

Perforation of Jejunal Diverticula in COVID-19 Positive Patients: A Case Series

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ABSTRACT

Jejunal diverticulosis is the herniation of mucosa through weakened wall of jejunum on the mesenteric border. Individuals are usually asymptomatic for most of their lives and are diagnosed incidentally by radiological investigations or during surgery. Increased number of hospital admissions and investigations done to better understand the phenomenon of Coronavirus Disease 2019 (COVID-19) had increased the rate of incidental diagnosis. Four patients admitted to the COVID-19 ward of the hospital were diagnosed with COVID-19. They were treated according to the protocol followed in the state, which included high dose of steroids. During the course of treatment, they experienced abdominal pain with distension and were diagnosed with jejunal diverticulitis with perforation. Exploratory laparotomy with jejunal resection and jejuno-jejunal anastomosis with feeding jejunostomy was performed and adequate postoperative care was provided. Two out of the four patients survived and were discharged after they achieved full recovery and became COVID-19 negative. The cause of perforation can be attributed to the high dose of steroids used during the treatment as steroids have been proved to cause spontaneous bowel perforations.

Keywords: Coronavirus disease-2019, Diverticulosis, High dose steroids, Long-term steroid

INTRODUCTION

As of January 16, 2022, 323 million people were affected with COVID-19 with 5.5 million deaths [1]. COVID-19 is a viral disease which predominantly affects respiratory system. It also affects gastrointestinal tract and liver. A 9% of 59294 patients with COVID-19 from 11 countries had gastrointestinal symptoms with longer hospital stay and worse prognosis [2]. Many complications of gastrointestinal tract are noted but perforation of the viscera has not received much attention. No report of jejunal diverticular perforation in COVID-19 was reported prior to this case series. Four patients were admitted to the hospital during the period between January 2020 to August 2021 to the COVID-19 ward in Dr. DY Patil Medical College, Hospital and Research Centre, Pune, Maharashtra, India.

CASE SERIES

Case 1

A 25-year-old male patient came to the Outpatient Department (OPD) with complaints of breathlessness, fever and generalised weakness for five days. Patient did not have any significant family history or past medical history. On examination, patient was febrile with a fever of 101°F, with a respiratory rate of 24 cycles per minute, oxygen saturation of 90% on room air, with equal air entry in both lungs and basal crept. He had no gastrointestinal symptoms and his abdominal and per rectal examination showed no obvious abnormality. Patient was diagnosed COVID-19 positive on the day of admission by Reverse Transcriptase Polymerase Chain Reaction (RT-PCR). Patient was shifted to the COVID-19 care ward, where he received the treatment as per the protocol for 15 days. He was administered injection methyl prednisolone, a dose of 80 mg/day for eight days followed by 40 mg/day for the next seven days. The patient improved symptomatically, on day 16 of hospital stay, he had two episodes of vomiting, abdomen was distended, tender, with guarding and absent bowel sounds. An X-ray erect abdomen was done, which displayed air under the diaphragm [Table/Fig-1], and a Contrast Enhanced Computed Tomography (CECT) of abdomen and pelvis showed irregular thickening of the jejunal wall with oedematous jejunal loops suggestive of jejunal diverticulitis with perforation. The patient underwent resection of the diverticular jejunal segment with jejuno-jejunosomy [Table/Fig-2-4]. Patient required Intensive Care

Unit (ICU) care for five days and then shifted to ward. Patient was discharged on postoperative day 14. The patient lost to follow-up.

