

Empyema caused by a colopleural fistula

A case report

Rui Lian, MD^a, Guochao Zhang, MD^b, Guoqiang Zhang, MD^{a,*}

Abstract

Rationale: Empyema is a condition in which pus gathers in the area between the lungs and the inner surface of the chest wall. An empyema caused by colo-pleural fistula is a rare but potentially life-threatening condition.

Patient concerns: We describe a case of 42-year-old man was brought to our Emergency Department for chest pain with dyspnea and fever.

Diagnoses: The final diagnoses are empyema caused by colo-pleural fistula and colon cancer.

Interventions: The patient underwent laparotomy surgery, during which a tumor was found in the splenic flexure of the descending colon. The tumor penetrated the colonic serosa and invaded the left side of the diaphragm. A left hemicolectomy was performed.

Outcomes: After the operation, the patient recovered smoothly and was discharged on postoperative day 14. It's been over 3 years now, CT and colonoscopy assessments show no recurrence or metastasis.

Lessons: This case serves as a reminder to test for pathogens in patients with an unexplained empyema. If normal intestinal bacteria are detected, the empyema may be derived from intestinal disease. In addition, an abdominal examination should be performed in patients with an empyema of unknown origin.

Abbreviations: CRP = C-reactive protein, CT = computerized tomography.

Keywords: colon cancer, colopleural fistula, thoracic empyema

1. Introduction

Primary or secondary colorectal tumors cause many symptoms, including abdominal pain, fever, and constipation. Infections, although rare, can in some instances be the sole clue to the presence of a malignancy. Among infections, an empyema caused by colon cancer is a rare but potentially life-threatening condition.^[1–5] Here, we report a case of empyema resulting from a colopleural fistula secondary to colon cancer.

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R.L. and G.Z. collected the patient's clinical data and wrote the article. They contributed equally to the article. G.Z. designed the study.

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Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the editor of this journal. The China-Japan Friendship Hospital research ethics committee approved this anonymous report.

The authors report no conflicts of interest.

^a Department of Emergency Medicine, ^b Department of General Surgery, China-Japan Friendship Hospital, Beijing, China.

* Correspondence: Guoqiang Zhang, Department of Emergency Medicine, China-Japan Friendship Hospital, YinghuaDongjie, Hepingli, Beijing 100029, China (e-mail: zhangchong2003@vip.sina.com).

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2. Case report

A 42-year-old man was brought to our Emergency Department for chest pain with dyspnea and fever. One day before, the patient had a sudden onset of sharp pain in the left chest with dyspnea, chest distress, palpitation, and fever. He had no medical history, history of genetic disease, or past mental illness. On physical examination, the patient's vitals were as follows: body temperature, 39.0°C; heart rate, 140 beats/min; respirations, 45 breaths/min; blood pressure, 115/65 mmHg; and oxygen saturation, 85% (no supplemental oxygen). The patient presented with tachypnea, decreased respiratory mobility, and vocal fremitus in the left chest. Auscultation of the left lung revealed diminished breath sounds and moist rales on the dorsal side in the supine position. The right lung examination was normal. His abdomen was soft and not tender to palpation, with normoactive bowel sounds. A blood test revealed severe leukocytosis (white blood cell count, 35×10^9 cells/L; neutrophils, 91.7%; platelets, 790×10^9 cells/L; C-reactive protein, 1522 mg/L; procalcitonin, 35.1 ng/mL) and hypoxemia (pO₂, 58 mmHg; lactic acid, 7.0 mmol/L). An electrocardiography showed sinus tachycardia. A chest radiograph and computed tomography (CT) scan showed a large left pleural effusion with a shift of the mediastinum and trachea to the right side (Fig. 1). The patient underwent thoracentesis, and approximately 2000 mL of foul-smelling, muddy fluid was drained. One day later, a closed thoracic drainage was performed because the drainage was obstructed. The symptoms of dyspnea and chest pain improved after this procedure. The patient's body temperature dropped to 37.5°C 24 h after admission, and the white blood cell count and CRP declined to 14×10^9 cells/L and 62.5 mg/dL, respectively, on day 7 after the closed thoracic drainage. A culture of the pleural effusion revealed the presence of *Escherichia coli* and *Enterococcus faecium*. On day 10 after

