

## A larval granuloma in the lung: An extremely rare phenomenon

*Akciğerde larva granülomu: Son derece nadir bir fenomen*

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### ABSTRACT

The formation of pulmonary nodules is associated with benign or malignant pathologies. Based on the sizes, growth rates, and morphological features of nodules, surgical treatment or follow-up can be performed. Pulmonary nodules are frequently encountered in the practice of thoracic surgery. A 37-year-old male patient who had a 2.0×1.9 cm nodule in the right lung was followed. His medical history revealed no chronic disease. During follow-up, the sizes of the nodule increased and, therefore, it was removed by wedge resection. The pathological examination result was reported as a larval granuloma. In conclusion, larval granulomas in the lung are extremely rare phenomena and should be further examined.

**Keywords:** Granuloma, larva, lung, nodule.

It is well known that parasites may cause granulomatous lesions in various parts of our body, although they rarely become observable. However, it almost never happens that larvae settle down in the lung parenchyma and develop calcified granulomas. The structure of granuloma recognized in lung nodules can be also arising from tuberculosis and *Schistosoma mansoni*, a kind of parasitic infection.<sup>[1]</sup> Furthermore, calcifications may take place in lung nodules from time to time.<sup>[2]</sup> Pulmonary calcification mostly occurs in cases of hamartomas and chondromas. In general, these lesions are located in the peripheral site of the lung, are well circumscribed, and are in the form of popcorn-like or lobular calcifications.<sup>[3]</sup> These calcifications can grow and reach larger sizes over time. As a result, the structure of granuloma in the

### ÖZ

Pulmoner nodül oluşumu, benign veya malign patolojiler ile ilişkilidir. Nodüllerin boyutlarına, büyüme hızlarına ve morfolojik özelliklerine göre, cerrahi tedavi veya takip yapılmaktadır. Göğüs cerrahisinde pulmoner nodüller ile sıkça karşılaşılmaktadır. Sağ akciğerinde 2.0×1.9 cm büyüklüğünde nodül bulunan 37 yaşında erkek hasta takibe alındı. Tıbbi öyküsünde herhangi bir kronik hastalık izlenmedi. Takip sırasında nodülün boyutları arttığı için, kama rezeksiyon ile çıkarıldı. Nodül patolojik değerlendirilme sonucunda larva granülomu olarak raporlandı. Sonuç olarak, akciğerde larva granülomu çok ender bir durum olup, daha ayrıntılı bir şekilde araştırılmalıdır.

**Anahtar sözcükler:** Granülom, larva, akciğer, nodül.

lung caused by a larva that first settles in the lung parenchyma and, then, exposed to calcification, and subsequently, wrapped with a fibrous tissue, like a silkworm cocoon, is an extremely rare phenomenon.

In this article, we present an extremely rare case of asymptomatic larval granuloma in the lung in the light of literature data.

### CASE REPORT

A 37-year-old male patient who was working as a construction worker and living in a rural area applied to a private hospital with non-specific complaints such as runny nose, cough and fever lasting for six months. He was smoking one pack of cigarettes a day, since he was 21 years old. His medical history had

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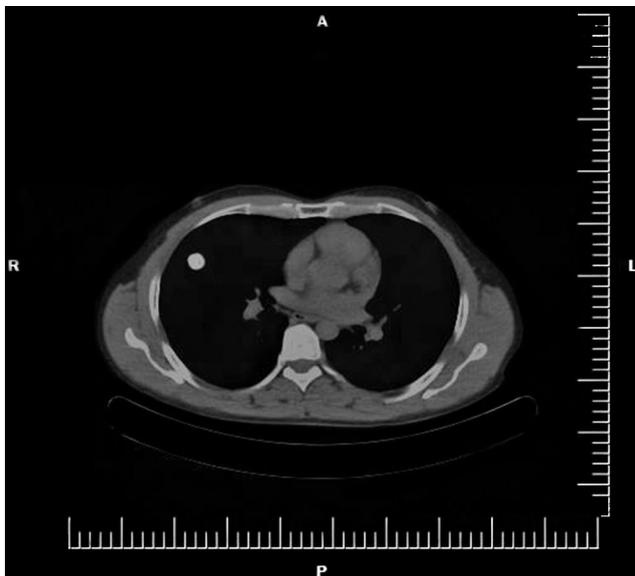
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no tuberculosis. A 2.0×1.9 cm, well-circumscribed nodular lesion including a point of calcific focus in the middle lobe of the right lung was detected on thoracic computed tomography (CT), and follow-up was recommended. When the patient was admitted to our clinic, the diameter of the lesion under discussion was identified to increase at six months after its initial diagnosis, as assessed by thoracic CT. Then, the patient underwent positron emission tomography (PET-CT), which revealed a well-circumscribed nodular lesion of

