Localization of Occult Bronchogenic Carcinoma by Bronchography

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Bronchography is seldom recommended today to localize radiographically and bronchoscopically occult bronchogenic carcinoma. We report a case in which bronchography promptly localized such a tumor that had been occult to multiple bronchoscopies and chest computed tomograms (CTs). The patient is free of recurrence 32 months after lobectomy. Bronchography should be considered when bronchoscopies and CT fail to reveal a radiographically occult carcinoma.

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Fiberoptic bronchoscopy is the procedure of choice in localizing radiographically occult bronchogenic carcinoma.\(^1\)\(^2\) Infrequently, initial bronchoscopy is nonlocalizing and additional techniques are required to guide subsequent bronchoscopies.\(^3\)\(^4\) We present a patient who had routine chest radiography, two chest computed tomograms (CTs), and three bronchoscopies that were nonlocalizing in whom bronchography identified an abnormal bronchus that proved to be involved by bronchogenic carcinoma.

**CASE REPORT**

A 54-year-old white man with a 50-pack year history of cigarette smoking was admitted to the Durham (NC) Veterans Administration Medical Center with hematemesis. Esophagogastroduodenoscopy revealed gastritis thought to be due to alcohol abuse. A routine chest roentgenogram obtained at the time of hospital admission was initially interpreted by the house staff to reveal a right paratracheal mass, and sputum for cytologic study was submitted. The staff radiologist's review of the roentgenogram found it to be without evidence of abnormal mass. The sputum cytologic specimen was subsequently interpreted to be diagnostic for squamous cell carcinoma.

Results of examination of the oral cavity and hypopharynx were normal and fiberoptic bronchoscopy revealed no areas suspicious for malignancy. Bronchoscopic forceps biopsy specimens of several areas of inflamed appearing mucosa confirmed the clinical impression of chronic bronchitis and demonstrated squamous metaplasia. Cytologic brushings from several segments disclosed no malignancy, but washings from the left upper lobe revealed malignant cells consistent with squamous cell carcinoma. Chest CT failed to reveal mass or peribronchial thickening. Bronchoscopic brushings of each segment repeated six days later disclosed no malignancy, while right upper lobe washings showed squamous cell carcinoma.

The patient was followed up as an outpatient without change in his chest roentgenogram or clinical status for three months. Realizing that the cytologic results of the washings did not localize the malignancy, a chest CT with 3-mm cuts was performed and was again normal. Fiberoptic bronchoscopy repeated four months after the first bronchoscopy revealed no endobronchial mass, and forceps and cytologic brush biopsy specimens disclosed no malignancy. Right upper lobe bronchial washings again showed squamous cell carcinoma. A right bronchogram performed six weeks later was normal. Two weeks later a left bronchogram revealed narrowing of

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**Figure 1A (upper).** Right anterior oblique spot film shows oily Dionisio outlining left main stem bronchus, left upper lobe bronchus (U), and left lower lobe bronchus (L). An unusual globular-shaped contrast collection is present just posterior to proximal left lower lobe bronchus (arrowhead). 1B (lower). Lateral view demonstrates superior segment left lower lobe take-off (S) and tapered malignant narrowing of inferiorly directed subsegment (arrowheads) with distal globular bronchial dilatation.

an inferiorly directed subsegment of the superior segment of the left lower lobe (Fig 1). Bronchoscopy was repeated and the orifice of the above subsegment was found to be narrowed and its mucosa granular. Biopsy specimens of this area revealed squamous cell
carcinoma. The patient underwent a left lower lobectomy seven months after the initial abnormal cytologic findings and the pathologic diagnosis was squamous cell carcinoma with in situ involvement of the surgical margin. Postoperatively, the patient received external beam radiation therapy to the left side of the chest and has been free of recurrence for 32 months.

**DISCUSSION**

This patient illustrates the infrequent conundrum of positive cytologic evidence of lung cancer without initial radiologic or bronchoscopic localization. These malignant neoplasms are usually detected either in the patient who has a change in symptoms that prompts sputum cytologic study or in studies that screened individuals believed to be at risk for lung malignancy.  

Our patient illustrates several common features of radiographically occult lung cancer, including the detection in smokers between ages 45 and 79 years. Further, exclusion of upper airways malignancy is imperative as 50 percent of patients with abnormal cytologic findings and normal chest roentgenograms have malignancy of the head and neck.  

Greater than 90 percent of the tumors are squamous cell carcinoma with pulmonary multicentricity and subsequent cancers in up to 32 percent of patients at an occurrence rate of 4 percent per year. Localization of these usually segmental or subsegmental tumors may require 1 to 1,014 days and 1 to 5 bronchoscopic examinations.

Bronchoscopic examination with forceps or cytologic brush biopsy often localizes radiographically occult lung cancer. If these techniques disclose no abnormalities, the patient is often followed up with periodic repeated chest roentgenograms and bronchoscopies. CT scanning, ventilation perfusion, and tumor-seeking radiopharmaceutical scanning have occasionally localized occult tumors. Bronchscopy under general anesthesia to allow careful examination and brush biopsy of each subsegment has also been recommended. Because of the infrequency of tumors that are initially bronchoscopically and roentgenographically occult, no prospective studies of these approaches have been performed.

