

**DIVERTICULOSIS AND RECTUS SHEATH CATHETER COMPLICATIONS - A CASE REPORT AND REVIEW OF THE LITERATURE**

Lucy Dale and Darren J. Porter\*

Department of General and Colorectal Surgery, Ninewells Hospital and Medical School, Dundee, Scotland, UK.

\*Corresponding Author: Dr. Darren J. Porter

Department of General and Colorectal Surgery, Ninewells Hospital and Medical School, Dundee, Scotland, UK.

Article Received on 07/06/2022

Article Revised on 28/06/2022

Article Accepted on 18/07/2022

**ABSTRACT**

Diverticular disease refers to a range of conditions affecting the large bowel. Diverticular disease refers to “out-pouchings” forming within the lumen of the colon, these out-pouchings are areas of weakness within the bowel wall. The aetiology of these areas of weakness in the colon is thought to be multifactorial, with both environmental and genetic factors playing a part. Whilst a large proportion of patients with diverticular disease are asymptomatic, 20% of patients experience symptoms. The prevalence of diverticular disease dramatically increases with age, with >60% of people over the age of 80 thought to be affected. Inflammation of the diverticular out-pouchings, also known as diverticulitis. In this case report, we present a complex case of severe diverticulosis. We review the literature regarding the appropriate management of diverticular disease, and in addition we review a severe and uncommon post-operative complication relating to the use of the rectus sheath catheter.

**KEYWORDS:** Diverticulosis, segmental colitis, rectus sheath catheter.**INTRODUCTION**

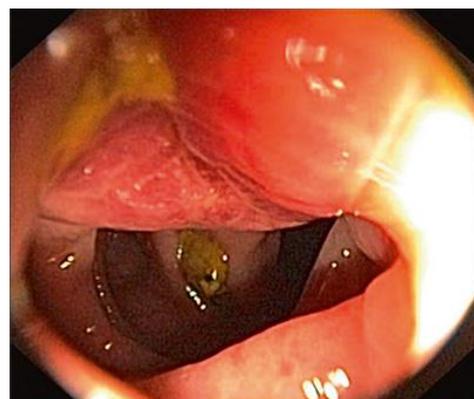
Diverticular disease refers to a range of conditions affecting the large bowel. The classification of diverticular disease ranges from asymptomatic diverticulosis to segmental colitis. Diverticular disease refers to “out-pouchings” forming within the lumen of the colon (Figure 1). The out-pouchings occur parallel to the longitudinal bands of smooth muscle of the large colon, the taenia coli.<sup>[1]</sup>

**Figure 1: Diverticular segment.**<sup>[2]</sup>

The aetiology of these areas of weakness in the colon is thought to be multifactorial, with both environmental and genetic factors playing a part. From an environmental perspective, lifestyle factors including

low fibre intake and lack of physical exercise are thought to contribute to its presentation.<sup>[3]</sup> The prevalence of diverticular disease dramatically increases with age, with >60% of people over the age of 80 thought to be affected.<sup>[4]</sup>

Whilst a large proportion of patients with diverticular disease are asymptomatic, 20% of patients experience symptoms including abdominal pain (typically left iliac fossa [LIF]), altered bowel habit and nausea/vomiting<sup>5</sup>. Inflammation of the diverticular out-pouchings, also known as diverticulitis, occurs when diverticula tear or become obstructed with stool resulting in trauma to the mucosa and subsequent inflammation (Figure 2).

**Figure 2: Severe inflammatory changes surrounding a diverticula, indicating diverticulitis.**<sup>[6]</sup>

Diverticulitis is often treated with antibiotics, or if recurrent, DMARDs.<sup>[7]</sup> However, certain cases of diverticulitis may progress into a “chronic inflammatory phase” - termed segmental colitis.<sup>[8]</sup> This is where inflammation of the colon persists, with some researchers noting that histologically, this is indistinguishable from inflammatory bowel conditions such as Crohn’s disease and Ulcerative Colitis.

In this case report, we present a complex case of severe diverticulosis with sub-acute large bowel obstruction. We review the literature regarding the appropriate management of diverticular disease, and in addition we review a severe and uncommon post-operative complicated relating to the use of the rectus sheath catheter.

### CASE REPORT

A 63-year-old-male with a 5year history of diverticular disease presented with 2 episodes of altered bowel habit, bloating and PR bleeding (QFIT >400) over a 6month period. The patient underwent a colonoscopy that demonstrated a diverticular stricture, however the endoscopist was unable to progress proximal to the sigmoid colon due to the narrowing. Biopsies taken demonstrated chronic inflammatory changes. A CT colonography was performed to visualise the proximal colon and this showed evidence of a diverticular stricture and severe diverticulosis with a sub-acute large bowel obstruction. Therefore, a semi-urgent elective laparoscopic sigmoid colectomy with colorectal anastomosis was scheduled. This was converted to open due to difficulties mobilising the distal sigmoid colon as it was adherent to the left ureter. Intraoperative findings included adhesions from the small bowel to sigmoid colon, sigmoid colon adherent to lateral abdominal wall, obstructed large bowel and a tight stricture within the sigmoid colon.

