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TEACHABLE
MOMENT

The Diagnostic Cascade of Incidental Findings

A Teachable Moment

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Story From the Front Lines

A frail 76-year-old woman from Mexico presented for follow-up of computed tomography (CT) angiography. She weighed 85 pounds, had stage 4 chronic obstructive pulmonary disease (COPD), which she managed at home with 2 liters of oxygen, and a history of tuberculosis (TB) 14 years earlier. One year prior to presentation, an asymptomatic right carotid body tumor had been incidentally discovered during CT angiography intended to evaluate a possible vertebral artery stroke. The biochemical workup of the tumor at that time was consistent with a benign nonsecretory paraganglioma of her neck. A decision was made to observe the tumor with a 1-year surveillance CT scan, the reason for her present visit. The follow-up scan showed no significant increase in tumor size but did reveal new right upper lobe lung nodules. She was admitted to the hospital for workup of this second incidental finding.

Aside from a cough slightly worsened from baseline, she was in her normal state of health. Test results for infectious and neoplastic conditions were negative except for 1 of 3 sputum cultures that grew acid-fast bacilli (AFB), but without growth from a bronchoalveolar lavage. The patient was discharged with a 4-drug anti-TB regimen while awaiting final identification of the AFB organism.

Three days later, she presented to the emergency department with vomiting and abdominal pain. Her transaminase levels were elevated, and she was rehospitalized for isoniazid-induced liver injury. Her antibiotic regimen was discontinued, and she recovered after 8 additional days in the hospital. The single sputum culture that initially grew out AFB ultimately did not grow an identifiable organism. A subsequent conversation with the patient and her family revealed that, given her frailty, end-stage COPD, and lack of carotid body tumor symptoms, she would have declined surgery to excise the tumor were it ever offered.

Teachable Moment

This case exemplifies the importance of clarifying a patient's goals of care before conducting a surveillance CT of an asymptomatic tumor. Surgical excision of carotid body tumors, most of which are slow growing, presents a significant risk of cranial nerve injury or stroke (35%) or death (1%).^{1,2} In this elderly, frail patient with severe COPD, surgery would have presented a greater-than-usual risk of adverse outcomes. When the indication for surgery is questionable, a "wait and scan" approach has been suggested because estimation of the tumor growth rate may influence the treatment strategy.² However, in the context of this patient's rea-

sonable aversion to surgery and absence of new symptoms, annual CT surveillance was unnecessary because it would not have changed management even if the tumor had grown.

This case further demonstrates how a seemingly innocuous surveillance CT scan can result in poor outcomes when incidental findings prompt additional evaluation and treatment. In a retrospective cohort of 1426 imaging studies,³ 40% were found to have at least 1 incidental finding, the incidence of which increased with patient age, use of CT compared with other imaging modalities, and images including the thorax. Only 1 of 11 incidental findings (9%) on thoracic CT that were further investigated resulted in clear benefit for the patient. Thus, incidental findings identified on CT scans of the thorax among older adults are common, and subsequent investigation usually does not result in improved patient-centered outcomes.

The diagnostic cascade following from the incidental findings on the surveillance CT scan in the present case led to empirical therapy for TB in response to growth of an acid-fast organism on 1 of 3 sputum cultures, despite no cultured growth from the bronchoalveolar lavage. This TB therapy ultimately resulted in increased morbidity from drug-induced liver injury. The patient's lack of fevers, night sweats, and hemoptysis would normally have supported a very low suspicion of active pulmonary TB. However, her pretest probability for TB was higher because she was elderly, frail, from Mexico, and had a TB history. Together with nonspecific lung CT findings and a chronic cough—even if more likely attributable to COPD—her history made it difficult for the clinician to forgo TB treatment.

Centers for Disease Control and Prevention guidelines for the treatment of TB recommend initiating therapy even before a final culture confirms the presence of the disease.⁴ On the other hand, risk of hepatotoxic effects due to anti-TB medications is approximately 5% overall and increases with age.⁵ The difficult decision in the present case to empirically treat TB, as well as 2 subsequent hospitalizations and substantial patient suffering, could have been avoided had the surveillance CT scan never been performed in the first place.

In summary, this case illustrates how further investigation of incidental radiographic findings, especially without eliciting the patient's wishes for care, can result in substantial morbidity. Ideally for our elderly patient with end-stage COPD, a more careful discussion about her general prognosis and desire to forgo invasive surgery should have been held before ordering a surveillance CT scan for a nonsecreting, asymptomatic paraganglioma.

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