



Monothematic meeting of Sfar

Which preoperative respiratory evaluation? ☆,☆☆



Quelle évaluation préopératoire respiratoire ?

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ABSTRACT

The preoperative respiratory evaluation aims at predicting the occurrence of postoperative respiratory complications (PORC), such as: atelectasis, pulmonary infection (bronchitis and pneumonia), acute ventilatory distress, pleural effusion, prolonged mechanical ventilation, exacerbation of chronic respiratory disease and bronchospasm. The incidence of (PORC) all surgeries combined is 6.8%. Individual surgical and anesthetic factors are impacting on the occurrence of PORC. Simple scores, including anamnestic data, clinical examination and some biological parameters were validated to assess the risk of PORC depending on the type of surgery. Data from standard pulmonary function tests (PFT) is of little use to estimate the individual risk of PORC. Most of the time, PFT abnormal parameters only confirm the clinical assessment of the severity of the illness. PFT may however be useful to confirm an improvement in the clinical condition of the patient related to the preoperative preparation. Specialized EFR, including standardized testing efforts are sometimes required in the case of lung reduction surgery. These specialized explorations can predict lung function and post-interventional pulmonary oxygenation and ensure that these are viable.

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R É S U M É

L'évaluation respiratoire préopératoire a pour objectif de prédire la survenue de complications respiratoires postopératoires (CRPO) comme : l'atélectasie, l'infection pulmonaire (bronchite et pneumopathie), la détresse ventilatoire aiguë, l'épanchement pleural, la ventilation mécanique prolongée, l'exacerbation d'une pathologie respiratoire chronique et le bronchospasme. L'incidence des CRPO, toutes chirurgies confondues est de 6,8 %. Certains facteurs individuels, opératoires et anesthésiques impactent sur la survenue de CRPO. Des scores simples incluant les données anamnestiques, d'examen clinique et quelques paramètres biologiques ont été évalués pour évaluer le risque de CRPO en fonction du type de chirurgie. Les données des explorations fonctionnelles respiratoires (EFR) standard sont peu utiles pour estimer le risque individuel de CRPO. En général, elles ne font que confirmer l'évaluation de la gravité clinique. Elles peuvent cependant être utiles pour confirmer une amélioration de l'état clinique du patient liée à la préparation préopératoire. Des EFR spécialisées incluant des tests d'efforts standardisés sont parfois requises en cas de chirurgie de réduction pulmonaire. Ces explorations spécialisées permettent d'anticiper la fonction ventilatoire et d'oxygénation pulmonaire post-interventionnelle et de s'assurer qu'elle est viable.

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1. Introduction

Preoperative respiratory evaluation aims to predict the occurrence of postoperative respiratory complications (PORC). Defining PORC is quite consensual. It is a set of anomalies, pathologies or ventilatory and/or respiratory dysfunction that pejoratively affects the postoperative course and outcome. PORC include atelectasis, pulmonary infection (bronchitis and pneumonia), acute ventilatory distress, pleural effusion, prolonged mechanical ventilation, exacerbation of chronic respiratory disease and bronchospasm. A systematic review of the literature shows that the incidence of PORC, all surgeries combined was 6.8% [1]. The analysis of recent epidemiological data shows that PORC contribute very significantly to the morbidity and postoperative mortality. After gastrointestinal surgery, PORC are the most common medical complications, more frequent than cardiac complications, and are associated with a significant increase in the length of hospital stay [2]. An extensive North American survey [3] shows that PORC are the leading cause of medical over cost after surgery, far ahead from thromboembolic and infectious complications. Thus, it is well understood that the importance of preoperative evaluation of the respiratory risk. This PORC risk assessment should be systematic for all patients, as well as risk assessment of difficult intubation of thromboembolic complications or cardiac complications. It allows fairly informing the patient on the surgical risk. This patient information is essential; it allows the patient settling his live problems, and to arrive quiet and unstressed in the operating room. Identify high risk PORC during consultation of anesthesia allows engaging an efficient preventive strategy of the risks. It is possible for example to prepare more intensively the patient to surgery, to delay surgery in order to complete a smoking cessation or improve the patient's nutritional status, optimize preoperative ventilatory function, equip the patient with a positive airway pressure ventilation at night for a sufficient time to improve sleep quality and general health status, to discuss the surgical strategy, to choose best anesthesia technique with less deleterious effect upon postoperative ventilatory function, to adapt the quality of postoperative monitoring, to anticipate postoperative ventilatory support, finally to reduce morbidity and postoperative mortality of pulmonary origin.

