

Lo, the ever confounding nipple shadow!

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Abstract

The discovery of a solitary pulmonary nodule (SPN) on chest imaging can be alarming for both the clinician and the patient. In the absence of a uniform guideline, managing SPN is nothing short of challenging for primary care physicians (PCPs). We present a case here of a patient presenting with prolonged cough who also displayed unilateral SPN on her chest radiograph. Through further examination, this presence was later shown to be a nipple shadow simulating SPN, and the patient was spared unnecessary testing and psychological distress.

Introduction

An SPN is defined as a rounded opacity measuring up to 3 cm in diameter which may be either poorly or well-defined and is completely surrounded by pulmonary parenchyma in the absence of atelectasis, lymphadenopathy, or pleural changes.^{1,2} Frequently, an SPN is first detected via plain chest radiography.³ Published data in the 1950s suggested that the frequency of detecting an SPN was about 1 in every 500 to 1,000 chest radiographs performed in United States (US), depending on the population studied.^{4,6} A more recent study involving 1,000 asymptomatic subjects with an increased risk of lung cancer noted that almost 6% of participants had non-calcified SPNs when screened with a chest X-ray (CXR) versus 16% screened with a chest CT.⁷ Fortunately, most SPNs are of benign pathology.²

Case Report

A 37-year-old Malay woman presented with the chief complaint of intermittent dry cough for more than 2 months, which was notably worse when she lay in bed to sleep. Additionally, she complained of acid regurgitation and water brash. The cough was not accompanied by fever, loss of weight or appetite, night sweats, or hemoptysis. She also denied any pulmonary tuberculosis exposure or smoking history. Her medical history included underlying depression, which had been treated with oral fluoxetine, and cervical myelopathy. There was no family history of atopy, though she did have a strong family history of malignancy; her father had been diagnosed with nasopharyngeal carcinoma, her uncle had lymphoma, and her aunt had breast cancer. Physical examinations revealed the patient to be overweight but with normal vitals. Precordial, respiratory, and abdominal

examinations were all unremarkable. Finally, no lymphadenopathy was present.

Her initial CXR revealed a small (about 2.5 cm), well-defined lesion with a vague medial border over the lower zone of the left lung (refer to **Figure 1**). A subsequent repeated image with nipple markers, however, showed clear lung fields, which confirmed that the opacity was likely a nipple shadow (refer to **Figure 2**). The patient was later treated for gastroesophageal reflux disease with a combination of oral proton-pump inhibitors and a prokinetic agent. In addition, she was advised regarding useful lifestyle and dietary changes. Her symptoms improved remarkably after 4 weeks of treatment.

