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REVISTA MÉDICA DE MINAS GERAIS

CASE REPORT

Round pneumonia as a differential diagnosis of lung mass: a case report

Pneumonia redonda como diagnóstico diferencial de massa pulmonar: um relato de caso

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ABSTRACT

Introduction: Round pneumonia, an atypical radiological pattern of lung infection, is a rare manifestation of pneumonia, being even less reported in adults compared to the pediatric population, with less than 1% of cases manifesting as a round lesion. **Objectives:** To describe a case of round pneumonia in an adult mimicking a lung mass. **Case Report**: Male patient, 51 years old, smoker, admitted with lower respiratory tract infection and chest tomography showing oval hypodensity in the middle lobe of the right hemithorax with a non-specific appearance. Despite antimicrobial treatment and clinical improvement, the radiological pattern persisted, which raised the hypothesis of malignancy, followed by investigation with biopsy and immunohistochemistry. With negative results for malignancy, 60 days after the onset of symptoms, the image completely disappeared, concluding the hypothesis of round pneumonia. **Conclusion:** Round pneumonia in clinical practice is very similar to lung cancer on imaging. Although features such as fever and cough may point to an infectious etiology, occasionally bronchogenic carcinoma may also present as pneumonia secondary to bronchial obstruction with superimposed infection, which makes a definitive diagnosis difficult. Given a rounded radiological image and a characteristic clinical presentation, it is important to consider the hypothesis of lung neoplasia. However, the institution of antibiotic therapy followed by a repeat chest X-ray in 3 to 4 weeks should be considered, as round pneumonia can occur in patients of all ages, postponing more invasive and more complex diagnostic procedures.

Keywords: Pneumonia; Mass lung radiography; Differential diagnosis.

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Conflicts of Interest:
The authors declare that they have no conflicts of interest.

Ethics Committee:
Report Number - 78219724.3.0000.5119.

Received: November 27th, 2024.
Approved on: March 26th, 2025.
Publication Date: July18th, 2025.

DOI: 10.5935/2238-3182.2025e35405-en

RESUMO

Introdução: A pneumonia redonda, um padrão radiológico atípico de infecção pulmonar, é uma manifestação rara das pneumonias, sendo ainda menos reportada em adultos em comparação à população infantil, com menos de 1% dos casos se manifestando como lesão redonda. **Objetivos:** Descrever um caso de pneumonia redonda em um adulto mimetizando uma massa pulmonar. **Relato de Caso:** Paciente, masculino, 51 anos, tabagista, admitido com quadro de infecção do trato respiratório inferior e tomografia de tórax evidenciando hipodensidade ovalada em lobo médio do hemitórax direito de aspecto inespecífico. Apesar de tratamento antimicrobiano e melhora clínica, houve persistência do padrão radiológico, o que levantou a hipótese de malignidade, seguindo-se a investigação com biópsia e imuno-histoquímica. Com resultados negativos para malignidade, após 60 dias do início da sintomatologia, constatou-se desaparecimento total da imagem, concluindo a hipótese de pneumonia redonda. **Conclusão:** A pneumonia redonda na prática clínica possui grande semelhança com o câncer de pulmão em imagem. Embora características como febre e tosse podem apontar para etiologia infecciosa, ocasionalmente, o carcinoma broncogênico pode se apresentar também como pneumonia secundária à obstrução do brônquio com infecção sobreposta, o que torna o diagnóstico definitivo difícil. Diante de uma imagem radiológica arredondada e uma clínica característica, é importante considerar a hipótese de neoplasia pulmonar. Entretanto, a instituição de antibioticoterapia seguida de repetição da radiografia torácica em 3 a 4 semanas deve ser considerada, pois a pneumonia redonda pode ocorrer em pacientes de todas as idades, adiando procedimentos diagnósticos mais invasivos e de maiores complexidades.

Palavras-chave: Pneumonia; Radiografia pulmonar de massa; Diagnóstico diferencial.

INTRODUCTION

Round pneumonia (RP), pseudotumor or organized pneumonia, is an atypical radiological presentation of pulmonary infection, characterized by an oval shape or rounded consolidation distributed in a non-segmental pattern[1-3]. It is a rare presentation of pneumonia, being even less reported in adults compared to the child population, with less than 1% of cases manifesting as a round lesion[4].

The presence of round images found on chest X-rays, especially in older patients and/or with risk factors, suggests the possibility of malignant neoplasms, as the size, shape, location, surface regularity, presence or absence of lobulations or cavitations are criterias that allow establishing the benign nature of the disease[5]. Therefore, when we find an image compatible with an intrathoracic mass, we must remember differential diagnoses, such as bronchogenic carcinoma or even teratoma[2].

