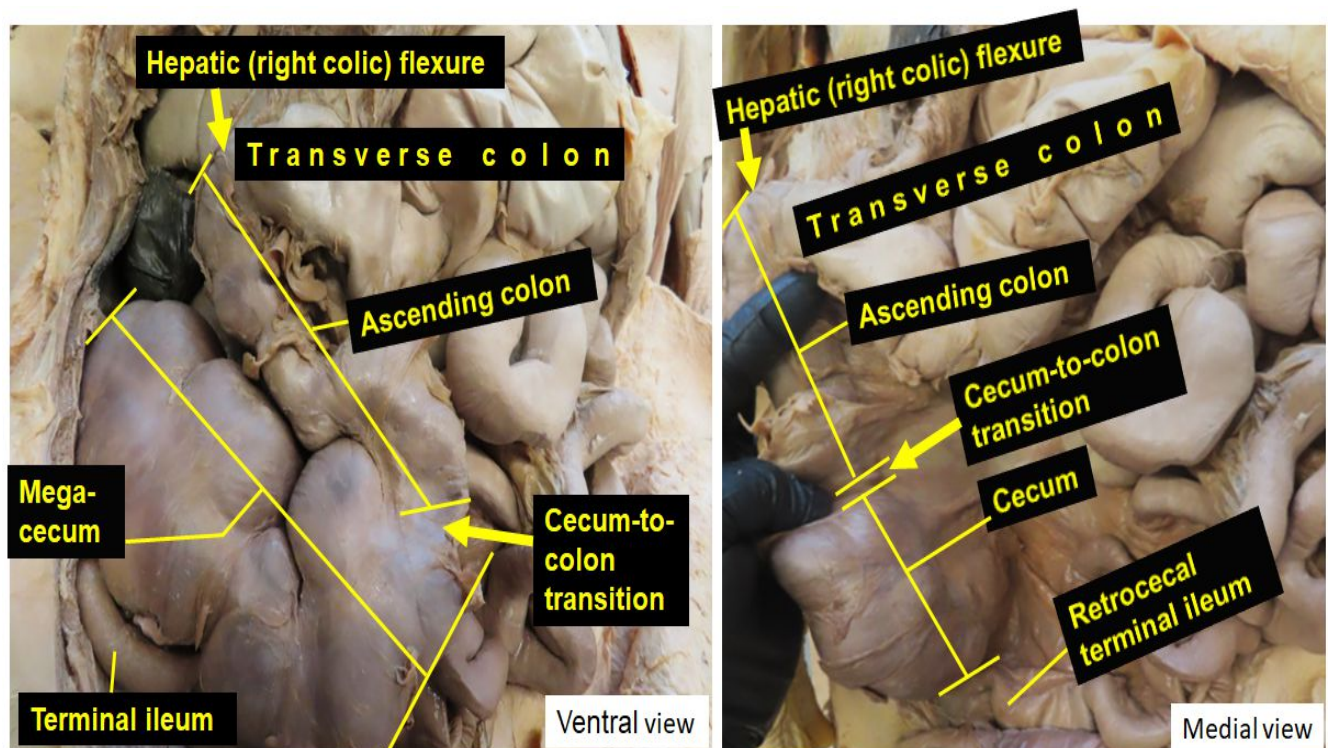


Figure 1: Illustrates the right half of the peritoneal cavity showing the mega-cecum, filling the space from the iliac fossa to the level of fundus of the gall bladder in the right upper quadrant of the abdomen. The short ascending colon and the retrocecal terminal ileum are also shown.

