Commonly misdiagnosed round pneumonia in a child: a case report

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ABSTRACT

Round pneumonia, a specific radiological finding in children, is often caused by Streptococcus pneumoniae; but it is easily misdiagnosed with some other diseases, causing many difficulties for clinicians. We described a case report of round pneumonia in a 9-year-old boy, with chest pain, following fever, productive cough, left-sided pulmonary consolidation syndrome, tachypnea, no chest indrawing, and a round homogenous lesion about 4 cm in diameter with a clear border in the left upper lobe position on chest X-ray. He was initially misdiagnosed as a lung tumor. He was correctly diagnosed with round pneumonia prior to pneumonectomy and was successfully treated with antibiotics. Therefore, it is important to carefully analyze round pneumonia cases that are often misdiagnosed, resulting in poor therapy.

KEYWORDS pneumonia, Streptococcus, vancomycin

CASE REPORT

A previously healthy 9-year-old boy was transferred to the hospital with chest pain and a 3-day history of fever and productive cough. He experienced a dull pain in his left chest that spread to his back. He had left-sided pulmonary consolidation syndrome, tachypnea (31 breaths per minute), no chest indrawing, a temperature of 38.5°C, and a regular heartbeat (102 beats per minute). His weight and height were 23 kg and 120 cm, respectively. He had lost 2 kg in the previous 2 months. His grandfather had tuberculosis (TB) 5 years prior to his presentation and was pneumonectomy and was successfully treated with antibiotics.
成功治愈，尽管咳嗽复发。入院时，他被诊断为严重肺炎并接受了静脉注射头孢曲松（150 mg/kg/天，分三次）、妥布霉素（5 mg/kg/天，一次）的治疗。

胸部X光片（CXR）显示左上肺叶直径约4 cm的圆形均匀病变（图1a）。胸部非对比CT显示右肺尖部圆形肿块大小为39 × 35 mm，含有4 mm气泡，左上肺叶有散在性实变区（图1b）。

血白细胞计数为16.9 g/l，中性粒细胞计数为1.1 g/l，血红蛋白水平为11.2 g/dl，C反应蛋白水平为94.7 mg/l。电解质和血糖水平、以及肝肾功能指标均在正常范围内。痰涂片抗酸杆菌试验呈阴性。

鼻咽拭子样本被送往越南胡志明市国际基因和免疫学研究所的Nam Khoa Biotek实验室，该实验室符合国际标准化组织9001:2015和13485:2017以及世界卫生组织良好制造规范第908号（附录4）的标准，用于实时聚合酶链反应（PCR）、培养和抗菌药物敏感性试验（AST）。

根据CXR和CT的发现、患者年龄以及体重下降史，诊断为恶性肿瘤。他被转介到越南胡志明市的一个大型儿童医院进行肺切除，但实时PCR结果证实存在肺炎双球菌（S. pneumoniae），超过了10^7 copies/ml。因此，他从头孢曲松/妥布霉素治疗转为万古霉素（60 mg/kg/天，分三次）治疗14天。

万古霉素被用于在无培养和AST结果的情况下替代头孢曲松，因为青霉素类抗生素耐药性很高；3天后，培养结果分离出对头孢曲松耐药、对万古霉素敏感的肺炎双球菌。患者临床状况改善；未报告胸痛，肺部通气良好，未闻及啰音。X光片上的阴影在万古霉素治疗3天后消失（图2）。出院时未加用任何其他抗生素。

**DISCUSSION**

圆形肺炎，也被称为球形肺炎，是一种主要影响儿童的放射学发现。新生儿更容易发展为圆形肺炎，因为他们发育不完全的Kohn孔和Lambert’s通道，可能导致液体或细菌的离心扩散。1,4,5

圆形肺炎通常影响5岁以下儿童，8岁时罕见，因为8岁时两肺发育良好。6,7

右上肺叶最常受累，右上肺叶的圆形肺炎比左上肺叶常见8倍，比右中下肺叶常见两倍。4,8

左肺动脉角度可能造成这种分布，因为它比右肺动脉角度更锐利。

**Figure 1.** Lesion on CXR and chest non-contrast CT. (a) Lesion on CXR showing a well-demarcated round opacity in the left upper lung field (arrows); (b) chest non-contrast CT showing a mass of 39 × 35 mm in the left lung apex and pleural-based opacity with smooth margins in the left lung apex with normal pulmonary vasculature coursing through the mass (arrow). CT=computed tomography; CXR=chest X-ray

**Figure 2.** Opacity on the chest X-ray (CXR) disappeared on the 5th day after vancomycin treatment
right bronchus. The sharper angle may act as a barrier to aspiration. However, the current patient was older than the typical age of patients with round pneumonia, and the lesion was in the left upper lobe. Therefore, round pneumonia should be considered even when the presentation is atypical. Obtaining a lateral CXR may have avoided a misdiagnosis in this patient.

Several features can help confirm round pneumonia as the first clinical stage of the disease includes symptoms of acute respiratory infection such as fever, cough, dyspnea, chest pain, and pulmonary consolidation syndrome. The most prominent findings are an opacity on CXR, leukocytosis, and a positive clinical radiographic response to a course of antibiotics. This is one of the most important features distinguishing round pneumonia from pulmonary neoplasms. Round pneumonia may appear as a halo sign on chest non-contrast CT. However, the halo sign may also be seen in fungal infections, lung abscesses, pulmonary TB, and lung malformations. Therefore, a non-contrast chest CT scan cannot definitively conclude whether a lesion is a tumor or another pathology. A CT scan has a high sensitivity but poor specificity; false-negative results occur in 15–30% of cases. Several previous studies have suggested using contrast-enhanced CT instead of non-contrast CT to help differentiate tumors from infection. The use of contrast-enhanced CT may have avoided a misdiagnosis in this patient.

This report highlighted the importance of real-time PCR testing for identifying pathogens and supporting diagnoses. With its high sensitivity and quick response time, real-time PCR is useful for developing targeted treatments and preventing potentially fatal mistakes. Strict procedures were used to collect sputum samples from the tracheal aspirate in this patient, limiting cross-contamination during manipulation. The presence of <10 squamous epithelial cells and >25 polymorphonuclear cells per low-power field (100× magnification) indicated a high-quality specimen. S. pneumoniae is the most common etiological agent of pediatric pneumonia. A recent study reported that Mycoplasma pneumoniae accounted for 69.7% of lobar pneumonia in children. Real-time PCR, culture, and AST can be used to identify causative agents and their susceptibilities.

In conclusion, this report presented an unusual case of a child with pneumonia caused by infection with S. pneumoniae. Round pneumonia is sometimes difficult to distinguish from lung neoplasms. The combination of radiographic lesions, including contrast-enhanced CT and real-time PCR, significantly increases the accuracy of an early diagnosis.

Conflict of Interest
The authors affirm no conflict of interest in this study.

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