We present a patient with occupational lung disease whose chest CT showed miliary nodular pattern, with concurrent laryngeal cancer who had been engaged in type printing for 22 years.

Case Presentation

A 55 year old male presented to the emergency outpatient department, complaining of shortness of breath on exertion, voice hoarseness, dry cough and fatigue. He was an immigrant from ex Soviet Union, residing in Greece for the last 15 years and reported a history of treated pulmonary tuberculosis at the age of 17. He was smoker and a social drinker. His body temperature was 38.6°C, respiratory rate was 22 breaths per minute, blood pressure was 150/90 and pulse rate 116 bpm.

Physical examination revealed inspiratory crackles and enlarged cervical lymph nodes. Initial laboratory evaluation revealed moderate leukocytosis and increased CRP levels. Mantoux was 8 mm. The results of the following laboratory tests were normal: K, Na, PO₄ and Ca in serum and urine, BUN, hepatic enzymes, coagulation. Thyroid function tests including T₃, T₄, TSH and anti-TPO and parathyroid hormones were normal. Autoantibodies, indicating connective tissue diseases, (ie. ANA, ASMA, etc.), fungal antibodies and ASTO serum levels were within normal limits. Protein electrophoresis, tumor markers and SACE tests were negative. A chest XR revealed bilateral reticulonodular opacities. A HRCT scan of the thorax and abdomen showed multiple centrilobular nodules throughout both lung fields with no zonal predominance (Figure 1). No significant lymphoadenopathy was noted and there were no abnormal findings in the abdomen. At this stage the differential diagnosis included miliary tuberculosis, metastatic carcinoma (thyroid, choriocarcinoma), sarcoido-
sis, fungal infection and pneumoconioses. Ultra sound of thyroid and testes were unremark able. Bronchoscopy was performed and showed a nodule on the left vocal cord, without any other specific findings in the bronchial tree. Bronchial washings were obtained and admitted for microbiological (Ziehl-Nielsen stain, cultures and PCR for \textit{Mycobacterium Tuberculosis} and \textit{fungae}) and cytological evaluation. An ORL (otorinolaryngo) evaluation followed including microlaryngoscopy and biopsy of the nodule.

During the workout the patient improved without any specific treatment. Histology of the laryngeal nodule showed squamous cell laryngeal cancer (Figure 2A). At the same time Ziehl-Nielsen stains, cultures and PCR for \textit{Mycobacterium Tuberculosis} and fungae were negative. Thoracoscopic lung biopsy was performed to aid diagnoses. Histology of the nodules showed a foreign body granulomatous response with several foreign body cells. There was considerable sclerosis of the tissue between the granulomata. Following the histological examination a more detailed medical history was obtained, revealing an occupational exposure to ink particles.

**Discussion**

Occupational lung disease to ink is defined as a non-neoplastic reaction of the lung to inhaled metal fumes of ink and the resultant alteration in the structure excluding asthma, bronchitis and emphysema.

Miliary radiograph pattern is a well known chest radiograph pattern consistent with the presence of multiple nodules in the lung. A heterogeneous group of conditions comprising more than 80 entities may display this pattern. One of the main advantages of HRCT resides in its ability so the distribution of the nodules in relation to the secondary lung lobules, information that is extremely helpful for the differential diagnosis.

Miliary nodules are an uncommon pattern of hematogenous lung metastases. There are usually associated with highly vascular lung tumors such as renal cell carcinoma, breast cancer, melanoma and typically thyroid carcinoma. Squamous laryngeal carcinoma is not associated with this metastatic pattern.

Our patient was a laborer in type industry for 22 years and probably had been exposed in numerous inorganic (lanthanides, elements such us La, Ce, Nd, Sm, Eu, Tb, Lu) and organic particles (such us acrylates, epoxy- and urethane-acrylates). These elements are quite stable and

![Figure 1](image1.png)

**Figure 1.** Multiple centrilobular nodules throughout both lung fields with no zonal predominance.

![Figure 2](image2.png)

**Figure 2.** \textit{A}, Larynx biopsy revealed an invasive, moderately differentiated, squamous cell carcinoma (H&E, × 200). \textit{B}, Biopsy of one of the lung nodules unveiled a granulomatous reaction with numerous ill-defined granulomas (H&E, × 100). \textit{C}, Granulomas consisted of epithelioid histiocytes and abundant foreign-type giant cells containing cholesterol crystals and carbon particles (H&E, × 400) whereas asteroids could be found in some of them [inset (H&E, × 400) and arrows in B].
can be retained for a long time in the lungs and are the cause of rare earth pneumoconiosis. Our patient has been working as a gardener for the last ten years and has not been exposed to potential harmful particles.

Our diagnostic dilemma was whether this patient, who presented with fever and a history of healed tuberculosis, had recurrent TB or metastatic foci of laryngeal cancer. The results of pathological and microbiological examination were not compatible with the aforementioned possible diagnoses, and exhibited a granulomatous reaction to an inhaled foreign body which is compatible with former occupational disease (Figure 2 B-C).

Ink exposure should always be considered as a causative factor for granulomatous lung disease even when more possible and common diagnoses are present, as in our patient.

References