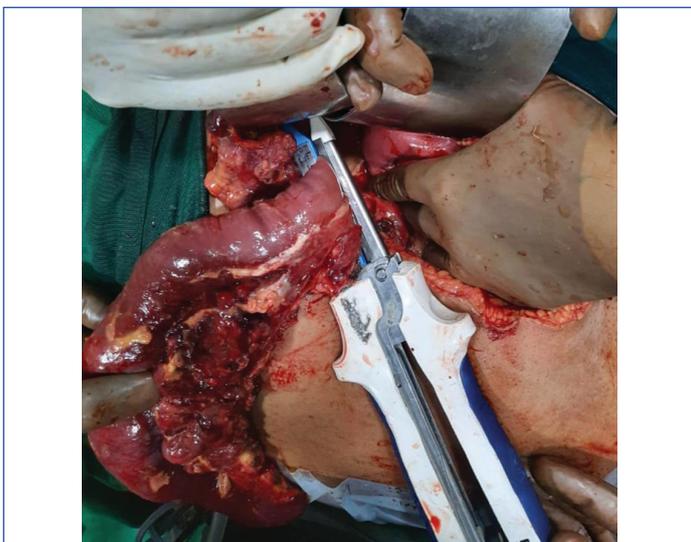
Case 2

A 55-year-old postmenopausal diabetic female came to the hospital with complaints of pain in abdomen, nausea, diarrhoea and fever for seven days. The patient did not have any significant family history. The old records showed the diabetes was under control.

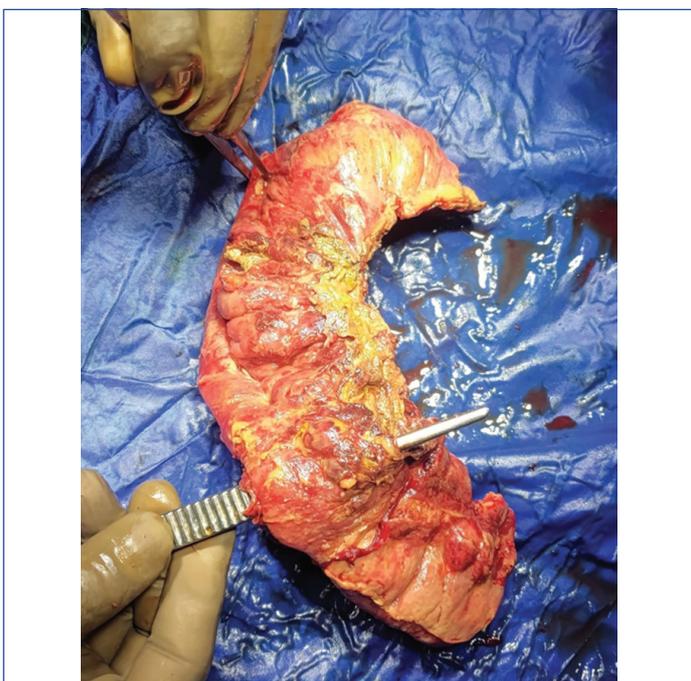
On examination, she was afebrile, with a respiratory rate of 16 per minute, oxygen saturation of 85% on room air, with equal air entry on both sides and no adventitious sounds. Per abdominal and per rectal examination revealed no obvious abnormalities. The RT-PCR was performed and patient was diagnosed as COVID-19 positive.



[Table/Fig-1]: Gas under diaphragm in 25-year-old male (case 1).



[Table/Fig-2]: Excision of jejunal loop with multiple diverticula (case 1).



[Table/Fig-3]: Excised specimen of jejunum with multiple diverticula showing the perforation (case 1).

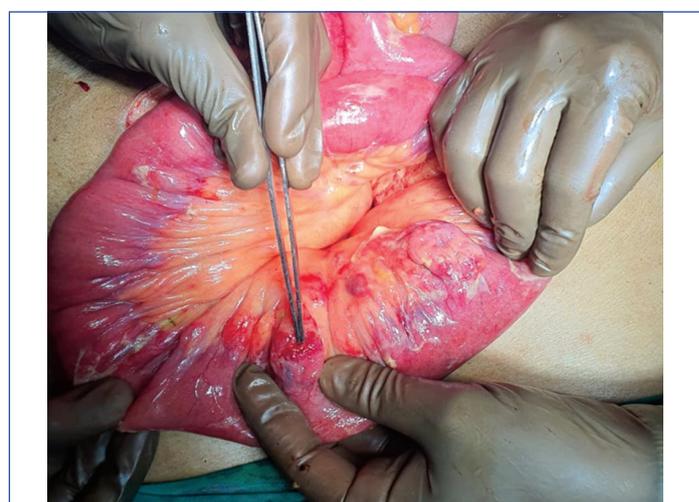


[Table/Fig-4]: Jejunum-jejunum anastomosis using a linear stapler (case 1).

