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Case Report

Multiple cavitary lung lesions from colorectal cancer responding to chemotherapy

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ABSTRACT

Lung metastasis is an uncommon cause of multiple cavitary lung lesions. Herein, we report a case of multiple cavitary lung lesions of colorectal cancer that responded to chemotherapy. An 81-year-old woman was referred to our hospital for abdominal pain. Computed tomography revealed multiple cavitary lung lesions. The patient was diagnosed with lung metastases from colorectal cancer with a lower gastrointestinal endoscopy and bronchoscopy. Following chemotherapy, the cavitary lung lesions shrank. Lung metastases from colorectal cancer may appear as multiple cavitary lung lesions, which may be misdiagnosed as infections. Clinicians should consider lung metastases when multiple cavitary lung lesions are detected.

1. Introduction

Lung metastasis with cavitary lesions is rare [1]. It is sometimes misdiagnosed as an infection, leading to a poor prognosis [2]. We report a case of multiple cavitary lung metastases from colorectal cancer that responded to chemotherapy.

2. Case report

An 81-year-old woman was referred to our hospital with abdominal pain. The patient had never smoked and had been treated for asthma and hypertension. The patient had no symptoms of coughing, phlegm, or dyspnea. Her vital signs were as follows: temperature, 36.6 °C; pulse, 89/min; respiration, 18/min; and blood pressure, 172/83 mmHg. Pulse oximetry in room air showed an oxygen saturation of 94%. There was no abnormality in respiratory sounds and tenderness on the left lower abdomen. The blood test results were *C*-reactive protein level: 2.90 mg/dL, white blood cell count: 10700/μL, carcinoembryonic antigen: 5.9 ng/mL, and carbohydrate antigen 19–9: 154.0 pg/mL (Table 1). Computed tomography (CT) showed multiple cavitary lesions with consolidation in the S^3 region of the left lung and the S^1, S^2, S^4, S^6, and S^{10} regions of the right lung (Fig. 1A–C) and wall thickening in the sigmoid region of the rectum (Fig. 1D).

After admission, the patient was initially diagnosed with septic pulmonary embolism and treated with ampicillin/sulbactam (12 g/day). The sputum culture showed normal respiratory flora, and the blood cultures were negative. A lower gastrointestinal en-

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Table 1
Laboratory data on admission.

Hematology			Biochemisty			Serology		
WBC	10,700	/μL	TP	7.6	g/dL	CRP	2.90	mg/dL
Neut.	71.5	%	Alb	2.9	g/dL	CEA	5.9	ng/mL
Lymph.	18.0	%	T-Bil	0.5	mg/dL	CA19-9	154.0	pg/mL
Mono.	8.3	%	AST	30	U/L	CYFRA	5.0	U/mL
Eosin.	1.6	%	ALT	13	U/L	ProGRP	42.0	pg/mL
Baso.	0.6	%	LDH	268	U/L	KL-6	258.0	U/mL
RBC	433 × 10^4	/μL	CK	81	U/L	SP-D	65.8	ng/mL
Hb	10.8	g/dL	γ-GTP	43	U/L	ANA	<1:40	titer
Ht	32.9	%	Na	140	mEq/L	MPO-ANCA	<1.0	U/mL
Plt	42.5	/μL	K	3.4	mEq/L	PR3-ANCA	<1.0	U/mL
Coagulation			Cl	101	mEq/L	β-D glucan	≤0.5	pg/mL
PT-INR	1.00		Ca	9.5	mg/dL	Aspergillus Ag	(−)	
aPTT	35.4	sec	BUN	17	mg/dL	T-SPOT.TB	(−)	
D-dimer	1.5	μg/mL	Cr	0.63	mg/dL	Anti-GPL-core IgA antibody	<0.5	U/mL

