Denim sandblasting and silicosis two new subsequent cases in Turkey

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ÖZET

Kot taşlamacılığı ve silikozis: Türkiye'den iki yeni olgu

Ülkemizde kuvars kot taşlamacılığında sık olarak kullanılmaktadır ve yeni silikozis olguları tanımlanmaktadır. Silikozis tedavisi olmayan ve kristalize silika inhalasyonu ile oluşan önlenebilir bir çevresel akciğer hastalığıdır (1).

Olgu 1: Üç yıl süre ile kot fabrikasında taşlama ve boyama işinde çalışmış 23 yaşında erkek olgu efor dispnesi ve öksürük ile başvurdu. Fizik bakısında solunum sesi şiddeti azalmıştı. Akciğer grafisinde alt ve orta zonlarda belirgin olan iki taraflı retikülonodüler dansiteler ve minimal pnömotoraks, kan gazı analizinde hipoksemi ve solunum fonksiyon testinde restriktif tipte bozukluk saptandı. Bronkoalveoler lavaj sıvısı lenfositik alveolit olarak değerlendirildi. Açık akciğer biyopsisinde interstisyel fibrozis ve polarize ışık altında daha iyi izlenen yabancı cisimler görüldü, akselere silikozis tanısı konuldu.

Olgu 2: İki yıl önce 1.5 yıl ilk olgu ile aynı fabrikada çalıştığı öğrenilen 25 yaşında erkek olgu nefes darlığı ve hemoptizi yakınması ile başvurdu. Akciğer grafisinde her iki hemitoraksta orta ve alt zonlarda belirgin retikülonodüler dansiteler ve tek taraflı minimal pnömotoraks, solunum fonksiyon testlerinde restriktif tipte bozukluk ve kan gazı analizinde hipoksemi saptandı. İlk olgu ile benzer yakınmaları, radyolojik bulguları ve çevresel maruziyet öyküsü nedeniyle ileri girişimsel inceleme planlanmayan olgu akselere silikozis tanısı ile takibe alındı.

Sonuç: Son zamanlarda taşlanmış kot kullanımı artmıştır ve kot taşlamacılığı küçük iş yerlerinde yapılmaktadır. Silikozisin tedavisi olmaması nedeniyle iş yerlerinin çalışma şartlarının düzeltilmesi hastalığın önlenmesi için önemlidir.

Anahtar Kelimeler: *Kot taşlamacılığı, kot kumlamacılığı, silikozis.*

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SUMMARY

Denim sandblasting and silicosis two new subsequent cases in Turkey

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In our country quartz is widely used for denim sandblasting and new cases with silicosis are defined. Silicosis is a preventable occupational lung disease caused by inhaled dust containing crystalline silica and no effective treatment for silicosis is available (1).

Case 1: A 23-years old man was admitted to the hospital with dyspnea on effort and cough. He had worked in a denim manufacturing factory for three years at sandblasting and dyeing. Physical examination revealed decreased breath sounds. Chest X-ray showed bilateral reticulonodular densities predominantly at middle and lower zones and minimal pneumothorax. Hypoxemia was determined in arterial blood gas analysis (BGA). Pulmonary function tests (PFTs) showed restrictive disorder. Lymphocytic alveolitis was demonstrated in the bronchoalveolar lavage fluid. Open lung biopsy revealed interstitial fibrosis and foreign particles which were seen more clearly under polarized light in interstitial areas. The patient was diagnosed as accelerated silicosis.

Case 2: A 25-years old man was admitted to the hospital with shortness of breath and haemopthysis. Two years ago, he had worked at the same place for 1.5 years. Bilateral reticulonodular densities at middle and lower zones and minimal unilateral pneumothorax were seen in chest X-ray. Restrictive disorder at PFT and hypoxemia in BGA were observed. Because of the similarity of complaints, radiological findings and occupational history with the former patient, no other further and invasive procedure was planned and the patient was diagnosed as accelerated silicosis.

Conclusion: The usage of sandblasted denims increase recently and denim sandblasting is being frequently made especially in small work places. Since there is no definite treatment for silicosis, it is important to take necessary precautions to improve the conditions of the factories.

Key Words: *Denim sandblasting, jean stoning, silicosis.*

Sandblasting is projecting, generally silica, onto surface which is formed by abrasion, with a powerful air compressor. It is frequently used for metal and glass abrasion. Recent increase in use of sandblasted denims has leaded to the increase of this procedure in Turkey, too (2). Quartz, a kind of stone, is cheap and easily obtained in Turkey, so it is widely used in our country (3). In this article, two cases who developed silicosis and apparent decrease in pulmonary function capacity despite the short period of working time in denim sandblasting are presented.

