CASE REPORT

Multiple Pulmonary Nodes and Thoracic Pain: A Case Report

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Abstract

There is limited data about the prevalence of pulmonary nodules in healthy children and no guidelines for their diagnosis and management. We report the clinical case of a 9-year-old boy with chest pain exacerbated by inspiration. Chest radiography showed pneumonia and, after treatment with azithromycin, there was imagiological aggravation. Chest computer tomography showed multiple nodular lesions compatible with metastasis syndrome. He had a normal blood panel, including inflammatory and neoplastic markers, and positron emission tomography with the hypermetabolism of 18F-fluorodeoxyglucose on multiple pulmonary nodules. He was submitted to a pulmonary biopsy with positive culture for *Staphylococcus warneri*. To our knowledge, this is the first report of pneumonia due to this agent. This pattern of mild manifestations suggests a low virulence. Immunocompetent patients rarely need a lung biopsy to diagnose pneumonia. However, in difficult cases, it can help determine the diagnosis in order to lead to adequate treatment.

Keywords: Chest pain/etiology; Child; Diagnosis, Differential; Multiple Pulmonary Nodules/diagnosis; Pneumonia, Staphylococcal/diagnosis

Introduction

A pulmonary nodule is a radiologic abnormality that is most often detected by chest radiography or computer tomography (CT).[1] Only limited literature is available on the prevalence of such nodules in healthy children, and previous studies showed a wide variance from 33% to 75%.[2]

There is no evidence-based guidelines or algorithms for the diagnosis and management of pulmonary nodes in children.[1] The differential diagnosis includes malignancy, fungal, bacterial, mycobacterial, and parasitic infections as well as inflammatory disorders such as granulomatosis and sarcoidosis.[3] While CT scans are very sensitive in detecting small pulmonary nodules, it remains difficult to identify CT features that can reliably predict their nature. In children, most pulmonary nodes are benign in origin.[1,2]

We report the clinical case of a boy with multiple pulmonary nodules associated with thoracalgia.

Case Report

A 9-year-old boy, with a history of recurrent productive cough and adenoidectomy (due to obstructive sleep apnea), presented to the emergency room with complaints of left inferolateral chest pain exacerbated by inspiration. Chest radiography was suggestive of pneumonia in the left pulmonary inferior lobe (Fig. 1), and he was treated with azithromycin for five days. Nine days later, despite clinical improvement with pain disappearance, a control radiography showed worsening (Fig. 2). A chest CT showed extensive condensation focus in the lateral inferior left pulmonary lobe that was approximately 50 mm in length and multiple expansive nodular lesions with regular contours, variable dimensions (about 5-16 mm of maximum diameter) scattered throughout both lungs, interpreted as secondary neoplastic nodes and, therefore, he was transferred to oncology hospital.

There was no history of fever, loss of appetite, weight loss, night sweats, asthenia, or aggravation of his cough during this period. He denied contact with sick people, recent travel, or other symptoms.

There was no notable family medical history. Physical examination in the first appointment at an oncology hospital, two weeks after the onset of symptoms, revealed infra-centimetric, mobile, elongated, soft, bilateral cervical lymph nodes and no other changes, including normal pulmonary auscultation. Laboratory investigations revealed hemoglobin (Hb) 11.5 g/dL,

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leucocytes 9160 cells/µL with 6320 neutrophils, and an absence of blast cells, in which the blood hepatic, renal, and electrolyte panel was between the normal ranges. C-reactive protein was 8.8 mg/L and procalcitonin was 0.064 ng/mL, angiotensin-converting enzyme (ACE) 65 U/L (elevated), alpha-fetoprotein (AFP) 0.781 ng/mL, and beta human chorionic gonadotropin (hCG) < 0.6 mUI/mL (both normal). An interferon gamma release assay (IGRA) test was negative. He repeated a thoracic CT that confirmed multiple pulmonary nodules with variable dimensions (between 3mm and 15 mm). A larger 50 mm diameter lesion was on the lateral inferior segment of the left lung (Figs. 3 and 4).

A positron emission tomography (PET) showed the hypermetabolism of 18F-fluorodeoxyglucose (18F-FDG) exclusively on multiple pulmonary and pleuro-pulmonary nodules, with densification on a posterolateral base of the left lung. Concerns about the possibility of neoplastic etiology, with left thoracic mass corresponding to the primary tumor, led to further investigation.

A left pulmonary mass biopsy provided tissue samples sent for histology and microbiologic study. The histology showed inflammatory lung infiltration and epithelial granulomas with necrosis. *Staphylococcus warneri* was detected on sample culture. He was treated with flucloxacillin 500 mg, every eight hours for 12 days, with clinical improvement and resolution on imaging (Fig. 5).

