

Single Case

Retroperitoneal and Mediastinal Emphysema after Sigmoid Colon Resection

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Keywords

Colorectal surgery · Diverticulum · Emphysema · Mediastinum · Retroperitoneum

Abstract

Retroperitoneal and mediastinal emphysema after colon resection is extremely rare, especially in the absence of anastomotic leakage. The feasibility and safety of conservative treatment for this complication are unknown. We report a patient who underwent open sigmoid colon resection for colon cancer and developed retroperitoneal and mediastinal emphysema that was not caused by anastomotic leakage. Retroperitoneal and mediastinal emphysema occurred as a result of diverticular perforation. We were able to treat this patient successfully with conservative management.

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Introduction

Free air is often seen in the abdominal cavity as a result of anastomotic leakage after colon resection, but retroperitoneal and mediastinal emphysema after colon resection is extremely rare [1–4]. Despite its rarity, surgeons must understand how to treat this complication.

There are case reports describing retroperitoneal and mediastinal emphysema after colon resection resulting from anastomotic leakage; all reported patients underwent surgical treatment [2–4]. To our knowledge, there are no reports of retroperitoneal and mediastinal emphysema occurring after colon resection that was not caused by anastomotic leakage, and so the feasibility and safety of conservative treatment for this presentation remain unknown.

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This report describes our experience with a patient who underwent open sigmoid colon resection for colon cancer and developed retroperitoneal and mediastinal emphysema that was not caused by anastomotic leakage. We were able to treat this patient successfully with conservative management. The CARE Checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see www.karger.com/doi/10.1159/000529282).

Case Presentation

A 73-year-old man with no significant past medical history had a mass of the sigmoid colon noted as an incidental finding on computed tomography (CT) performed for another indication. Follow-up investigation revealed a diagnosis of sigmoid colon cancer and cholelithiasis; he underwent open cholecystectomy and resection of the sigmoid colon with D3 lymph node dissection [5]. A drain was placed from the left lateral abdomen into the anastomosis. Histologic examination of the tumor showed well-differentiated adenocarcinoma of the sigmoid colon; the pathologic classification was T3N1bM0, stage IIIB, according to the Union for International Cancer Control Classification of Malignant Tumours, 8th edition [6].

The patient began oral intake on postoperative day (POD) 2. On POD 3, he experienced mild nausea; routine radiography revealed areas of subcutaneous, retroperitoneal, and mediastinal emphysema (online suppl. Fig. 1). CT confirmed these findings (Fig. 1), showing a massive amount of air in the retroperitoneum around the pancreas; a small amount of air was also present at the dorsal descending colon. There were no fluid or air collections around the anastomosis on CT, and the drainage was serous in nature; thus, anastomotic leakage was not suspected. Laboratory analysis showed a white blood cell count (WBC) of 14,100/ μL and a C-reactive protein (CRP) of 18.36 mg/dL.

The cause of the retroperitoneal and mediastinal emphysema was unclear at that time, but because the patient was doing well overall, we opted for conservative management. We stopped oral intake because we considered the possibility of intestinal perforation other than anastomotic leakage, and we administered intravenous cefepime and metronidazole. Anastomotic leakage was unlikely, but we considered the possibility of inhaled air from the drain insertion site, so we removed the drain on POD 7. Nausea resolved on POD 7, and the patient resumed eating. On POD 11, laboratory analysis showed a WBC of 8,700/ μL and a CRP of 1.34 mg/dL, and we changed his antibiotics to oral levofloxacin and metronidazole. He experienced no further complications and was discharged on POD 15 with a WBC of 5,600/ μL and a CRP of 0.42 mg/dL.

On POD 23, the patient was asymptomatic, but the CRP level elevated to 6.48 mg/dL (WBC: 5,800/ μL); thus, we performed CT (Fig. 2). By this time, the mediastinal emphysema and retroperitoneal emphysema around the pancreas had resolved, but the patient had developed localized fluid and air collections in the retroperitoneum, contiguous with the descending colon. Retrospective review of the CT from POD 3 revealed small fluid and air collections at that location (Fig. 1c); these had grown significantly larger by POD 23 (Fig. 2c), suggesting perforation of the descending colon. The perforation site was at the same location as a diverticulum noted on the patient's preoperative CT (Fig. 3). Thus, we presumed perforation of this diverticulum of the descending colon, which then caused retroperitoneal and mediastinal emphysema. The patient was readmitted and underwent percutaneous drainage of the retroperitoneal abscess. The patient was discharged on POD 43 with a WBC of 3,500/ μL and a CRP of 0.58 mg/dL. At the time of last follow-up, 7 months after the original surgery, he was doing well.

