

Case Report

Dental technician pneumoconiosis mimicking lung cancer

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Abstract: A 47-year-old man was referred for assessment of bilateral lymph node enlargement identified on a routine chest radiograph. Positron emission tomography showed high standardized uptake values (SUVmax: 20.5) in right supraclavicular, right intercostal, and multiple mediastinal lymph nodes. Biopsy samples obtained from the right upper and left lower paratracheal nodes by mediastinoscopy revealed granulomatous inflammation. Clinical and laboratory findings indicated a diagnosis of dental technician pneumoconiosis. The patient is alive and well 3 years after diagnosis. This case highlights the importance of obtaining an occupational history. (J Oral Sci 57, 269-271, 2015)

Keywords: PET; silica; granuloma.

Introduction

Pneumoconiosis can develop in dental technicians exposed to metal dust and silica particles in the laboratory (1-3). Dental technician pneumoconiosis (DTP) is a formerly unknown disorder among technicians and may manifest with sputum and dyspnea symptoms, parenchymal opacities, and decreased respiratory function

(4-6). We report a case of dental technician pneumoconiosis and discuss the present radiologic findings and potential exposures in this occupational group.

Case Report

A 47-year-old man was referred to our hospital for assessment of bilateral lymph node enlargement on a routine chest radiograph. He had a smoking history of 25 pack-years. His vital signs were within normal limits, and the physical examination was normal. He had no history of tuberculosis contact. He had been working as a dental technician for 30 years. Laboratory findings were as follows: white blood cell count, 5,000/ μ L; platelet count, 250,000/ μ L; hemoglobin, 15 g/dL; hematocrit, 46%; C-reactive protein, 3 mg/dL; erythrocyte sedimentation rate, 18 mm/h; urea, 25 mg/dL; angiotensin converting enzyme, 136 U/L (normal, 8-52); Ca, 9.9 mg/dL; and glucose, 90 mg/dL. The findings of spirometric studies were as follows: forced expiratory volume in 1 s (FEV₁), 2.56 L (80%); forced vital capacity (FVC), 3.54 L (90%); and FEV₁/FVC, 72. Thoracic computed tomography (CT) scanning revealed multiple, conglomerated, mediastinal lymph nodes bilaterally (Figs. 1, 2). There were two nodules—one in the right upper lobe and another in the right lower lobe. One of these nodules measured 2 × 1 cm and had irregular margins. The findings of a fiberoptic bronchoscopic examination were normal, and transbronchial needle aspiration samples were obtained from the right paratracheal lymph node. Right paratracheal lymph node aspirate was benign, and the findings of acid-fast bacilli (AFB) staining of sputum and bronchial lavage were negative. Ocular examination was normal.

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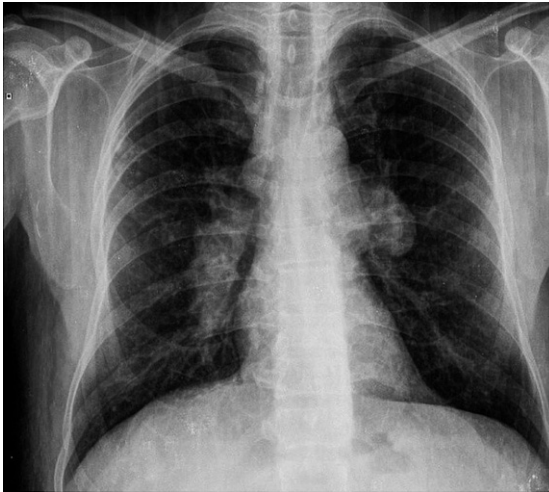


Fig. 1 Bilateral hilar enlargement.

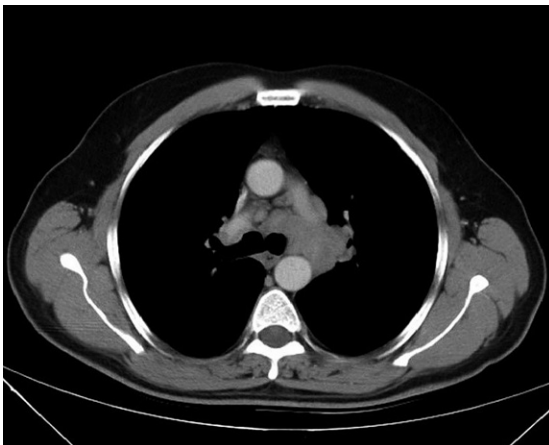


Fig. 2 Asymmetric lymph node enlargement and mediastinal invasion.

