Acute Pneumonitis and Adult Respiratory Distress Syndrome After Subcutaneous Injection of Liquid Silicone

To the editor: Liquid silicone is a polymer (dimethylpolysiloxane) that has been widely used for esthetic purposes since the 1960s, due to its chemical properties, lack of immunogenicity, and physical stability. However, it is not completely inert and local complications (infection, necrosis, reaction to it as a foreign body) and systemic complications (mastitis, granulomatous hepatitis, connective-tissue disease, lymphadenopathy, and acute febrile reaction) have been observed.[1] Pulmonary involvement is considered to be an exceptional circumstance.

A 30-year-old Ecuadorian male-to-female transsexual with no history of drug or alcohol abuse who had undergone silicone breast implant surgery 6 months previously was admitted to the emergency department following 3 days of sudden onset dyspnea eventually occurring at rest, a temperature of 38.5°C, chills, and feeling he was on the verge of death. On examination, the patient presented a temperature of 37.3°C, a heart rate of 110 beats/min and a respiratory rate of 30 breaths/min, with no cyanosis and decreased bilateral vesicular murmur. All other signs were normal. A chest x-ray showed an alveolar pattern that was peripheral and at the bases of both lungs. Arterial blood gas analysis—with a fraction of inspired oxygen (FiO_2) of 0.21—revealed a pH of 7.45, $PaCO_2$ of 35 mm Hg, PaO_2 of 60 mm Hg, arterial oxygen saturation of 90%, and bicarbonate (HCO_3) of 23 mmol/L. Blood tests showed a leukocyte count of 12 500 with a normal differential profile. The complete blood count, biochemistry, and coagulation tests were normal. The patient was diagnosed with severe community-acquired pneumonia and acute respiratory failure. Due to suspicion of infection with the human immunodeficiency virus, treatment with cefotaxime, clarithromycin, and co-trimoxazole was initiated in the emergency department. The patient subsequently revealed that his symptoms had begun immediately following the injection of 125 mL of liquid silicone in the trochanteric region of the thighs. He also revealed that he had suffered similar symptoms 4 years previously, in his country of origin. No lesions were revealed by bronchoscopy and a protected brush catheter and bronchoalveolar lavage (BAL) were performed in the right lower lobe. It was not possible to perform a transbronchial biopsy as arterial oxygen saturation was 90% with FiO_2 of 0.5. In the following 12 hours, the patient´s clinical symptoms and blood gas analysis (FiO_2 of 0.5) worsened: pH, 7.43, $PaCO_2$ of 36.1 mm Hg, PaO_2 of 65 mm Hg, HCO_3 of 23 mmol/L, and PaO_2/FiO_2 of 121. A chest x-ray showed progression of the bilateral alveolar pattern and the patient was admitted to the intensive care unit. Computed tomography of the thorax showed a panlobar alveolar pattern with an air bronchogram (Figure, A). All samples were negative. Analysis of the BAL showed 625 cells/mL, with 83% macrophages, 12% neutrophils, 3% lymphocytes, and 2% eosinophils. Staining of the BAL showed microvacuolar and macrovacuolar inclusions in the microphages, which were indicative of silicone particles (Figure, B), confirming the diagnosis of acute pneumonitis induced by silicone with respiratory distress syndrome. Following admission to the intensive care unit, the antibiotics were withdrawn and treatment was initiated with 20 mg of intravenous methylprednisolone every 8 hours and high-flow oxygen therapy with no ventilatory support. This treatment led to a gradual improvement in the patient´s blood gases. Blood cultures, human immunodeficiency virus serology, *Legionella* species and pneumococcus antigens in urine, and respiratory serology were all negative. When the patient was released from hospital (10 days after admission), the results of the computed tomography scan of the thorax and the functional examination were normal.

