

# Solitary colonic metastasis from primary lung adenocarcinoma first presenting as intestinal obstruction

## A case report

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### Abstract

**Rationale:** The brain, liver, adrenal glands, and bone are the most common sites of metastatic disease in patients with lung cancer. Symptomatic gastrointestinal metastases are rare. In the present report, we describe a rare case of a patient with intestinal obstruction due to solitary colonic metastasis from primary lung adenocarcinoma, wherein the intestinal obstruction was the first symptom of lung cancer.

**Patient concerns:** A 74-year-old man was admitted to the emergency room with abdominal pain and vomiting, and abdominal computed tomography (CT) indicated obstruction of the ascending colon due to a huge mass.

**Diagnosis:** The ascending colon cancer was found to be a metastatic adenocarcinoma based on the results of the pathology report. Chest CT and positron emission tomography-CT were performed to identify the cancer origin site. Moreover, immunohistochemical staining of the tissue specimen for thyroid transcription factor 1, cytokeratin 7 (CK7), and CK20 and CT-guided gun biopsy of the lung mass confirmed the presence of an adenocarcinoma that originated from the lung.

**Intervention:** Right hemicolectomy was performed as the primary treatment.

**Outcomes:** The patient recovered without any problems due to the surgery itself. However, malignant pleural effusion deteriorated, and no additional palliative chemotherapy was performed.

**Lessons:** Patients with malignant bowel obstruction along with lung infiltration should be suspected of not only colon cancer with lung metastasis, but also lung cancer with colon metastasis.

**Abbreviations:** CK = cytokeratin, CT = computed tomography, PET = positron emission tomography, TTF-1 = thyroid transcription factor 1.

**Keywords:** colonic metastasis, colonic obstruction, metastatic adenocarcinoma, primary lung cancer

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The study was approved by the institutional ethics board of Kangwon National University Hospital.

Written informed consent was obtained from the patient for publication of this case presentation and accompanying images.

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## 1. Introduction

Lung cancer is the most common cause of cancer-related mortality worldwide.<sup>[1]</sup> The brain, liver, adrenal glands, and bone are the most common sites of metastatic disease in patients with lung cancer.<sup>[2]</sup> The reported incidence of symptomatic gastrointestinal metastases is 0.2% to 1.7%.<sup>[3–6]</sup> In particular, there have been no reports of cases of lung cancer wherein gastrointestinal symptoms developed as the first presenting symptom as a result of solitary malignant bowel obstruction. In the present report, we describe 1 such case.

## 2. Case report

A 74-year-old man was admitted to the emergency room with abdominal pain and vomiting. The abdominal pain began on the morning of the hospitalization day, and the patient vomited even after drinking water. Abdominal radiography performed at a nearby hospital indicated the presence of ileus. After the insertion of a nasogastric tube, the patient was referred to a larger hospital, and was admitted to our emergency room. The patient experienced a reduction in weight of 9 kg during the past year.

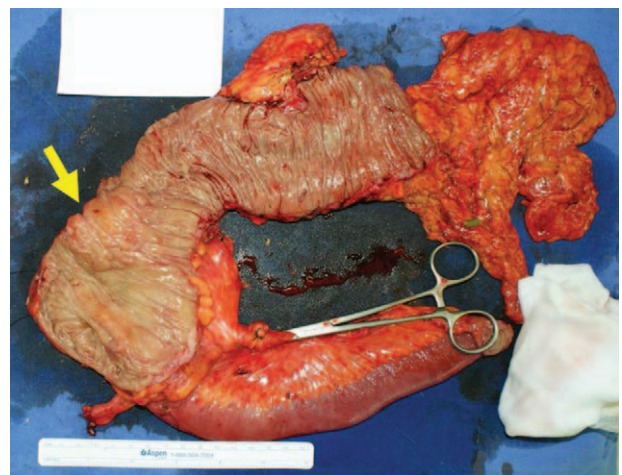


**Figure 1.** Abdominopelvic computed tomography scans indicate the obstruction of the proximal ascending colon with segmental wall thickening. (A) Transverse section. (B) Coronal section.