CASE REPORTS

Case 1

A 23-years old man was admitted to our clinic with dyspnea on effort, chest pain and haemopthysis for eight months. His history indicated 10 package/year of cigarette smoking and three years of working at a denim factory as a sandblaster and painter. His physical examination was normal except for decreased breath sounds. Hemoglobin was 16.7 g/dL. Results of BGA were as follows; PaO_2= 54.3 mmHg, $PaCO_2$= 55.9 mmHg and oxygen saturation= 90.2%. Bilateral reticulonodular densities at middle and lower zones and minimal pneumot-

horax were seen in the chest X-ray (Figure 1). High resolution computerized tomography (HRCT) revealed 2 x 1.5 cm lymphadenopathies at hilar and subcarinal area, apparent reticulonodular densities at the pulmonary paranchima in perihilar areas, interlobular septal thickness and bilateral minimal pneumothorax were detected (Figure 2,3). FEV_1= 1.32 mL (33.4%), FVC= 1.75 mL (37.8%) and FEV_1/FVC= 75.6 in PFT. Acid-resistant basille (ARB) in gastric fluid and tuberculin skin test were negative. Fiberoptic bronchoscopy (FOB) was normal. ARB were negative in bronchoalveolar lavage (BAL) and bronchial lavage fluids. Lympocytic alveolitis was determined in the assessment of BAL. Intra and extracellular metachromatic globular and granular amorphous materials were observed in

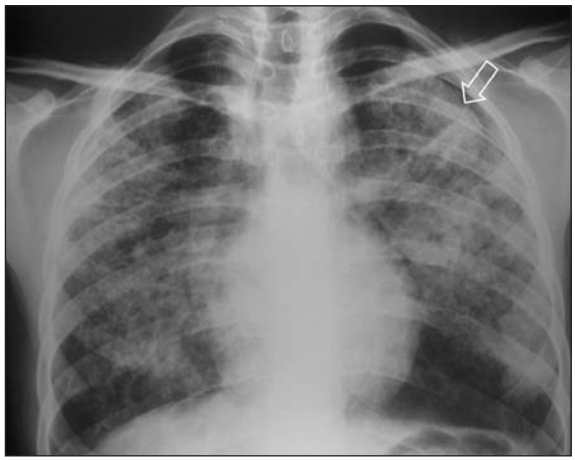

Figure 1. Posteroanterior chest X-ray of 1st case: Bilateral reticulonodular densities and minimal pneumothorax.

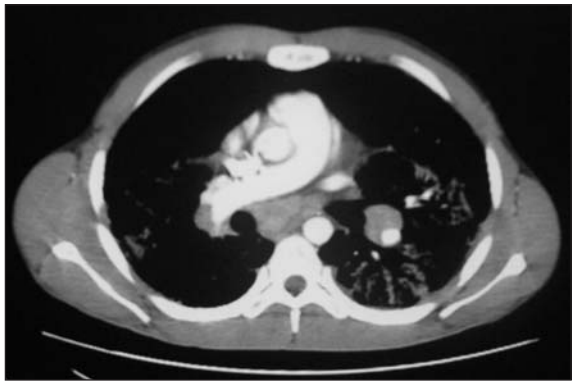

Figure 2. HRCT of 1st case: Reticulonodular densities at the pulmonary paranchima in perihilar areas, interlobular septal thickness.

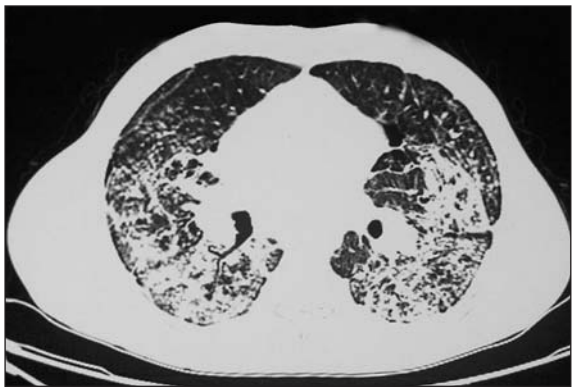

Figure 3. Lymphadenopathies at hilar and subcarinal area.