However, the means used to achieve the preoperative respiratory evaluation is based on a highly debated topic that we are interested in the perspective of pulmonologists or anesthesiologists. While the goal of these two medical specialties is the same, namely, to predict the risk of postoperative morbidity and mortality from pulmonary origin, for a given patient, the factors to be taken into account when estimating the risk of PORC differ significantly. For pulmonologists, the estimated PORC risk is difficult without performing pulmonary function tests (PFT). The latest recommendations for clinical practice of PFT, published by the *Journal de la Société de Pneumologie de langue Française* (SPLF) are clear. For experts of SPLF, performing preoperative PFT seems necessary for a majority of patients requiring surgery, except perhaps in cases of peripheral orthopaedic surgery, and of course if there is no risk factor for PORC. PFT for pulmonologists represent part of standard preoperative evaluation [4]. For the anesthesiologists, estimation of PORC risk is part of an approach based on medical evidence and relies mainly on clinical evaluation. It seems that the information arising from PFT interpretation does not really allow estimating postoperative morbidity and mortality of pulmonary origin. Indeed, the literature demonstrates that the predictive value of operative risk derived from PFT is lower than that of anamnesis and clinical evaluation data. Unlike experts of the SPLF, anesthesiologists believe that PFT are not useful for estimating the risk of PORC, and only serve to reinforce the clinical

impressions! Moreover, contra-indicating a patient for surgery cannot rely on PFT results alone. Insofar, as we discuss the interest of PFT in the preoperative respiratory evaluation, we will begin by presenting the physiopathology of PORC, then we will try to respond to 2 questions: does clinical evaluation or PFT allow to prediction PORC, and finally, we will discuss those indications where PFT is able predict outcome after surgery.

2. Physiopathology of PORC

Regardless of the patient health status central surgery types, residual effects of anesthesia, the effects of analgesia and pain contribute to reduced lung volumes in the postoperative period. The surgical site is dominant postoperative lung volume reduction element. Schematically, postoperative reduction in lung volumes, such as the functional residual capacity (FRC: determining post operative oxygenation) and vital capacity (VC: determining capabilities of coughing) is systematic after open abdominal surgery, even in patients without preoperative pulmonary pathology. Lung volumes are amputated nearly 50% of their preoperative value and this reduction persists for about a week. It is then easy to understand that “patients at risk” defined by the individual factors, such as: age (> 60 years), malnutrition (albumin < 35 mg/L), diabetes, chronic respiratory disease, pulmonary hypertension, congestive heart, chronic renal failure, ASA > III, heavy smokers, morbid obesity (BMI > 30 kg/m²) and sleep apnoea syndrome, are exposed to an increased risk of PORC during the postoperative period [1].

Similarly, some operating factors will increase the risk of PORC. The operative site near the diaphragm, vascular surgery and neurosurgery result in higher risk of PORC. The choice of the surgical technique affects the risk of PORC. The size of the incision, which directly affects the function of a large number of respiratory muscles, is important also. Open surgery types of the thorax and the abdomen are responsible for more PORC than the closed thoracoscopy or laparoscopy.

The duration of the surgery is also important. When, it last over 3 hours, the risk of occurrence of PORC is increased. The type of anesthesia affects also the risk of PORC. Performing regional anesthesia reduces the risk of PORC. When general anesthesia is required, the return to normal neuromuscular function should be provided right out of the operating room. Residual neuromuscular blockade in the postoperative period increases the risk of PORC. When considering the risk of PORC associated with locoregional anesthesia, peripheral nerve trunk block have less impact on intraoperative ventilatory function and postoperative respiratory function than plexus and axial blocs (epidural and spinal).

3. Does clinical evaluation allow to predicting PORC?

During preoperative anesthesia consultation, health status evaluation allows to identify a number of “warning signs” to predict the occurrence of PORC. In case the patient is showing the following features: a history of chronic productive cough, ongoing or recent pulmonary infection, the pursuit of active smoking, pathological lung auscultation with wheeze and rhonchus, long expiratory time, arterial oxygen saturation < 90% on room air, low cardiopulmonary effort metabolic reserve (< 4 metabolic equivalents), increased respiratory rate, dyspnoea at rest, and a STOP-BANG questionnaire suggestive of sleep apnoea syndrome, thus, high risk of PORC is easily anticipated [5]. If you combine these clinical features with operative factors and some biological findings, it is possible to quite precisely quantify the risk of PORC. Risk scores from Gupta et al. [6], Arozullah [7] and Canet [8] are now used to assign patients at low, moderate and high PORC risk

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