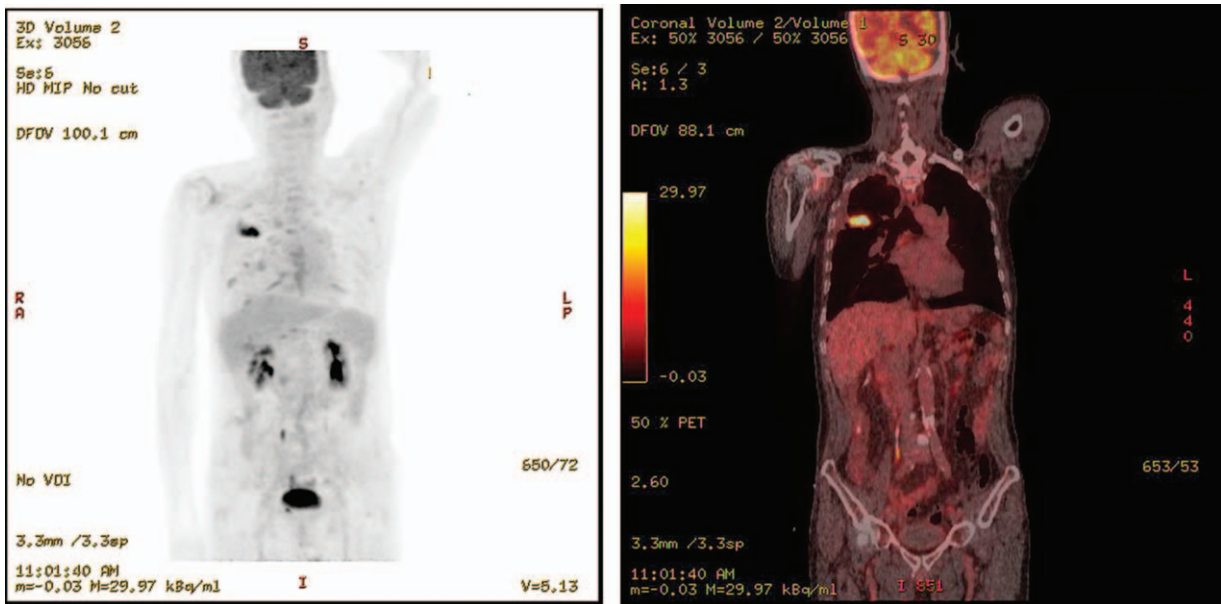
His vital signs on admission included: blood pressure, 130/80 mm Hg; heart rate, 72 beats/min; respiratory rate, 20 breaths/min; and body temperature, 36.5°C. The patient also had a history of coronary stent insertion performed for angina at another hospital 10 months previously after he presented with dyspnea; moreover, the patient had a history of hypertension and diabetes, but had no abdominal surgical history. A physical examination in the emergency room indicated distension of the overall abdomen, hyperactive bowel sounds, and tenderness in the right upper abdominal quadrant. His white blood cell count was 16,700/ $\mu$ g (neutrophils, 85%), C-reactive protein level increased to 3.791 mg/dL, blood urea nitrogen level was 38.3 mg/dL, and creatinine level was 1.1 mg/dL. As mechanical ileus was suspected, abdominal computed tomography (CT) was performed, which indicated an enhanced obstructive mass 5  $\times$  5 cm in the cecum, and enlargement of the lymph nodes around the mass (Fig. 1). The patient was diagnosed with malignant bowel obstruction and emergency surgery was performed. Since infiltrates were noted in the right upper lung field on chest radiography, as part of the preoperative work up, we suspected the presence of pneumonia. However, as symptoms such as cough, sputum, and fever were not observed at that time, an emergency surgery was considered to be more beneficial rather than proceeding with management of the pneumonia.

During surgery, the mass was found to be a hard irregular mass, 5  $\times$  5  $\times$  2 cm in size, that infiltrated the retroperitoneal fat of the ascending colon; moreover, enlarged lymph nodes were observed along the ileocolic vessel, and no peritoneal seeding was observed. Right hemicolectomy was performed with 20-cm proximal and distal safe margins from the tumor, and D2 lymph node dissection was performed. However, on visual examination of the specimen, the mucosa was unexpectedly found to be intact, and the mass appeared to have originated from the outside of the lumen (Fig. 2). Hence, metastatic colon cancer was suspected, and an assessment of the pathology test result was required.

