Preoperative Pulmonary Evaluation

Postoperative pulmonary complications are the most costly of major postoperative medical complications and result in the longest length of stay.

Significant complications that adversely affect the clinical outcome

<table>
<thead>
<tr>
<th>Atelectasis</th>
<th>Hypoxemia</th>
<th>Exacerbation of COPD or asthma</th>
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<tr>
<td>Infection</td>
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<td>Respiratory failure (mechanical ventilation &gt;48 hours after surgery or unplanned reintubation)</td>
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The rate of postop pulmonary complications across all surgery was 6.8% in one systematic review.

Patient-related risk factors

- **Age** – independent risk factor for every decade over 50; even healthy older adults have post-op pulmonary risk (unlike cardiac surgery)
- **COPD** – OR 2.4 for all complications; no absolutely prohibitive level of pulmonary function, most severe obstruction surgical mortality is 5-6%; must weigh against risks and benefits of surgery
- **Smoking** – RR 1.7, risk is greater with more than 20 pack years, risk decreases with at least 4 weeks of smoking cessation
- **OSA** – many patients preparing for surgery have undiagnosed sleep apnea and should be screened
- **Pulmonary hypertension** – even mild and moderate and regardless of etiology; i.e., hip replacement mortality OR is 3.7
- **Heart Failure** – OR is about 3
- **ASA class >2** has OR of 4.8 for pulmonary complications (that’s “severe systemic disease” or worse)

Asthma and obesity are **not** risk factors for post-op pulmonary complications.

Procedure-related risk factors

- **Surgical site** is most important and inversely related to distance from diaphragm – upper abdominal OR is 20 and lower abdominal OR is 8. (An exception is laparoscopic cholecystectomy.)
- **Duration** – less than 2 hours has 8% complication rate while greater than 4 hours has a 40% rate
- **Anesthesia** – this is controversial but existing data suggests lower risk with regional anesthesia compared with general. One large systematic review showed 40% decrease in pneumonia and 60% decrease in post-op respiratory depression with epidural or spinal vs general

Preoperative risk assessment

- Most important is a history and physical with particular attention to the above factors
- If concerned for sleep apnea, administer the 4 question STOP questionnaire
- Candidates for lung resection should have preoperative PFTs; sometimes a quantitative VQ scan

Pulmonary Function Testing should not be part of routine preoperative testing, including abdominal and other high risk surgery with the exception of lung resection. Get PFTs if it will change preoperative management. For example, if the patient has COPD and you are not sure if they are at baseline. If the patient has unexplained dyspnea and could have heart or lung disease or deconditioning.

Other routine testing that does not help

- **ABG** – the exception is a pCO2 >45, but this risk is not prohibitive and you should already know about it
- **CXR** – very unlikely you will find anything that will change preoperative management

CPET is helpful in two settings:
1. Patients with abnormal PFTs to assess the safety of lung resection
2. Unexplained dyspnea in non-cardiopulmonary surgery – can predict survival and overall complication rate. Distance on a 6 minute walk gives comparable numbers.

There are several postoperative pulmonary risk calculators out there. I like the Arozullah respiratory failure index because it predicts the incidence of postoperative respiratory failure, which is what we mostly care about. (Arozulla AM, et al. Ann Surg 2000; 232:242 – This article among others is on your website)

Here is a different calculator that is online and easier to use (this is from the CHEST paper on the website):