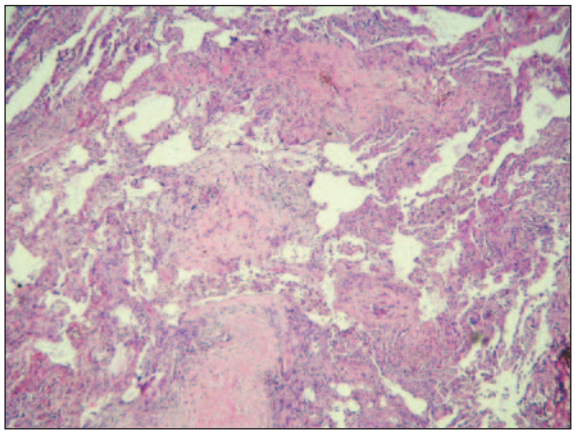

Figure 4. Open lung biopsy of 1st case: Granuloma-like small nodules of fibrosis surrounded by lymphocytes and histiocytes in the interstitium.

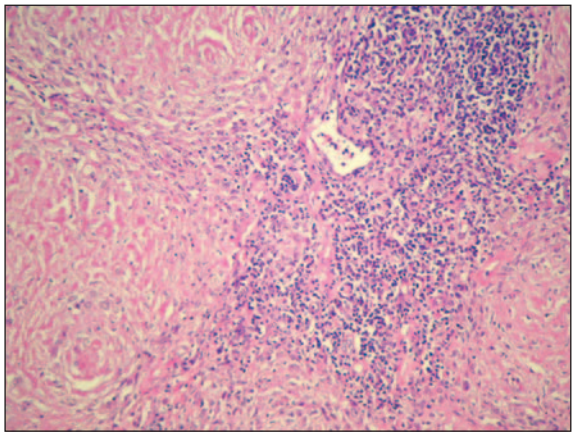

Figure 5. Mediastinal lymph nodes: Chronic granulomatous inflammation, small amount of material in the intra and extracellular areas.

bronchial mucosa biopsy. For the differential diagnosis open lung biopsy was performed. In the interstitium, granuloma-like small nodules of fibrosis surrounded by lymphocytes and histiocytes were determined (Figure 4). Multinuclear cells around the nodules; rare particles which were seen more clearly under polarized light in and out of the cells were observed. Chronic granulomatous inflammation and small amount of material in the intra and extracellular areas were observed in mediastinal lymph nodes (Figure 5). In regard of his complaints, radiologic findings and occupational history, the case was followed-up with the diagnosis of accelerated silicosis.

Case 2

A 25-years old man was admitted to our clinic with shortness of breath and haemopthysis. Two years ago, he had worked at the same factory for 1.5 years and six months ago tube thorochostomy was performed for pneumothorax. Arterial blood pressure was 110/60 mmHg, pulse was 135/minute and decreased breath sounds were determined at physical examination. In chest X-ray, reticulonodular densities which were seen at middle and lower zones of bilateral hemithorax and minimal pneumothorax were seen (Figure 6). There were millimetric nodules especially in pulmonary paranchyma. Interlobular septal thickness, increased reticular image and bilateral hilar lymphadenopathy were observed at HRCT (Figure 7). FEV_1= 1.25 mL (30%), FVC= 1.50 mL

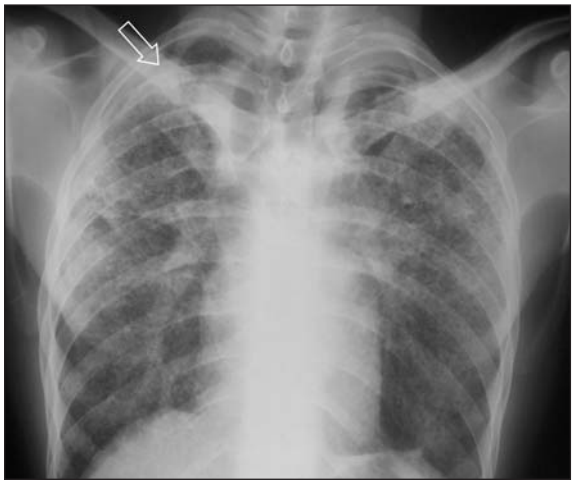

Figure 6. Posteroanterior chest X-ray of 2nd case: Reticulonodular densities in bilateral hemithorax, minimal pneumothorax.

