A 55-year-old man was referred for a second opinion regarding multiple enlarging pulmonary masses (Fig 1). Two weeks earlier, bronchoscopy, transbronchial biopsy, and bronchoalveolar lavage had been performed. Transbronchial biopsy and bronchoalveolar lavage were negative for malignant cells, acid-fast bacilli, and fungi.

The recent medical history was remarkable for epigastric pain present for five months. The pain was described as burning in nature and usually lasted up to 24 h. The pain returned at intervals of up to a week and was associated with heartburn and reflux. The patient had lost 8 lb (3.6 kg) in the previous three months without associated nausea and vomiting. The patient had a 60 pack/yr smoking history, but had stopped using tobacco seven years earlier.

Colonoscopy revealed several polyps in both the right and the left colon. The polyps were removed endoscopically and found to be adenomas. One exception proved to be a tubular villous adenoma. Endoscopic findings in the upper gastrointestinal (GI) tract were reported as normal. An upper GI and small bowel follow-through showed partial small bowel obstruction at the terminal ileum, thought to be related to Crohn's disease. A regimen of sulfasalazine (Azulfidine; Pharmacia, Piscataway, NJ), 500 mg four times a day, was started.

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Diagnosis: Metastatic adenocarcinoma compatible with colonic origin

Colonoscopy revealed an adenocarcinoma in the right colon, which was surgically removed. Pathologic evaluation revealed transmural extension with involvement of the pericolic fat.

Computed tomographic sections obtained through the lower chest (Fig 2) reveal the presence of branching air-filled bronchi within the tumor masses (ie, air bronchograms within multiple tumor masses). The air bronchogram was initially described by Fleischner as a useful sign in differentiating parenchymal from pleural processes, but the term was popularized by Felson as a sign of end air-space filling indicating alveolar disease. Thus, the air bronchogram became known as one of the hallmarks of alveolar disease.

Reed and Madewell pointed out that few diseases are purely end air-space filling processes. While bacterial pneumonia produces end air-space filling, it also produces a marked cellular reaction in the interstitium. Pneumonia commonly produces air bronchograms, as do pulmonary edema and acute pulmonary hemorrhage. In pulmonary alveolar proteinosis, which is thought to be exclusively an end air-space filling process, air bronchograms are rare.

Interstitial lung disease is characterized by reticular stranding, Kerley's lines, honeycombing, and, in some cases, nodules. Despite this, one occasionally encounters air bronchograms in interstitial processes. There are reports of alveolar sarcoid in the literature, but there is no histologic confirmation of intra-alveolar granulomas. It is thought more likely that the appearance relates to a high concentration of interstitial granulomas crowding and collapsing the end air spaces or obstructing distal airways, with resultant alveolar filling by macrophages and debris. In desquamative interstitial pneumonitis, another interstitial disease, the end air spaces become filled with type 2 pneumocytes, producing air bronchograms. Heitzman demonstrated the presence of air bronchograms in severe interstitial fibrosis, thus further limiting the diagnostic usefulness of air bronchograms as a radiographic sign.

Air bronchograms are also encountered in some tumors involving the parenchyma. The best known of these is bronchioalveolar cell carcinoma. The tumor is unique in that it uses the existing pulmonary tissue as a scaffold along which to grow. It also has a tendency to produce large amounts of mucus, which can fill the end air spaces. Lymphoma and pseudolymphoma are primarily interstitial processes that may grow to a significant size, compressing alveoli and thus producing air bronchograms.

Air bronchograms in other tumors involving the lungs are unusual but have been described. ZuWallack et al reported a case of metastatic melanoma to the lung with the radiographic appearance of an air bronchogram. To that unusual case report we add the current report of a patient with metastatic adenocarcinoma of colonic origin. The report serves to emphasize the lack of specificity of the air bronchogram as a sign of alveolar disease and endorses its use as proposed initially by Fleischner, that is, in the differentiation of parenchymal from pleural processes.

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