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Case Report

An unusual case of small bowel and sigmoid volvuli presenting with dyspnea ☆

Dario Milazzo, MD[a,], Pietro Valerio Foti, MD[a,b,c], Renato Farina, MD[d], Roberta Granata, MD[e], Elio Romeo, MD[e], Massimiliano Veroux, MD[e], Salvatore Lavalle, MD[f], Stefano Palmucci, MD[g], Antonio Basile, MD[a]*

[a] *Radiology Unit 1, Department of Medical Surgical Sciences and Advanced Technologies "GF Ingrassia", University Hospital Policlinico "G. Rodolico-San Marco", University of Catania, Catania 95123, Italy*
[b] *NANOMED-Research Centre for Nanomedicine and Pharmaceutical Nanotechnology, University of Catania, Catania 95125, Italy*
[c] *Centro di Ricerca Multidisciplinare "Chirurgia delle Sindromi Malformative Complesse della Transizione e dell'Età Adulta" (ChiSMaCoTA), Department of Medical Surgical Sciences and Advanced Technologies "G.F. Ingrassia", University of Catania, Catania 95123, Italy*
[d] *Radiology Unit 1, University Hospital Policlinico "G. Rodolico-San Marco", Catania 95123, Italy*
[e] *General Surgery Unit, Azienda Ospedaliera San Marco, University of Catania, Catania, Italy*
[f] *Dipartimento di Medicina e Chirurgia, Università degli Studi di Enna "Kore" Cittadella Universitaria, Enna 94100, Italy*
[g] *UOSD I.P.T.R.A., Department of Medical Surgical Sciences and Advanced Technologies "GF Ingrassia", University of Catania, University Hospital Policlinico "G. Rodolico-San Marco", Catania, Italy*

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ABSTRACT

Intestinal volvulus is a pathological condition that can lead to bowel obstruction and intestinal ischemia, and is therefore potentially fatal in severe cases. Patients' symptoms are often nonspecific: volvulus most frequently presents as an acute abdomen, but vague symptoms such as abdominal pain and distension, nausea and vomiting are common. In this scenario, the gold standard for diagnosis is contrast-enhanced computed tomography, which allows a timely assessment. However, in this article we present a rare case of a small bowel volvulus associated with a sigmoid volvulus in which the patient presented to the emergency department with respiratory symptoms.

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* Corresponding author.
E-mail address: dario.milazzo2015@libero.it (D. Milazzo).

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Introduction

Gastrointestinal volvulus is a phenomenon that occurs when the bowel rotates around its mesenteric axis: this can then lead to bowel obstruction, by occluding the visceral lumen, or to intestinal ischemia, by altering vascular flow [1]. Gastrointestinal volvuli are commonly divided into gastric, small bowel, and large bowel volvulus.

Based on the absence or presence of predisposing factors, small bowel volvulus (SBV) is also classically divided into primary and secondary forms, respectively.

Even though it is considered to be a typical diagnosis in childhood due to its high association with malrotation of the intestine, this condition can also occur in adults. Among the latter, SBV is found most frequently in African, Asian and Middle Eastern populations [2].

Conversely, sigmoid volvulus is often attributed to high-fiber diets, particularly in developing countries where it constitutes a significant proportion of bowel obstructions [1]. Volvulus typically presents with acute symptoms of bowel obstruction or vascular insufficiency, up to peritonitis or full-blown ischemia; however, the more subtle or chronic forms may present with nonspecific abdominal symptoms [3,4].

In diagnosis, in case of low clinical suspicion, the use of radiography and ultrasonography is indicated in the first instance. Abdominal radiography is usually not diagnostic of SBV. However, it may reveal distention of the stomach, duodenum, and proximal small bowel, as well as a collapsed or poorly aerated appearance of the distal bowel loops. In contrast, the radiographic findings suggestive of a sigmoid volvulus include a distension of the proximal colon with a collapsed rectum, a dilated sigmoid colon with absent haustral markings, or, in some cases, an inverted “U-shaped” sigmoid often pointing towards the right or left upper quadrant or a “coffee bean” configuration of the bowel [5].

In cases of SBV, ultrasound examination frequently reveals the rotation of the small bowel and superior mesenteric vein around the superior mesenteric artery. These findings are highly indicative of midgut volvulus [6].

