Talc Poudrage in the Treatment of Spontaneous Pneumothoraces in Patients with Cystic Fibrosis

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As patients with cystic fibrosis live longer, spontaneous pneumothoraces are seen with increasing frequency. Severe underlying pulmonary disease in these patients makes them particularly susceptible to life-threatening respiratory distress. Several modalities, including chemical sclerosis and open thoracotomy with pleurectomy, have been used to treat pneumothoraces in these patients. In the past 4 years, pneumothoraces in five patients (ages 9–22 years) with cystic fibrosis have been treated with thoracoscopy and talc poudrage. All procedures were performed under either regional or general anesthesia, depending on the age of the patient. Thoracoscopy was performed with a rod lens system and a 5.5-mm trocar, using biopsy forceps to lyse pleural adhesions, all of which ensures access to the entire pleural surface. United States Pharmacopeia-certified talc was insufflated to cover the entire pleural surface. There were no complications, and the patients had minimal pleural pain. Follow-up ranged from 6 months to 4 years. No patient has had a recurrent pneumothorax on the treated side. Thoracoscopy with talc poudrage is a preferable alternative to chemical sclerosis or thoracotomy for treating pneumothoraces in patients with cystic fibrosis. The procedure may be performed under regional anesthesia and allows rapid and complete sclerosis of the pleural cavity.

CYSTIC FIBROSIS is the most commonly fatal, inherited disease of whites.[1,2] Persons with this disorder are living longer because of significant advances in supportive care.[3,4] Pneumothoraces are quite common in the more advanced stages of this disease and may cause severe respiratory compromise due to the underlying pulmonary disease.[5,6] These older patients, who are the most prone to recurrent pneumothoraces, are increasingly likely to be cared for by adult, rather than pediatric, medical and surgical services.[7] There is a consensus that treatment of pneumothoraces with tube thoracostomy alone has an unacceptably high recurrence rate in these patients who already have significantly compromised pulmonary function, and that some additional measure is necessary to prevent recurrence.[2,5,8–10] Talc poudrage has been used to prevent recurrences in normal patients with spontaneous pneumothorax.[11–15] This report describes our experience with thoracoscopy and talc poudrage as the definitive treatment of spontaneous pneumothorax in patients with cystic fibrosis.

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Patients and Methods

Five patients with cystic fibrosis who had spontaneous pneumothoraces from 1982–1985 were treated with thoracoscopy and talc poudrage. The patients ranged in age from 9–22 years, the mean age being 16.5 years. All patients had chest pain with the onset of the pneumothorax, and three had severe respiratory distress.

After the diagnosis of pneumothorax was confirmed, all patients were operated on. In four of the five patients, chest tubes were not placed before thoracoscopy. In one case, a tension pneumothorax required emergency chest tube placement. The younger patients were anesthetized with general endotracheal anesthesia, whereas the older patients were given intravenous sedatives and intercostal nerve blocks. The technique used for thoracoscopy has been described in detail elsewhere.[16] A 5.5-mm trocar served as the introducer for the Storz rod lens telescope (Karl Storz Endoscopy–America, Inc., Culver City, CA). A second trocar was inserted in the same intercostal space, about 5 cm from the first trocar, and served as the introducer for instruments, including suction catheters and

TABLE 1. *Follow-up of Patients Treated with Talc Poudrage*

Patient	Age at Time of Treatment	Previous Pneumothoraces	Anesthesia	Follow-up	Recurrence on Treated Side	Recurrence on Contralateral Side	Alive
1	22	No	Ketamine	7 mos	No	Yes	Yes
2	14	Yes	Valium®* intercostal blocks	3 yrs	No	No	No
3	20	Yes	IV ketamine, stellate ganglion block and intercostal block	4 yrs	No	Yes	Yes
4	9	No	General endotracheal anesthesia	6 mos	No	No	Yes
5	17	No	General endotracheal anesthesia	10 mos	No	No	Yes

* Roche Products Inc., Manati, Puerto Rico.

the talc insufflation cannula. The thoracoscope was used to examine the lung and pleural space for abnormalities, and all adhesions were completely lysed so that the entire visceral pleural surface could be coated with the talc. Attempts were made to avoid excessive manipulation of the diseased lung. Dry USP pure talc was then insufflated onto the pleural surfaces. The thoracoscope was used to ensure uniform, complete coverage of both visceral and parietal pleural surfaces with a thin coating of talc (approximately 2 g). At the completion of the procedure, one of the trocars was removed and a chest tube was positioned through the trocar site under thoracoscopic guidance. If not already performed, intercostal nerve blocks were placed two interspaces above and below and in the interspace containing the chest tube. The patients were taken to the recovery room until their conditions were stable and then were moved to their rooms. No patient required admission to the intensive care unit.

Results

All patients tolerated the procedure well, and there were no complications. There have been no recurrent pneumothoraces on the treated side in any patients (Table 1). The follow-up period ranged from 6 months to 4 years. Since treatment, two patients have had at least one recurrence on the contralateral side. The recurrence in one patient was not serious and was treated conservatively. In the other patient, a physician unfamiliar with the technique of talc poudrage treated the recurrence with tube thoracostomy. Four of the five patients are still alive. One patient died of the infectious complications of cystic fibrosis.