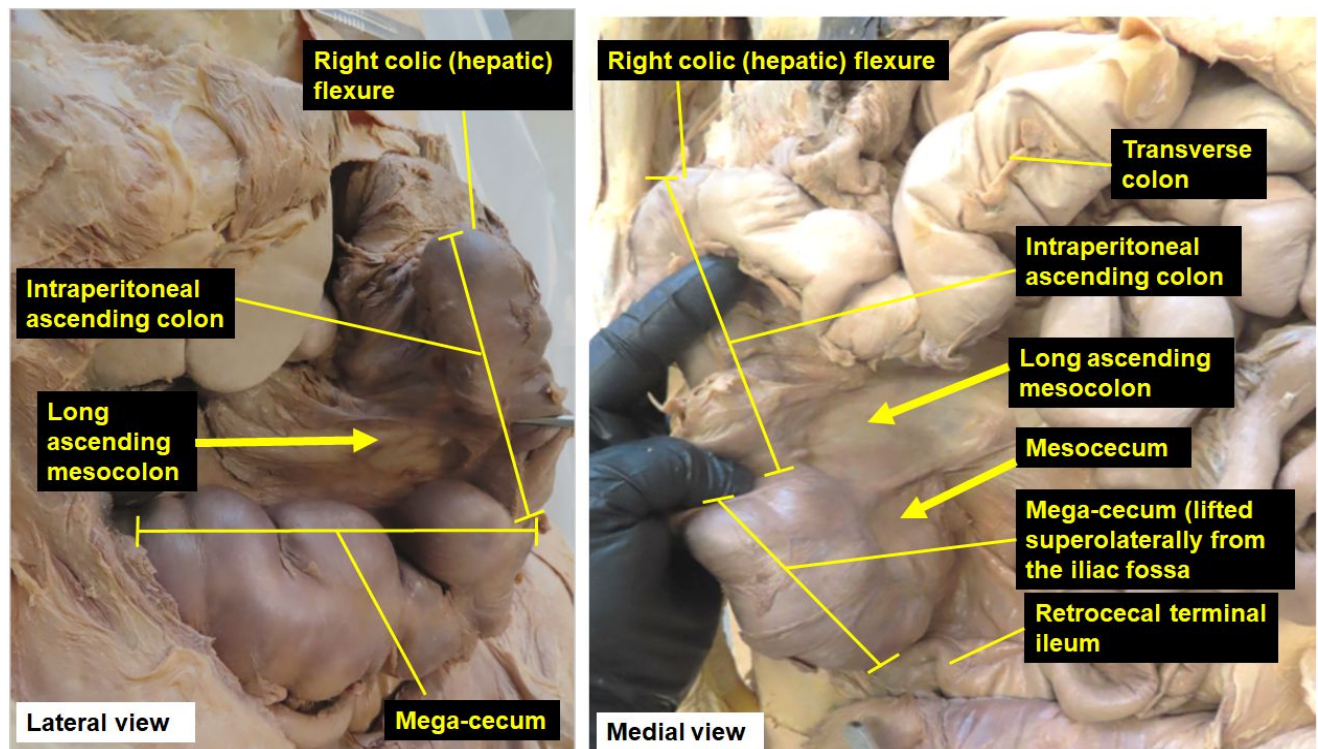


Figure 2: Lateral and medial view of the short intraperitoneal ascending colon demonstrating the long ascending mesocolon. The meg-cecum (lifted superiorly from the iliac fossa on its short mesentery) with its short mesocecum and the retrocecal terminal ileum are also shown.

DISCUSSION

According to the classic description, the cecum is located in the right iliac fossa entirely covered by peritoneum. A study done by Banerjee A et al. [1] on 25 cadavers also revealed that the majority of the ceca (24 out of the 25) were found in the right iliac fossa, while it is found in the subhepatic region only in a single cadaver. Though entirely covered by peritoneum, the cecum lacks a mesentery for which reason it is not movable, whereas the ascending colon is secondary retroperitoneal, covered by peritoneum only anteriorly [4,5]. However, the finding in this case report defies this because of the fact that the mega-cecum fills the entire right iliac fossa and the major part of the right peritoneal cavity with the terminal ileum running dorsal to it. It has a short mesentery that is attached to the parietal peritoneum of the right posterior abdominal wall rendering its movability as