In any case of high clinical suspicion or in order to confirm the diagnosis, computed tomography (CT) with contrast medium remains the most reliable and sensitive imaging modality, thanks to the possibility of detecting certain pathognomonic radiological signs and of assessing complications [2].

Finally, given the severity and mortality of the disease, the gold standard in treatment is definitely emergency surgery, with volvulus derotation or intestinal resection as appropriate [3].

Case report

A 94-year-old female was admitted to our emergency department (ED) because of an acute onset of dyspnea and respiratory distress. She had undergone a previous endoscopic gastric resection for mucosal necrosis and her past medical history included hypertension and urinary incontinence, conditions for which she was on treatment with pantoprazole and irbesartan.

At physical examination she was found alert, afebrile with lower limb edema; she had a treatable nonpainful abdomen in which a median laparocele was evident. Vesicular respiratory sounds were reduced to both bases. Her parameters were an increased respiratory rate (27/min) and heart rate (111/min), with normal blood pressure. The most significant parameter was the 90% oxygen saturation which accounted for her breathing difficulties. The patient was therefore classified as high clinical risk using the National Early Warning Score (NEWS).

Laboratory investigations revealed mild leukocytosis (12.09×10^9/L) and PCR elevation (6.38) as the only relevant values.

A chest X-ray was performed whereby a significant rise of both hemidiaphragms with subsequent pulmonary atelectasis and massive esophageal dilatation were observed.

Thus, an abdominal X-ray was carried out, that revealed a marked distension of the entire bowel, without signs of pneumoperitoneum (Fig. 1).

Because of the severity of the case, further investigations included an urgent thoraco-abdominal contrast-enhanced computed tomography (CE-CT) examination (Fig. 2). A non-contrast scan was performed, followed by an arterial, a venous and an excretory phase. The CT scan confirmed the massive bowel dilatation, which caused a significant rise of both hemidiaphragms, and the extreme esophageal distension, causing esophageal dislocation in the left paratracheal space (Fig. 3). These elements, taken together, accounted for reduced lung expansibility and the patient’s shortness of breath.

Even the duodenum was dilatated (diameter >3.5 cm): dilatation continued to the duodenal-jejunal flexure where a transition point was clearly visible, with collapsed loops distal to the obstruction point (Fig. 4). Moreover, in contrast- enhanced scans the “whirlpool sign” was visible, pathognomonic for bowel volvulus, seen when the bowel rotates around its mesentery thus causing the mesenteric vessels to twist (Fig. 5) [7]. These radiological findings are very suggestive of SBV.

The CT also demonstrated diffuse colonic distension, most evident at the sigmoid colon (diameter >10 cm), identifying the underlying cause of diastasis of the rectus abdominis muscles observed at physical examination (Fig. 6). Both the CT scanogram and coronal CT reconstructions showed an inverted "U" shape of the sigmoid colon in the left upper abdomen, a suggestive sign of sigmoid volvulus [5].

No abdomen free fluid or signs of bowel ischemia/strangulation were observed.

As an ancillary finding, the bladder was filled with blood-dense fluid.

The patient then underwent emergency surgery. A median laparotomy was performed that revealed a jejunal loop twisting around its own axis, confirming the diagnosis of a jejunal volvulus. Nevertheless, the loop showed no distress signs and was therefore treated with decompression and derotation. Finally, unexpectedly the sigmoid colon was found dilated and partially rotated but not obstructed, permitting simple colonic decompression and derotation.