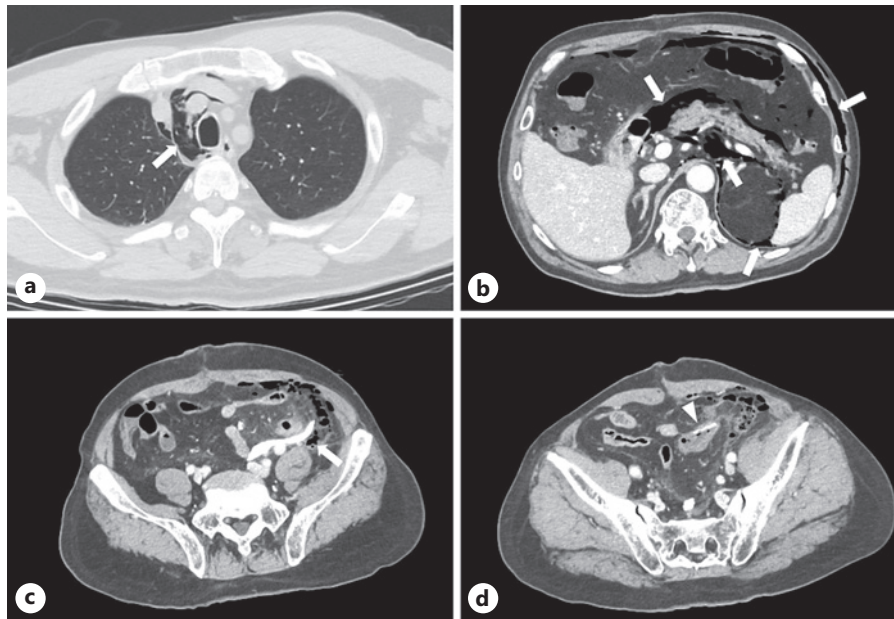


Fig. 1. Computed tomography on postoperative day 3 shows mediastinal emphysema (a), retroperitoneal emphysema around the pancreas (b), retroperitoneal emphysema at the dorsal descending colon (c), but no fluid or air collections around the anastomosis (d). Arrows: areas of subcutaneous, retroperitoneal, and mediastinal emphysema. Arrowhead: area of the anastomosis.

Discussion

This case report highlights two important clinical issues: first, retroperitoneal and mediastinal emphysema can occur from perforation of a diverticulum after sigmoid colon resection, and second, this complication can be treated conservatively if the patient is doing well overall. Most complications after colon surgery develop in the abdominal cavity rather than in the retroperitoneum; retroperitoneal and mediastinal emphysema is extremely rare [1–4]. All reported cases of retroperitoneal and mediastinal emphysema after colon resection resulted from anastomotic leakage (Table 1) [2–4]. Retroperitoneal emphysema is thought to result from air in the colon being under higher pressure than in the retroperitoneum and thus migrating through any colonic defect because of the pressure gap; mediastinal emphysema occurs because of the points of communication between the retroperitoneum and the mediastinum [7–9]. It is plausible that anastomotic leakage leads to retroperitoneal fluid and air collections, followed by retroperitoneal emphysema, then mediastinal emphysema. However, our patient displayed no evidence of anastomotic leakage on CT, and the drainage was serous in nature. Our patient did have localized fluid and air collections in the retroperitoneum that were contiguous with the descending colon and apparently in the same location as the diverticulum noted on his preoperative CT. Therefore, we presumed that diverticular perforation was the cause of his retroperitoneal emphysema.

While our patient had fluid and air collections at the dorsal descending colon on POD 3, these were too small to suspect diverticular perforation at that time. These collections increased over time and were evident on the CT performed on POD 23. We assumed that the diverticular perforation hole was small and in contact with the retroperitoneum; thus, air in the colon spread rapidly to the retroperitoneum and mediastinum, followed by slow leakage of fluid from the colon. This process presumably resulted in the delayed abscess. It remains unknown whether the diverticular perforation developed in response to an intraoperative