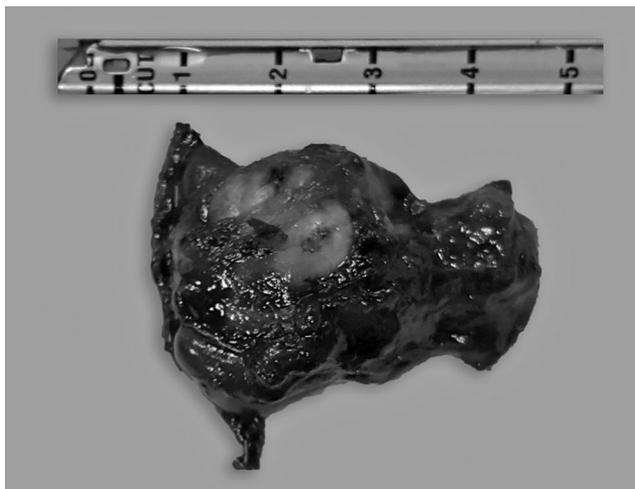
which volume was 2.51 cm<sup>3</sup> in the middle lobe of the right lung without any activity involvement. The lesion was a calcified ametabolic nodule with the attenuation value of 706 HU (Figure 1).

Since the diameter of the lesion involved was larger than 2 cm and it tended to grow, we decided to perform resection therapy. A written informed consent was obtained from the patient. Preoperative pulmonary function test, complete blood count, and biochemistry analysis results were all normal. The patient underwent wedge resection with mini-thoracotomy, due to its less parenchymal damage allowing the palpating of the nodule easily through thoracotomy, and the proper positioning of the stapler. The gross examination showed that the removed mass was 3.7×2.5×1.5 cm in size, encapsulated, and had a gray-black color (Figure 2). Based on the results of the cross-sectional analysis, the lesion had a round shape, light yellow color, and was well circumscribed. Furthermore, there was a necrotic and calcific area with a diameter of 0.3 cm in the middle of the lesion, where the structure surrounding the area was less bright and homogeneous, compared to the one in the center (Figure 3).

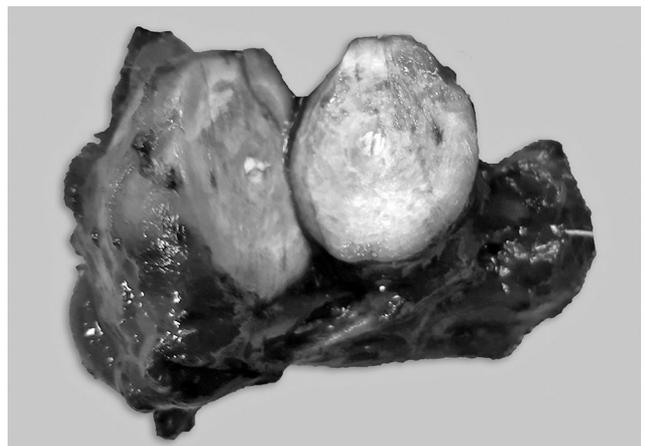
In the pathological evaluation of the lesion, a skeletal structure thought to be belonging to a larva, was seen in the middle of the removed mass. This skeletal structure was exposed to calcification and the calcific structure was surrounded by a fibrous tissue like a silkworm cocoon (Figures 4 and 5). Therefore, the structure was diagnosed as a larval granuloma. The patient was discharged with full recovery from the hospital after a five-day postoperative follow-up. At six months of follow-up, no abnormality was found.



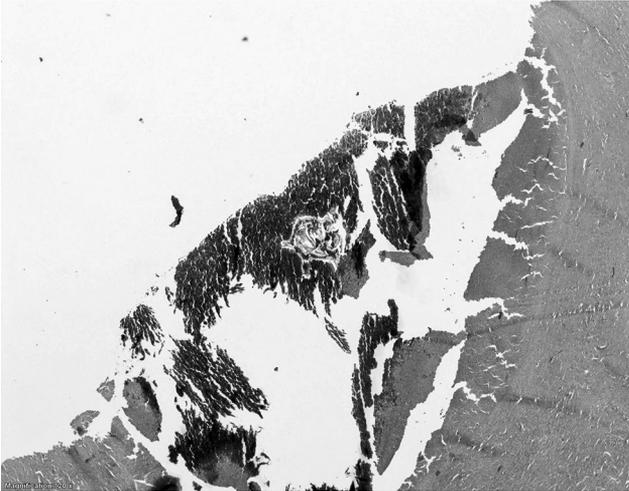
**Figure 1.** Transaxial section images of PET-CT showing a calcified, ametabolic nodule that is well circumscribed, located in the middle lobe of the right lung, with the volume of 2.51 cm<sup>3</sup>, with an attenuation value of 706 HU, and with no activity involvement. PET: Positron emission tomography; CT: Computed tomography.