WBC: white blood cells, Neut: neutrophils, Lymph: lymphocytes, Mono: monocytes, Eosin: eosinophils, Baso: basophils, RBC: red blood cells, Ht: hematocrit, Plt: platelets, PT-INR: prothrombin time – international normalized ratio, aPTT: activated partial thromboplastin time; TP: total protein, Alb: albumin, T-Bil: total bilirubin, AST: aspartate aminotransferase, ALT: alanine transaminase, LDH: lactate dehydrogenase, CK: creatine kinase, GTP: glutamyl transferase, BUN: blood urea nitrogen, Cr: creatinine, CRP: *C*-reactive protein, CEA: carcinoembryonic antigen, CA19-9: carbohydrate antigen 19–9, CYFRA: cytokeratin 19 fragment antigen, ProGRP: pro-gastrin releasing peptide, KL-6: sialylated carbohydrate antigen KL-6, SP-D: surfactant protein D, ANA: antinuclear antibodies, ANCA: antineutrophil cytoplasmic antibodies, MPO: myeloperoxidase, PR3: proteinase3, Ag: antigen, T-SPOT.TB: the measurement of enzyme-linked immunospot assay for tuberculosis, GPL: glycopeptidolipid, IgA: immunoglobulin.

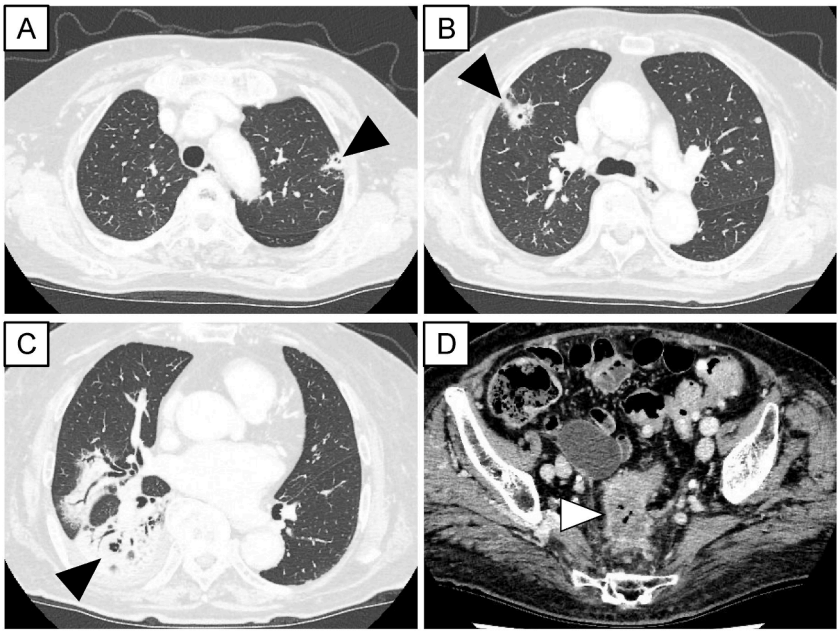

Fig. 1. Computed tomography on admission shows multiple cavitary lung lesions and wall thickening in the sigmoid region of the rectum. Representative cavitary lesions in the (A) S^3 region of the left lung, (B) S^3, and (C) S^6 region of the right lung (black arrowheads). (D) Wall thickening in the rectum (white arrowhead).

doscopy was performed on the 3rd day after admission. A tumor was found in the rectum (Fig. 2A), and histopathology revealed well/moderately-differentiated tubular adenocarcinoma (Fig. 2B). The patient was then diagnosed with rectal cancer.

A follow-up chest CT was performed on the 10th day after admission. Consolidation decreased, but multiple cavitary lung lesions persisted (Fig. 3). On the 11th day, a transbronchial lung biopsy of the S^6 lesion was performed. Histopathology revealed well-differentiated adenocarcinoma (Fig. 4A), and immunostaining showed cytokeratin (CK) 7−/CK20 + /thyroid transcription factor 1 (TTF-1) −/caudal-related homeobox transcription factor 2 (CDX2) + (Fig. 4B–E). Considering this, the patient was diagnosed with lung metastasis from colorectal cancer.