She was shifted to the COVID-19 ward and started on the treatment protocol which included injection Remdesivir-200 mg intravenous (i.v.) on first day and 100 mg once daily for next four days and injection methyl prednisolone with 40 mg/day for 15 days followed by 20 mg/day for the next 15 days as the oxygen saturation improved. On day 30 of treatment, she complained of pain and distension of abdomen. On examination patient had tachycardia, with abdominal distension, guarding and absent bowel sounds. An erect X-ray of abdomen revealed air under the diaphragm. The CECT abdomen revealed multiple diverticula arising from the mesenteric border of jejunum. There was one inflamed diverticulum in the left hypochondriac region with increased attenuation, forming small inflammatory mass [Table/Fig-5]. At laparotomy the patient had multiple jejunal perforations with 20 mL pus collection for which resection and anastomosis was performed [Table/Fig-6]. The patient required ICU care for three days and was discharged on postoperative day 10. She was followed-up for a period of four months and was doing well.



[Table/Fig-5]: CT scan of the 55-year-old female multiple outpouchings arising from the mesenteric border of jejunum.

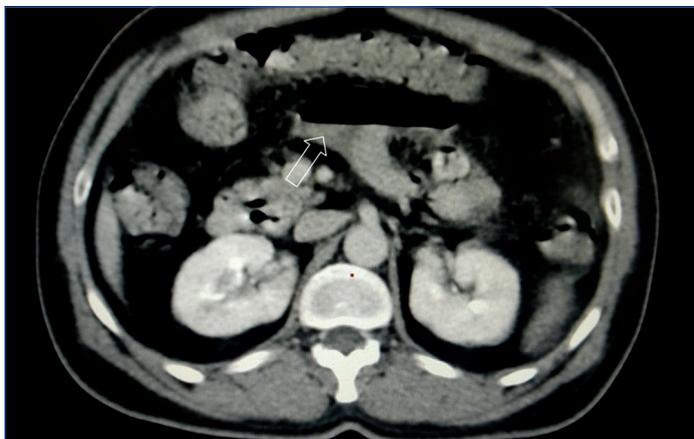


[Table/Fig-6]: Jejunal perforation (case 2).

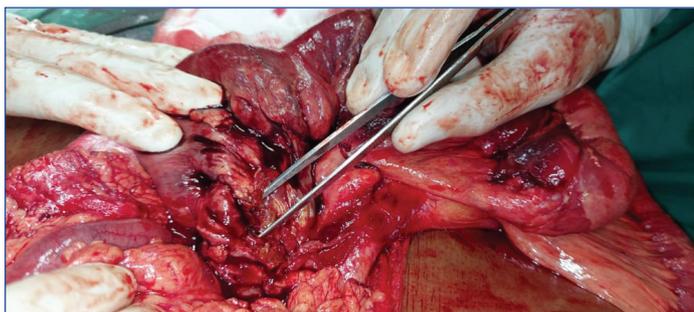
Case 3

A 70-year-old male hypertensive and asthmatic patient came to the hospital with complaints of generalised weakness, breathlessness, cough and body pains of three days duration. The patient had medical risk factors such as systemic hypertension and asthma. On examination patient was febrile with a temperature of 100°F, with a respiratory rate of 30/minute, oxygen saturation of 85% on room air with bilateral air entry and wheeze in both lungs. Patient was diagnosed COVID-19 positive and started on treatment according to the protocol. Patient was started on non invasive ventilation on 40% FiO₂, injection methyl prednisolone 40 mg/day, along with nebulisation with budesonide 0.5 mg thrice daily. Patient was maintaining stable vitals for one week. On day 8 of treatment, patient complained of mild abdominal pain with nausea. Over the

