Preoperative Chest X-rays: Old Habits Die Hard

A 54 year old veteran with mild intermittent asthma, anxiety, and depression presented to his general surgeon for pre-op evaluation. His umbilical hernia had become more painful in the past 3 months. After documenting a normal cardiopulmonary exam and labs, an EKG and chest radiograph are ordered 2 days prior to his surgery. The indication for the radiograph is “pre-operative work-up, over 55, history of asthma”.

Two days later, the chest film returns with a read of a “7mm left parahilar... lung nodule... recommend CT of the chest for further evaluation”. Surgery is delayed, and a CT is ordered. Three weeks later, the CT is completed; a week after that, the patient arrives in my clinic to review the results: “1. No pulmonary nodule. 2. Circumscribed homogenous right adrenal nodule.” An adrenal CT is ordered; three weeks later, adrenal adenoma is confirmed. The patient has yet to undergo ventral hernia repair.

As early as the 1980s, researchers examined the utility of pre-op chest radiographs (CXRs), attempting to create algorithms and categories to curb overtesting.\(^1\)\(^-\)\(^8\) More recently, the Choosing Wisely campaign identified preoperative CXR as a priority area to raise patient awareness on rampant overtesting.\(^9\)

Assessing the utility of this screening method requires estimating what fraction of the total number of CXRs ordered actually proves useful in management. This fraction is a subgroup of the ordered CXRs that are unexpectedly abnormal. Despite the complexity of identifying this subgroup of CXR results, our best estimates do not support screening CXR. For example, in a meta-analysis by Archer et al., only 10% of 14,390 subjects had abnormalities. Only 1.3% of those screened had an unsuspected abnormality, and only 0.1% (0 to 0.6%) of those screened had CXRs that changed management.\(^10\) This same analysis calculated that every “useful” CXR came at a cost of $23,000 taking into account only the cost of the CXR itself (in 1993) and no follow-up tests.

The most common criteria for whether the CXR changed management is delay/cancellation of surgery or change in anesthesia management due to CXR results. Regarding anesthesia management changes, there are no randomized controlled studies on this topic, and reviews of the topic consistently cite the same few non-blinded, non-randomized--and often retrospective--studies. Silvestri et al. conducted the largest study to date (n=6111) across multiple hospitals. The results showed that pre-op CXR changed management anywhere from 0% to 44% of the time depending on the anesthesiologist questioned,\(^11\) illustrating the subjectivity of this outcome. Given the involved anesthesiologists were interviewed after the operations, it still is not clear if the CXR, independent of history and physical, changed management or if they simply believed it did. Assuming the retrospective analysis is accurate the question remains as to whether
management changes following CXR are necessary or lead to improvements in important patient outcomes (e.g. major post-operative complications).

On the other hand, delay or cancellation of operations is a relatively straightforward outcome to measure. However, none of the studies reviewed in the literature address whether surgical cancellation or delay was beneficial or detrimental to the patient. In the presented case, it was clearly more detrimental. This adverse effect comes in the form of anxiety over the findings, increased radiation with work-up of asymptomatic incidentalomas, procedures associated with incidentaloma workup, increased costs, and delay of an indicated surgery.

Given the absence of clear data, physicians often look to expert guidelines. In 2001 the American Society of Anesthesiologists (ASA) recommendations on pre-operative CXR stated, “clinical characteristics to consider include smoking, recent upper respiratory infection, COPD, and cardiac disease. The [ASA] Task Force recognizes that chest radiographic abnormalities may be higher in such patients, but does not believe that extremes of age, smoking, stable COPD, stable cardiac disease, or resolved recent upper respiratory infection should be considered unequivocal indications for chest radiography.”

An extensive ACP systematic review in 2006 looked at predictors of perioperative pulmonary risk. The authors concluded that “clinicians may predict most abnormal preoperative chest radiographs on the basis of the history and physical examination and that chest radiography only rarely provides unexpected information that influences preoperative management.”

In the case of the above patient, asthma was interpreted as a risk factor despite the fact that asthma is not associated with poor perioperative outcomes, nor is it a disease monitored via CXR. His age greater than 55 was also considered a risk factor. While older patients have higher rates of abnormal CXRs, no data supports any association between identifying abnormalities and improved clinical outcomes. While age over 55 is associated with higher rates of pulmonary complications, there is no evidence of correlation between CXR abnormalities and adverse outcomes.

This case report is not valuable because of the rarity of the situation, but rather how common it is. The veteran experienced continued pain due to his delayed surgery, unnecessary costs and radiation, and anxiety over multiple false positive findings. No physician with clinical experience is unfamiliar with such a story: an image ordered for unclear reasons leading to a cascade of distracting, time-consuming, anxiety-provoking and expensive follow-up tests with no measurable benefit.