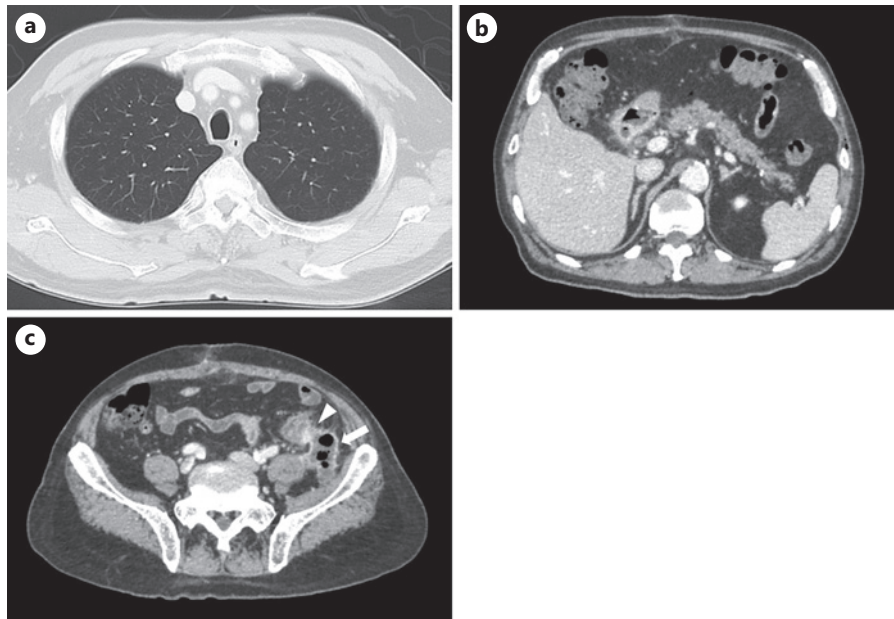


Fig. 2. Computed tomography on postoperative day 23 shows resolution of the mediastinal emphysema (a), resolution of the retroperitoneal emphysema around the pancreas (b), and development of localized fluid and air collections in the retroperitoneum, contiguous with the descending colon (c). Arrow: area of the fluid and air collections in the retroperitoneum. Arrowhead: area of the continuity with the descending colon and fluid and air collections in the retroperitoneum.



Fig. 3. Preoperative computed tomography shows a diverticulum of the descending colon, corresponding to the site of postoperative perforation. Arrow: diverticulum.

maneuver on our part or due to a spontaneous event. There are several reports of retroperitoneal and mediastinal emphysema caused by diverticular perforation; thus, it is reasonable to assume that diverticular perforation was the cause for our patient as well [10–12].

Surgical treatment is frequently performed for retroperitoneal and mediastinal emphysema, but conservative treatment is also reported [7–12]. There are no reports of abscess development at the site of emphysema. Our patient's emphysema had mostly resolved by POD 23, and he was doing well overall. Therefore, retroperitoneal and mediastinal emphysema related to the diverticular perforation can be treated as a localized abscess. Conservative treatment is commonly performed for the diverticular perforation when the abscess is localized [13–15].

In the present case, CT was not performed before the first discharge because the patient was doing well overall with conservative treatment. If CT was performed before the first discharge and the retroperitoneal abscess was detected early, readmission might have been

Table 1. Retroperitoneal and mediastinal emphysema after colon surgery

Authors	Age	Sex	Surgical procedure	POD	Cause of emphysema	Treatment	Outcome
Anaye et al. [2]	80	M	Open partial descending colon resection	15	Anastomotic leakage	Relaparotomy	Unknown
Souche et al. [3]	73	M	Laparoscopic left colectomy	4	Anastomotic leakage	Relaparotomy	Survive
Al Obeed [4]	62	M	Laparoscopic sigmoid colon resection	5	Anastomotic leakage	Relaparotomy	Survive
Present authors	73	M	Open sigmoid colon resection	3	Diverticular perforation	Conservative	Survive

POD, postoperative day from surgery to emphysema appearance.

prevented by continuing oral antibiotics. Therefore, CT follow-up is important in cases of retroperitoneal and mediastinal emphysema.

In conclusion, retroperitoneal and mediastinal emphysema can occur as a result of diverticular perforation after open sigmoid colon resection; surgeons must consider this possibility when patients develop this complication. Conservative management is acceptable for this complication if the patient is in good general condition.

Statement of Ethics

Ethical review board of Inazawa Municipal Hospital approved the publication of this case report (Approval No. 2022-7). Written informed consent was obtained from the patient for publication of this case report and the accompanying images.

Conflict of Interest Statement

The authors have no competing interests to declare.

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Author Contributions

All authors contributed to the concept of this case report. Rs.Y. drafted the manuscript. K.Y. performed the surgery and conducted postoperative management. M.A., Y.T., A.T., K.K., and Rz.Y. supervised the writing of the report. All authors participated in interpreting the results and writing the report. All authors approved the final version of the manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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