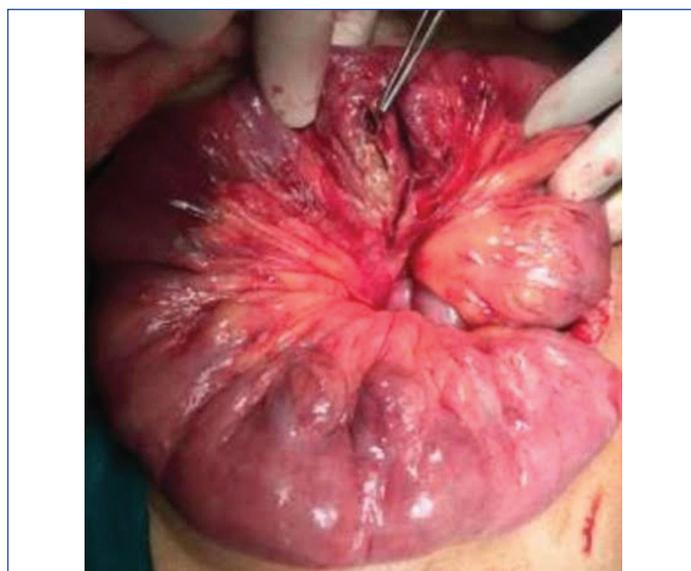
course of two days patient did not pass stools, the abdominal pain became severe and associated with distension. An erect X-ray of the abdomen revealed multiple air fluid levels and air under the diaphragm. CECT abdomen revealed, dilated jejunal loops with a single outpouching at mesenteric border and pneumoperitoneum [Table/Fig-7]. At laparotomy, patient has single jejunal diverticular perforation for which jejunal resection anastomosis was done [Table/Fig-8]. He continued to need ICU care and died on postoperative day 3 due to respiratory failure.



[Table/Fig-7]: CT scan of 70-year-old patient showing contrast leak and air fluid level.



[Table/Fig-8]: Jejunal perforation (case 3).



[Table/Fig-9]: Intraoperative finding of jejunal diverticular perforation (case 4).



[Table/Fig-10]: Intraoperative finding of multiple jejunal diverticula (case 4).

Case 4

A 66-year-old male with no co-morbidities came to the casualty with complaints of fever, cough, body pains and diarrhoea of four days duration. The patient did not have any significant family and personal history. On examination, he was febrile with a temperature of 101°F, with a respiratory rate of 20 cycles per minute, saturation of 95% on room air, basal crepitations in bilateral lungs. Patient was shifted to suspect ward and diagnosed as COVID-19 positive, the following day. He was started on the treatment protocol, which included injection methyl prednisolone 40 mg/day for the first five days. However, his oxygen saturation dropped to 90% in the next two days and the dose of methyl prednisolone was increased to 80 mg/day for the next 20 days. The patient complained of severe pain in abdomen with distension, fever and loss of appetite on 27th day of hospitalisation. The patient was febrile with a temperature of 102°F, tachycardia, with distended abdomen with tender and guarding all over and absent bowel sounds. An X-ray erect abdomen showed air under the diaphragm. The CECT abdomen showed irregular thickening of jejunum with outpouchings and break in the continuity of the bowel at the outpouchings and pneumoperitoneum, suggestive of multiple jejunal diverticula with perforation. The patient had multiple jejunal perforation and underwent jejunal resection and anastomosis [Table/Fig-9,10]. The patient died after 12 hours due to respiratory failure.

DISCUSSION

Gastrointestinal perforation is a rare complication of COVID-19 and its treatment [3]. Small bowel diverticulosis is an uncommon condition with presenting symptoms of abdominal pain, constipation, diarrhoea, dyspepsia and malnutrition. Individuals are often asymptomatic for

a long period of time, before being incidentally diagnosed with the condition. The incidence varies from 0.06-1.3% and prevalence increases with age. Elderly population above the age of 60 years are most affected. Jejunal diverticulosis can progress to diverticulitis and result in complications such as perforation (2.1-7%), obstruction (2.3-4.6%) and bleeding (2-8.1%) [4]. Four patients in present series were diagnosed incidentally after they complained of acute abdomen, during the course of their treatment for COVID-19. In a review of 28 cases of gastrointestinal perforation, none of the patients had jejunal diverticular perforation [3].

During the course of their hospital stay, all the patients were treated according to the treatment guidelines issued by the state of Maharashtra. High dose systemic corticosteroids were administered during the therapy and the dose was tapered or increased based on the patient's response. COVID-19 results in a cytokine release syndrome leading to massive inflammatory cell infiltration and acute lung injury [5]. Corticosteroids by acting intracellularly, down regulate transcription factors that are responsible for producing proinflammatory mediators and upregulate transcription factors of anti-inflammatory mediators, thus suppressing inflammation and immune response [6].

