Transbronchial Fine Needle Aspiration of Bronchogenic Cysts* 

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Transbronchial fine needle aspiration (TBFNA) was used to confirm the diagnosis of bronchogenic cyst in two asymptomatic patients with mediastinal masses who declined surgical exploration. Both masses were located subcarinally but differed in computed tomographic density (7 and 59 Hounsfield units). Aspirate cytology demonstrated predominately bronchial columnar epithelial cells in mucus, without the lymphocytes and polymorphonuclear leukocytes normally seen in intrabronchial secretions. The denser cyst additionally contained some alveolar macrophages with ingested surfactant. While benignity cannot be absolutely assured, it is corroborated by serial evaluation of these patients, which has revealed no interval change in symptoms or roentgenographic size for two and three years, respectively. Under selected circumstances, it appears that TBFNA can be used to extend bronchoscopic diagnosis to benign mediastinal masses if the cytologic features of such aspirates are unique.

Mediastinal and hilar masses often present a difficult diagnostic challenge. Unless there is endobronchial extension, these masses are inaccessible to standard fiberoptic bronchoscopy. Thus, mediastinoscopy has been the only diagnostic alternative to thoracotomy. Several groups now advocate transbronchial fine needle aspiration to evaluate malignant mediastinal, hilar, and more recently, peripheral lung masses.1,2 We report the first uses of transbronchial fine needle aspiration (TBFNA) to diagnose two benign mediastinal bronchogenic cysts.

Case Reports

Case 1

A 61-year-old man was admitted to the Ann Arbor Veterans Administration Medical Center for dilatation of a peptic esophageal stricture. His admission chest roentgenogram showed an ill-defined density in the right hilum. Previous chest roentgenograms had been reported normal ten years prior to admission. The patient complained of a slight nonproductive morning cough and occasional epigastric discomfort, but denied hemoptysis, dyspnea, anorexia, weight loss, or other constitutional symptoms. The patient was a pipe smoker, but denied cigarette use. Under treatment for mild hypertension, he had also had a previous subtotal thyroidectomy for lymphocytic thyroiditis 20 years ago. The physical examination and results of routine laboratory studies were normal.

Conventional elliptical motion tomograms of the hila and mediastinum demonstrated a 2.3 cm round, smoothly contoured, noncalcified mass in close proximity to the posterior aspect of the right mainstem bronchus. Subsequent computed tomography (CT) of the chest confirmed a nonenhancing homogeneous mass posterolateral to the carina and in contact with the wall of the right mainstem bronchus. The measured computed tomographic density was 7 Hounsfield units (Hu) suggesting a cyst close to water density. No other abnormalities and no mediastinal nodes greater than 0.5 cm in diameter were present.

We performed fiberoptic bronchoscopy with TBFNA of this mass because the patient was reluctant to undergo exploratory surgery. The anatomy and mucosal appearance of the larynx, trachea, and bronchi to the subsegmental divisions were normal. Guided by the previous CT scan and biplanar fluoroscopic localization,1 we placed a 13-mm fixed transbronchial needle (22 gauge Mill Rose W-122-13) through the posterior right mainstem bronchial wall. Three discrete aspirations were made separated by 0.5 cm and spaced in a triangular pattern. Each of these aspirations yielded 0.5 to 1 ml of a clear yellow, slightly viscid fluid.

The cytopathologist (T.B.) received the specimens in the bronchoscopy suite. Aspirated fluid was sprayed directly on glass slides and immediately fixed by immersion in 95 percent ethanol. The needle and distal tubing were rinsed and the fluid centrifuged for a cell block. The centrifuged pellet was then fixed in glutaraldehyde and processed into plastic for sectioning. Light and electron microscopy

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Figure 1. Representative cytologic smear of the mucoid material aspirated through the transbronchial needle in patient 1. There are numerous ciliated columnar epithelial cells with visible tufts (arrow) in a background of mucus. Note the absence of any other cellular components. The specimen was alcohol fixed and stained by the method of Papanicolaou.
thelial cells. Bronchogenic cysts are infrequent congenital anomalies with a slight male predilection and are thought to result from abnormal budding of the tracheobronchial tree during the embryologic development of the lung. Normally thin-walled structures, these cysts are usually noncommunicating, but lie in close proximity to the tracheobronchial tree, and therefore, are accessible to local aspiration. In a large series of bronchogenic cysts, 30 percent were mediastinal, and the remainder occurred in the pulmonary parenchyma. Of the mediastinal cysts, one-half occurred in the posterior mediastinum, one-third in the middle, and the remainder in the superior mediastinum.

Roentgenographically, mediastinal bronchogenic cysts usually present as homogeneous, clearly defined masses inferior to the carina, more often adjacent to the right hilum than to the left. Computed tomography is ideal for mapping the exact location of these masses and their relationship to other thoracic structures. The CT density of bronchogenic cysts has been shown to vary from typical water density (0 to 20 HU) to high density (89 to 99 HU). This has not been correlated with cyst histology, but it is suggested that higher CT numbers represent increased calcium content, anthracotic pigment, or greater cellular turbidity of the fluid. Mediastinal bronchogenic cysts usually cause no symptoms, but patients may present with dyspnea, cough, stridor, or dysphagia. These cysts rarely become infected, and therefore, normally pose the problem of an unidentified yet benign chest mass.

