Annals of Case Reports
Chopan MS, et al. Ann Case Rep: 8: 1172
www.doi.org/10.29011/2574-7754.101172
www.gavinpublishers.com

Case Report

Surgical Management of Giant Colonic Diverticulum with Da Vinci Robotic System: A Case Report

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Citation: Chopan MS, Lopez J, Barrows BD, Rayhrer CS (2023) Surgical Management of Giant Colonic Diverticulum with Da Vinci Robotic System: A Case Report. Ann Case Report. 8: 1172. DOI:10.29011/2574-7754.101172

Received: 10 February 2023, **Accepted:** 14 February 2023, **Published:** 16 February 2023

Abstract

Background: Giant colonic diverticulum is rare occurrence with less than 200 cases reported in the scientific literature. Robotically assisted laparoscopic colectomy is widely used in the treatment of diverticular disease but has not been reported in the treatment of giant diverticulum.

Case Report: We present a case of giant sigmoid diverticulum treated surgically with the Da Vinci Robotic System. The patients is a 51-year-old female with well controlled Type II diabetes, and hypertension. She had a McNutt type II diverticulum or inflammatory type, which is the most common. Serial imaging demonstrated progressive enlargement of the diverticula over the course of a year indicating it was a progressive entity. The patient had intermittent symptomatology associated with her diverticulum all of which resolved with resection.

Conclusion: The Intuitive DaVinci Robotic System is a platform that offers three-dimensional laparoscopic visualization and more degrees of operative dexterity with its wristed instruments, facilitating the identification and mobilization in this difficult case.

Keywords: Giant Colonic Diverticulum; Laparoscopic Colectomy; Da Vinci Robotic System

Introduction

Giant colonic diverticulum is defined as a diverticulum over 4.0 cm. Ninety percent of giant diverticula originate from the sigmoid colon. The diverticula are typically filled with air via a hypothetical ball valve mechanism. They can present incidentally on abdominal radiograph or computer tomography (CT), or clinically with rupture or an associated abscess. Rarely do they present as malignancies. Radiographic manifestations of the giant diverticula include the lifting balloon sign [1,2] characterized by migration of the diverticulum out of the left lower quadrant, creating an air filled cystic lesion seen in the left hypochondrium. These diverticula are described with the McNutt [3] pathologic classification system and are usually treated with sigmoid resection.

Case Presentation

A 51-year-old Caucasian female with well-controlled Type II diabetes, hypertension, and known diverticula documented on routine colonoscopy presented to the emergency room with abdominal pain and leucocytosis of 16,100 cells/ml. CT scan of the abdomen and pelvis demonstrated a 5.0 x 7.0 cm abscess versus diverticulum in the left mid abdomen. She was hospitalized for six days and treated empirically with intravenous and oral antibiotics with resolution of her symptoms. Over the next few months, the patient had intermittent left upper quadrant pain that resolved with a clear liquid diet and without antibiotics. Repeat CT

scan six months later demonstrated an 8.7 x 6.6 cm air filled giant diverticulum or abscess in the mid abdomen, abutting a redundant sigmoid colon. Subsequent barium enema was initially read as normal and subsequently reread as an abnormal ovoid pocket of air within the left mid abdomen 9.5 x 7.1 cm without filling of contrast. The air space had originally been interpreted as representing the stomach as it was displaced in the left upper abdomen. Upper gastrointestinal study with small bowel follow through was normal. The patient then once again developed pain, and CT scan demonstrated inflammatory changes around the diverticulum. The patient was treated with antibiotics and scheduled for Da Vinci robotically assisted laparoscopic sigmoid colectomy. The Da Vinci Si platform was used. Conventional laparoscopy was used to assess the feasibility of laparoscopic approach and to mobilize the left upper white line of Toldt. Adhesions to the diverticula were divided with ultrasonic shears. A robotically assisted laparoscopic sigmoid colectomy was accomplished without complication. The diverticulum was identified just above the umbilicus in left upper quadrant. The sigmoid colon was remarkably redundant. No other abnormalities were noted. The diverticulum measured 9.0 cm. The patient resumed clear liquids immediately after surgery and was discharged home after 48 hours. A consent was obtained from the patient, and an IRB approved publication of this case report.