The diameter of a reaction to a purified protein derivative (PPD) skin test was 5 mm. Positron emission tomography (PET)-CT images were obtained because of high suspicion of malignancy, which was suggested by mediastinal invasion and asymmetric conglomerated lymph nodes on thoracic CT. PET-CT revealed SUV values as high as 20.5 in right supraclavicular, right intercostal, and multiple mediastinal lymph nodes. Two nodular densities in the right lung had a SUVmax of 3.3. Mediastinoscopy was performed, and a lymph node sample was obtained from the right paratracheal and left upper paratracheal lymph nodes. The findings from these biopsy samples were compatible with granulomatous inflammation. Dark-field microscopic images were normal. The clinical and histologic findings were consistent with a diagnosis of DTP. The patient is alive and well at this writing, in May 2014, 3 years after diagnosis.

Discussion

The differential diagnosis of conglomerated mediastinal and supraclavicular lymph nodes mainly includes lymphoma, sarcoidosis, tuberculosis, silicosis, and malignancy. In our patient, mediastinoscopy was preferred to lymph node excisional biopsy because the lymph nodes were nonpalpable. Granulomas were seen in mediastinoscopic biopsy samples. The results of bronchial lavage AFB and mycobacterium culture (BACTEC) were negative. Radiologic appearance was not typical of sarcoidosis: neither giant cells nor Langhans cells (the presence of which would support a diagnosis of sarcoidosis) were detected in biopsy samples. DTP was diagnosed on the basis of occupational history and clinical findings.

Solvents and mineral acids are used during tooth manufacturing. Gases, vapors, gypsum, metal alloy, and powders from ceramic and acrylic resin are formed in dental laboratories during the procedures. Silica exposure may occur during casting, crushing, sanding, porcelain grinding, and polishing in dental laboratories. In a study examining dental laboratories, the concentration of respirable silica dust in the polishing section was double that in the porcelain section, and respiratory symptoms were significantly more frequent in dental technicians than in controls (2).

Prevalence of DTP has been reported as 13-46% in several studies (3-5). In our patient, DTP had no significant impact on pulmonary function tests that indicate parenchymal involvement. In a previous study, respiratory symptoms were similar and FEV₁ was lower in dental technicians as compared with a control group (4). In another study, sputum was identified as the most common symptom among patients with DTP (6). Parenchymal changes were positively correlated with duration of employment as a technician and inversely correlated with FEV₁ and FVC in some studies (1,6). Frequency of symptoms and pulmonary function did not differ among technicians who worked less than 10 years compared to technicians who worked more than 10 years (3). In our patient, respiratory function was not compromised, perhaps because of the absence of parenchymal involvement. Previous studies have reported inconsistent pulmonary function test results in patients with DTP, such as normal parameters including carbon monoxide lung diffusion capacity (DLCO), obstructive or a mostly restrictive pattern of impairment (3,5).

Parenchymal opacities were present on 31% of chest radiographs and 69% of high-resolution CT (HRCT) images from DTP patients (6). The most common finding in DTP patients is round nodules on HRCT (5). Studies

have reported radiologic abnormalities such as diffuse reticulonodular infiltration, calcified lymph nodes, small opacities (International Labour Organization [ILO] category $\geq 1/0$), and diffuse interstitial disorder in DTP; however, this is the first report of conglomerated lymphadenopathy and increased PET uptake (1,2,7,8).

Mineralogic analysis of lung tissue revealed silicon, phosphorus, chrome, and cobalt in open-lung biopsy specimens from two dental technicians (9). Lung injury, inflammation, granulomas, and fibrosis developed after crystalline silica inhalation in an animal model (10). In our case, histopathologic analysis identified granulomas, and dark-field microscopic images were evaluated as normal for mineralogic substances.

This report described the characteristic radiographic appearance of DTP and highlights the importance of obtaining a careful occupational history for differential diagnosis.

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