These masses, when they are within 10 mm of the trachea, are now accessible via the fiberoptic bronchoscope, utilizing transbronchial fine needle aspiration. While this technique can yield material diagnostic of malignancy, its diagnostic utility for nonneoplastic entities has been limited because the absence of neoplastic cells can result from failure to aspirate the tumor. In the setting of a cystic mediastinal structure, typical by standard roentgenography and computed tomography, a voluminous mucoid aspirate containing only bronchial columnar epithelial cells confirms accurate localization of the aspiration and allows the presumptive cytologic diagnosis of a bronchogenic cyst. The absence of lymphocytes and polymorphonuclear leukocytes, which are universal components of bronchial secretions, supports this diagnosis. While unplanned aspiration of intratracheal secretions is a frequent occurrence with the use of transbronchial needles without a central obturator, in reviewing all previous transbronchial aspirates obtained at this institution, we can find no case in which contamination with polymorphonuclear leukocytes or lymphocytes was not present. Additionally, we have encountered no other entity which has produced such a characteristic voluminous, nonpurulent aspirate with

Figure 2. Transmission electron micrograph taken of two macrophages found within the TBFNA of patient 2. Each contains numerous lamellar bodies (arrow) characteristic of ingested surfactant. Specimen was fixed in glutaraldehyde and osmium tetroxide and stained with lead citrate/uranyl nitrate (original magnification × 8400).

demonstrated only bronchial ciliated columnar epithelial cells individually and in sheets, with a background of mucus and some goblet cells (Fig 1). Lymphocytes and polymorphonuclear leukocytes were conspicuously absent as were alveolar macrophages.

Case 2

An asymptomatic 48-year-old man was referred for evaluation of a subcarinal density discovered on routine chest roentgenogram. His only medical problem had been stable angina since suffering a myocardial infarction two years prior to this admission. No previous films were available and previous chest roentgenograms had been interpreted as normal. Chest CT revealed a well-circumscribed, cystic appearing, 2.9 × 4.0 cm mass inferior to the main carina without associated adenopathy. The central CT density of the mass averaged 59 ± 17 Hu. At fiberoptic bronchoscopy, the mucosa and anatomy of the tracheobronchial tree were normal. Guided by the chest CT, a fixed transbronchial needle was placed through the medial right mainstem bronchial wall in three locations, spaced over 2 cm (1 cm distal to the main carina). Each aspiration yielded approximately 0.5 ml of a highly viscous, turbid, yellow-gray material which was processed for cytologic examination as previously described.

Examination of this fluid demonstrated a mucoid background with a preponderance of bronchial columnar epithelial cells individually and in sheets, but in addition, contained carbon-laden macrophages. Some macrophages also contained lipid vacuoles characteristic of ingested surfactant when examined by electron microscopy (Fig 2). No lymphocytes or polymorphonuclear leukocytes were present.

Eight weeks after aspiration of this second cyst, we received chest roentgenograms obtained two years previously which disclosed the mediastinal density unchanged in size.

Discussion

To our knowledge, these are the first reported uses of transbronchial fine needle aspiration to support the diagnosis of a benign mediastinal mass and the first reports of aspiration cytology from bronchogenic cysts. Previously, only cyst histology has been reported, but because this has been so well defined, aspiration cytology of noninfected cysts can be expected to be unique, containing only mucus and bronchial epi-
the exception of the inadvertent aspiration of pleural fluid. The latter is easily distinguished microscopically by the presence of numerous mesothelial cells. The turbid nature, high carbon content, and alveolar macrophages within the cyst in our second patient may additionally indicate that high density CT values in bronchogenic cysts are associated with bronchial or parenchymal communication. This needs further evaluation. Although an absolute assurance of benignity requires surgical or autopsy confirmation, serial evaluations of these patients have failed to reveal either symptoms or roentgenographic change in lesion size for two and three years, respectively. While we cannot support the routine use of this technique for all cystic mediastinal masses, it appears justifiable in diagnostic situations where surgery is precluded.

If transbronchial fine needle aspiration is to be utilized to confirm the presence of a bronchogenic cyst, several criteria should be necessary to support this benign diagnosis as follows: (1) aspiration should yield a significant volume of nonbloody fluid (greater than 0.5 ml) on several punctures; (2) the aspirated fluid should contain only mucus and bronchial epithelial cells as primary cytologic components without polymorphonuclear leukocytes or lymphocytes; (3) no malignant or necrotic cells should be present; and (4) aspiration should be undertaken in a setting both clinically and roentgenologically suggesting a bronchogenic cyst and under circumstances which mitigate against surgical exploration and removal.

We believe that with careful needle guidance, transbronchial fine needle aspiration can extend the diagnostic utility of the fiberoptic bronchoscope to include the diagnosis of some benign mediastinal abnormalities if, as in these cases, a unique cytologic picture is obtained on aspiration.

REFERENCES

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