However, long term corticosteroid therapy is often associated with perforations of the gastrointestinal tract. The first three weeks of corticosteroid therapy have 40.3% chance of gastrointestinal perforation [7]. Two of the four patients have received systemic corticosteroid for less than three weeks, the other two received for 25 and 30 days following which they were diagnosed with jejunal diverticular perforation. Gastroerosive properties of corticosteroids contribute to the ulcer formation and subsequent perforation of intestinal mucosa [8].

Extrapulmonary manifestations of COVID-19 can involve the gastrointestinal tract due to its high expression of Angiotensin Converting Enzyme-2 (ACE2) receptors in the epithelial lining which act as host cell receptors for the virus. The infection promotes local coagulopathy leading to the necrosis of the intestinal wall followed by perforation or bleeding [9]. Given the asymptomatic nature of jejunal diverticula [3], the local effect of COVID-19 infection [5] and the gastro-erosive effects high dose of steroids [7] would have led to diverticular mucosal injury leading to diverticulitis followed by perforation. Perforations have been reported in COVID-19 as a presenting pathology even without any treatment such as steroids and anti-interleukin-6 medications such as tocilizumab [3].

In patients presenting with acute abdomen, jejunal diverticulitis should be considered for differential diagnosis, as it is associated with a high mortality rate of 40% [10]. A delayed diagnosis would be fatal in such a case, and therefore an immediate CT scan would decrease the time required to diagnose and result in a better outcome [11]. For all the four patients' intestinal perforation was considered as provisional diagnosis, which after CT scan was found out to be jejunal diverticulitis leading to perforation.

In a case of uncomplicated jejunal diverticulitis, medical management with antibiotics is preferable. However, in cases of complicated jejunal diverticulitis, resulting in a peri-diverticular abscess may be treated with intravenous antibiotics and a CT-guided percutaneous drainage has been advised [12]. In cases with generalised peritonitis, a surgical approach had been advised where the affected part of the jejunum is to be excised [13]. All the four patients in present series, had signs and symptoms of generalised peritonitis, and underwent surgery which revealed jejunal diverticula with perforation.

Surgeons dealing COVID-19 positive patients with gastrointestinal complications have to focus on reaching an early diagnosis, adequate source control to stop contamination, appropriate antimicrobial therapy and prompt resuscitation. On a case-by-case basis, based on the haemodynamic status after the initial resuscitative measures, age and co-morbidities, the need for surgical management has to be evaluated. If chosen to be managed conservatively, clinical and radiological surveillance should be carried out every 12-24 hours till the condition settles. However, if the signs symptoms and haemodynamic parameters of the patients show a deteriorating trend, surgery can be undertaken [13].

Postoperative care is of prime importance in COVID-19 patients undergoing surgery. Most common perioperative complications include thromboembolic episodes, infection and pulmonary complications. All patients were shifted to an ICU, two of the four patients suffered from respiratory failure 12 hours after surgery and on Post-operative day 3. The postoperative rate of ICU admission in COVID-19 patients is 15%, with the prevalence of perioperative mortality for undergoing an emergency surgical procedure is 29% [14]. Postoperative ICU admission would offer better monitoring for complications in a COVID-19 patient taken for emergency surgery.

COVID-19 patients with prolonged hospital stay on systemic steroids should be monitored for complications. Acute abdominal symptoms should be examined with a high suspicion for perforation. Jejunal diverticulitis should be considered as an important differential while planning for further management.

CONCLUSION(S)

All the four patients were incidentally diagnosed with jejunal diverticulitis with perforation upon presenting with symptoms of acute abdomen during the course of treatment for COVID-19. COVID-19 being a thromboembolic phenomenon, ischaemic changes in the intestinal mucosa could have caused an initial insult, accelerated by the erosive effects of prolonged course of systemic steroids on the intestinal mucosa resulting in perforation. While the surgical management was successful, lung parenchymal damage due to COVID-19 resulted in patients experiencing respiratory failure postoperatively resulting in death. Jejunal diverticulitis complicating with perforation has to be considered as a differential diagnosis while treating patients with peritonitis with COVID-19 infection, on treatment with long term course of high dose systemic steroids.

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