Discussion

The diagnosis of giant diverticulum is challenging, as this entity is rare and can cause displacement of the colon upward, moving landmarks from their typical location in the left lower quadrant. Preoperative evaluation consists of a combination of abdominal radiography, CT scans, barium enema, and colonoscopy. The giant diverticulum is characteristically filled with only air secondary to a ball valve effect and often does not fill with contrast on barium enema, as the connection with the sigmoid colon is small. On plain films, the air-filled diverticulum can be displaced in the upper left abdomen, a finding described as the rising balloon sign [1,2]. This presentation may not be recognized as a diverticulum. An air space on CT scan that does not fill with contrast can be mistaken for an abscess or contained bowel perforation as in our patient. Giant diverticula are often not well appreciated on colonoscopy, as the diverticular opening can be negligible. Treatment is similar to that of routine diverticular disease and is based on the clinical scenario. Surgery can be open, laparoscopic, or robotically assisted, depending on the availability of specialty equipment and surgical experience. McNutt and colleagues proposed a classification system, which divides giant diverticula into three subtypes [3]. They describe type1 diverticula, as showing remnants of the muscular is mucosa near the transition point from the colon into the diverticulum while more distal aspects of the wall are cyst-like and lined by chronic inflammation and granulation tissue with underlying fibrosis. Type 2 diverticula are described as potentially arising from subserosal perforation (likely a ruptured diverticulum) progressing to a walled off abscess with connection to the colon and a cyst wall composed of fibrous tissue and acute inflammation. Type 3 diverticula include a complete mucosal lining with intact smooth muscle layers of muscular is mucosae and muscular is propria and are thought to be congenital in origin. A more recent review article by Nigri and colleagues compiled 166 cases of giant colonic diverticula in 138 studies. They found that type II diverticula (inflammatory diverticula) were the most prevalent (66%) of the reported cases, followed by type 1(22%) or pulsion diverticula (typical diverticula with herniation through muscular layer, but followed by slow continuous growth) [3]. Type III giant diverticula (true diverticula with all muscle layers; possible embryologic anomaly) were least common (12%) (Figures 1-4, 5.1-5.6). The histomorphologic features in the current case including a fibrotic wall, lumen lined by acute inflammation with granulation tissue, and predominantly absent smooth muscle layers are most consistent with the description of type II giant colonic diverticulum. To our knowledge, this case is the first report of giant diverticula treated with Da Vinci Robotically assisted sigmoid colectomy. Benefits of robotic surgery include true three-dimensional visualization, which is an advantage when visually tracing the redundant colon [4]. Other advantages include the use of immunofluorescence to assess the blood supply of the colon to determine resection margins and the integration of flexible wristed instruments allowing the surgeon more degrees of freedom for suturing [4]. These advantages overcome some of the challenges associated with open and laparoscopy can be overcome [5-12].

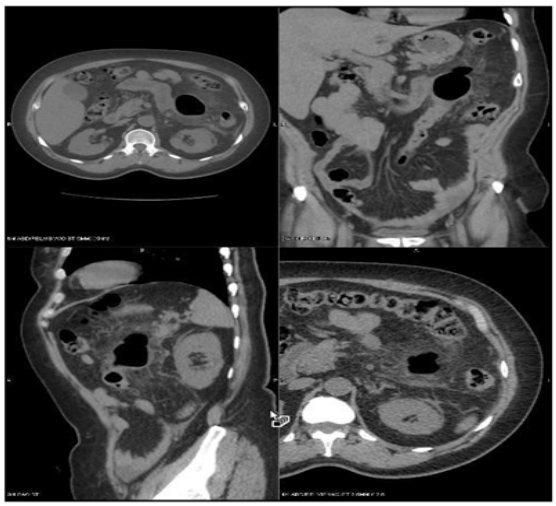

Figure 1: CT of the diverticulum in axial, coronal and sagittal imaging of giant diverticulum at original presentation.

Figure 2: Barium enema. Air containing structure without contrast represents the giant diverticulum originating from the sigmoid colon.

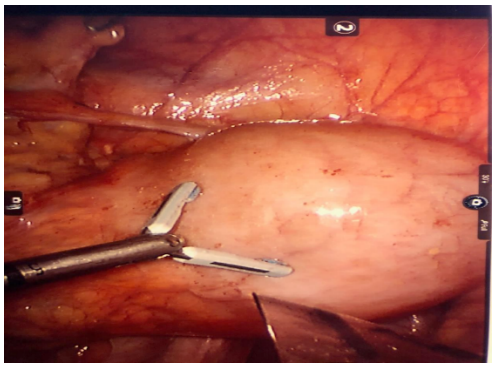

Figure 3: Laparoscopic view of the giant diverticulum with adhesion at the top left.

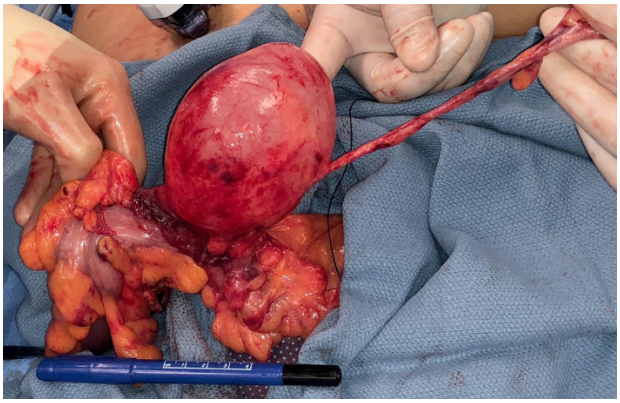

Figure 4: Intra-operative view of specimen with giant diverticulum and adhesion.

Figure 5 Giant diverticulum histology. The specimen consisted of a segment of sigmoid colon 17.7 cm in length and 2.5 - 3.0 cm in diameter with attached peri-colonic adipose tissue. The midpoint of the colon contained a dilated protruding cystic structure 7.5 x 7.5 x 6.0 cm. Opening the colon longitudinally revealed an unremarkable mucosa with several diverticula, including one opening into the giant diverticulum. This diverticulum consisted of a smooth thick-walled cavity filled with air.