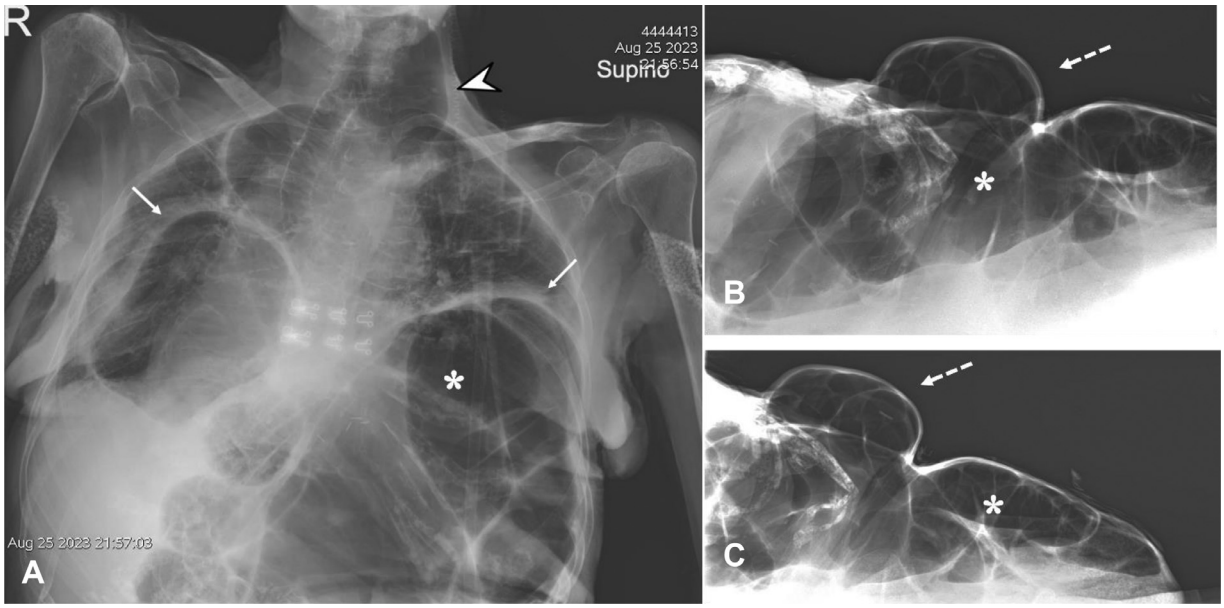

Fig. 1 – (A-C) Radiographs. Supine anteroposterior chest view (A) showing significant rise of both hemidiaphgrams (arrows in A) and massive esophageal dilatation (arrowhead in A) was followed by 2 abdominal radiography in dorsal decubitus view (B, more cranial and C, more caudal) that revealed marked distension of the entire bowel (asterisks in A-C) and median laparocele (dotted arrows in B, C), without signs of pneumoperitoneum (no evidence of free air).