shown on the medial views of both figures. Moreover, in the current case the mesocecum is continuous with the mesocolon of the intraperitoneal ascending colon that increases in length in the direction of the right colic flexure making the cecum and ascending colon mobile. Many previous studies stated, mobile-cecum that involves the cecum, ascending colon and terminal ileum is a fairly frequent condition found in 10-20% of the cases caused by failure of attachment of the mesentery to the parietal peritoneum of the posterior abdominal wall [7] or a long mesentery fixed to the retroperitoneum by a narrow base of origin [8,9]. This was believed to cause chronic mobile-cecum syndrome with recurrent abdominal pain and constipation or rarely an acute cecal volvulus with typical features of intestinal obstruction [7-9]. Therefore, the narrow attachment to the parietal

peritoneum of the posterior abdominal wall (retroperitoneum) by mesenteries seen in the present case report seems to be consistent with these previous descriptions. It could also be the cause of the various displacements (retrocecal position the terminal ileum, shifting of the ileocecal junction laterally and the transition to the ascending colon medially) observed in this case but there is no information whether or not the donor had chronic mobile-cecum syndrome. Though not observed in the current donor, the other complication of mobile-cecum is acute cecal volvulus, which can also be caused by non-anatomical factors like cecal distension [9]. Many studies have documented that enlarged cecum not caused by diseases is a frequent encounter. A study done on 21 patients found 15 mega-ceca with a mean volume of $587 + 27.9 \text{ cm}^3$ [10] and a markedly enlarged cecum (mega-cecum) causing chronic constipation with comorbid urogynecological symptoms was also reported [11] but no literature that describes anything similar to this current combination of variations could be found. The mechanism of such cecal enlargement is unknown but a study done on germ free rodents pointed out that absence of intestinal microbiota and their enzymes result in an altered osmolarity within the intestinal lumen leading to increased amount of mucopolysaccharides that retain water and cause dilation of the cecum. It was also noted that recolonization with intestinal microbiota was found to normalize the cecal size within a few weeks. It is also believed that age plays a role in cecal enlargement, i.e., cecal size increases with age in rodents but no related study on human beings is available [12].

Despite the fact that the ascending colon is one of the secondary retroperitoneal segments of the GIT [13,14], intraperitoneal ascending colon with ascending mesocolon is found in about 12% of the

case which is more common in female than in males [15]. The association of such intraperitoneal ascending colon with parastomal hernia [16] and its complete absence [17] were also previously described. Even so, many studies and case reports related to this region of the GIT exist, none of them had noted the co-occurrence of mega-cecum, intraperitoneal ascending colon and retrocecal terminal ileum. Therefore, this case report is the first of its kind to the author's knowledge, which is of tremendous anatomical and clinical relevance.

CONCLUSION

This case is unique in that there has been no similar documentation found describing the co-existence of mega-cecum with mesocecum, intraperitoneal ascending colon and retrocecal terminal ileum as an entity. Since gastrointestinal diseases (like malignancies, inflammatory and infectious diseases, and miscellaneous conditions like volvulus, hernias and dolichocolic large intestine) with their potential complications are common in this region, such a complex variation can cause diagnostic and therapeutic difficulty that could result in misdiagnosis, treatment failure and iatrogenic injury during various procedures. Therefore, gastroenterologists, GI-surgeons and radiologists must be aware of such variations of the cecum, ileum and ascending colon.

ACKNOWLEDGEMENT

I am thankful to the donor and his families for their invaluable donation and consent for education, research and publication. I would also like to express my gratitude to the Department of Biomedical Sciences for the encouragement and uninterrupted support. Similarly, I am also grateful to Denelle Kees

and John Opland for their immense assistance during the dissection of this cadaver in the gross anatomy lab.

CONFLICT OF INTEREST

None

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