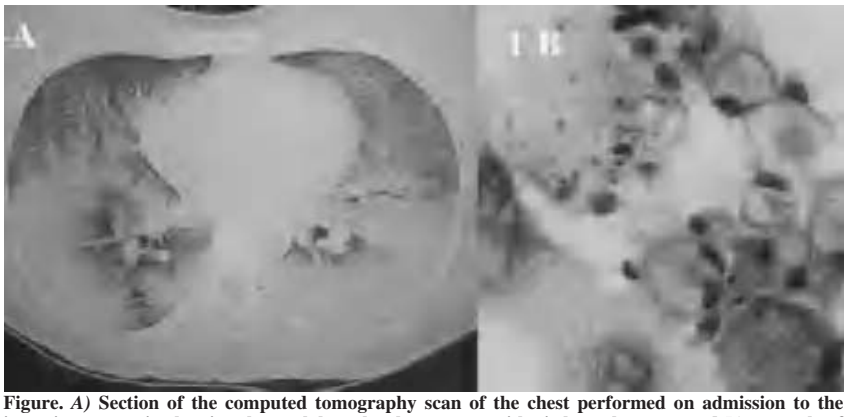

Figure. ***A)*** **Section of the computed tomography scan of the chest performed on admission to the intensive care unit, showing the panlobar alveolar pattern with air bronchogram, and** ***B)*** **a sample of the bronchoalveolar lavage showing microvacuolar inclusions in the alveolar macrophages.**

The first case of pneumonitis following silicone injection was described in 1975[1] and later there were several reports of pulmonary edema or bilateral pleural bleeding related to subcutaneous injections of silicone in the breasts, malar region, buttocks, or trochanteric region. In 1983, Charstre et al[2] published an article on a series of 5 patients with lung lesions and showed that the substance obtained from the BAL aspirate was the same substance that had been used in the injections and that the globular inclusions in the cytoplasm of the alveolar macrophages were silicone particles. Two forms of pneumonitis following silicone injection have been described. The acute form, as in the case of our patient, consists of sudden-onset dyspnea, tachycardia, tachypnea, fever and, occasionally, chest pain or hemoptysis.[2-6] It usually appears immediately after injection or within 24 hours. The volume of silicone injected varies between 100 and 250 mL. This entity affects healthy people and the presence of infections or drugs should be ruled out as causes of the symptoms. As in the case of our patient, moderate or severe hypoxemia and, occasionally, acute respiratory failure will be involved. Radiographs typically show a bilateral alveolar pattern with patchy areas of consolidation. Treatment is usually conservative, based on rest and high-flow oxygen therapy, although ventilatory support is necessary in some cases. There is disagreement regarding the use of steroids as there is no clear evidence that they improve outcome. Symptoms generally remit without sequelae although one case of consequent pulmonary fibrosis has been described.[4] While the BAL may show increased cellularity due to higher counts for alveolar macrophages, neutrophils, and eosinophils, finding globular inclusions in the macrophages is characteristic and confirms the diagnosis of pneumonitis following silicone injection. Spectrophotometry and electron microscopy confirm the nature of these inclusions.[2,3] The presence of these findings may make transbronchial or open biopsies unnecessary.[4,5] Four histological patterns have been described in this regard[6]: the mere presence of silicone emboli; congestion and hemorrhage; acute pneumonitis; and diffuse alveolar damage. A latent form, which appears between 6 and 13 months after the injection, has also been described[3] and affects people who presented local swelling with mild respiratory symptoms and hypoxemia. The pathogeny of pneumonitis following silicone injection involves a process of pulmonary embolism following the diffusion of the silicone into the circulatory system, encouraged by high local tissue pressure, massages, migration or direct injection. The occasional presence of alveolar hemorrhage and petechial exanthema point to this mechanism, which is similar to fatty embolism. Another hypothesis is that it is a cell-mediated inflammatory process. Supporting this hypothesis would be prior injections and lymphocytes in the BAL.[3]

In conclusion, in cases of acute lung damage and a history of subcutaneous injections of silicone, a diagnosis of pneumonitis following silicone injection should be considered and the finding of vacuolar inclusions in the macrophage cytoplasm from BAL can be decisive in dealing with these patients.

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