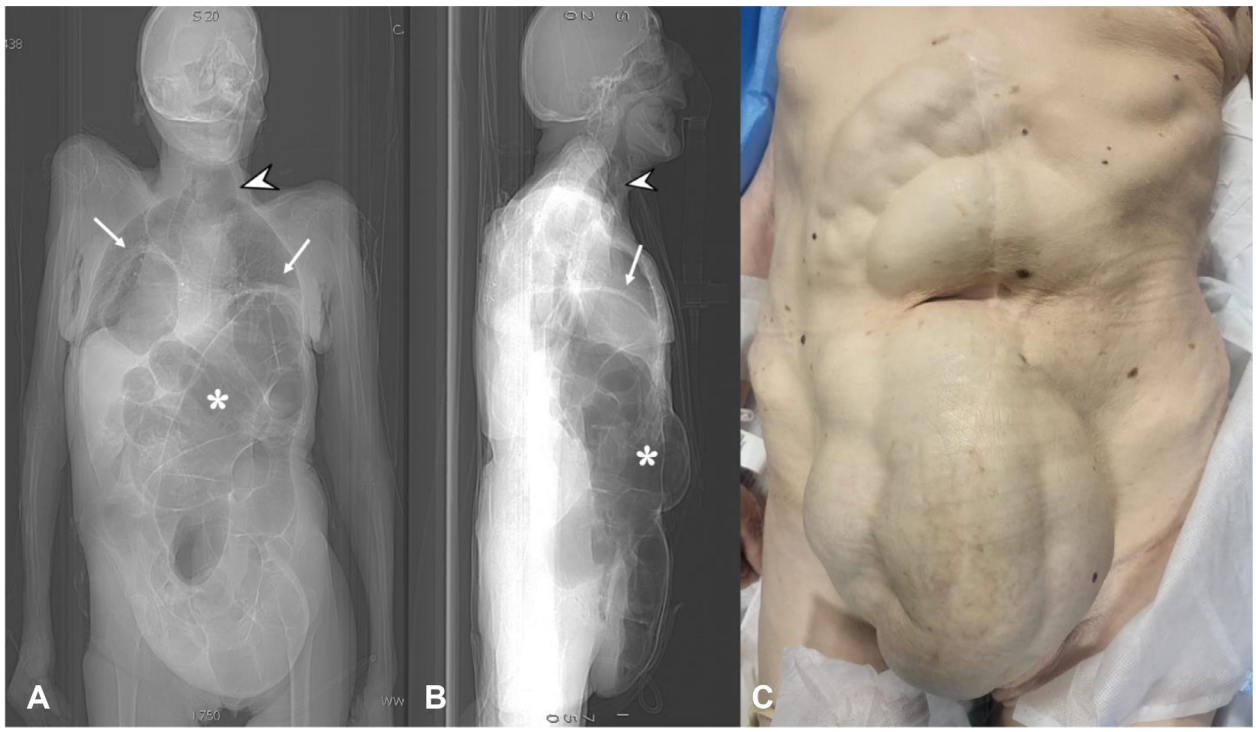

Fig. 2 – (A-C) CT scanograms and corresponding presurgery image. Frontal anteroposterior (A) and lateral (B) scout views confirming the marked esophageal (arrowheads in A, B) and abdominal (asterisks in A, B) distension observed previously on conventional radiography and the hemidiaphgrams' rise (arrows in a,b). The corresponding preoperative picture (C) shows the severe abdominal distension, closely matching the radiological images. Additionally, an inverted "U" shape of the sigmoid colon can be seen in the left upper abdomen, which is a classic sign of sigmoid volvulus (asterisk in A).

