percent can be attributed in most cases to multisystem failure, often triggered by excessive postoperative bleeding complications. The patients remain at risk for frequent pulmonary infections both early and late after transplantation, and in the intermediate and late phases there is a continually increasing incidence of obliterative bronchiolitis.

The accumulating evidence suggests that this latter complication is primarily due to rejection, but may be triggered by viral infection. Until this complication can be detected early and either reversed or held in check, the intermediate and long-term results after heart-lung transplantation will continue to be disappointing. Since the routine use of triple drug therapy which includes cyclosporine, prednisone and azathioprine, this complication may be less frequent. Due to increased awareness, patients are followed more closely for a decline in pulmonary function, and receive an increase in immunosuppression if obliterative bronchiolitis is proven. As we develop better understanding of this process, overall long-term results can only improve.

Since heart-lung transplantation has been successful in diffuse lung disease, there is reason to believe that bilateral en bloc lung transplantation could also be used for this indication, and may be preferable. In many of the patients with cystic fibrosis, cardiac function is reasonably well maintained. Depending upon the degree of pulmonary hypertension and right ventricular hypertrophy, the heart could be saved or could be used as a donor heart for cardiac transplantation if heart-lung transplantation is performed. A recent report of successful bilateral lung transplantation is an encouraging development.

Since a bilateral lung transplant allows the donor heart to be available for another patient requiring heart transplantation, better cooperation in sharing donors would provide for transplants in a larger number of patients. It is not clear yet whether the intermediate and long-term complication of obliterative bronchiolitis will develop in the bilateral lung transplant, but there is no reason to suspect that it would not be present.

Although heart-lung transplantation therapy is difficult and complicated, and the present intermediate and long-term results are not as good as for heart transplantation alone, the remarkable functional improvement in the patient reported by Higgenbottom and associates, and in other patients, encourages many centers to continue. At least for many years to come, there will be no other alternative therapy for patients with end-stage disease due to cystic fibrosis.

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Thin-Section CT and the Solitary Pulmonary Nodule

Less is more.
Andrea del Sarto (1855)
Robert Browning

Several large series of resected solitary pulmonary nodules (SPN) have shown that granuloma accounts for about 50 percent of cases, and bronchogenic carcinoma for another 30 percent. Since the majority of SPNs which are not granulomas are carcinoma, identification of a SPN as a granuloma is important. A SPN can be diagnosed as a granuloma if a dense nidus of calcification, laminated calcification, or diffuse calcification is identified on low kilovoltage spot films or conventional tomograms. If spot films or tomograms are unrevealing, computed tomography (CT) may demonstrate benign calcification because CT is 10-20 times more sensitive to density differences than chest radiography.

Standard chest CT examinations, eg, staging of bronchogenic carcinoma, are performed using 8-10 mm thick slices. The key to CT detection of calcification in SPN is obtaining 1.5-5 mm thick slices, ie, thin-section CT, through the SPN. Thin-section CT avoids partial volume averaging of surrounding lung (-1,000 Hounsfield units) with a diffusely calcified SPN (+200 to 300 Hounsfield units), which reduces the CT density of the SPN so that it no longer appears calcified. Using thin-section CT, 50 percent of SPNs not seen to be calcified on spot films or conventional tomography can be shown to be diffusely calcified.

In this issue of Chest (see page 595) Naidich et al. report a new and useful finding in thin-section CT of SPNs. The authors describe the "positive bronchus" sign—a bronchus leading to or contained within a SPN.
on a CT slice. Using 10 mm thick CT slices, the diagnostic yield from fiberoptic bronchoscopic procedures (FOB) was 60 percent for SPNs with the positive bronchus sign, and 30 percent for SPNs without this sign. Some SPNs were also scanned using 1.5 mm thick slices (thin-section CT), and the diagnostic yield of SPN without the positive bronchus sign dropped from 30 to 14 percent. This suggests that thin-section CT is more effective than standard CT in identifying whether lesions may be accessible by bronchoscopy.

A 14 percent diagnostic yield for FOB for SPNs without the positive bronchus sign is far less than the expected 40-60 percent FOB yield reported by Cortese and McDougall and Radke et al for peripheral lung lesions. If a larger series of thin-section CT through SPN confirms the low yield of FOB for SPN without the positive bronchus sign, percutaneous needle aspiration biopsy would be the diagnostic procedure of choice for these SPNs. Using modified aspirating needles, 95 percent of malignant lesions and 85 percent of benign lesions can be diagnosed. Modified aspirating needles such as 20-22 gauge Turner or Greene needles (Cook, Bloomington, IN) combine the safety of a “skinny” needle with the ability to obtain a cytologic specimen for diagnosis of malignant SPN and a tissue core for diagnosis of benign SPN.

Thin-section CT has proved itself clinically useful in identification of benign SPNs, assessment of bronchiectasis, and evaluation of focal airway disease. As Naïdich et al conclude, thin-section CT may also determine the best diagnostic approach for the SPN.

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Clinical Value of Assessment of Acute Reversibility of Airways Obstruction in Patients with COPD

The study by Berger and Smith in this issue (see page 541) is a model for studies done in a purely clinical setting. They conclude that “in the clinical setting, changes in FEV1 will identify the overwhelming majority of patients with significant, acute response to bronchodilators, and that drawing conclusions from a one-time no-response test may be erroneous in many cases.” They further point out that, despite controversy, there is a common perception “that establishing marked reversibility . . . : a) supports a diagnosis of asthma; b) justifies aggressive bronchodilator therapy; c) may predict a positive response to corticosteroids . . .; d) implies a better prognosis than 'fixed' obstruction.”

I assess reversibility of airways obstruction in patients with COPD routinely in my clinical practice—most of us do. The question (it is not a problem—a problem is solvable) is, what is the clinical value of spirometric assessment of acute reversibility of airways obstruction in patients with COPD? To be useful in day-to-day clinical practice, tests should, in my opinion, meet at least one of these basic criteria: 1) they should have a definite “normal” value, or range of “normality;” 2) they should strongly influence therapeutic decisions; 3) they should give a reasonable indication of prognosis. Does clinical assessment of acute reversibility of airways obstruction in COPD meet any or all of these criteria? The only honest answer is a resounding maybe.

First, what constitutes “significant” reversibility of airways obstruction in COPD? Other than arbitrarily chosen values, only two recent studies have addressed the question, and there is no consensus among clinicians or research physiologists as to what constitutes a “significant response.” What, indeed, is the definition of asthma vs COPD? Who among us, who actually take care of patients on a day-to-day basis, has not seen patients with classic COPD, due to their long history of cigarette smoking, who show a 20 percent, 30 percent, or even more pronounced response to inhaled bronchodilators from time to time?

Second, although one widely quoted study related