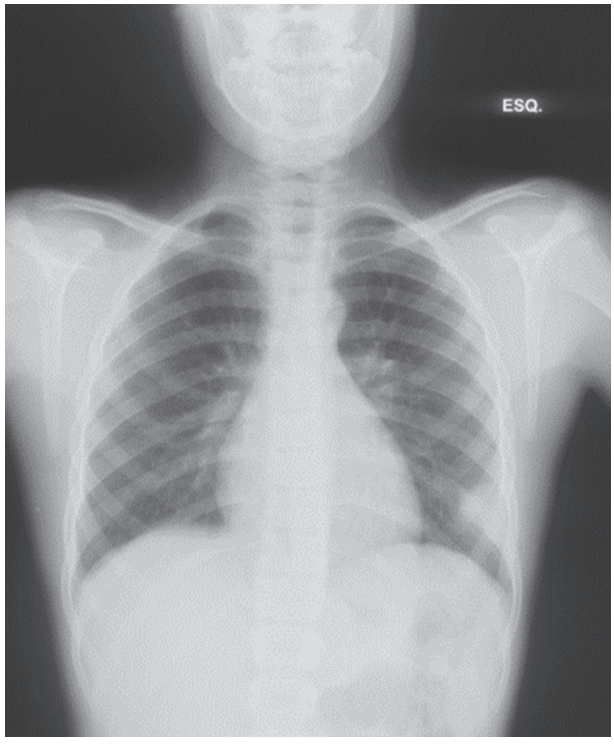

Figure 1. Chest radiography showing the hypotransparency of the left pulmonary inferior lobe (circle).

Figure 2. Chest radiography showing the hypotransparency of the left pulmonary inferior lobe after five days of azithromycin (circle).

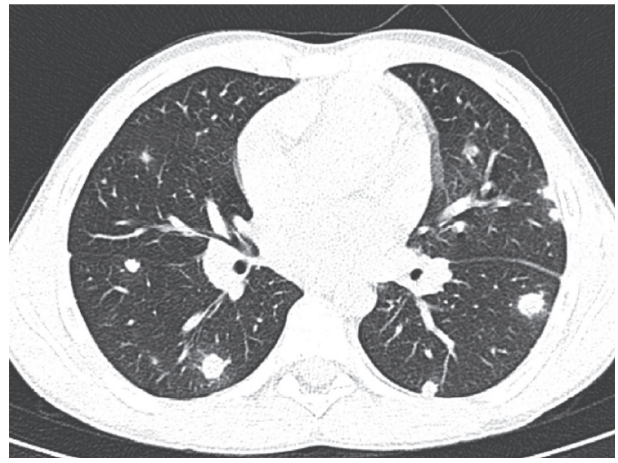

Figure 3. Thoracic computerized tomography showing multiple pulmonary nodules with variable dimensions.

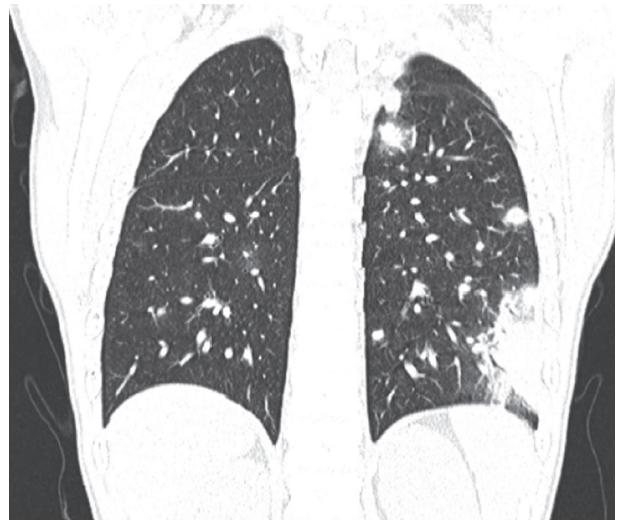

Figure 4. Thoracic computerized tomography showing multiple pulmonary nodules, with the largest lesion on the lateral inferior segment of the left lung.

Figure 5. Chest radiography after treatment.

