Cecal volvulus in giant ventral hernia

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INTRODUCTION: Colonic volvulus is the third leading cause of the colonic obstruction with cecal volvulus accounting for approximately 40% of all colonic volvulus. Lack of peritonealization of the right colon, adhesions from prior surgery, colonic atony, and distal colonic obstruction are potential risks factors for the development of cecal volvulus.

PRESENTATION OF THE CASE: 63 year old male with history of multiple prior intraabdominal surgeries and recurrent ventral hernia. Presented with colon perforation, as a result of cecal volvulus, which was contained in a giant ventral hernia. Diagnosis of cecal volvulus was suspected based on preoperative imaging studies, and confirmed in the OR. Patient underwent damage control procedure with subsequent challenging abdominal wall closure.

DISCUSSION: Axial cecal volvulus and cecal bascule are representing two types of cecal volvulus. Both of these types require a mobile cecum and presence of right colon to occur. It is generally accepted, that mobile cecum is a congenital condition, but in certain situations, particularly after prior intraabdominal surgeries, cecum may lose fixation points and potentially become vulnerable to twisting. This patient with long history of large recurrent ventral hernia had mobile cecum inside the hernia sac and developed cecal volvulus.

CONCLUSION: We present a unique case of cecal volvulus in giant ventral hernia after multiple prior intraabdominal surgeries. Challenges in management of this exceptionally difficult patient were discussed. Large ventral hernia with mobile cecum inside hernia sac is a risk factor for cecal volvulus.

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1. Introduction

Colonic volvulus is a twisting of a segment of colon resulting in an obstruction and sometimes ischemia [1]. Cecal volvulus is felt to occur as a result of the loss of development of the peritoneal fixation of the cecum [2].

Cecal volvulus results from either meso-axial or organo-axial rotation. When meso-axial, the rotation is typically around the ileocolic vessels, creating a volvulus comprised of ascending colon and terminal ileum, not just the cecum. Organo-axial rotation causes the cecal bascule, in which the cecum is flipped anteriorly over the ascending colon to produce obstruction at the ileocecal valve and a closed loop of proximal ascending colon [3,4].

A mobile cecum is generally considered to be congenital [5]. Several potential acquired risk factors were described and included lack of peritonealization of the right colon, typically due to mobilization during prior abdominal or pelvic surgery, adhesions from prior surgery, colonic atony and distal colonic obstruction [1,6].

Surgical intervention and right hemicolectomy are considered the gold standard as soon as diagnosis of cecal volvulus is made [1].

We present the first case of cecal volvulus in giant ventral hernia after multiple prior intraabdominal surgeries. Challenges in the management of this exceptionally difficult patient were discussed.

2. Case report

63 year old male with history of active heroin abuse, noncompliance, hypertension, obesity, CHF, hypercholesterolemia, multiple prior intraabdominal surgeries, including appendectomy, cholecystectomy, several ventral hernia repairs, long history of large ventral hernia, presented with worsening abdominal pain and distention for 2 weeks. Two days prior to admission, he noticed that his ventral hernia on right side of the abdomen became more swollen and painful. In the ER he became obtunded, developed severe respiratory distress and required endotracheal intubation. Subsequent CXR showed free intraabdominal air. Plain abdominal radiograph showed markedly distended cecum pointing to the left upper quadrant and free air (Fig. 1). At this point surgical consultation was obtained. Vitals: T 99, BP 174/90, pulse 115, respirations 12. Clinical exam showed distended abdomen and very large tender hernia occupying all right side of the abdomen.
Fig. 1. Plain abdominal radiograph.

Fig. 2. CT axial view showing markedly distended cecum, partially contained in the ventral hernia.
Fig. 3. CT coronal view showed markedly distended cecum, compressed stomach and lot of free air.

Fig. 4. CT sagital view showing tremendous amount of free air and distended cecum.
and extending to the left of midline with redness and warm skin above it. Patient had multiple surgical scars and another 2 smaller hernias in lower abdomen. Abnormal laboratory results: WBC 15,000, creatinine 4.5. Subsequent CT of the abdomen and pelvis without contrast showed tremendous amount of free air and markedly distended cecum, partially contained in the ventral hernia and crossing midline to the left, suspicious for cecal volvulus (Figs. 2–4). Patient was immediately taken to the OR, where diagnosis of cecal volvulus was confirmed. Cecum, terminal ileum, and ascending colon were twisted in axial plane, with concomitant clockwise torsion and grossly perforated hepatic flexure, significant fecal spillage and large abscess cavity along the transverse mesocolon. Size of the hernia was approximately 20 × 30 cm. Hernia contained part of the cecum. Right colon had significant adhesions from prior surgeries, including those inside the hernia sac. Patient had loss of the domain. There was another lower abdominal wall hernia containing old infected mesh and communicating with major right sided abdominal wall hernia defect. The volvulus was reduced in counterclockwise direction. Extensive lysis of adhesions, right hemicolectomy, abdominal washout, explantation of infected mesh was performed. Because of extreme condition of the patient, damage control procedure was chosen and abdomen was temporally closed with negative pressure (VAC) dressing. Patient remained intubated in ICU. After 48 h of resuscitation patient improved: pressors were discontinued and he had good urine output. Patient was taken back the OR. Reopening of recent laparotomy, ileocolostomy anastomosis and ventral hernia repair with biological mesh was performed. Repair of abdominal wall defect was challenging because of the size of the hernia. Despite meticulous dissection, we had 10 × 12 cm defect in the middle, which was not possible to approximate. This area was bridged with one piece of biological mesh. Another bigger piece of mesh (same type) was placed above the bridged area to have 7–8 cm overlapping from the edges of the hernia. Mesh was secured to the fascia with unabsorbable sutures and titanium tackers. Patient had successful recovery. He was extubated 5 days later, started on regular diet. All drains were removed before his discharge to rehabilitation center. A week after his discharge, patient was readmitted with pneumonia, and CT of the abdomen was performed in the ER. CT showed no bowel obstruction and no hernia (Fig. 5). Patient was discharged to home in stable condition and was followed in the clinic without evidence of recurrence during 4 months after surgery.

