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CLINICAL VIGNETTE

Pulmonary Fibrosis as a Late Complication of Talc Pleurodesis for Refractory Nonmalignant Pleural Effusion

Brian K. Wong, MD

Introduction

Pleurodesis is the procedure to eliminate the potential pleural space to prevent recurrent pleural effusions of malignant and nonmalignant etiologies as well as recurrent pneumothorax. Mechanical abrasion or instillation of chemicals to elicit intrapleural inflammation with resultant fibrosis and adhesion of the visceral and parietal pleura prevents reaccumulating fluid or intrapleural air. Talc, a hydrated magnesium silicate has been used since the 1930's for this indication.[1] Long term longitudinal follow up suggests minimal long-term morbidity.[2] We report a case of unilateral pulmonary fibrosis following talc insufflation for recurrent nonmalignant pleural effusion.

Case Report

A 66-year-old nonsmoking male presented with insidious onset of dyspnea on exertion over the past year. He noted it most when riding a bicycle or walking uphill. He associated it with his sedentary lifestyle but became concerned when his symptoms failed to improve with increased exercise. He had no other associated symptoms of chest pain, cough or orthopnea. He denied any fever, night sweats, or weight loss. There was a history of hypertension controlled on a thiazide diuretic. There was no heart disease and a recent negative exercise stress test. Echocardiogram revealed normal left ventricular function without valvular dysfunction and normal estimated right ventricular systolic pressure.

His past medical history revealed was significant for refractory nonmalignant right pleural effusion 12 years prior. He underwent multiple diagnostic and therapeutic thoracentesis with pleural fluid studies compatible with borderline exudate. Cultures including bacterial, AFB and fungi were negative and cytology showed no evidence of malignancy. Extensive evaluation revealed no cardiac, hepatic or renal dysfunction and screening for connective tissue disease was negative.

Thoracic surgery performed video assisted thoracoscopy. Pleural biopsies revealed areas of fibrosis and nonspecific chronic inflammation with benign mesothelial hyperplasia and no malignancy. A total of 8 grams of non-graded talc was insufflated into the pleural space. The patient did well post-operatively.

Two weeks later the patient returned with worsening shortness of breath and chest radiograph showed recurrent effusion. He underwent thoracentesis twice over the next 4 weeks. The last thoracentesis was complicated by asymptomatic hydropneumothorax with evidence of focal loculated effusion. Video assisted thoracoscopy was repeated with an additional insufflation of eight grams of talc. Post-operatively the pleural drainage resolved without recurrence on CT and the patient was discharged (Figure 1).

Seven years after pleurodesis the patient was referred from primary care with non-productive cough and lower extremity edema. Physical examination revealed diminished breath sounds at the right base with rare dry crackles. CT scan of the chest revealed no recurrence of effusion. There was diffuse pleural thickening with pleural calcifications in the right lower lobe and upper aspect of the major fissure and pericardium. The right posterior upper lobe showed severe interstitial changes with honeycombing suggestive of pulmonary fibrosis. Milder changes were noted in the right middle lobe (Figure 2). Spirometry revealed restrictive indices with an FVC 0f 62% of predicted, FeV1 of 60% of predicted with FeV1/FVC of 92% of predicted. He was reevaluated by cardiology without evidence of restrictive pericarditis or pulmonary hypertension. He was placed on low dose furosemide with the resolution of cough and leg swelling. Ambulatory oximetry revealed no desaturation with exercise.

The patient was lost to follow up until 5 years later. He had been using his thiazide diuretics intermittently when he noticed swelling in his ankles. He felt well but noted dyspnea on exertion as initially described. Physical examination was notable for increased crackles at the right base. Cardiac examination was normal. Pulmonary function studies were again restrictive with an FVC of 62% of predicted, FeV1 of 50% predicted with FeV1/FVC 80% predicted. Diffusing capacity was 52% of predicted with D/VA 95% of predicted. Total lung capacity was reduced at 69% of predicted. CT scan of the chest demonstrated progression of honeycombing and fibrosis with progressive volume loss of the right lung with traction bronchiectasis in the right lower lobe (Figure 3).