Results of the pathologic examination indicated the presence of a moderately differentiated adenocarcinoma without mucosal involvement. The tumor had infiltrated the submucosa, muscle, and pericolic fat, and penetrated the visceral peritoneum; metastasis was identified in 2 of 25 lymph nodes. In addition, lymphovascular invasion and perineural invasion were also identified. Hence, additional immunohistochemical staining was performed, and further chest CT and positron emission tomography (PET)-CT examinations were conducted. The presence of infiltration without any respiratory symptoms on chest radiography in the preoperative examinations was also considered. As the chest CT and PET findings indicated the presence of lung cancer in the right upper lung (Fig. 3), CT-guided needle biopsy was performed, which indicated



**Figure 2.** Gross examination findings of the specimen. A mass 5  $\times$  5 cm in size can be observed at the proximal ascending colon that appears as a submucosal tumor with an intact mucosa.



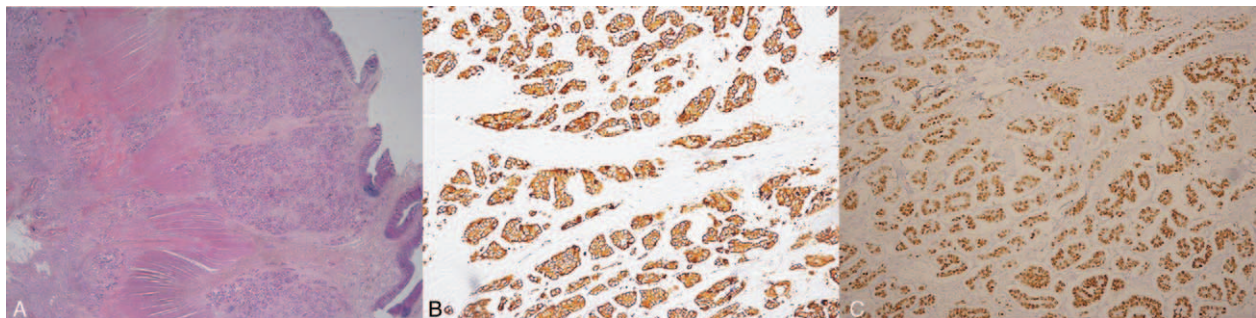
**Figure 3.** Whole body positron emission tomography-computed tomography scans indicate a spiculated ellipsoid solid mass with a hypermetabolic state (standardized uptake value, 11.0) in the right upper lung.

adenocarcinoma. Moreover, immunohistochemical staining indicated positive results for thyroid transcription factor 1 (TTF-1) and cytokeratin 7 (CK7) and negative results for CK20 and CDX-2 (Fig. 4). These findings suggested the presence of metastatic adenocarcinoma originating from the lung. Furthermore, additional immunohistochemical staining for biomarkers in lung tissues indicated positive results for epidermal growth factor receptor (EGFR) and EGFR19 and negative results for EGFR21. Although pneumothorax developed after lung biopsy, the patient showed improvement after chest tube insertion; therefore, palliative chemotherapy was scheduled. However, malignant pleural effusion occurred 2 weeks postoperatively. Despite supportive care, persistent dyspnea developed while the patient was in intensive care unit (ICU) care. Because of the long-term ICU life, the patient and caregivers did not want any more active treatment, including palliative chemotherapy. The patient died on the 41st postoperative day due to exacerbation of respiratory distress.

### 3. Discussion

Most of the cases of mechanical large bowel obstruction are due to colorectal cancer, and other causes include gastrointestinal metastasis, primarily from ovarian or gastric cancer.<sup>[7]</sup> However, the present case involves colonic metastasis originating from lung cancer, which is a very rare case and can be confused with obstruction caused by primary colon cancer. Dyspnea, cough, and hemoptysis are distinctive symptoms of lung cancer and although intraabdominal metastasis occasionally presents with abdominal pain or vomiting, it is primarily noted during cancer progression in patients diagnosed with lung cancer. Lung cancer may result in multiple metastases to the small bowel or stomach, and cases of solitary metastasis to only the colon are rare. To our knowledge, the present case is the first showing solitary colonic metastasis.

