Calcified Nodules with Metastatic Dissemination to Multiple Organs and Systems: A Rare and Surprising Presentation of Primary Lung Adenocarcinoma

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Abstract

With increased use of computed tomography of the chest as a crucial diagnostic method, more lung injury began to be achieved in the early stages. One of the most important findings is the pulmonary nodules. Calcified pulmonary nodules are a group with a relatively narrow differential of diagnoses and will be discussed in this article. We report the case of a 46-year-old woman without prior disease who was evaluated in our emergency room with shortness of breath, cough and chest pain, both started two months ago. It progressed with progressive worsening of the condition in the last week. She denied weight loss, denied a fever, and denied drug abuse during that time. In the emergency room, the patient underwent chest radiography and chest tomography. Chest x-ray showed multiple radiodense lesions, some calcified, spread bilaterally over the lung fields. Chest tomography demonstrated multiple nodules and solid lung masses, most with calcifications, both of unknown etiology.

The initial diagnostic hypotheses were pulmonary tuberculosis, pulmonary neoplasia and pneumoconiosis. The initial support measures were performed, and the patient was admitted to our hospital for diagnostic investigation and treatment. During hospitalization, the patient was diagnosed with primary lung adenocarcinoma with calcified lesions and calcified metastatic lesions to organs and systems. Although common, it is of paramount importance to diagnose calcified pulmonary nodules and generally seek its etiology and cause, since these nodules can represent benign and or malignant lesions, having different conduct's in the therapeutic approach.

Keywords: Tomography; Calcified Nodules; Primary Lung Cancer; Adenocarcinoma; Neoplasm Metastasis

Introduction

With the increase of computed tomography as a crucial diagnose method, more pulmonary lesions started to be caught up at initial stages. One of the most important findings are pulmonary nodules. There are a lot of variations that might be considered to its evaluation, such as size, morphology and distribution. When it comes to morphology, there are three possible variations, solid pulmonary nodules, partly solid pulmonary nodules and ground glass pulmonary nodules. All of them can be calcified or not, and that’s an important characteristic to guide the diagnose [1].

Case Report

We report the case of a 46-year-old woman without prior disease who was evaluated in our emergency room with shortness of breath, cough and chest pain, both started two months ago. It progressed with progressive worsening of the condition in the last week. She denied weight loss, denied a fever, and denied drug abuse during that time. In the emergency room, the patient underwent chest radiography and chest tomography. Chest x-ray (Figure 1) showed multiple radiodense lesions, some calcified, spread bilaterally over the lung fields. The initial diagnostic hypotheses were pulmonary tuberculosis, pulmonary neoplasia and pneumoconiosis. The initial support measures were performed, and the patient was admitted to our hospital for diagnostic investigation and treatment. During the hospitalization, the patient was diagnosed with primary lung adenocarcinoma with calcified lesions and calcified metastatic lesions to organs and systems. Laboratory tests were within normal limits and tuberculosis research was negative. The patient underwent further imaging tests, such as neck, thorax and total abdomen tomography, and performed a battery of laboratory tests, including tuberculosis research.
The tomography of the neck (Figure 2) showed an expansive mass of imprecise limits and with gross calcifications in its interior. This mass is located in the right supraclavicular / cervical region and is suspected of secondary involvement. Chest tomography (Figures 3 & 4) showed some nodules and solid lung masses, most with calcifications, both of unknown etiology. Calcified lymph nodes on both sides of the neck and mediastinum were also observed. Tomography of the abdomen (Figure 5) demonstrated a nodular thickening in the adrenal glands, probably due to secondary involvement. Other abdominal organs with no apparent signs of injury. No changes were found in breast, thyroid, and bone. Neoplasia and pneumoconiosis continued as the main hypotheses in the differential diagnoses after this new evaluation.

The medical team decided to continue the diagnostic investigation by performing a biopsy of the lesion in the supraclavicular / right cervical region and sent the collected material to the anatomopathological. The anatomopathological result (Figure 6) showed acinar structures in the extracted lesion. An immunohistochemical study (Figure 6) was requested, which resulted in positive cytokeratin 7 (CK-7); Positive Thyroid Transcription Factor 1 (TTF-1); E-cadherin positive; Positive Epithelial Membrane Antigen (EMA); other factors, such as thyroglobulin, chromogranin, CK 5/6, Ca 125, CK 20 estrogen receptor, progesterone receptor and WT-1 were all negative. This immunexpressed profile is highly suggestive of primary lung cancer [2-4], which was considered the final diagnosis due to the lack of findings in other organs. The chemotherapy regimen for primary lung adenocarcinoma was started and the patient presented progression of the disease with low response to treatment. About three months after diagnosis, a new chest tomography (Figures 7 & 8) revealed an increase in the number...
and size of lung lesions. In addition, a computed tomography scan of the skull was performed to assess a complaint and a symptom of the patient’s visual turbidity in the right eye. Cranial tomography (Figure 9) showed an amorphous solid lesion within the right eyeball, which evolved from partial involvement to total vitreous humor. No extra-axial or intra-axial cranial changes were found. This eyeball injury was considered as secondary involvement. The clinical team decided to keep the chemotherapy regimen current and the patient had progressive clinical worsening. Currently, the patient is being treated with another chemotherapy regimen for primary lung adenocarcinoma, with a low clinical response, making this case challenging and atypical.

Discussion

Calcified pulmonary nodules are a group with a relatively narrow differential [5]. Usually central, diffuse, laminated or popcorn calcifications are benign patterns [6]. These types can be seen in granulomatous disease and hamartomas. The most common cause of nodule calcification is granuloma formation in response to a healed infection, with residual aspect. All other patterns of calcification should be considered, at least, suspicious. However, there is an exception. If the patient is known to have a primary tumor, a diffuse calcification, for example, may be seen in osteosarcoma pulmonary metastasis [7]. Other examples are central and popcorn patterns, which also may be seen in patients with GI-tumors and patients who already passed throughout chemotherapy. Occupational diseases, also known as pneumoconiosis, are a differential that need to be considered, which explains why is so important to know the patient’s background history of work [6]. Silicosis is associated with nodal egg-shell calcification and multiple small densely calcified nodules that are upper lobe predominant. Coal worker’s
primary lung adenocarcinomas with calcified aspect associated with metastases. In this case, in addition to the unusual pattern, the secondary involvement of the lung, adrenal and right orbit of the patient (metastasis to the orbits may present as primary site the lungs in up to 23% of the cases) [14]. Such diversity of findings led the medical team to first rule out non-neoplastic hypotheses of calcified pulmonary nodules. After confirming the carcinomatous pattern, all the possible primary sites of extrapolunary adenocarcinomas were investigated, which did not show relevant alterations. With the result of the anatomopathological and immunohistochemical tests, the diagnosis was closed for this challenging case of pulmonary primary adenocarcinoma of aggressive behavior and calcified pattern.

This case report is important for radiologists and the medical community in general, as it demonstrates through CT scan an infrequent spectrum of lung adenocarcinoma, presenting as lung nodules and calcified metastases.

References
