Successful Management of Recurrent Pneumothorax in Cystic Fibrosis by Localized Apical Thoracoscopic Talc Poudrage*

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Thoracoscopic talc poudrage of the entire pleural surface constitutes successful treatment of recurrent pneumothorax in cystic fibrosis (CF); however, subsequent lung transplantation is seriously jeopardized due to the development of extensive pleural adhesions. We describe a 27-year-old patient with CF with recurrent right-sided pneumothorax, refractory to chest tube drainage and to chemical (tetracycline) pleurodesis, who was successfully treated with a localized, apical thoracoscopic talc poudrage, thereby preserving the possibility of subsequent lung transplantation.

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CF=cystic fibrosis; LT=lung transplantation

Pneumothorax is a frequent and potentially life-threatening complication of cystic fibrosis (CF), occurring in up to 19 percent of patients with CF who reach adulthood. The treatment of pneumothorax in CF, as well as in other underlying chronic pulmonary diseases, remains a cause of debate in the literature; simple observation, chest tube drainage, chemical pleurodesis with intrapleural instillation of irritants, thoracoscopic talc poudrage, and surgical pleural ablation all have been advocated. However, since the advent of lung transplantation (LT) for patients with CF, treatment of pneumothorax should, whenever possible, aim to avoid development of extensive pleural adhesions which represent a relative contraindication for subsequent LT. We present a patient in whom simple chest tube drainage and tetracycline instillation failed to achieve pleurodesis, whereas local thoracoscopic talc poudrage (which was limited to the lung apex, thereby avoiding extensive pleural adhesions) was successful.

CASE REPORT

A 27-year-old patient with CF with exocrine pancreatic insufficiency, diabetes mellitus, and respiratory pulmonary insufficiency requiring long-term oxygen therapy, was admitted to the hospital for sudden increase in dyspnea and a dull right thoracic pain. He was extremely dyspneic and cyanotic with reduced breath sounds over the right lung. Arterial blood gases showed an acute-on-chronic respiratory acidosis and severe hypoxemia (pH, 7.32; PaCO2, 74 mm Hg; PaO2, 51 mm Hg; bicarbonate, 39 mEq/L; total CO2, 41 mEq/L; base excess, +10.2 mEq/L; and oxygen saturation, 75 percent on 7 L/min supplemental oxygen). Chest radiograph showed a complete right-sided pneumothorax (Fig 1). A chest tube was immediately inserted and active suction (~20 cm H2O) was applied. There was immediate clinical improvement; arterial blood gases were as follows: pH, 7.39; PaCO2, 68 mEq/L; PaO2, 50 mm Hg; bicarbonate, 42 mEq/L; total CO2, 44 mEq/L; base excess, +14 mEq/L; and oxygen saturation, 82 percent.

Since respiratory tract infection was suspected (low-grade fever, abundant purulent sputum, elevated C-reactive protein levels and erythrocyte sedimentation rate), intravenous antibiotics were administered.

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were added (ticarcillin, 5 g three times a day; amikacin, 675 mg once daily). Two days later, the active tube suctioning was discontinued for 24 h, without recurrence or air bubbling. The chest tube was removed the next day. Nine days later, there was a sudden and dramatic increase in dyspnea due to recurrence of the right-sided pneumothorax, followed by ventricular fibrillation and respiratory arrest. Cardiopulmonary resuscitation and electrical defibrillation were begun, together with insertion of a new chest tube with active suction. There was quick and complete cardiorespiratory recovery. Two days later, chemical pleurodesis with tetracycline, 20 mg/kg intrapleurally, was performed. Forty-eight hours later, again after 24 h of discontinued suctioning, the chest tube was removed without immediate recurrence. However, 8 days later, there was a second recurrence of a symptomatic right-sided pneumothorax. This time, two chest drains (one apical, one posterolateral) were inserted.

Despite active suction (∼20 cm H₂O) at the two chest tubes, apical pneumothorax persisted with a persistent air leak at the apical tube. When suction was interrupted, there was a significant increase of dyspnea and oxygen desaturation. Since, at that time, the patient was still a possible candidate for LT, we decided to perform thoracoscopy with talc poudrage limited to the lung apex to limit the extent of pleural adhesions.

Under general anesthesia and controlled ventilation via an endotracheal tube, the thoracoscope (Storz, Germany) was inserted through the fifth intercostal space at the midaxillary line. A stiff, severely deformed lung was seen, as well as multiple organized pleural adhesions. Inspection of the upper lobe showed important scarring and deformation, though no individual or ruptured blebs or bullae were seen. A second 5-mm trocar was inserted a few centimeters anteriorly from the first insertion; talc poudrage of the lung and thoracic apex using 2.5 g of sterile, asbestos-free talc was performed through the second entrance, after careful dissection of apical adhesions. Thereafter, a 28Fr chest tube was inserted into the apex under direct vision. Postoperative recovery was quick and uneventful. There was complete reexpansion of the right lung. Ten days later, the chest tube was removed (Fig 2). There were no recurrences of pneumothorax in a 2-month follow-up period. The patient ultimately decided against HLT.