The aim of this article is to describe a case of round pneumonia in an adult mimicking a lung mass.

CASE REPORT

Male patient, 51 years old, smoker, alcoholic, user of illicit drugs, such as crack, and splenectomized due to previous trauma, transferred from an emergency service with reports of cough with purulent sputum, pleuritic chest pain on the right, fever and weight loss that began 15 days before. There was previous hospitalization with use of ceftriaxone for 7 days, negative BAAR and negative ANTI-HIV and a chest tomography showing oval hypodensity in the middle lobe of the right hemithorax, measuring 4.6 x 3.9 cm, with a non-specific appearance associated with discrete bibasal pleural effusion and ground glass image in the lower portions of the upper lobes, without mediastinal or lobar lymph node enlargement. At the time of admission, he was asymptomatic, with no signs of abnormality on physical examination. Admission laboratory tests were requested with elevated PCR (47 mg/dL), leukocytosis (21600 mm^3) with left shift and thrombocytosis (755000 mm^3). A new antimicrobial regimen was started with amoxicillin and clavulanate for 7 days and bronchoscopy was requested, with testing for BAAR, culture for BK and TRM-TB all negative. Although there was partial laboratory improvement in subsequent tests, associated with clinical improvement after the period of antibiotic therapy, the chest x-ray and tomography performed later demonstrated the persistence of a heterogeneous lung mass measuring 4.4 x 4.2 cm (Figure 1). Despite the fact that such findings suggested an infectious process, malignancy could not be ruled out. A CT-guided transthoracic biopsy was performed, suggestive of an acute inflammatory process. Next, the sample was sent for immunohistochemistry, which showed fragments of lung parenchyma with a focus of suppuration and alveoli showing slight fibro-inflammatory thickening. Absence of granulomas or signs of viral cytopathic effect. Positivity for TTF-1 in reactive pneumocytes and absence of neoplasia, favoring the hypothesis of acute organizing pneumonia. Due to the situation of social vulnerability, although asymptomatic and without clinical worsening, the patient remained hospitalized awaiting test results. After the results of the biopsy and immunohistochemistry, a chest x-ray was performed 60 days after the onset of symptoms, which showed complete disappearance of the image (Figure 2), concluding the hypothesis of round pneumonia, and the patient was discharged.

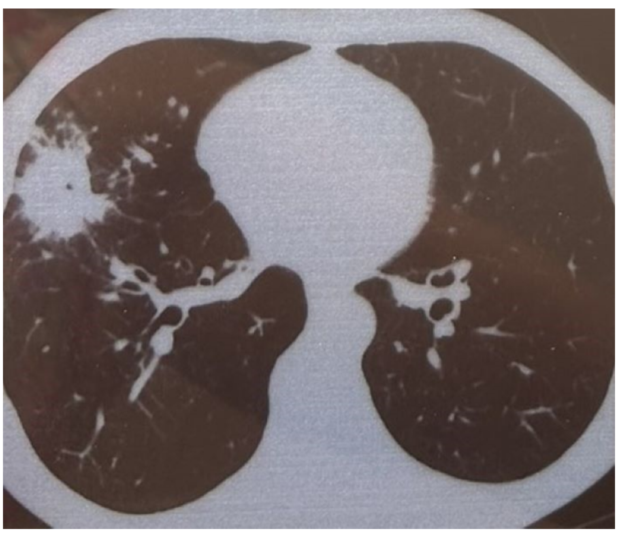

Figure 1. Chest computed tomography showing a heterogeneous pulmonary mass on the right, measuring 4.4 x 4.2 cm.

Figure 2. Chest X-ray showing complete resolution of the initial abnormality.

DISCUSSION

RP is generally considered a childhood disease and it is rarely reported in adults[6]. The pathogenesis of this disease is unclear, however it may explain why its incidence is higher in children. Some argue that the pores of Kohn and the ducts of Lambert in the lungs, responsible for intra-alveolar communication, may be blocked or poorly developed, resulting in compaction and confluent consolidation[4]. In children, these communications are generally not well developed and there is a shortage of alveoli and connective tissue in the septa, contributing to generating regions of confluent and well-defined consolidations, resulting in a higher prevalence of this pneumonia[3,4].

Others argue that RP may represent an early stage of pneumonia, when the infection is still contained, since its spread occurs centrifugally, subsequently determining the appearance of the typical image of pneumonia, such as the segmental or lobar forms[3]. Therefore, it is believed that its true incidence is much higher than that reported, since many cases are treated with antibiotics prior to imaging confirmation[1,4].