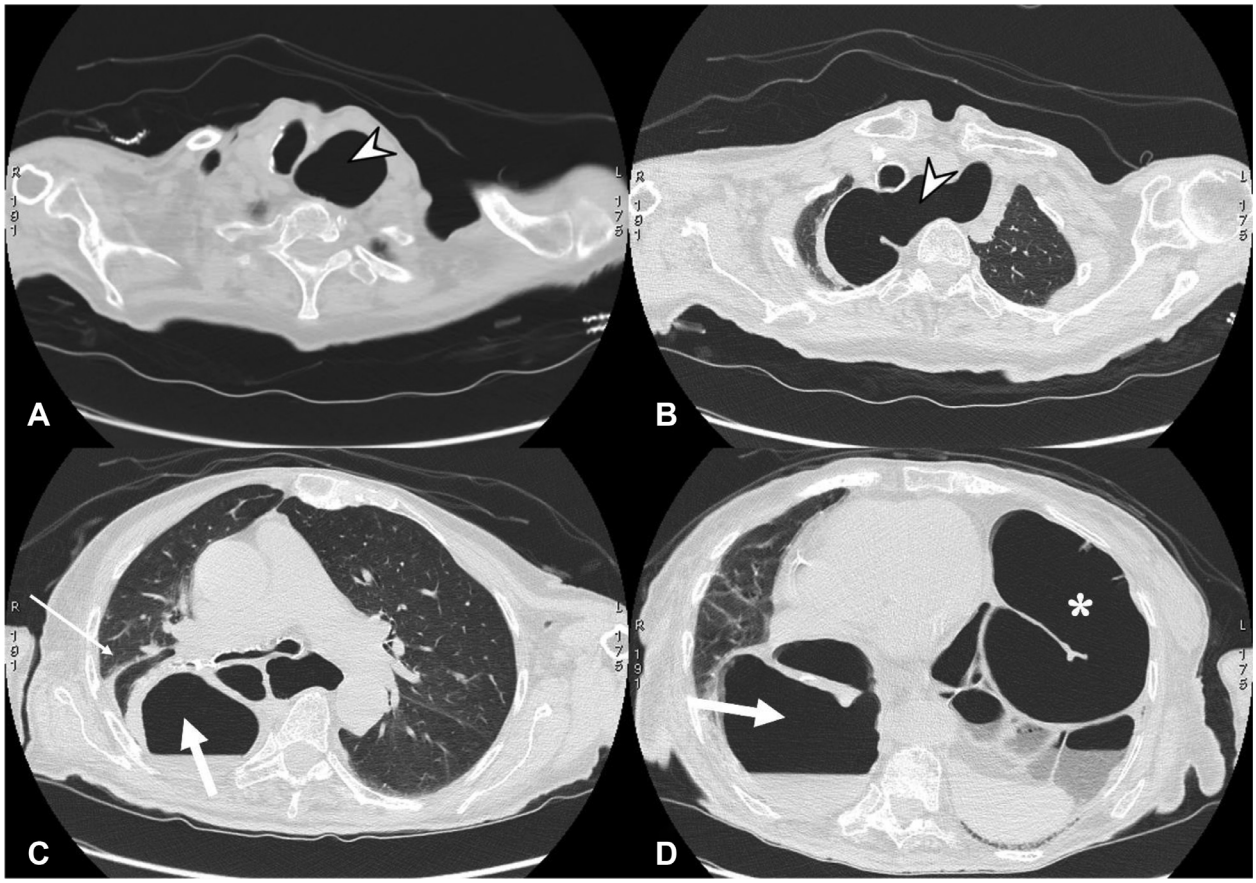

Fig. 3 – (A-D) Axial thoracic nonenhanced CT. Consecutive cranio-caudal axial scans obtained on lung window showing esophageal (arrowheads in A, B), gastric (thick arrow in C, D) and large bowel (asterisk in D) dilatation, with subsequent partial right pulmonary atelectasis (thin arrow in C).

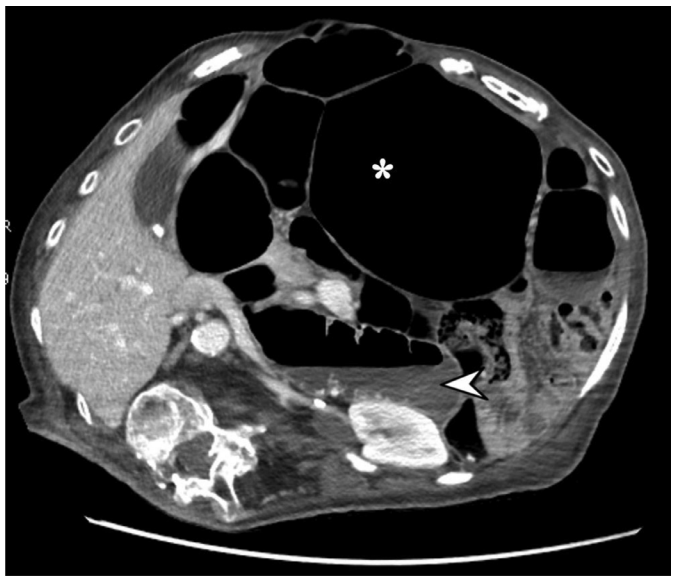

Fig. 4 – Axial abdominal contrast-enhanced CT. The scan obtained in portal-phase shows sigmoid (asterisk) and duodenum dilatation, with formation of an air-fluid level (arrowhead).

