

Preoperative Evaluation

Estimation of Pulmonary Risk



Anand Lakshminarasimhachar, MBBS, FRCA^{a,*}, Gerald W. Smetana, MD^b

KEYWORDS

- Postoperative pulmonary complication (PPC)
- Pulmonary function tests
- Risk indices
- Preoperative evaluation
- Risk factors

KEY POINTS

- Postoperative pulmonary complications (PPCs) are the second most common postoperative complication; their incidence ranges from 2.0% to 5.6% in the general surgical population.
- PPCs are associated with poor outcomes, longer hospital stays, increased likelihood of rehospitalization, and increased mortality. Surgical, anesthetic, and patient factors contribute to the development of PPCs.
- Reliable predictors include American Society of Anesthesiologist class, functional class, advanced age, surgical site, and prolonged operative time.
- The preoperative evaluation seeks to identify risks for PPCs, change modifiable factors, discuss risks with patients, optimize health before surgery, and plan appropriate perioperative care.
- The overall risk can be predicted using scores that incorporate readily available clinical data. Do not routinely perform pulmonary function tests before high-risk noncardiothoracic surgery.

INTRODUCTION

Postoperative pulmonary complications (PPCs) after major surgery are common and are associated with significant morbidity and high cost of care. In a recent analysis of the National Surgical Quality Improvement Program (NSQIP), of the 165,196 patients who underwent major abdominal surgery, the incidence of PPCs was 5.8%.¹ PPCs have shown to be one of the most significant factors associated with poor patient outcomes, leading to longer durations of hospital stay, increased likelihood of rehospitalization, and increased mortality.² Some studies have shown that PPCs predict long-term mortality more accurately than cardiac complications.³

^a Division of Cardiothoracic Anesthesiology, Barnes Jewish Hospital, Washington University School of Medicine in St. Louis, 660, South Euclid Avenue, St Louis, MO 63110, USA; ^b Division of General Medicine and Primary Care, Beth Israel Deaconess Medical Center, Harvard Medical School, Yamins 102C, 330 Brookline Avenue, Boston, MA 02215, USA

* Corresponding author.

E-mail address: lakshmia@anest.wustl.edu

Understanding the potential risk of developing pulmonary complications allows perioperative physicians to choose appropriate anesthetic and surgical care, thereby decreasing the adverse respiratory outcomes. This has become even more relevant with the recent introduction of the concept of the perioperative surgical home.⁴ The goals of the perioperative surgical home are to:

- Reduce preoperative testing;
- Reduce day of surgery cancellations;
- Reduce postoperative complications;
- Reduce cost (through reduced testing and reduced perioperative complications); and
- Improve clinical outcomes.

In this article, we review the definition of PPCs, perioperative changes in pulmonary function, risk factors for developing PPCs, the role of preoperative pulmonary function testing, and the role of pulmonary risk indices. The evaluation of patients for lung resection differs substantially and is not discussed in this article.

PULMONARY PATHOPHYSIOLOGY IN THE PERIOPERATIVE PERIOD

The changes in pulmonary function that occur postoperatively are primarily restrictive, with proportional decrease in all lung volumes and no change in airway resistance. The decrease in functional residual capacity (FRC) is the yardstick by which the restrictive defect is gauged. This reduction in lung volumes is generated by the abdominal contents that impinge on and prevent normal movements of the diaphragm and by the abnormal respiratory pattern devoid of sighs and characterized by shallow, rapid respiration (**Fig. 1**).

The decrease in lung volume promotes atelectasis in the dependent areas of the lung; this persists for more than 24 hours in 50% of patients. Arterial hypoxemia occurs from ventilation perfusion (V/Q) mismatch and increased shunt fraction. The vital capacity is reduced by 50% to 60% and the FRC is reduced by about 30% in major upper abdominal and thoracic surgery.⁵ Lower abdominal surgery is associated with similar changes, but to a lesser degree. Reduction in lung volume does not occur with surgery on extremities,⁶ but most other operative sites, including intracranial, peripheral vascular, and otolaryngeal, have approximately the same modest effect on FRC with reduction of 15% to 20% from preoperative levels. Thus, the operative site is one of the single most important determinants of the degree of pulmonary restriction and risk of PPCs.

Both the residual effects of anesthetic agents and postoperative opioids depress the respiratory drive resulting in diminished response to both hypoxia and hypercarbia. Inhibition of the cough reflex and the impaired mucociliary clearance of pulmonary secretions contribute to risk for postoperative infection.⁷ The combination of neuromuscular blockers and anesthetic agents cause diaphragm and chest wall relaxation, which results in the reduction of FRC and thereby thoracic volume.

DEFINITION OF POSTOPERATIVE PULMONARY COMPLICATIONS

A comprehensive list of pulmonary complications includes cough, dyspnea, bronchospasm, hypoxemia, atelectasis, hypercapnia, adverse reaction to pulmonary medication, pleural effusion, pneumonia, pneumothorax, and ventilatory failure.⁸ However, this broad definition includes complications that may have no clinical significance. A more reasonable definition is a pulmonary abnormality that produces identifiable disease or dysfunction, is clinically significant, and adversely affects clinical course.⁹ This

Download English Version:

<https://daneshyari.com/en/article/2744474>

Download Persian Version:

<https://daneshyari.com/article/2744474>

[Daneshyari.com](https://daneshyari.com)