**Figure 2.** A macroscopic view of the excised mass.

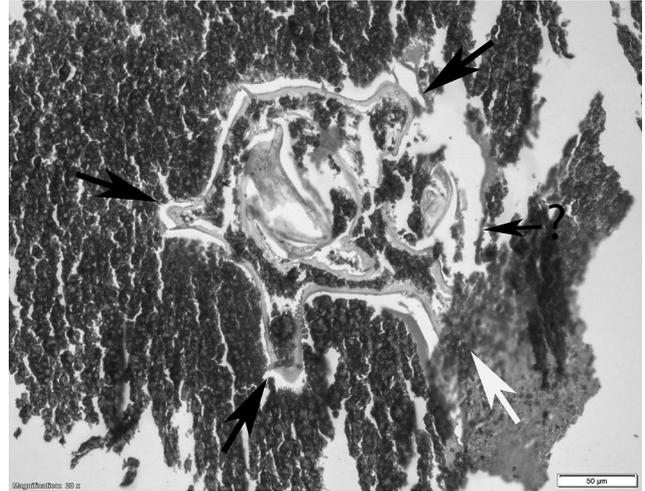


**Figure 3.** A macroscopic view of the excised mass divided into two pieces from the middle.



**Figure 4.** A larva enveloped in dystrophic calcification surrounded by compact fibrosis (H-E,  $\times 100$ ).

H-E: Hematoxylin-eosin.



**Figure 5.** Head of larva (white arrow), legs of larva (black arrows), and thoracic and abdominal segments of larva (H-E,  $\times 400$ ).

H-E: Hematoxylin-eosin.

## DISCUSSION

Pulmonary nodules are lesions, that are smaller than 3 cm in diameter, can be properly detected in the lung parenchyma, have a round shape, are well circumscribed, and can be solitary or multiple. These lesions can occur due to benign or malignant pathologies.<sup>[4]</sup> The age of the patient, history of smoking, and the presence of concomitant pathologies are crucial factors to identify whether these nodules are benign or malignant.<sup>[5]</sup> Besides, many other parameters including nodule size, growth rate, radiological structure, the presence of fluorodeoxyglucose uptake on PET-CT are determinants for the diagnosis. Solitary pulmonary nodules are mostly seen in infections; however, they can be also seen in parasitic, vascular, and inflammatory diseases and neoplasms.<sup>[6]</sup> Multiple nodules are mostly seen in tuberculosis and metastases, and these nodules are usually well circumscribed and round in shape.<sup>[7]</sup>

The majority of pulmonary nodules are detected incidentally through chest radiographies or CT scans. Currently, the rate of detection of pulmonary nodules has been increased, owing to the increasing awareness of patients, and the higher utilization rates of CT. The majority of radiologically detected pulmonary nodules are classified as benign.<sup>[8]</sup> Although the presence of calcification in the nodule mainly represents a benign pathology, it sometimes indicates malignancies, as well. Dystrophic calcification can be seen in the necrosis areas of bronchogenic carcinomas. About 25% of the bronchial carcinoids develop calcification.<sup>[9]</sup> While calcification can be frequently observed in osteosarcomas, it can

be rarely seen in chondrosarcomas. In addition, the lung hematogenous metastases of the thyroid, breast, colon, testicular, and ovarian cancers can exhibit calcification.<sup>[10]</sup> Focal calcifications may be seen in infections of healed primary granulomatous.<sup>[9]</sup> Calcified granulomas usually occur in tuberculosis, histoplasmosis, coccidiomycosis, and blastomycosis.<sup>[11]</sup> Calcification or ossification is observed in nearly half of the nodules of pulmonary amyloidosis.<sup>[12]</sup> While about 20% of solitary pulmonary nodules represent malignant nodules, the rate of malignancy was higher in nodules evaluated pathologically.<sup>[13]</sup> Granulomas mostly appear in the lungs. Granulomas in cases of tuberculosis, fungal infections, and hamartomas are usually in benign form. First, the immunoinflammatory response occurs against the bacteria or parasites intervening the lung and, then, they are phagocytosed by phagocytes. The agents that cannot be phagocytosed are covered and limited by a fibrous structure. The event of fibrous tissue formation continues, until it reaches to a certain size and, finally, causes to a granuloma structure. In our case, there was an asymptomatic larval granuloma in the lung, which is an extremely rare phenomenon.

In conclusion, although the formation of the granuloma is not known precisely, insect larvae may have been aspirated and settled down in the peripheral lung field and could not be thrown away through cough in our case. We believe that the larva localized in the peripheral lung cannot be phagocytosed by the acute inflammatory process in some cases. This type

of granuloma structure is extremely rarely seen in the lung. Therefore, we believe that the larval granuloma should be included in the etiology of the amebic, calcific, and fibrotic lung nodules, and the pathology of the larval granuloma should be clarified by further studies.

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The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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