In addition, whole body F-18 fluorodeoxyglucose PET/CT was used to identify the site of cancer origin. PET-CT is a useful imaging modality for detecting cancers of unknown origin or cancers without any symptoms.<sup>[8–10]</sup> PET-CT is a very useful test



**Figure 4.** Histologic findings. (A) The colon wall shows infiltration of a moderately differentiated adenocarcinoma with no mucosal or submucosal, muscle, and pericolic soft-tissue involvement (hematoxylin and eosin,  $\times 10$ ). (B) On immunohistochemical staining, the malignant cells were positive for cytokeratin 7, which suggested that they did not originate from primary colon cancer ( $\times 100$ ), and were positive for (C) thyroid transcription factor 1, which suggested that they originated from lung cancer ( $\times 100$ ).



to simultaneously examine multiple sites where adenocarcinoma may be present, including the lung, gastrointestinal tract, pancreas, prostate, and colon.

The immunohistochemical staining method used in the present study has been proven to be useful to differentiate the origin of adenocarcinoma in a few studies. As the immunohistochemical staining results were positive for CK7 and TTF-1, and negative for CK20, the colon cancer was confirmed to be metastasis of a primary lung adenocarcinoma. CK7 is primarily expressed in lung cancer and breast cancer, and not in the alimentary tract, whereas CK20 is expressed in gastrointestinal tract epithelium and urothelium. In addition, TTF-1 is expressed only in lung cancer and thyroid cancer.<sup>[11–15]</sup> According to the report of Su et al,<sup>[12]</sup> the positive rates of primary lung adenocarcinoma were 73% for TTF-1, 75% for CK7, and 0% for CK20, and those of metastatic breast cancer were 0% for TTF-1, 50% for CK7, and 0% for CK20. In addition, the positive rates of primary colon cancer were reported to be 0% for TTF-1, 7% for CK7, and 86% for CK20. Thus, since TTF-1 expression is lacking in all adenocarcinoma types except for lung adenocarcinoma, this finding is crucial to distinguish between primary adenocarcinoma and metastatic adenocarcinoma.

When progressive colon cancer and metastatic lesions in the lung are detected, it is reasonable to assume that the adenocarcinoma originating from colon cancer had metastasized to the lung, and hence, additional immunohistochemical staining is not routinely performed. However, contrasting findings may also be noted, as in the present case. The current findings suggest that the adenocarcinoma, which was thought to be a colon cancer with lung metastasis, may have instead originated from the lung itself. Hence, such cases would require a reexamination through immunohistochemical staining. In addition, the specimens of patients who were diagnosed with colon cancer with lung metastasis may need to be retested through additional immunohistochemical staining to confirm that the actual origin of the adenocarcinoma was the colon, as previously determined.

Hence, as indicated in the present case, patients with malignant bowel obstruction along with lung infiltration without any symptoms should be suspected of not only colon cancer with lung metastasis, but also lung cancer with colon metastasis. If a metastatic mass is suspected due to the presence of an intact mucosa during surgery, the other origin sites should be identified by performing further assessments such as PET-CT; moreover, immunohistochemical staining of markers such as TTF-1, CK7, and CK20 may be useful to distinguish the origins of the adenocarcinoma. In conclusion, we describe a case of lung cancer wherein intestinal obstruction as a result of a solitary colon mass was the first presenting symptom. To our knowledge, this is the first report of such a case.

## Author contributions

**Investigation:** Young-Joon Ryu.

**Supervision:** Seong Kweon Hong.

**Writing – original draft:** Sang-ji Choi.

**Writing – review & editing:** Sang-ji Choi, Gibong Chae, Sung-Bae Park, Yang Hee Kim, Suk-Bae Moon, Song-Yi Kim, Hwansoo Kim.

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