Pulmonary Talcosis in an Intravenous Drug Abuser: A Case Report and Literature Review

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Talc is a mineral composed of hydrated magnesium silicate, and is used as a lubricant and excipient in some medications. Intravenous injection of heroin mixed with talc particles or crushed tablets is a major cause of pulmonary talcosis, which can lead to complications such as pulmonary artery hypertension, cor pulmonale, emphysema, and progressive massive fibrosis. A 42-year-old man, a former drug addict receiving methadone treatment, presented with progressive dyspnea on exertion and malaise for 3 months, and low-grade fever for 3 weeks. A chest radiograph and high resolution computed tomography revealed diffuse bilateral micronodular lesions. The initial differential diagnosis included miliary tuberculosis, silicosis, and rare pulmonary talcosis. The patient underwent video-assisted thoracoscopic wedge resection of the right middle lobe of the lung. The pathologic report revealed numerous foreign bodies (crystals) with granuloma formations along the lymphovascular bundles, as well as fibrosis and diffuse crystals deposited in the perivascular space and interstitium. These crystals exhibited birefringence under polarized light. Pulmonary talcosis was confirmed. At present, there is no established treatment for pulmonary talcosis. Lung transplantation is an option for advanced disease. *(Thorac Med 2016; 31: 351-357)*

Key words: talcosis, intravenous drug abuse, micronodule

Introduction

Talc is a mineral composed of hydrated magnesium silicate. It is widely used in industry, and is also used as a lubricant and excipient in some medications. Talc can cause pulmonary problems, such as pneumoconiosis, pulmonary massive fibrosis, pulmonary hypertension, emphysema, and chronic respiratory failure through inhaled occupational exposure or intravenous injection [1-2]. Pulmonary talcosis is difficult to diagnose because of its rarity. Imaging studies are typically used to differentiate among pulmonary diseases, and high resolution

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computed tomography (HRCT) is capable of revealing the characteristics of talcosis, which include fine micronodular pattern, ground-glass attenuation, and emphysema [3]. Thus, pulmonary talcosis may occasionally be misdiagnosed as miliary tuberculosis [4]. We describe a patient with pulmonary talcosis mimicking miliary tuberculosis.

Case Report

This patient was a 42-year-old male who was employed as a plumber. He presented with progressive dyspnea on exertion, malaise, and weight loss (17 kg) for about 3 months. He also had low-grade fever in the afternoon, which lasted for 3 weeks. He had been an intravenous heroin addict, and began drug rehabilitation with regular methadone treatment 1 year prior to this presentation. He was also a hepatitis C virus carrier. He denied a history of chills, productive cough, chest pain, palpitation, night sweating, hemoptysis, leg swelling or orthopnea. He initially visited a local hospital, but was referred to our hospital when the chest radiograph disclosed diffuse lung nodules. Physical examinations were unremarkable, except for multiple injection marks along the veins in his forearm and antecubital area. Oxygen saturation using pulse oximetry was 93-98% under room air. Laboratory test results were within normal ranges, except for mildly elevated aspartate aminotransferase 89 U/L (normal range 8-38 U/L), alanine aminotransferase 89 U/L (normal range 10-50 U/L), and gamma-glutamyl transferase 109 U/L (normal range 4-63 U/L). Enzyme-linked immunosorbent assay for human immunodeficiency virus was negative. An electrocardiogram presented normal sinus rhythm. A chest radiograph revealed diffuse bilateral micronodular lesions (Figure 1A). HRCT was arranged and showed diffuse randomly distributed nodules measuring 1-3 mm in bilateral lung fields (Figure 1B). Miliary tuberculosis was suspected; however, 3 sets of acid-fast staining and tuberculosis culture of the sputum

Fig. 1. (A). Chest radiography revealed diffuse micronodular lesions. (B). High resolution computed tomography showed diffuse randomized tiny 1-3 mm nodules.
retrieved negative results. A bone marrow biopsy was then done, but the pathology disclosed neither caseous necrosis nor acid-fast bacilli. Therefore, video-assisted thoracoscopic surgery (VATS) wedge resection of the right middle lobe of the lung was performed. The pathologic report revealed diffuse crystals deposited in the perivascular space and interstitium. Numerous foreign body granuloma formations along the lymphovascular bundles were found, as well as fibrosis (Figure 2A and 2B). These crystals were birefringent under polarized light (Figure 2C and 2D). The pathologic findings were consistent with the diagnosis of talc granulomatosis.

Discussion

Talc is a mineral widely used in many industries. It is also used as a food additive and as a lubricant and filler in medications, including acetaminophen, cocaine, diazepam, heroin, methadone, methylphenidate, meperidine, oxymorphone, pentazocine, and promethazine [3,5-7]. Intravenous injection of heroin mixed with talc particles or crushed tablets is a major cause of pulmonary talcosis. Talc particles reach the pulmonary vasculature via the bloodstream,
leading to a talc embolism that initially results in arteritis. Then, talc particles are phagocytized by giant cells and macrophages after moving into the surrounding perivascular and pulmonary interstitium [8]. Unlike injected talc, inhaled talc is deposited predominantly around respiratory bronchioles and alveolar ducts [9]. The serial reactions finally result in the formation of foreign body granuloma with needle-shaped, birefringent talc crystals under polarized light [10-12].