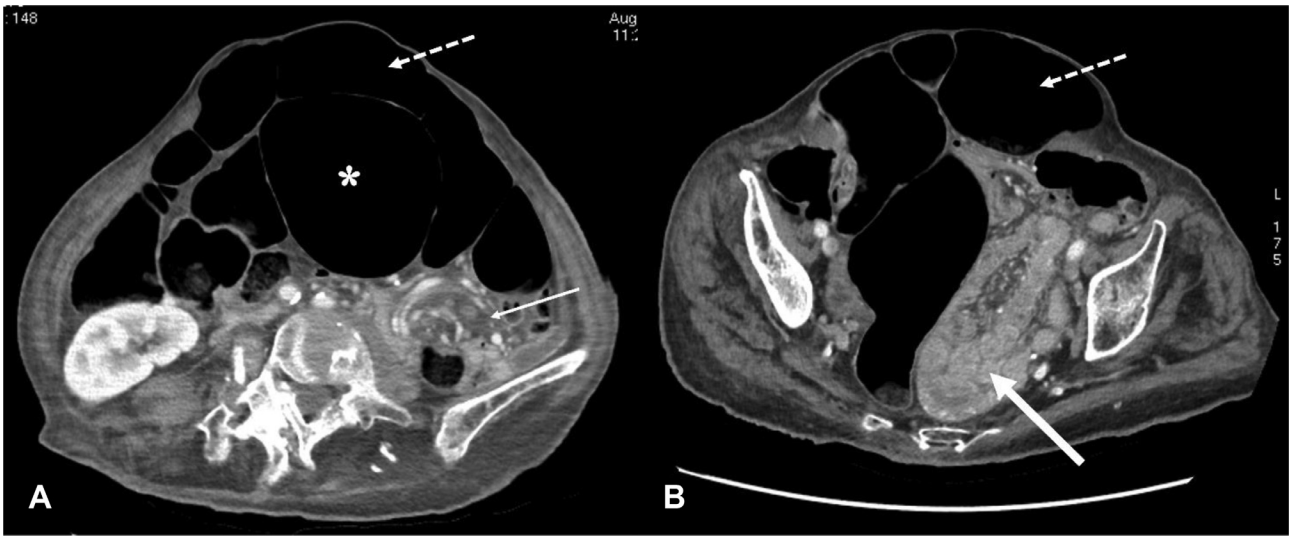

Fig. 5 – (A, B) Small bowel volvulus. Axial portal venous phase CT image (A) shows the "whirlpool sign", pathognomonic for small bowel volvulus, seen when the bowel rotates around its mesentery thus causing the mesenteric vessels to twist (thin arrow). In this case, it is possible to see the jejunal-ileal branches of the superior mesenteric artery forming a whirl. Additionally, it is possible to see the sigmoid dilatation (asterisk) and the median laparocele (dotted arrow). Portal venous phase image (B) showing the median laparocele (dotted arrow) and multiple small bowel loops, localized distal to jejunal volvulus, disposing abnormally in the pelvic cavity (thick arrow).

An incidental finding during surgery was a Meckel's diverticulum arising from an ileal loop, confirmed at postresection anatomo-pathological analysis (Fig. 7).

After admission to the surgical ward, the patient was finally discharged on the sixth postoperative day in overall good health.

Discussion

A gastrointestinal volvulus is an occurrence caused by an abnormal twisting of a bowel loop around its mesenterial vascular axis, in most cases greater than 180°. This can lead to a mechanical bowel obstruction and to an impairment of the vascular flow, commonly causing acute or chronic intermittent abdominal pain [1,2,8].

SBV has no gender predilection and is usually caused by certain age-specific predisposing factors. In newborns and children, the prevalence of SBV is higher than in adults, and is often secondary to intestinal malrotation/nonrotation [9].

In developed countries SBV is a rare cause of intestinal obstruction in the adult population, in which it shows a higher prevalence in patient ranging from 60 to 90 years [3].

SBV is classified into primary and secondary, depending on the existence of predisposing factors. The primary variety has no precise etiology, and the risk factors identified are more related to diet, particularly the habit of long fasts that cause altered intestinal motility [3]. In fact, dietary habits could explain why this phenomenon has been observed more frequently in Asian and African populations: it is most often seen after the breaking of the fast at the end of the month of Ramadan or during the winter and spring seasons in Ethiopia [10].

On the other hand, secondary volvulus occurs in the presence of predisposing factors, whether congenital or acquired: among the latter, postoperative adhesions are the most frequent [9]. Other acquired secondary causes, beyond surgical ones, include neoplasms, meconium ileus, ascariasis, internal hernias, aneurysms, and some others that are strictly gynecological, such as leiomyomas, endometriosis, ovarian cysts, and pregnancy (especially in its late stages) [3].

The main congenital secondary causes of SBV, as reported by many authors, are midgut malrotation [11], jejunal diverticulum [12], and Meckel's diverticulum [13].

Regarding sigmoid volvulus, it is typically an acquired condition, with its occurrence more common in individuals suffering from chronic constipation or a lengthened sigmoid colon, frequently associated with a high-fiber diet [1].

An endemic region has been identified, encompassing Eastern Europe, Russia, the Middle East, Africa, South America and India, where colonic volvulus accounts for a significant proportion of intestinal obstructions, representing 13% to 42% of all cases. In contrast, volvulus constitutes 10% to 15% of large-bowel obstructions in the United States and Western Europe [4].Another aspect to be considered is the age of our patient: in agreement with what is reported in the literature, most sigmoid volvulus and small bowel volvulus due to secondary causes occurs at an advanced age [3,4].The clinical onset of our case is particular: symptoms described in previous literature cases are usually abdominal. The most common symptoms are abdominal distension, nausea, vomiting and