Discussion

Cystic fibrosis is a generalized disorder of exocrine gland function that results in abnormal mucus production. It is the most commonly fatal, inherited disease of whites, with 5% of whites and 2% of American blacks being carriers.[1,2] Chronic progressive pulmonary disease is the hallmark of this disorder, which is also characterized by pancreatic insufficiency and an abnormally elevated concentration of chloride in perspiration. The pulmonary disease includes recurrent pneumonia, obstructive airway disease and, in its more advanced stages, hemoptysis and recurrent pneumothorax.[2] Before antibiotics were available to treat pneumonia, patients generally did not live more than 5 years after the onset of symptoms.[7] As general supportive therapy has steadily improved, more of these patients are living to adulthood.[1] In a recent series of patients who did not have meconium ileus at birth, one third lived to be more than 30 years of age.[17] Spontaneous pneumothoraces occur with increasing frequency in the later stages of this disease. In older patients the incidence of pneumothorax is reported to be 12–20%.[1,8] That this complication is not innocuous in these patients is evident from one series that reported a 15% mortality rate.[9]

The ideal treatment of spontaneous pneumothorax in patients with cystic fibrosis should relieve the pneumothorax, should not further compromise the respiratory function in these patients who already have minimal pulmonary reserve, and should reliably prevent recurrence. Treatment with tube thoracostomy alone has an unacceptably high recurrence rate of about 50%.[1,2,5,8–10] Other treatments include pleurodesis with a variety of sclerosing agents, open thoracotomy with pleurectomy, and bleb re-

section. Thoracotomy with pleural abrasion or pleurectomy is effective but is associated with significant morbidity and even mortality.[1,10] A wide variety of chemical sclerosing agents has been introduced into the pleural space to achieve pleural symphysis, including olive oil,[18] tetracycline, silver nitrate,[19] and quinacrine.[20] Of these agents, quinacrine has the lowest recurrence rate, about 12.5%.[20] However, quinacrine is difficult to obtain in a parenteral form.[1,20] Pleural symphysis with sclerosing agents results in better maintenance of the patients' pulmonary function,[11,14] as opposed to pleurectomy. No sclerosing agent has had a lower recurrence rate than that reported for talc. These excellent results have been obtained both experimentally[11] and in other clinical series.[12,13,15] In one series of 104 patients with spontaneous pneumothorax treated with talc poudrage performed under thoracoscopic guidance, there was only a 7.7% recurrence rate.[12] Our experience confirms these reported results and specifically supports the use of talc poudrage in patients with cystic fibrosis.

Talc was once commonly used for pleurodesis in this country but fell out of favor in the 1950s, as open thoracotomy was advocated and pleural irritants condemned as dangerous.[21] There was also concern about contamination of the talc with asbestos, which is known to be carcinogenic.[14] Despite the fact that USP-certified pure talc, free of contamination with asbestos, is now widely available, enthusiasm for its use has not been widespread in the United States.[22-25] The advantages of talc include its safety in its pure form[14] and its excellent sclerosing capacity.[11,26] Application of talc through the thoracoscope has several features that make this technique more reliable than the techniques of the simple instillation of sclerosing agents. First, the use of the thoracoscope allows the operator to lyse localized adhesions to ensure access of the sclerosing agent to the entire pleural cavity. Second, the ability to apply the talc under direct vision ensures that there is complete coverage of all pleural surfaces by the adherent powder and maximizes the probability of obtaining a complete pleural sclerosis. Third, the use of thoracoscopy to aid in the talc insufflation is scarcely more invasive than the placement of the chest tube itself.[16,27] In older patients, this procedure was performed with regional anesthesia without discomfort. In younger patients we used general anesthesia. Finally, avoiding the use of a thoracotomy minimizes the postoperative discomfort in patients, and none of our patients had compromise of pulmonary function after thoracoscopy. Thoracoscopy with talc poudrage is also used to treat other pleural conditions, such as recurrent malignant pleural effusions and spontaneous pneumothoraces,[23] in otherwise healthy individuals.

In patients with cystic fibrosis and pneumothorax, supportive therapy is necessary in addition to treatment of the pneumothorax. Although these pneumothoraces are rarely complicated by infection in the pleural space,[5,6] they are often preceded by an associated exacerbation of the underlying chronic parenchymal infection that requires antibiotic therapy and aggressive pulmonary toilet. An interesting ancillary issue is that airplane and helicopter transport are probably contraindicated in these patients, since lower ambient pressures increase the likelihood of spontaneous pneumothorax[5] and can exacerbate a pre-existing pneumothorax. This issue arose in two of our patients who were transported via helicopter. One patient was transported with a tension pneumothorax and almost did not survive the flight.

In summary, as patients with cystic fibrosis live longer, they are increasingly susceptible to spontaneous pneumothoraces, which are extremely likely to recur without effective pleural symphysis. Talc poudrage under thoracoscopic guidance is a safe, easily tolerated, effective method of achieving pleural symphysis in these patients with minimal pulmonary reserve. We have experienced no complications and have had no recurrence of pneumothorax on the treated side in five patients treated with talc poudrage.

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