This patient’s admission was complicated by a 2.5L post-operative retroperitoneal bleed; this was felt to be iatrogenic due to insertion of the rectus sheath catheters. The patient developed a full thickness wound dehiscence, requiring return to theatre for washout and haemostasis. During this procedure, the patient underwent a flexible sigmoidoscopy and underwater leak test which confirmed the anastomosis to be patent. Unfortunately following this, the patient experienced further complications requiring level 3 care. This included a type 2 myocardial infarction (MI) with left ventricular failure, and an anastomotic leak secondary to hypoperfusion caused by the MI. The patient was taken back to theatre for a re-laparotomy and a Hartmann’s procedure. 1 week post-operatively, the patient developed a cardiac arrest responding to CPR and one 150J shock. In total, this patient spent >50days in the ICU and was eventually fully weaned from respiratory support, being stepped down via HDU to the surgical ward for extensive rehabilitation and stoma management.

This patient was eventually discharged from hospital with a follow-up at clinic 6 weeks post discharge.

### DISCUSSION

Diverticula are small outpouches that form within the lining of the large intestine. They were described by the French surgeon Alex Littre in the 18<sup>th</sup> century.<sup>[9]</sup> Graser described the development of diverticula into diverticulitis (inflammation of diverticula) in 1899.<sup>[10]</sup>

The aetiology of diverticular disease is thought to be multi-factorial. Western diets are arguably one of the most important factors that puts individuals at risk for the development of diverticular disease. Crowe et al. conducted a large cohort study in 2011 that identified if individuals consume >25g of fibre per day, the risk of hospitalisation from diverticulitis is reduced by 40%.<sup>[11]</sup> Consumption of red meat, elevated body mass index (BMI) and lack of physical exercise has also been shown to contribute to the development of symptomatic diverticulitis.<sup>[11]</sup> There are therefore a multitude of factors that individuals can alter in order to prevent formation or progression of disease.

From a genetic perspective, there have been population based familial studies (mono and dizygotic twin studies) that have shown that diverticular disease has a genetic predisposition. Strate et al. suggested that ‘53% of susceptibility to diverticular disease results from genetic factors’.<sup>[12]</sup> Hence, diverticular disease has a range of aetiological influences, and it is most likely due to a combination of the factors mentioned above that puts individuals at an increased risk for development of this disease.

It is thought that up to 85% of patients who develop diverticula will remain asymptomatic throughout their lifetime. Nevertheless, approximately 5-10% will report symptoms. This commonly includes LIF pain (due to the position of the sigmoid colon anatomically), nausea, vomiting and altered bowel habit including constipation and/or diarrhoea. In addition, if patients develop acute diverticulitis, signs representing systemic illness such as pyrexia, haemodynamic instability and tachycardia may be present.

Whilst some patients are diagnosed with diverticula during routine screening (e.g. those offered a colonoscopy as part of the national bowel cancer screening programme), most are diagnosed during an acute attack. Where diverticular disease is suspected, investigations including endoscopic procedures (i.e., flexible sigmoidoscopy or colonoscopy) and radiological procedures (CT colonography) may confirm the diagnosis. CT interpretation of diverticulitis has been shown to have a sensitivity and specificity of up to 99%.<sup>[13]</sup>

The treatment of diverticular disease is variable and depends on its severity. For asymptomatic uncomplicated

disease, patients are advised to persist with conservative management with symptomatic analgesia and antispasmodics<sup>[14]</sup> and are encouraged to consume a diet high in fibre. For those who experience an episode of complicated diverticular disease treatment options include oral/IV antibiotics and/or radiological drainage/surgery.<sup>[15]</sup>

Surgery is considered when diverticular disease has led to bowel perforation/obstruction or in recurrent attacks in young non-comorbid patients where the disease is causing severe quality of life disruption. Laparoscopic surgery (sigmoid colectomy with anastomosis with or without a defunctioning ileostomy) is often preferred due to its minimally invasive nature and reduced risk of post-operative complications.<sup>[16]</sup> However, if intra-operative complications occur or in the case of perforated diverticular disease with faecal peritonitis then conversion to open or open surgery should be considered. Surgical intervention is not without risk.<sup>[17]</sup> Nevertheless, surgical intervention for severe, complication diverticulitis is still considered to be the gold standard.