The patient was discharged after a colostomy for bowel obstruction due to colorectal cancer. The patient was treated with bevacizumab (7.5 mg/day) and capecitabine (3000 mg/day). The follow-up CT after three cycles of chemotherapy showed that all multiple cavitary lung lesions had decreased (Fig. 5).

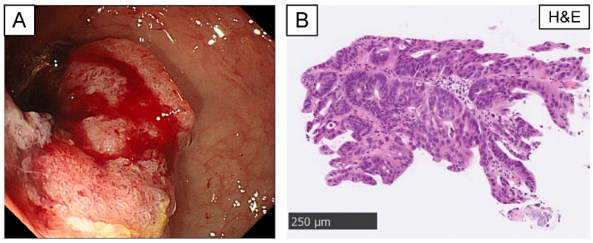

Fig. 2. The tumor found in the rectum is colorectal cancer. Tumor detected by lower gastrointestinal endoscopy. (B) Hematoxylin and eosin stain (H&E) staining of the tumor, × 200.

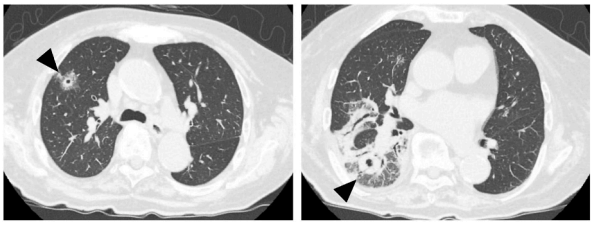

Fig. 3. Multiple cavitary lung lesions remained after antibiotic treatment. Representative persistent cavitary lung lesions (black arrowheads).

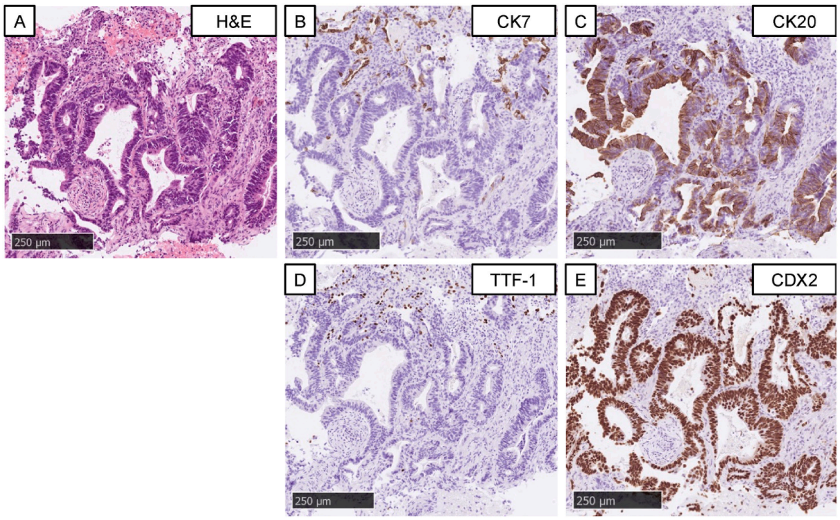

Fig. 4. The cavitary lung lesion in the S^6 region is a lung metastasis from colorectal cancer. Histopathology or immunostaining showing (A) hematoxylin and eosin staining (H&E), × 200, (B) cytokeratin 7 (CK7), × 200, (C) cytokeratin 20 (CK20), × 200, (D) thyroid transcription factor-1 (TTF-1), × 200, (E) caudal-related homeobox transcription factor 2 (CDX2), × 200.

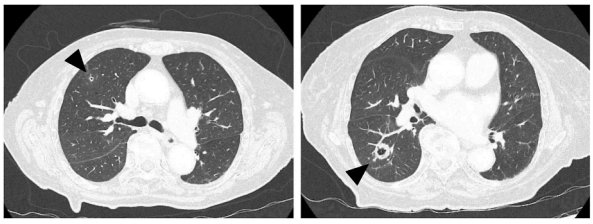

Fig. 5. Multiple lung cavitary lesions shrank after chemotherapy. Representative reduced cavitary lung lesions (black arrowheads).