Over time, diffuse micronodules replace the interstitial space, and pneumoconiosis, progressive massive fibrosis, and diffuse interstitial fibrosis emphysema develop because of the granulomatous inflammation [13-15]. Talc particles affect not only pulmonary tissue, but also other organs. Kringsholm B and Christoffersen P found birefringent material mainly within lung tissue (94%), followed by the spleen (76%), liver (55%), portal lymph nodes (39%), and bone marrow (24%) in a postmortem study of 33 intravenous drug addicts [10,16].

Patients with pulmonary talcosis can be asymptomatic or symptomatic. Most of the clinical presentations of symptomatic patients were nonspecific, and included progressive dyspnea on exertion, cough, increased sputum production, night sweats, weight loss, and hemoptysis [12]. More severe presentations include pulmonary artery hypertension, cor pulmonale, emphysema, spontaneous secondary pneumothorax, progressive massive fibrosis, acute respiratory distress syndrome, and chronic respiratory failure [12-14,17-20]. Pulmonary function tests usually reveal a mixed obstructive and restrictive physiology with a reduction in the diffusing capacity for carbon monoxide (DLCO) [7].

Imaging studies can play an important role in the diagnosis of pulmonary talcosis. Paré et al. [21] described the chest radiographic manifestations of 17 intravenous methadone addicts. Seven of them (41.2%) showed diffuse pinpoint micronodularity on the chest radiograph, similar to the presentation of our patient. In another study by Paré et al. [13], patients who injected talc-containing drugs and showed micronodularity on the chest radiograph also developed profounder lung injuries, including conglomerate masses, lower lobe emphysema, lower lobe bullae, and progressive massive fibrosis. Other manifestations in HRCT imaging studies include small centrilobular nodules, widespread ground-glass attenuation, confluent perihilar masses with areas of high attenuation, and panlobular emphysema in the lower lobes [12,22-23]. Although imaging studies supported our tentative diagnosis, the definitive diagnosis could only be obtained by histopathologic examination via transbronchial biopsy, fine-needle aspiration of pulmonary masses, VATS, or open lung biopsy.

Paré et al. [13] presented a long-term follow-up of 6 drug abusers with intravenous talcosis for more than 10 years. Even with the discontinuation of intravenous injection of oral drugs, the symptoms and complications related to pulmonary talcosis, including progressive dyspnea, pulmonary arterial hypertension, emphysema, hypoxia, and progressive interstitial lung disease, became more severe over time. Pulmonary function also declined. To date, there is no specific treatment for pulmonary talcosis besides best supportive care. Although treatment with systemic or inhaled glucocorticoids has been reported, there are currently few data supporting glucocorticoid therapy. Some patients have received successful lung transplantation [24-25]. Weinkauf JG et al. reported that there were no obvious differences in the rates
of survival and rates of being free from bronchiolitis obliterans syndrome after 1 and 5 years of follow-up between patients who received a lung transplant for talc lung granulomatosis and those who received a lung transplant for other indications [25]. Lung transplantation can be considered in patients with advanced pulmonary talcosis.

Conclusion

Although pulmonary talcosis is rare, detailed history-taking, especially drug abuse history and occupational exposure history, and cautious image interpretation can offer clues that may be useful in reaching the final diagnosis. Lung biopsy can confirm the diagnosis of pulmonary talcosis.

References


滑石肺症在靜脈注射藥物濫用者：病例報告及文獻回顧

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滑石是由水合矽酸鎂所組成的礦物，可作為潤滑和稀釋藥物的物質。靜脈注射含有滑石成分的海洛因或搗碎的藥錠可能引起滑石肺症，進而造成肺高壓、肺心症、肺氣腫和進行性大塊型纖維化等併發症。一位 42 歲男性為藥物濫用者，從一年前開始戒毒並接受美沙酮治療。病人從三個月前開始有活動性喘及倦怠的症狀，近三周也有輕微發燒的情形產生。他接受了一系列的檢查，胸部 X 光以及高解析度電腦斷層掃描可見廣泛性微小結節。根據病史及影像學檢查，可能的鑑別診斷有粟粒性結核、矽肺症及滑石肺症。為求診斷，病人接受胸腔鏡輔助右中肺葉楔狀切除手術。病理報告顯示在血管周圍及間質中有晶體廣泛性的沉積，並且有許多肉芽腫沿著淋巴血管束分布；而這些沉積的晶體在偏極光下呈現雙折射的變化。綜合以上結果，病人確診為滑石肺症。然而針對滑石肺症，至今仍無藥物被證實可有效治療此疾病。若是病情較嚴重的患者，可考慮採取肺移植的治療方式。( 胸腔醫學 2016; 31: 351-357)

關鍵詞：滑石症，靜脈注射藥物濫用，微小結節

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