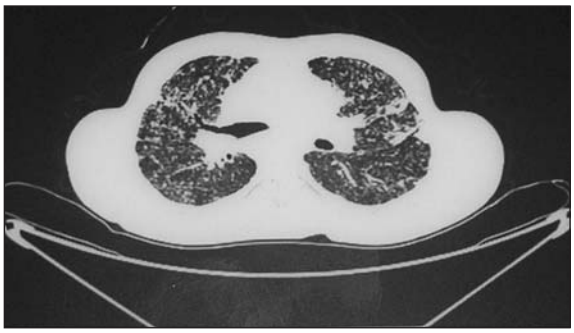

Figure 7. HRCT of 2nd case: Milimetric nodules in pulmonary parenchyma, interlobular septal thickness, increased reticular image and bilateral hilar lymphadenopathy.

(31%) and FEV_1/FVC= 102 at PFT. ABGA values were; PaO_2= 65 mmHg, $PaCO_2$= 36.9 mmHg and oxygen saturation= 92.5%. Although the complaints, radiologic findings and occupational history were similar to the characteristics of the former patient, advanced invasive assessment was not planned for the case. He was followed up with the diagnosis of accelerated silicosis.

DISCUSSION

Silicosis is a preventable but untreatable environmental pulmonary disease and can be mortal by decreasing general health status. Silicosis occurs by inhaling crystalline silica dust (1,4,5). Pathological and epidemiological studies have shown that silica powder also causes chronic obstructive pulmonary disease (6).

Crystalline silica exposure and silicosis have been associated with several type of work. These works are mining, quarrying, tunnelling, sandblasting, masonry, foundry work, glass manufacture, ceramic and pottery production, cement and concrete production, and work with certain materials in dental laboratories (1). New silicosis subjects have been diagnosed in new occupations, recently two new cases working in denim sandblasting were reported (2).

Shortness of breath, cough and general constitutional symptoms are frequently seen in the patients. Major complaint of our subjects was shortness of breath at time of admission. Sputum may be seen primarily in cigarette smokers, patients complicated with infectious diseases especially tuberculosis. Fever, haemopthysis

and sputum may be seen in silicotuberculosis and other infections. Respiratory insufficiency and cor pulmonale may develop in advanced stages of the disease (5). Even though the first patient had haemopthysis, no asidoresistane bacillus was detected in sputum smear. Respiratory insufficiency was detected in the second patient after the assessment of blood gases. Disease generally shows a chronic progression but in acute subjects in which the exposure to silica powder is dense, accelerated forms and rapid progression may be observed. Particularly, acute silicosis occurring months after extensive exposure may cause severe dyspnea, cough, hypoxemia and constitutional complaints (5). Although both cases had worked for a short period of time in transporting at denim factory, silicosis going on with hypoxemia brought the opinion of extensive exposure at the work place and they were defined as accelerated silicosis.

Diagnosis is easy in the presence of exposure; it is characteristic to see large nodular opacities in subjects with massive pulmonary fibrosis in chest X-ray (5). Widespread nodular opacities were observed at the chest X-rays of the both subjects and this image was in concordance with the literature. Severe silicosis causing apparent disorders in respiratory functions is a known fact. Analyses of respiratory function test are important in determining functional capacity and severity (5). Apparent restrictive disorder was observed in both subjects. Silicotic powder particles can be seen in tissue samples related to its refractile character under polarized light (5). Bronchial mucosa biopsy and open lung biopsy of the first case revealed foreign particles thought to be silica particles which were seen more clearly with polarized light.

Use of silica in sandblasting was limited 40 years ago in Europe (1,2,7). With the limitation of silica usage, decrease in mortality and morbidity rates of tuberculosis related to silicosis was observed (6). Between 1968-2002, mortality rates related to silicosis decreased by 93% (1,2,7). Besides silica, there are many kinds of materials that can be used, but since it is cheaper and easy to obtain, many work places prefer to use silica in our country (2,3,7).

In our country sandblasting is done in small work places (3). In order to prevent the disease, these small work places should be controlled and preventive precautions should be applied. With the increased number of big scaled work places with appropriate preventive precautions and audits, silica exposure and frequency of the disease will decrease.

Occupational diseases like silicosis are not frequently diagnosed or reported. For this reason, it is important to educate the health workers about the diagnosis of the disease and reporting the illness (4).

Because of the severity of silicosis, work place conditions should be improved but also raising the knowledge and sensitivity of health providers on the subject would beneficial.

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