3. Discussion

Colonic volvulus is a twisting of a segment of colon resulting in an obstruction and sometimes ischemia. The sigmoid colon and the cecum are the areas most commonly involved, but volvulus of the transverse colon and splenic flexure can occur. Regardless of the location, volvulus is manifested by progressive bowel distension proximal to the twisted colon. Over time, peristalsis can force stool and gas into the closed loop. As this closed loop distends, luminal pressure can increase beyond diastolic venous pressure. This venous congestion, coupled with diminished arterial flow from mesenteric torsion, can lead to ischemia, gangrene, and perforation of the colon [1].

Cecal volvulus is felt to occur as a result of the loss of development of the peritoneal fixation of the cecum, allowing both it and the proximal bowel to be fully mobile to any part of the abdominal cavity. In addition, a focal point of fixation can then serve as a fulcrum for the bowel to twist around its associated ileocolic-based mesentery, forming an intermittent or closed-loop obstruction [2].

Cecal volvulus occurs classically in two different patterns—twisting in an axial plane around its long axis in approximately half the patients in either a clockwise or counterclockwise motion, or in the other half of patients in which the cecum both twists and inverts along with the terminal ileum [3]. Another variant is known as the
cecal “bascule,” where the cecum folds on itself anteriorly without any concomitant torsion. The latter creates a ball-valve type obstruction at the level of the ileocecal valve, and is associated with inflammatory bands extending across the ascending colon [4].

It is generally accepted, that presence of mobile cecum is congenital and some autopsy studies suggested that up to 25% of the population have a cecum “mobile enough” to develop volvulus or a bascule [5]. However, potentially acquired risk factors exist and include lack of peritonealization of the right colon, typically due to mobilization during prior abdominal or pelvic surgery, adhesions from prior surgery, colonic atony and distal colonic obstruction [1,6].

Rapid diagnosis, resuscitation, and surgery are imperative as the mortality of gangrenous cecal volvulus is up to 40%. Surgical intervention is generally advised as soon as diagnosis was established. Right hemicolectomy is the gold standard for both gangrenous and viable bowel [1].

We present a first case of cecal volvulus contained in giant recurrent ventral hernia. Patient had multiple prior intraabdominal surgeries including cholecystectomy, appendectomy, several ventral hernia repairs with mesh, and had long history of recurrent ventral hernia. The hernia sac contained part of the cecum. As hernia grew in size, the cecum was losing fixation points and became more and more vulnerable to twisting. We want to emphasize in our case the importance in differentiation between a strangulated hernia with cecum inside from a real cecal volvulus. Our patient had strangulated colon as a result of axial rotation and torsion, which are pathognomonic for the volvulus. Presence of a large ventral hernia with mobile cecum inside may represent a risk factor for the developing of cecal volvulus.

A combination of large recurrent ventral hernia together with colonic volvulus represented a significant clinical challenge. During the first surgery patient was not stable enough for establishing bowel continuity and abdominal wall closure. Sepsis was controlled by right hemicolectomy and abdomen was temporarily closed. After improvement in ICU, patient was taken back for bowel anastomosis and abdominal wall closure. Repair of abdominal wall defect was challenging because of the size of the hernia. We utilized biological mesh with bridging of the defect to avoid tension repair, and used sandwich technique in the middle of the hernia (area 10 x 12 cm) with mesh-to-mesh and no tissue in between. A CT scan few weeks after operation showed good mesh incorporation and no recurrence.

In conclusion, we present a unique case of cecal volvulus in giant ventral hernia after multiple prior intraabdominal surgeries. We believe that large ventral hernia with mobile cecum inside the hernia sac is a risk factor for cecal volvulus.

4. Consent
Written informed consent was obtained from the patient for the publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal upon request.

Conflict of interest
Authors do not have any conflicts of interest.

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Ethical approval
Tulare Regional Medical Center Ethics Committee approved this article.

Consent
Consent was obtained and is available upon request.

Author contribution
Dr. Aleksandr A. Reznichenko – performed both of surgeries and followed patient in the hospital and in clinic, analysed the data, wrote the paper.
Dr. Frank Macaluso – analysed and interpreted radiology studies, chose images for publication.
Dr. Rebecca Zulim – assisted during first operation.

Guarantor
Aleksandr A. Reznichenko.

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