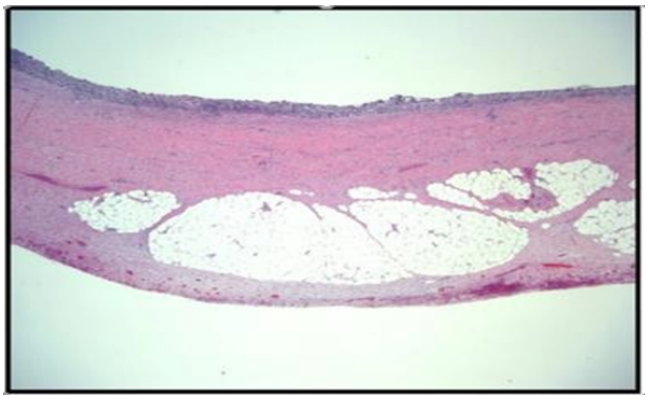

Figure 5.1: Fibrotic wall of giant diverticulum (20X).

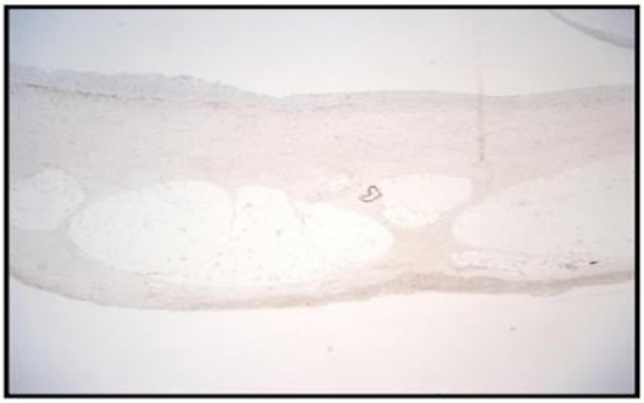

Figure 5.2: Immunohistochemical stain for smooth muscle (desmin) demonstrating absence of muscular is and muscular is propria (20X).

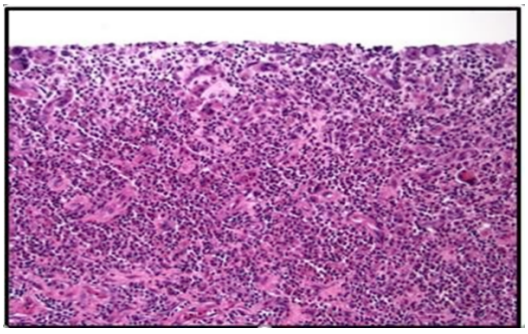

Figure 5.3: Ulcerated mucosal surface at opening of diverticulum in sigmoid colon (40X).

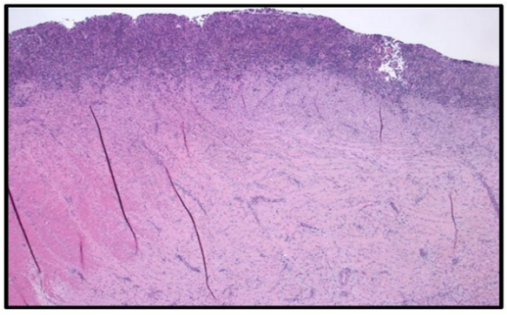

Figure 5.4: Higher power representative image of the diverticulum mucosal surface showing acute inflammation, granulation tissue, and absence of epithelium.

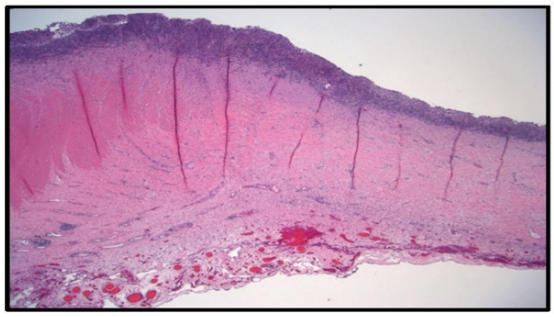

Figure 5.5: (200x) Features compatible with Type 2 giant diverticulum (inflammatory type).

Figure 5.6: H&E-Hematoxylin and eosin stain.

Conclusion

Our patient had a McNutt type II diverticulum or inflammatory type, which is the most common. Serial imaging demonstrated progressive enlargement of the diverticula over the course of a year indicating it was a progressive entity. Our patient had intermittent symptomatology associated with her diverticulum all of which resolved with resection. To date no consensus opinion provides guidance with respect to resect without symptoms. In our patient, the diverticulum continued to enlarge and was symptomatic prompting resection. The Intuitive DaVinci Robotic System is a platform that offers three-dimensional laparoscopic visualization and more degrees of operative dexterity with its wristed instruments, facilitating the identification and mobilization in this difficult case.

Consent: Consent was obtained from patient.

Competing Interests: The authors have no competing interests to declare. All authors have nothing to disclose. This case report was approved by an IRB

Financial Support: None

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