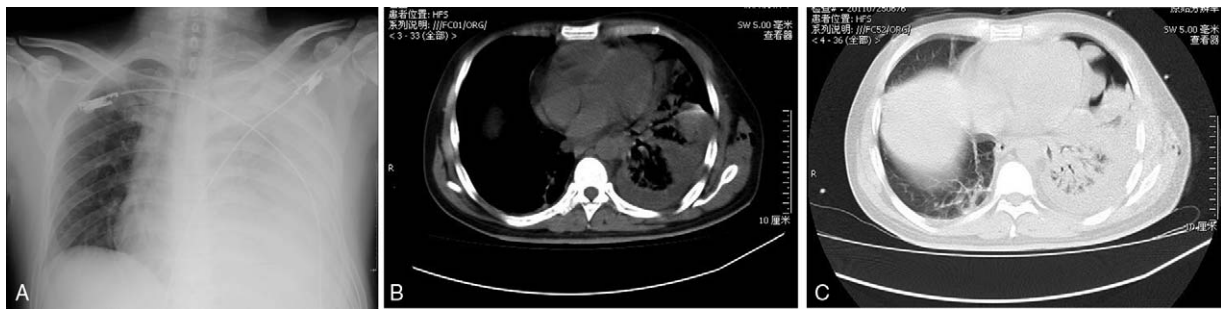


Figure 1. Chest radiological images. (A) A chest radiograph showed a large left pleural effusion with a shift of the mediastinum and trachea to the right side. (B and C) A chest computed tomography scan showed a large left pleural effusion with left pulmonary consolidation and atelectasis.

admission, the volume of chest drainage had been less than 10 mL for 3 consecutive days, and no pleural effusion was detected by chest ultrasound, so the drainage tube was removed.

Two weeks later, the patient began to show abdominal distention and abdominal paroxysmal colic. The patient's body temperature rose to 39.0°C. A blood test revealed leukocytosis (white blood cell count, 26×10^9 cells/L; neutrophils, 93.9%). A standing plain abdominal radiograph showed multiple intra-abdominal gas-liquid planes. An abdominal CT scan showed a mass in the splenic flexure of the colon, with local wall thickening, luminal stenosis, and proximal intestinal expansion (Fig. 2). A colonoscopic biopsy showed a tubular adenoma with severe dysplasia. During laparotomic surgery, we found a moderate amount of clear yellowish ascites and an 8 cm × 6 cm tumor located in the splenic flexure of the descending colon (Fig. 3). The tumor penetrated the colonic serosa and invaded the left side of the diaphragm. Liver metastases were not found. The patient underwent a left hemicolectomy with dissection of the lymph nodes and the invaded left diaphragm. In addition, a transverse colostomy was performed. The postoperative pathology showed that the tumor was a moderately differentiated adenocarcinoma (Fig. 4), size 7.5 × 4.0 × 1.5 cm, which penetrated the surface of the visceral peritoneum, with no lymph node metastasis (0/47). After the operation, the patient recovered smoothly and was discharged on postoperative day 14. The final diagnoses were empyema caused by colo-pleural fistula and colon

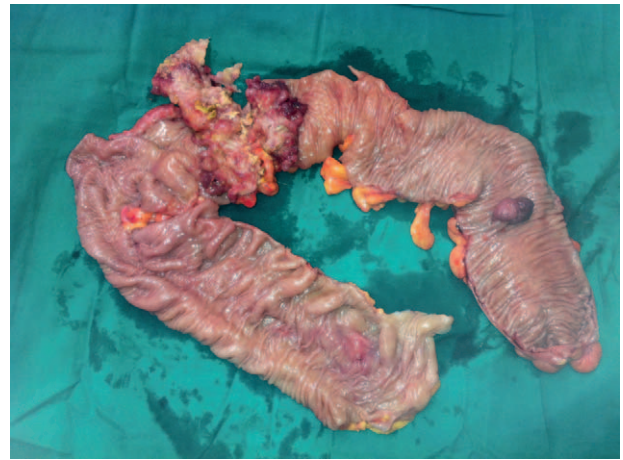


Figure 3. The surgical specimen showed a cauliflower-like tumor located in the splenic flexure of the colon. The tumor penetrated the serosa. A polyp is located in the sigmoid colon.

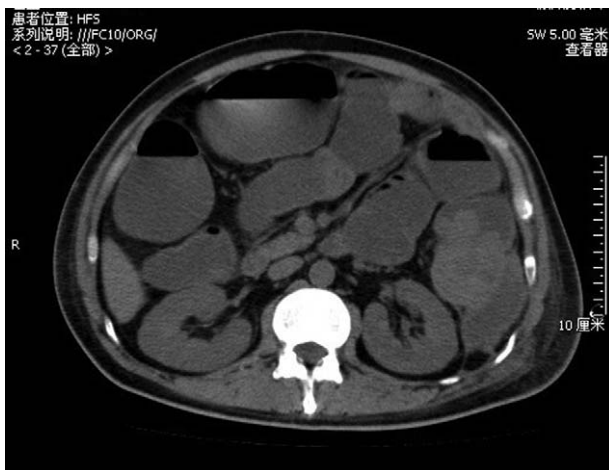


Figure 2. Abdominal radiological images. An abdominal computed tomography scan showed a mass in the splenic flexure of the colon, with local wall thickening, luminal stenosis, and proximal intestine expansion.