Post-operative complications for diverticular disease include intra-abdominal abscesses, surgical site infections, iatrogenic injury and anastomotic leaks. Interestingly, this case report highlights complications that were thought to be due to the insertion of a rectus sheath catheter (RSC) during the initial operation. Potential complications include bleeding, catheter blockage/knotting, systemic local anaesthetic toxicity and injury to bowel/blood vessels, however these are very rare and following extensive literature review we could find no studies highlighting these in the current literature. Rectus sheath haematomas and subsequent bleeds are normally associated with blunt abdominal trauma or therapeutic anticoagulation, neither of which this patient had. Rucklidge et al<sup>[18]</sup> reports that to their knowledge, there are no reports of "RS haematoma associated with RSC analgesia". Therefore, this case presents a unique complication due to RSC insertion.

## CONCLUSION

Diverticular disease is a common condition, with an increasing incidence with age. Whilst a large proportion of patients with this disease remain asymptomatic. Some individuals can become critically unwell due to this disease and from complications due to surgery. Although many of the surgical complications are well documented, including anastomotic leak, iatrogenic injury, intra-abdominal abscesses, some may occur due to rare causes, such as RSC - associated iatrogenic injury as discussed in this case report.

Severe diverticulitis can result in abscesses, obstruction and fistulae of the bowel, often leading to a systemic immune response and subsequent sepsis. Whilst some complications such as localised abscesses can be managed with drainage, more severe complications often

require surgery, with laparoscopic resection being the preferred choice.

## Grant

None.

## CONFLICTS OF INTEREST

We the authors of this case report have no conflicts of interest to declare.

## REFERENCES

1. Tursi A, Scarpignato C, Strate LL, Lanas A, Kruis W, Lahat A et al. Colonic diverticular disease. *Nat Rev Dis Primers*, 2020; 6(1): 20.
2. Crean A, Fazendin E, Stein D. Diverticulitis: It's (Sometimes) Complicated. [Internet publication]. 2017. Available from: <https://reference.medscape.com/slideshow/diverticulitis-6007689?reg=1#1>
3. Kupcinskas J, Strate LL, Bassotti G, Torti G, Herszèzenyi L, Malfertheiner P et al. Pathogenesis of diverticulosis and diverticular disease. *J Gastrointest Liver Dis.*, 2019; 28(4): 7-10.
4. Painter NS, Burkitt DP. Diverticular disease of the colon; a 20<sup>th</sup> century problem. *Clin Gastroenterol.*, 1975; 4(1): 3-21.
5. Maconi G. Diagnosis of symptomatic uncomplicated diverticular disease and the role of rifaximin in management. *Acta Biomed*, 2017; 88(1): 25-32.
6. Gross M, Labenz J, Börsch G, Dormann A, Eckardt AJ, Kiesslich R et al. Colonoscopy in acute diverticulitis. *Visz Gastrointest Med Surg.*, 2015; 31(2): 124-129.
7. National Health Service U.K. Diverticular disease and diverticulitis. [Internet publication]. 2020. Available from: <https://www.nhs.uk/conditions/diverticular-disease-and-diverticulitis>
8. Piscopo N, Ellul P. Diverticular disease: A review on pathophysiology and recent evidence. *Ulster Med J.*, 2020; 89(2): 83-88.
9. Littre A. Observations sur une nouvelle espèce de hernie. *Hist de l'Acad Roy des Sci.*, 1700.
10. Graser E. Ueber multiple falsche Darmdivertikel in der Flexura sigmoidea. *Munch Med Wochenschr.*, 1899.
11. Crowe FL, Appleby PN, Allen NE, Key TJ. Diet and risk of diverticular disease in Oxford cohort of European Prospective Investigation into Cancer and Nutrition (EPIC): Prospective study of British vegetarians and non-vegetarians. *BMJ.*, 2011; 343.
12. Strate LL, Erichsen R, Baron JA, Mortensen J, Pedersen JK, Riis AH et al. Heritability and familial aggregation of diverticular disease: A population-based study of twins and siblings. *Gastroenterology*, 2013; 144(4): 736-742.
13. Kircher MF, Rhea JT, Kihiczak D, Novelline RA. Frequency, sensitivity and specificity of individual signs of diverticulitis on thin-section helical CT with

- colonic contrast material: Experience with 312 cases. *Am J Roentgenol*, 2002; 178(6): 131-1318.
14. Pfützner RH, Kruis W. Management of diverticular disease. *Nat Rev Gastroenterol Hepatol*, 2015; 12(11): 629-638.
  15. BMJ Best Practice. Diverticular Disease Treatment Algorithm. [Internet publication]. 2022. Available from: <https://bestpractice.bmj.com/topics/en-gb/3000089/treatment-algorithm>
  16. Neale JA. Surgical Management of Diverticular Disease in the Elective Setting. *Clin Colon Rectal Surg.*, 2018; 31(4): 236-242.
  17. Anania G, Vedana L, Santini M, Scagliarini L, Giaccari S, Resta G et al. Complications of diverticular disease: Surgical laparoscopic treatment. *G Chir.*, 2014; 35(5-6): 126-128.
  18. Rucklidge M, Beattie E. Rectus sheath catheter analysis for patients undergoing laparotomy. *BJA Educ.*, 2018; 18(6): 166-172.