Q: Are routine preoperative chest radiographs necessary in asymptomatic patients undergoing noncardiothoracic surgery?

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A: Routine preoperative chest radiographs (chest x-rays [CXRs]) are not indicated for asymptomatic patients younger than age 50 years who do not have risk factors for postoperative pulmonary complications (PPCs). Patients with significant risk factors for PPCs may warrant a preoperative CXR irrespective of age. For asymptomatic patients older than 50 years with no risk factors, there is insufficient evidence for or against ordering routine CXRs.

Pulmonary complications: Just as common as cardiac complications

The American College of Physicians' (ACP) 2006 guidelines on preoperative pulmonary risk stratification for noncardiothoracic surgery notably state that PPCs are just as prevalent as cardiac complications.[1,2] The risk for PPCs increases with age and with patient- and procedure-related risk factors.[1,2] Risk factors for PPCs that may warrant a preoperative CXR include the following:[1–3]

- American Society of Anesthesiologists physical status classification of II or greater
- Functional dependency
- Known cardiopulmonary disease
- Upper abdominal or thoracic procedures, or surgery for an abdominal aortic aneurysm.

Few studies evaluate postoperative pulmonary complications

The practice of routinely obtaining preoperative CXRs originated during World War II to detect tuberculosis infection, now a rarity in developed nations.[4] Today clinicians often order CXRs as part of a routine preoperative evaluation in order to screen for abnormalities that may affect surgical risk or outcomes.

Few studies that have assessed abnormal versus normal preoperative CXRs have used PPCs as the primary end point. A systematic review conducted to support the 2006 ACP guidelines found that only four such studies (two univariate analyses and two multivariate analyses) evaluated this outcome. Only two of these studies showed that an abnormal CXR was a statistically significant predictor of PPCs.[1]

The first of these studies, by Lawrence et al,[5] found that both abnormal lung examination and an abnormal CXR were statistically significant predictors of PPCs, but these authors did not indicate if patients with abnormal CXRs also had abnormal physical exam findings. Also, the cohort population consisted predominantly of male veterans with a high prevalence of smoking and chronic obstructive pulmonary disease.[5] The second study, by Bluman et al,[6] which was designed to evaluate the effects of smoking on PPCs, showed that an abnormal CXR was a predictor of PPCs.

Abnormal CXRs have little effect on management

Most studies looking at the utility of preoperative CXRs have evaluated changes in surgery date or anesthesia management as the primary end point. In one meta-analysis of 21 studies assessing the value of preoperative CXRs, only 10% of routine preoperative CXRs were abnormal, and in only 1.3% (95% confidence interval [CI], 0 to 2.8%) were these abnormalities unanticipated after a thorough history and physical exam.[7] Furthermore, the CXR findings changed management in only 0.1% of the patients (95% CI, 0 to 0.6%).

In a Canadian study of 1,000 patients who had a preoperative CXR, 74 had abnormalities on CXR, and 68 of these patients (92%) had a history or symptoms of cardiorespiratory disease.[8] Surgery was delayed in 1.3% of the patients with radiographic abnormalities. However, without symptoms or pertinent medical history, abnormal CXRs did not predict a worse clinical outcome.

In a United Kingdom study by the Royal College of Radiologists involving 10,619 patients undergoing nonacute, noncardiopulmonary surgery, preoper-

All authors reported that they have no commercial affiliations or financial interests that pose a potential conflict of interest with this article.

ative CXR results were found to have no influence on the decision to use inhalation anesthesia or to operate.[9] There was no evidence that the preoperative CXR could be used as a baseline to be compared against a postoperative CXR should pulmonary complications arise.

A recent systematic review of 14 eligible studies that looked at PPCs in patients undergoing noncardiothoracic surgery showed that 65% of abnormalities found on preoperative CXR were chronic, such as cardiomegaly (15% to 65%) and chronic obstructive pulmonary disease (10% to 30%).[10] The diagnostic yield of a preoperative CXR increased with patient age, and nine studies showed that the yield in patients younger than 50 years was low (3% to 16%) and that most of these findings were chronic abnormalities. Surgery cancellation rates of 1% to 4% were reported in four of the reviewed studies, while changes in anesthetic management ranging from 0.5% to 5.8% were reported in five studies. In two studies, rates of PPCs were similar regardless of whether patients' preoperative CXRs were abnormal or normal. Symptomatic congestive heart failure and pneumonia were the only conditions that appeared to affect postoperative outcomes in this meta-analysis,[10] and these can be predicted preoperatively by a thorough history and physical exam.

Conclusions

Generally, there is limited evidence to guide the decision to order a preoperative CXR in an asymptomatic patient, and the decision should be based on the patient's risk for PPCs. CXRs in patients younger than age 50 appear to have the lowest yield in the absence of risk, and a thorough history and physical examination is important for assessing risk for the individual patient.

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