Discussion

Instillation of talc in the pleural space induces an intense inflammatory response. Among several mediators, interleukin-8 stimulates migration of neutrophils needed for adhesion of the

opposing pleural surfaces facilitating the development of fibrosis.[3]

Talc preparations vary widely in particle size. Talc approved for use in pleurodesis in the United States varies more in particle size compared to European approved talc that is graded by size. Median graded European talc particle size is 25 microns. Mixed talc preparations commonly used in the United States have median size of 15 microns.[4,5]

Talc that contain a significant percentage of particles smaller than 10 microns have been shown to elicit a more severe systemic inflammatory reaction. The smaller particles are believed to migrate farther into the pulmonary parenchyma as well as systemically.[5]

The risk of talc induced lung injury may also be related to the dosage of talc used. One study demonstrated an increased incidence of acute lung injury when a median dose of 6 grams was utilized.[6]

Long term complications such as a reduction in pulmonary function, increased risk of malignancy or development of pulmonary fibrosis appear minimal when talc pleurodesis was used for treatment of pneumothorax.[7]

Success rates of pleurodesis performed by insufflation of talc during thoracoscopy versus instillation of talc suspension or slurry by tube thoracostomy trended to favor insufflation, although not statistically significant.[8,9]

In conclusion talc pleurodesis has been proven to be effective in the treatment of malignant and non-malignant pleural effusions, as well as recurrent pneumothorax. Several studies document little to no reduction in pulmonary function or development of pulmonary fibrosis. It is postulated in our patient that a larger dose of eight grams of non-graded talc insufflated twice during two separate procedures were responsible for development of unilateral pulmonary fibrosis. In addition, the inflammatory pleural reaction from the first pleurodesis attempt likely facilitated migration of smaller non-graded talc particles into the pulmonary parenchyma, enhancing the development of fibrosis.

FIGURES

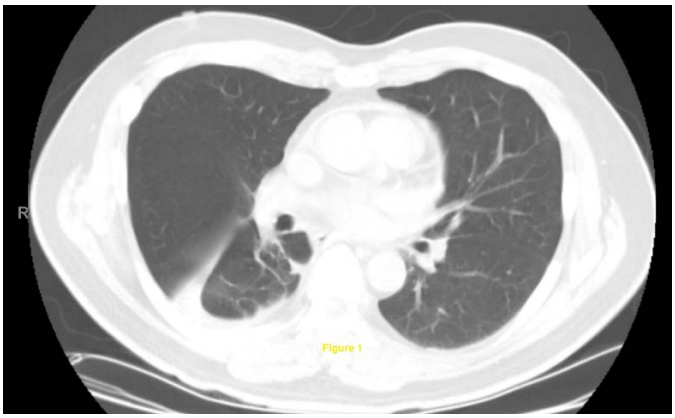

Figure 1

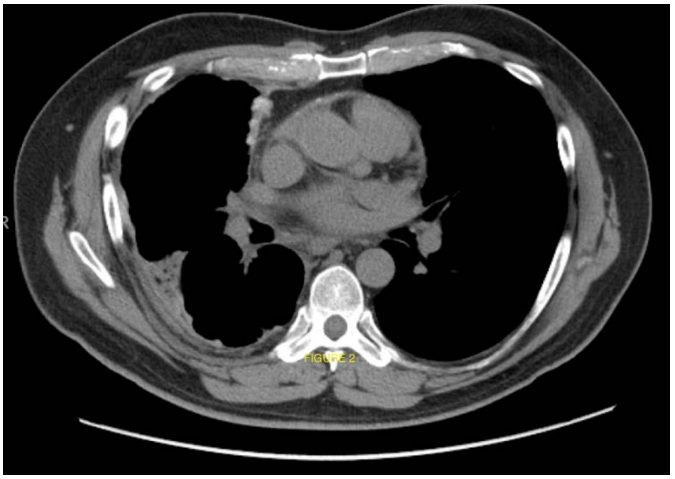

Figure 2

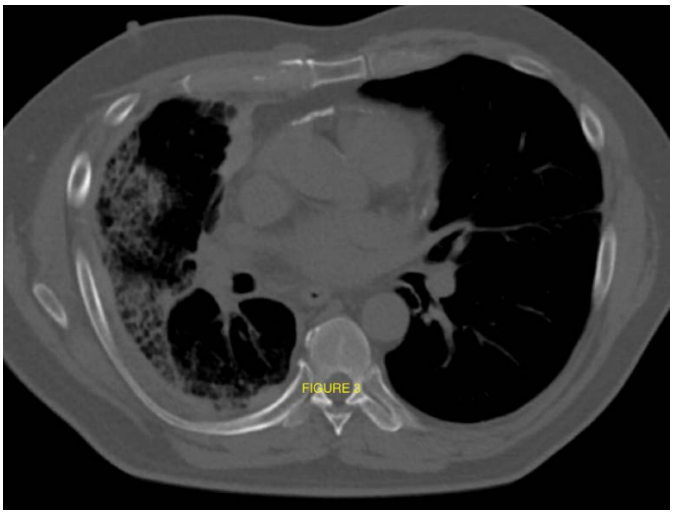

Figure 3

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