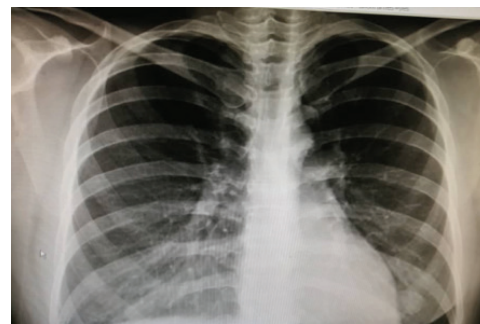


Figure 1: CXR in posteroanterior view without nipple markers

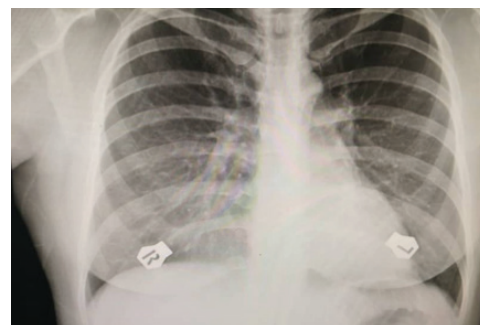


Figure 2: CXR in posteroanterior view with nipple markers in situ

Discussion

An SPN poses a great conundrum, since the underlying causes are legion, ranging from benign findings to early malignancies, which require urgent intervention (refer to **Figure 3**).^{2,8} The ideal approach to treating SPNs is still unknown because of a lack of quality evidence to indicate best practice.^{2,9} Not surprisingly, a U.S. study has shown that almost half of the PCPs surveyed reported a lack of confidence in managing their SPNs, while 3 out of 4 were inclined to refer to pulmonologists for further evaluation.¹⁰ The general first rule in approaching an SPN is to evaluate the patient's risk of malignancy.^{2,11} In recent years, several computational prediction models have been proposed to quantify the risk of SPN malignancy.^{12,13} The bedside use of such cumbersome models, however, remains limited. As such, most clinicians still depend on clinical judgment to determine SPN risk.^{11,12} The criteria associated with greater malignancy risk include clinical factors such as older age, being a smoker, a personal or family history of cancer with radiological features involving larger nodules, upper lobe SPN location, and the presence of spiculation or ill-defined edges.¹²

An SPN patient with a low risk of malignancy still warrants judicious deliberation of

probable benign causes. This is important to avoid needless testing, which creates not only financial cost but also unnecessary apprehension in patients, all of which would be worsened in the event of false positive results. In cases like this one, in which a nipple shadow simulates an SPN, clinicians should always consider the possibility of artifacts. This is particularly important considering that in a series of 1,000 routine CXRs, nipple shadows were detected about 10% of the time.¹⁴

Radiographic results potentially indicative of nipple shadows may include bilateral symmetrical lesions, asymmetrical lower zone lesions, lesions appropriately positioned in relation to breast shadows, and any lesion with a sharp lateral border but a vague medial outline.¹⁴⁻¹⁷ An important caveat to remember is that nipple shadows are not infrequently noted in male patients as well.^{14,18}

When confronted with the possibility of nipple shadows, another CXR in the oblique view or with the use of nipple markers is often adequate to confirm the diagnosis.^{15,16} It is prudent, however, to keep in mind that in extremely rare cases, an SPN may superimposed on a nipple shadow.¹⁹⁻²¹

Type	Etiology
Infections	Tuberculosis Atypical mycobacteria Round pneumonia Lung abscess Fungus: aspergillosis, blastomycosis, cryptococcosis, histoplasmosis, coccidioidomycosis Parasites: amoebiasis, echinococcosis Measles Nocardia Pneumocystis jiroveci
Neoplastic (Benign)	Mesenchymal tumors: hemangioma, lipoma, chondroma, fibroma Pulmonary hamartoma Neural tumors: schwannoma, neurofibroma, paraganglioma Sclerosing pneumocytoma Plasma cell granuloma Endometriosis
Neoplastic (Malignancy)	Lung cancer Solitary metastasis Neuroendocrine tumors Malignant teratoma
Vascular	Haematoma Arteriovenous malformation Pulmonary artery aneurysm Pulmonary venous varix Lung infarct

Congenital	Bronchogenic cyst Lung sequestration
Inflammatory	Rheumatoid nodules Sarcoidosis Granulomatosis with polyangiitis Microscopic polyangiitis
Lymphatic	Intrapulmonary lymph node Lymphoma
Miscellaneous	Nipple shadow Round atelectasis Lipoid pneumonia Amyloidosis Mucoid impaction Focal scar

Figure 3: Common etiologies of SPNs^{2,8}

Conclusion

Although only a small fraction of SPNs are malignant, PCPs should remain mindful that the foremost step in approaching an SPN is to evaluate the risk for malignancy. It is paramount to consider the wide-ranging benign causes in low-risk patients, particularly the possibility of a nipple shadow masquerading as an SPN, in order to minimize harm and to provide the best outcome for the patient.

Conflict of interest

The authors declare that there are no conflicts of interest.

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Contribution of authors

Woi Hon Boo and Yuen Ching Chan diagnosed and treated the patient. Woi Hon Boo conceived the study. Both participated in the interpretation and drafted the manuscript.

How does this paper recommend changes to general practitioners (GPs)?

- Underscores the importance of assessment of malignancy risk by considering both clinical findings and radiological features in the initial management of SPN.
- Highlights the need for comprehensive evaluation of the probable benign causes of SPN in low-risk patients to avoid unnecessary harm.

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