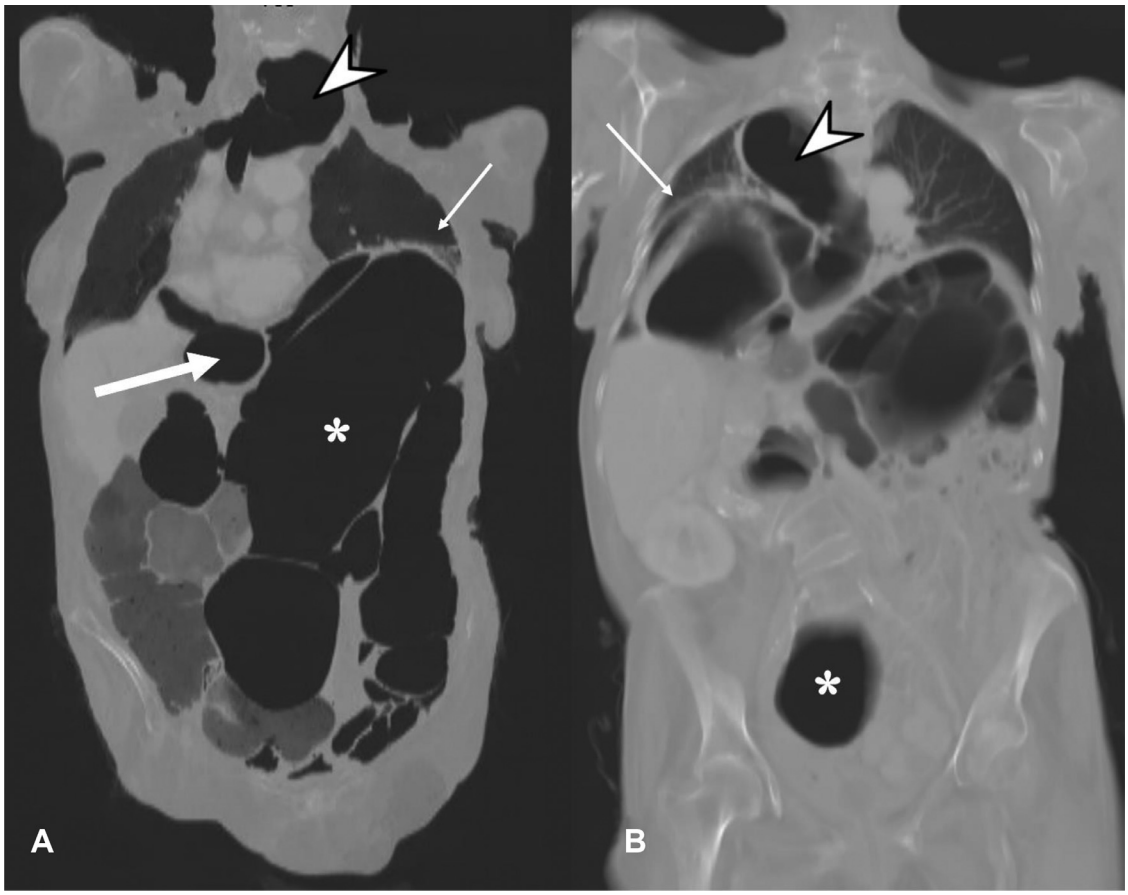

Fig. 6 – (A, B) Coronal contrast enhanced CT. Images obtained with Minimum-intensity projection (MinIP) reconstruction and visualized on lung window showing overall picture. In particular, it is possible to see sigmoid (asterisks in A, B), esophageal (arrowheads in A, B) and duodenal (thick arrow in A) dilatation; elevated hemidiaphgrams with gastric rise (thin arrows in A, B) could also be seen. These elements taken together accounted for reduced lung expansibility and patient's shortness of breath. Additionally, an inverted "U" shape of the sigmoid colon can be seen in the left upper abdomen, which is a classic sign of sigmoid volvulus (asterisk in A).

abdominal pain resistant to analgesia, with varying degrees of intensity [2]. This depends on the presence of peritonitis and the degree of vascular compromise. In contrast, dyspnea is extremely rare, reported only once as a collateral symptom in previous publications [14].