Its condition is variable and may be mild, imitating an acute viral syndrome, or with asymptomatic patients[6]. However, patients generally present with acute febrile illness, cough, dyspnea, tachypnea and pleuritic chest pain[1], as reported by the patient in this case. Signs of parenchymal consolidation, such as dullness to percussion and rales are often present on respiratory auscultation[1]. An interesting aspect of this case was the absence of diagnostic signs of pulmonary consolidation on physical examination.

In relation to its appearance in imaging exams, round pneumonia is characterized by oval-shaped pulmonary consolidations, interstitial infiltrates, or cavitations that may mimic a pulmonary neoplasm. These findings can occur in any part of the lung, although the right lung is more commonly affected[7]. It is observed that the imaging findings from the clinical investigation of the reported patient align with the evidence found in the medical literature.

Several microorganisms are reported to cause RP, however, *Streptococcus pneumoniae*, *Coxiella burnetii* and the Coronavirus are the most common etiological agents

Table 1. Comparison of round pneumonia, lung cancer, tuberculosis, and other pulmonary diseases[1,7].

Criteria	Round Pneumonia	Lung Cancer	Pulmonary Tuberculosis	Other Pulmonary Diseases
Symptoms and Signs	May be asymptomatic; in symptomatic cases, fever, cough, and respiratory discomfort.	Persistent cough, weight loss, hemoptysis, chest pain.	Evening fever, chronic cough, night sweats, weight loss.	Varies by condition (e.g., asthma: dyspnea, wheezing; COPD: chronic cough).
Radiological Presentation	Rounded or oval lesion, well-defined, with a non-segmental pattern. Typically resolves after treatment or spontaneously.	Irregular mass or nodule, ill-defined edges; cavitation possible.	Cavitations, heterogeneous infiltrates, nodules in lung apices.	Highly variable: infiltrates, atelectasis, airway thickening, etc.
Image Resolution	Resolves after antibiotic treatment or spontaneously; may initially mimic cancer on imaging.	Typically does not resolve; biopsy required for confirmation.	Improves with treatment, but scars may persist.	Depends on the disease and treatment (e.g., improves with bronchodilators in asthma).
Etiology	Mainly caused by *Streptococcus pneumoniae* but also *Klebsiella* and others.	Associated with risk factors such as smoking and family history.	*Mycobacterium tuberculosis.*	Varied, including bacterial, viral infections, autoimmune, or chronic inflammation.

associated with this condition in adults[4]. In the case reported above, the treatment was empirically directed towards the *Streptococcus pneumoniae*, according to the recommendations for the management of community-acquired pneumonia from the Brazilian Society of Pulmonology and Phthisiology[8]. In most cases, round pneumonia, after the use of antibiotic therapy, follows a benign course with therapeutic and radiological resolution in 2 to 4 weeks[3].

The importance of identifying round pneumonia in clinical practice lies in its great similarity to lung cancer on imaging, as evidenced in Table 1. Although features such as fever and cough may point to infectious etiology, occasionally, bronchogenic carcinoma may also present as pneumonia secondary to bronchial obstruction with superimposed infection[4].

In the patient in this case, despite the respiratory infectious condition accompanied by leukocytosis with left shift, elevated C-reactive protein and thrombocytosis being highly suggestive of pneumonia, given the situation of social vulnerability combined with its epidemiological region of high incidence of tuberculosis, the first diagnostic hypothesis to be ruled out was tuberculosis. Considering the persistence of the lung mass radiographed after the use of antibiotic therapy for 14 days, combined with the patient's age and smoking history, lung neoplasia remained an important differential diagnosis, suggesting the need to follow up the investigation with biopsy.

Therefore, establishing a definitive diagnosis becomes difficult, since even F18-FDG positron emission tomography is not capable of differentiating round pneumonia from primary lung cancer. This can lead to unnecessary invasive biopsies resulting in increased morbidity[4].

Conclusion

Given a rounded radiological image and a characteristic clinical condition, it is important to consider the hypothesis of lung neoplasia, especially in patients over 50 years of age and with a history of smoking. However, in the presence of signs and symptoms suggestive of infection of the lung parenchyma, the hypothesis of round pneumonia should be considered. Therefore, the institution of antibiotic therapy followed by repeat chest x-ray in 3 to 4 weeks should be considered in all adults presenting with a solitary lung mass, as round pneumonia can occur in patients of all ages, postponing more invasive and complex diagnostic procedures.

Author's Contributions

We describe contributions to the papers using the taxanomy (CRediT) provide above: *Conceptualization, Investigation, Methodology, Visualization & Writing – review & editing*: LMR; LJF. *Project administration, Supervision & Writing – original draft*: LMR; LBG. *Validation & Software*: CGM. *Resources & Funding acquisition*: CGM. *Data curation & Formal Analysis*: CGM.

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