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Case Report

An unusual case of diastatic perforation of the transverse colon: Case report and literature review ☆

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ABSTRACT

Diastatic perforation corresponds to a bursting of the cecal wall caused by excessive distension resulting from a remote obstruction of the low large bowel. This perforation could be explained by Laplace's physical law, and by the particular vascular anatomy of the cecal wall. We report the case of a 75-year-old man admitted for peritonitis with an abdominal CT scan highly suggestive of a diastatic perforation of the cecum complicating colonic distension upstream of a stenosing tumor of the rectosigmoid junction. To our surprise, surgical exploration revealed the defect to be in the transverse colon and not in the cecum. Diastatic perforation of the transverse colon is exceptional, and would require other pathophysiological explanations than those for classical cecal perforation.

Introduction

Colorectal cancer is one of the most frequently diagnosed cancers in the world, and the second leading cause of cancer-related death [1]. In the course of its evolution, this cancer can be acutely complicated by bleeding, perforation, or obstruction. Colorectal cancer is the most common cause of low bowel obstruction [2]. This obstruction is responsible for a distension of the upstream colon, which could expose it to the risk of perforation, particularly of the cecum, known as diastatic perforation. This can be explained by several mechanisms, including Laplace's law. Diastatic perforation of the cecum is exceptional in the same context and would require other pathophysiological explanations. Whatever the location of the colonic perforation, the clinical symptoms are those of peritonitis. The absence of a clearly visible colonic parietal defect on CT could suggest cecal perforation, as this is more common and well known. The type of surgical treatment may differ according to the location of the perforation, ranging from simple colostomy to subtotal colectomy, hence

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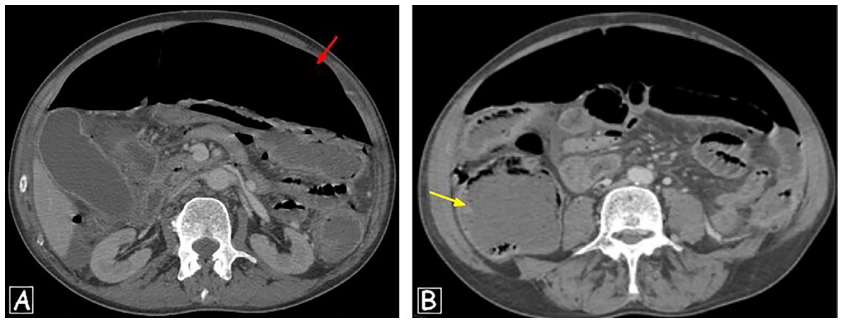

Fig. 1 – Abdominal CT scan showing massive pneumoperitoneum (red arrow) with colonic cecal distension (yellow arrow).

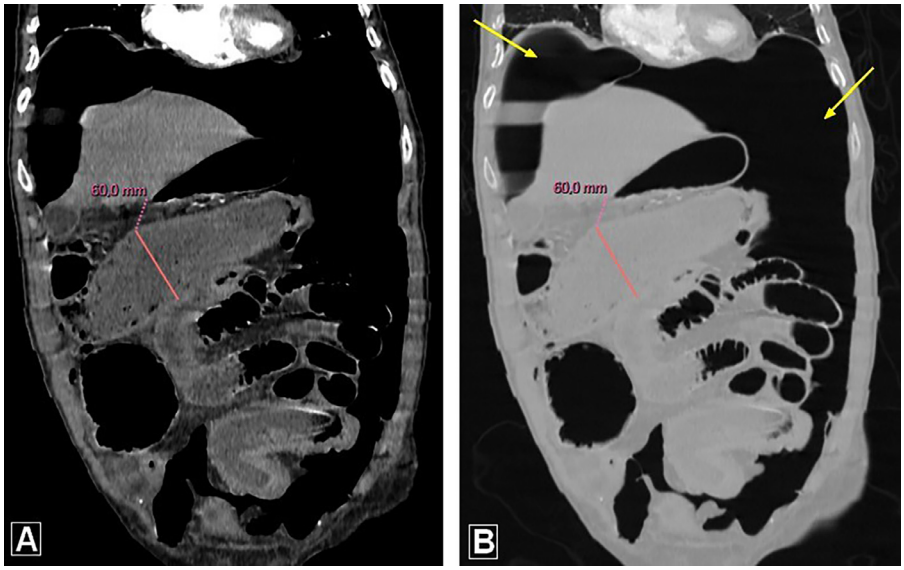

Fig. 2 – Soft tissue (A) and lung window (B) abdominal CT, showing the large volume pneumoperitoneum (yellow arrows) and the diameter of maximum distension of the transverse colon. (Note that this diameter is after perforation. We have no previous abdominal imaging of the patient immediately before perforation).

the importance of precise location of the perforation on the CT scan to prepare the procedure preoperatively.