3. Discussion

In this report, we highlight two important clinical issues. First, lung metastases from colorectal cancer (LMCC) may show multiple cavitary lung lesions. Second, LMCC with multiple cavitary lung lesions may be misdiagnosed as an infection.

LMCC may present as multiple cavitary lung lesions. The frequency of lung metastasis is 5–10% in patients with colorectal cancer, and it is typically a solid nodule [3]. Cavitary lung lesions are mainly caused by infections (bacteria, viruses, fungi, mycobacteria, and

Table 2
Literature review of cases of multiple cavitary lung lesions from colorectal cancer.

Case	Age	Sex	History of chemotherapy	Initial diagnosis	Duration of treatment for infection	Reference
1	49	M	None	Not mentioned → Hospital-acquired pneumonia	About six weeks	[2]
2	78	F	Postoperative adjuvant chemotherapy two years before lung lesions appearance	Invasive aspergillosis Staphylococcal pneumonia Nocardiosis	Not mentioned	[7]
3	60	F	None	Tuberculosis	12 weeks	[8]

parasites), collagen disease (rheumatoid arthritis and granulomatosis with polyangiitis), and cancer (primary or secondary) [4]. Only 4% of lung metastases are estimated to produce cavitary lung lesions, 69% are from squamous cell carcinoma, and 31% are from adenocarcinoma [1]. Chemotherapy with an angiogenesis inhibitor has been reported to cause cavitation in LMCC with solid nodules [5,6]. To our knowledge, there have been only three cases of LMCC with multiple cavitary lung lesions before chemotherapy (Table 2). In this case, CT showed multiple cavitary lung lesions, and the patient was diagnosed with LMCC by bronchoscopy.

LMCC with multiple cavitary lung lesions may be misdiagnosed as an infection. Notably, all three reported cases of LMCC with multiple cavitary lung lesions were initially diagnosed as infections [2,7,8]. In a study of 102 patients with multiple cavitary lung lesions, 73 (71.6%) were diagnosed with infection and 20 (19.6%) with lung metastases, and this study showed that a greater number of cavitary lesions and the absence of centrilobular nodules were associated with a higher probability of malignancy [9]. Differentiating multiple cavitary lung lesions showing a random pattern on CT (ex, lung metastases, septic pulmonary embolism, and miliary tuberculosis) is complex [10]. It requires a comprehensive approach based on clinical course, comorbidity, symptom, laboratory data, and culture study [4]. In this case, the patient was initially treated with antimicrobials. However, there was little sign of infection, and since a tumor was found on a lower gastrointestinal endoscopy, a bronchoscopy was immediately performed, leading to the diagnosis of LMCC.

Cancers other than colorectal cancer also show multiple cavitary lung lesions. Multiple cystic or cavitary lung lesions before chemotherapy are reported in gallbladder cancer [11–13], breast cancer [14], bladder cancer [15], and renal cell carcinoma [16]. The mechanism by which a lung tumor forms a cavity is likely oligemic necrosis of the tumor interior, tumor invasion into preexisting cavitary lesions, and abscess formation due to bronchial obstruction [17]. Cavitary lesions in lung tumors are associated with poor outcomes [18]. Various cancers can have multiple cavitary lung lesions, and a delay in diagnosis may lead to poor outcomes. To the best of our knowledge, this is the first reported case of LMCC with multiple cavitary lung lesions that responded to chemotherapy.

4. Conclusion

In conclusion, LMCC can present with multiple cavitary lung lesions and be misdiagnosed as an infection. Various cancers, including colorectal cancer, may produce multiple cavitary lung lesions, and delayed diagnosis could lead to poor outcomes. Clinicians should consider lung metastases when multiple cavitary lung lesions are detected.

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Declaration of competing interest

The authors declare that there are no conflicts of interest.

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