![Image](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21696/ on 06/21/2017)

**Figure 2.** Complete reexpansion after apical talcage and removal of the chest tube.

**Discussion**

We present an adult with CF and recurrent pneumothorax in whom thoracoscopic talc poudrage limited to the apex successfully achieved pleurodesis, whereas previously simple chest tube drainage and tetracycline instillation failed to do so.

Pneumothorax is a well-known complication of CF and its incidence increases with age: in children, it occurs in 2 to 10 percent, whereas in adults the incidence reaches 19 percent. Pneumothorax in these patients is probably caused by rupture of subpleural blebs or bullae, which are commonly seen at autopsy and at thoracotomy. Pneumothorax is an important cause of morbidity and mortality in patients with CF: a potentially fatal tension pneumothorax occurs in as many as 40 percent of patients (with a usually short subsequent survival), and median survival after the first pneumothorax is 29.9 months.

Depending on the degree of emergency, therapeutic approaches to pneumothorax in CF include simple observation, chest tube drainage, chemical pleurodesis via the chest tube with intrapleural installation of irritants such as 50 percent dextrose, tetracycline, quinacrine, silver nitrate, or talc, thoracoscopic talc poudrage, surgical ablation of the pleural space, and surgical or thoracoscopic closure of apical blebs.

Although the results of these treatments seem to depend on the physician’s personal experience, it is generally accepted that simple observation should be limited to patients with small and relatively asymptomatic first episodes of pneumothorax. Chest tube drainage should be initiated in patients with recurrent, large, and/or symptomatic pneumothorax. However, this procedure should not be prolonged for more than a week due to an appreciable increase in mortality after that period, and recurrence is frequent. To avoid any waste of time, immediate chemical pleurodesis is advocated by some; the results, however, are often disappointing. Excellent results have been achieved by Daniel et al with entire pleural surface thoracoscopic talc poudrage, and by Spector and Stern with surgical pleural abrasion and pleurectomy.

However, the advent of LT has complicated therapeutic decision making regarding pneumothorax in patients with CF, since most transplant centers consider prior pleurodesis a contraindication to transplantation, because of extensive adhesions and bleeding that occur after pleurodesis. On the other hand, some authors believe that since only a minority (<20 percent) of patients with CF ultimately will undergo transplantation, patients should be given the best treatment available for the problem at hand, even if it would mean forgoing a possible future LT.
A general solution to this (partially ethical) problem cannot, in our mind, be given when confronted with an individual patient. As an approach to treating pneumothorax and preventing recurrence without disqualifying the patient for subsequent LT, limited surgical abrasion pleurodesis,9 excision, and oversewing of apical blebs through a limited thoracotomy11 or via thoracoscopy12 have been suggested. Only if these limited interventions should prove unsuccessful, a definitive pleural ablative procedure (surgical pleurectomy or entire surface thoroscopic talc poudrage) should be undertaken, thereby excluding only a minority of patients from subsequent LT.7

In our patient (still a potential candidate for LT at the time of the events), chest tube drainage and chemical (tetracycline) pleurodesis were unsuccessful. Surgical pleurectomy was considered a high-risk intervention and would definitely compromise LT. We therefore performed a thoroscopic intervention, during which talc poudrage (after careful dissection of most of the apical adhesions) was limited to the apical lung and parietal pleura. This treatment proved to be successful and, by its limited area of pleural sympysis, probably would not compromise in itself subsequent LT.10 In this particular patient, the prior presence of extensive, organized pleural adhesions would probably, to a certain extent, have compromised LT; additional apical talc poudrage therefore did not substantially increase subsequent operative risks.

This case history suggests the following approach in patients with CF with pneumothorax who are potential recipients of LT. After failure of chest tube drainage (persistent air leak after 5 days), thoracoscopy with apical blebectomy,17 laser bleb ablation,12 limited apical talc poudrage (present article), or surgical ablation via a limited thoracotomy11 seem valuable alternatives, the choice of which would depend on the personal experience of the surgeon or physician. Chemical pleurodesis via the chest tube probably should be abandoned in view of its rather poor result and its possible compromise for subsequent LT. Conventional surgical interventions such as pleurectomy should be reserved for patients in whom the above-mentioned interventions fail.

ADDENDUM

At the time of reviewing proofs of this article another adult patient with CF who had recurrent bilateral pneumothorax was successfully treated with bilateral apical thoroscopic talc poudrage.

REFERENCES


264 Successful Management of Recurrent Pneumothorax in CF (Noppen et al)