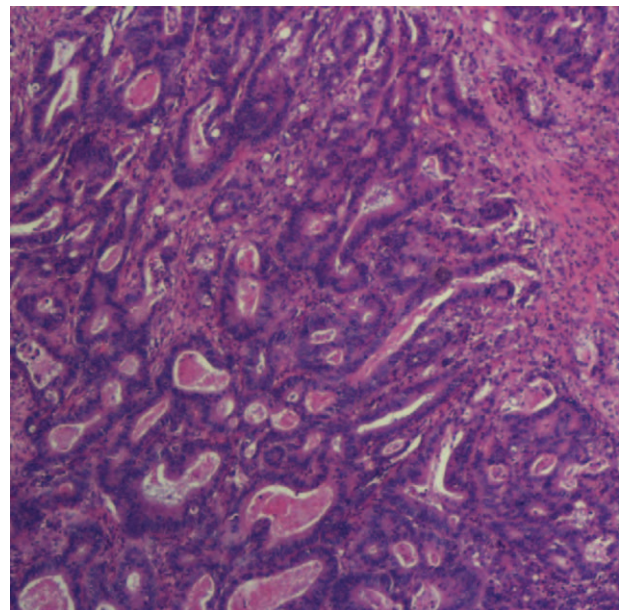


Figure 4. A histological examination showed that the excised tumor tissue was composed of moderately differentiated adenocarcinoma cells. Hematoxylin-eosin staining, 40× magnification.



Figure 5. The timeline for this case.

Table 1**Summary of reported cases of thoracic empyema associated with colorectal carcinoma.**

Authors	Age, y	Sex	Site of empyema	Site of tumor	Bacterial culture	Cause*
Bentley and Lepper (1969) ^[1]	74	Male	R	Cecum	<i>Escherichia coli</i> , <i>Clostridium perfringens</i>	Aspiration pneumonia
	53	Male	R	Sigmoid	<i>Clostridium perfringens</i>	Bacteremia after tumor biopsy
Panwalker (1988) ^[2]	71	Male	R	Cecum	<i>Escherichia coli</i> , <i>Bacteroides fragilis</i>	Tumor perforation/retroperitoneal abscess
Ishiwa et al (1995) ^[3]	51	Female	L	Transverse (recurrence of gastric cancer)	N.D.	Fistula of diaphragm from colon tumor
Teruuchi et al (2000) ^[4]	63	Male	L	splenic flexure of transverse colon	<i>Enterobacter cloacae</i> , <i>Gemella morbillorum</i> <i>Bacteroides thetaiotamicron</i> Anaerobic GNR	colopleural fistula
Osada et al (2001) ^[5]	47	Male	L	Descending colon (post-operative recurrence)	<i>Streptococcus bovis</i>	Bacteremia caused by necrotic tumor tissue

GNR=gram-negative rod, L=left, N.D.=not described in the literature, R=right.

* Speculate cause of empyema.

cancer (pT4bN0M0 IIC). The patient received follow-up once every 6 months after the operation. More than 3 years after the surgery, CT and colonoscopy assessments have shown no recurrence or metastasis.

The timeline for this case is shown in Figure 5.

3. Discussion

Infections in patients with colorectal cancer may be secondary to colorectal cancer perforation or invasion of tissues or organs that are in close proximity to the tumor. In the literature, the rate of abscess formation due to colon cancer perforation is 3–4%.^[6] The perforation of colorectal cancer usually occurs in the abdominal cavity. In rare cases, it can be manifested as an abdominal abscess, an inflammatory mass in the groin, necrotizing fasciitis, or a subcutaneous abscess.^[4,7] If the tumor is located at the splenic flexure of the colon, it may invade the left diaphragm. After perforation, the tumor can cause a left subphrenic abscess, a perisplenic abscess, or even left-sided empyema. Empyema associated with colon cancer has rarely been reported in the literature. To our knowledge, only 6 cases have been reported (Table 1).^[1–5] Only 2 cases of empyema caused by a colo-pleural fistula have been reported in Japanese literature.^[3,4] In both cases, the tumors were located in the transverse colon, and the empyema occurred in the left thoracic cavity. In our patient, the thoracic empyema was also caused by a colo-pleural fistula. The tumor tissue invaded the left diaphragm, resulting in a colo-pleural fistula and consequent empyema formation. The intraoperative findings and postoperative pathological results confirmed the diagnosis.

Reviewing the whole course of the case, the patient was initially diagnosed with empyema, but its cause was difficult to identify. A pleural fluid culture revealed the growth of *Escherichia coli* and *Enterococcus faecium*. This result confused us until intestinal obstruction was detected. Ultimately, we identified cancer located

in the splenic flexure of colon as the cause of the empyema. Because the patient was previously in good health with no significant abdominal pain, bloating, bloody stools, or other gastrointestinal symptoms, and furthermore, because the empyema occurred suddenly and severely, the abdominal symptoms and signs were obscured. This presentation caused difficulties in the diagnosis and treatment.

This case serves as a reminder that pathogens should be tested for in patients with unexplained empyema. If normal intestinal bacteria are detected, the empyema may be derived from intestinal disease. In addition, an abdominal examination should be performed in patients with an empyema of unknown origin.

Acknowledgments

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