Case presentation

A 75-year-old male patient with no history of abdominal surgery, admitted for severe diffuse abdominal pain with constipation and vomiting. Clinical examination revealed abdominal rigidity and distension, with a fever of 39.7°C. The hernial orifices were free and there was no fecal impaction on rectal examination.

Biological tests revealed an elevated C-reactive protein of 213 mg/L with hyperleukocytosis of 14,000/mL. An abdominal CT scan was performed and showed massive pneumoperitoneum of the supra- and submesocolic regions, ascites of medium abundance, with colonic distension maximal at the level of the cecum measuring 10 cm. The maximum diameter of the transverse colon was 6 cm (Figs. 1 and 2). This colonic distension was upstream of a stenosing tumor of the rectosigmoid junction (Fig. 3). Digestive wall enhancement was preserved. No colonic wall defect was clearly individualized, and the diagnosis of a diastatic perforation of the cecum was the most likely.

Surgical exploration by laparotomy was immediately indicated to better explore the colon and to access all necessary surgical treatment options. Intraoperative exploration revealed, to our great surprise, a 1 cm perforation of the left transverse colon. The wall of the cecum was intact. The patient underwent a transverse colostomy with lavage and drainage.

A rectosigmoidoscopy with biopsy of the rectal mass was performed 1 week after surgery. The pathological findings were consistent with well-differentiated rectal adenocarcinoma. The patient was then referred for further oncological treatment.

Fig. 3 – CT scan of the stenosing tumor of the rectosigmoid junction with the apple core sign.

Discussion

Diastatic perforation corresponds to a bursting of the cecal wall caused by excessive distension resulting from a remote obstruction of the low large bowel. This is an infrequent complication of colorectal cancers, which tend to perforate locally more often [3].

Diastatic perforation could be explained by Laplace's physical law, and by the particular vascular anatomy of the caecal wall. The wall tension of a hollow cylinder, such as the digestive tract, is directly proportional to its intraluminal pressure and its radius, according to Laplace's law. Since the cecum has the largest radius of all the segments of the digestive tract, its wall is exposed to maximum tension in the presence of an obstacle in the downstream colon, and is therefore the most exposed to the risk of perforation especially with a continent ileocecal valve [3,4]. The risk of cecum perforation becomes significant when distension reaches 9 cm [5]. The duration of distension also increases this risk [3].

To date, according to our review of the English and French literature, only one case of "diastatic perforation" of the transverse colon has been described. This was a case of transverse colon perforation upstream of rectal cancer in a 60-year-old patient [1]. About 7% of transverse colon cancers are complicated by perforation, and may themselves cause diastatic perforation of the cecum [6].

CT is the gold standard for exploring peritonitis in adults, and can detect the site of digestive perforation with an accuracy of 85%. Abdominal CT scans in colonic perforation peritonitis shows indirect signs such as extensive pneumoperitoneum, infiltration of the pericolic fat, and thickening of the perforated wall [7]. To our knowledge, no maximum distension diameter of the transverse colon has been described that is predictive of perforation. In our case, the maximum diameter of the transverse colon was 6 cm, but we had no abdominal imaging immediately prior to perforation.

The management of diastatic perforations is essentially surgical. When the perforation is close to the site of the obstruction, removal of the affected segment is the most appropriate option. If the perforation is widely separated from the obstacle, a suture with colostomy would be more suitable. Some teams tend to perform a subtotal colectomy [8,9].

Conclusion

Diastatic perforation of the cecum is well known and is explained by the physical and anatomical properties of the cecal region. Diastatic perforation of the transverse colon upstream of a colorectal obstruction may require other pathophysiological explanations. To our knowledge, no maximum distension diameter of the transverse colon has been described that is predictive of perforation. A distension threshold similar to that of the cecum and other radiological signs likely to predict transverse colon perforation could help select patients requiring a preventive attitude.

Authors' contributions

All authors have made a significant contribution to this manuscript. All the authors have read and approved the final version of the manuscript.

Patient consent

An informed consent was obtained from the patient.

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