American authors infrequently recommend bronchography or use it as a last resort to aid bronchoscopy in localizing roentgenographically occult lung cancer as opposed to its more routine use in Europe and Japan. Before the advent of chest CT, bronchography was the radiologic study of choice to localize and define the extent of endobronchial tumors. The bronchographic appearance of pulmonary carcinoma has been classified into six categories. Our patient would be classified as having symmetric narrowing of the bronchus, which is a more frequent but less specific presentation for bronchogenic carcinoma. Although the overall accuracy of bronchography in the diagnosis of pulmonary carcinoma may be as high as 94 percent, the procedure's sensitivity and specificity in the setting of roentgenographically and bronchoscopically occult pulmonary carcinoma are unknown.

Appropriately, fiberoptic bronchoscopy has supplanted bronchography for several reasons beyond bronchoscopy's ability to directly view and biopsy endobronchial abnormalities. The incidence of fatal complications of bronchography is estimated to be 18 per 100,000 procedures, primarily in children or patients with limited respiratory reserve. Less serious complications include febrile reactions, skin reactions, facial edema, pneumonia, parotitis, and acute asthma. Transient depression of lung volume and the carbon monoxide diffusing capacity almost always occur following bronchography.

Further, CT scanning has on occasion proved successful in localizing these tumors. CT is also less invasive, more comfortable, and associated with less morbidity than bronchography. To our knowledge, a study comparing the sensitivity and specificity of CT scanning and bronchography in the detection of these occult tumors has not been performed.

The advantages of bronchoscopy and CT are not disputed. However, if the initial bronchoscopy and CT are nonlocalizing, periodic radiologic and bronchoscopic surveys carry several disadvantages. These include the expense and risks of repetitive radiologic and bronchoscopic examinations, possible general anesthesia, delay in localization with risk of increased depth of tumor invasion, and a decreased probability of curative resection as well as prolonged emotional duress for the patient.

Bronchography has a limited but useful role in localizing roentgenographically occult bronchogenic carcinoma. The localizing procedure of choice remains fiberoptic bronchoscopy. CT scanning may guide subsequent bronchoscopy in the remaining cases with less morbidity than bronchography. Those that remain occult may be detected with bronchoscopy. Prompt and persistent evaluation of these occult malignant neoplasms may well result in more curative resections of pathologically less advanced tumors.

**References**

Essential Thrombocytemia Associated with Angina Pectoris with Unusual Coronary Artery Findings*

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A case of ET associated with angina pectoris is presented. Angiography showed a 3.0-cm long mosaic-like thrombus shadow consisting of small filling defects in the proximal left anterior descending artery. The lesion could not be reduced with warfarin, ticlopidine, trapidil, urokinase or melphalan. Coronary artery bypass grafting was performed successfully. (Chest 1991; 100:1162-63)

Essential thrombocytemia, a myeloproliferative disorder, may result in thrombus formation and acute vascular occlusion. However, coronary artery occlusion in patients with ET rarely has been described. The effect of chemotherapy suppressing bone marrow activity is controversial. We describe a patient with ET who had unusual coronary arteriographic features and who underwent CABG successfully while being treated with melphalan.

CASE REPORT

A 52-year-old man visited our hospital because of angina pectoris and thrombocytemia. He was well until seven months earlier, when chest pain on effort appeared. He was admitted to another hospital. Coronary arteriography showed a 3.0-cm long mosaic-like thrombus shadow consisting of small filling defects in the proximal left anterior descending artery associated with delayed filling of the distal coronary artery. The first diagonal branch was totally occluded and filled poorly by collaterals from the circumflex artery. The other

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FIGURE 1. Left coronary arteriography showing delayed filling of left anterior descending artery and occluded first diagonal branch; LAO-cranial view. Vessels were entirely normal (Fig 1 and 2). The platelet count was 1,092,000/cu mm and the remainder of the hemogram was normal. Ticlopidine, 100 mg twice daily; trapidil, 100 mg three times daily; and diltiazem, 30 mg three times daily, were started. After three months of medication, coronary arteriography was repeated. Urokinase, in a dose of 240,000 units, was infused into the left coronary artery, but the lesion did not change. Thallium 201 exercise scintigraphy revealed reversible perfusion of the anteroseptal wall of the left ventricle. He was referred to our hospital. Bone marrow examination revealed increased megakaryocytes and a mildly hypercellular marrow, confirming the diagnosis of ET. The aggregation of platelets with epinephrine, adenosine diphosphate and collagen was normal. Bleeding time, coagulation time, prothrombin time, partial thromboplastin time and thromboelastogram also were normal. Diltiazem, 30 mg three times daily, long-acting isosorbide dinitrate, 20 mg three times daily; metoprolol, 20 mg twice daily;

FIGURE 2. Enlarged photograph of left anterior descending coronary artery in RAO view. A 3-cm long mosaic-like thrombus shadow consisting of small filling defects is seen.