Our patient arrived at the ED with dyspnea alone, an abnormal clinical presentation of a volvulus. In fact, the extreme general abdominal distension, due to both volvuli, caused a subsequent reduction in lung expansibility. There is no evidence in previous reports in the literature of a similar case.

Because of the nonspecific symptoms, a plain radiograph can help guide the diagnosis of volvulus, nevertheless the diagnostic hypothesis must be confirmed by means of second-level examinations. As mentioned above, CE-CT is a widespread imaging modality allowing for an accurate diagnosis in cases of midgut volvulus. Precisely because of the high mortality rate of this disease, early detection and diagnosis is necessary for treatment, which is often surgical.

Typical CT signs include: the "whirl" sign, detected on cross-sectional images and representative of mesenteric vessel torsion [15], with an overall sensitivity of about 64% [16]; a sudden reduction of midgut luminal caliber, which suggests the location of the obstruction point; along with these, other nonspecific signs, such as mesenteric fat stranding, engorgement of the mesenteric vessels, fluid-air levels, and upstream loop distension, may be seen.

Furthermore, CE-CT enables evaluation of complications such as ischemia and/or bowel perforation, and detection of collateral findings. In this regard, CT has made it possible to exclude signs of loop distress or free abdominal air.

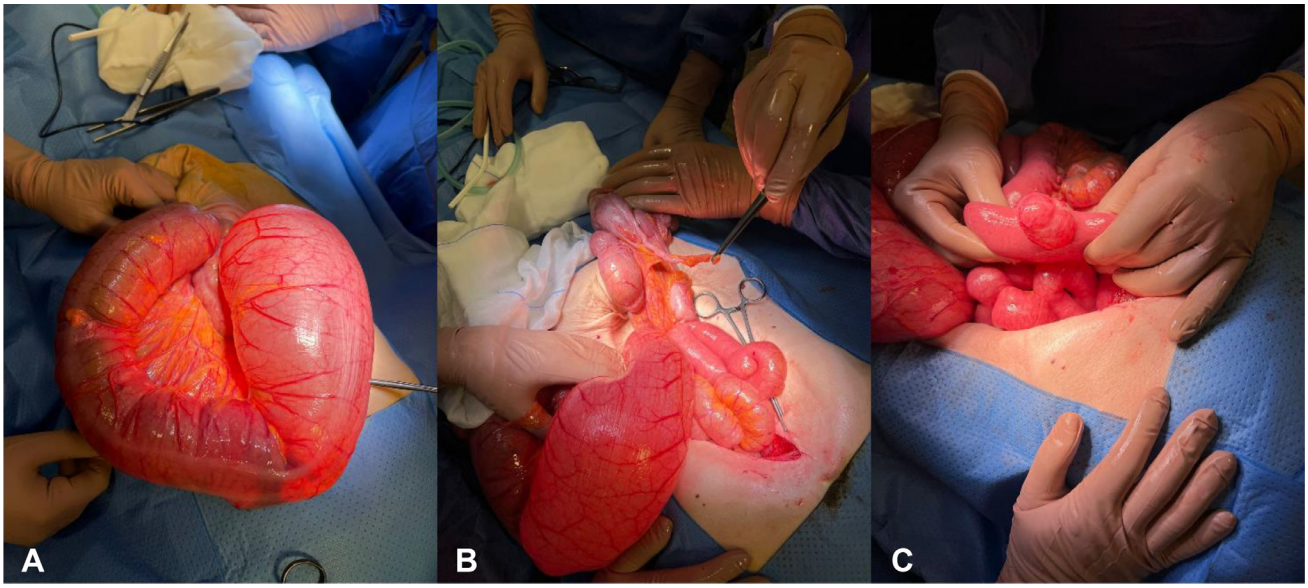

Fig. 7 – (A-C) Surgical findings. A median laparotomy was performed. The sigmoid colon was markedly distended and distressed due to its partial rotation around its own axis (A). However, in the absence of a clear obstruction, simple derotation and decompression were risolutive (B). An incidental finding during surgery was a Meckel's diverticulum arising from an ileal loop, confirmed at postresection anatomo-pathological analysis (C).

Conclusion

This case highlights that in elderly patients a volvulus may not present with classical symptoms, hence, the importance of further radiological diagnostic investigation if there is a strong clinical suspicion.

Patient consent

Written informed consent for this case report was obtained from the patient.

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