Discussion

Staphylococcus warneri is a coagulase-negative staphylococcus that is a commensal microorganism of the human skin, nasal cavity, and mouth.[4-7] Approximately 50% of all individuals carry this organism and it represents 1% of the normal staphylococcal population.[4]

Human infections by these bacterial groups have been associated with immunosuppression, but also as contaminants of medical devices like catheters, prosthesis, and artificial or native heart valves, producing bacteremia and localizing infection in several organs as well as infections of the skin, eyes, urinary tract, and nosocomial infection in immunocompromised patients and neonates.[7] However, there are no clear risk factors associated with this agent and there is an important number of infections by this pathogen in immunocompetent individuals and not related to nosocomial infections.[5]

Staphylococcus warneri is associated with infections such as endocarditis, bacteremia, spondylodiscitis, meningitis, and urinary tract infection. There are reports of patients with septic arthritis and minor complains. The diagnosis can be difficult because it is a skin commensal with a high probability of contamination and false positive diagnosis.[5] To our knowledge, this is the first report of human pneumonia due to *Staphylococcus warneri*.

In this case, although lung imaging was worrisome, the boy had an unexpected excellent vitality, and the symptoms were scarce without fever, cough, respiratory distress, impaired pulmonary auscultation, or elevation of inflammatory markers. His pain had waned on previous antibiotic treatment but there was a radiographic worsening. Malignancy was a possibility but an extrapulmonary primary tumor was not elicited by PET scan. In children, secondary metastatic lung nodes usually have extrapulmonary primary tumors, most frequently Wilms tumor, osteosarcoma, and Ewing sarcoma.[2] Germ cell tumors and hepatoblastoma markers, a less frequent possible etiology, were negative. An elevated ACE level, despite being a non-specific finding, raised the possibility of sarcoidosis.

Although limited data is available regarding the clinical significance of coagulase-negative species other than *Staphylococcus epidermidis*, this pattern of mild clinical and/or laboratory manifestation suggests a low virulence of this agent and is also supported by the slower growth of *Staphylococcus warneri* when compared to *Staphylococcus aureus*.[4,8] The multifocality seen in CT scan images might be due to a prolonged course before the diagnosis, as reported in other cases.[4,5] Nevertheless, pneumonia in children is frequently a challenging diagnosis because signs and symptoms are nonspecific and may be subtle. They vary depending on the responsible pathogen and the severity of the infection.[9]

In immunocompetent patients, the use of a lung biopsy to diagnose pneumonia is rare.[9] Since there was no clinical or radiologic improvement with previous antibiotic treatment, and neoplastic disease could not be excluded, an image guided biopsy was performed. Despite being rarely done, the biopsy of lung lesions should be considered since it yields diagnostic information that may affect medical management in up to 90% of patients.[9]

The knowledge about the pathogen and the confirmation of pneumonia was crucial to choose an adequate antibiotic, leading to the complete resolution of infection and a favorable prognosis.

WHAT THIS CASE REPORT ADDS

- Pulmonary nodules are frequent in children and usually benign, but their differential diagnosis is vast and there are no evidence-based guidelines to manage them.
- This is the first report of pneumonia caused by *Staphylococcus warneri* in a previously healthy person.
- *Staphylococcus warneri* is a pathogen usually associated with nosocomial infections, affecting immunocompromised individuals, but it has been reported that it also affects healthy people without medical devices.
- *Staphylococcus warneri* has low virulence and is usually associated with mild manifestations.
- In difficult cases, a lung biopsy can be determinant in reaching a final diagnosis and instituting the right treatment.

Conflicts of Interest

The authors declare that there were no conflicts of interest in conducting this work.

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Consent for publication

Consent for publication was obtained.

Confidentiality of data

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

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Nódulos Pulmonares Múltiplos e Dor Torácica: Caso Clínico

Resumo

Os dados sobre a prevalência de nódulos pulmonares em crianças saudáveis são limitados e não há diretrizes para seu diagnóstico e tratamento. Reportamos o caso de uma criança de 9 anos do sexo masculino, com toracalgia agravada pela inspiração. A radiografia de tórax mostrou pneumonia e, após o tratamento com azitromicina, houve agravamento imagiológico. A tomografia computadorizada do tórax mostrou múltiplas lesões nodulares compatíveis com metástases. Apresentava estudo analítico normal, incluindo marcadores inflamatórios e neoplásicos, e tomografia de emissão de positrões com hipermetabolismo de 18F-fluorodesoxiglucose nos múltiplos nódulos pulmonares. Foi submetido a uma biópsia pulmonar com cultura positiva para *Staphylococcus warneri*. Até onde sabemos, este é o primeiro relato de pneumonia por este agente. Este padrão de manifestações ligeiras sugere uma baixa virulência. As crianças imunocompetentes raramente necessitam de biópsia pulmonar para o diagnóstico de pneumonia. No entanto, em casos difíceis, esta pode ajudar a determinar o diagnóstico que leva ao tratamento adequado.

Palavras-Chave: Criança; Diagnóstico Diferencial; Dor no Peito/etiologia; Nódulos Pulmonares Múltiplos/diagnóstico; Pneumonia Estafilocócica/diagnóstico