

Preoperative assessment for thoracic surgery

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Abstract

Preoperative assessment of thoracic surgical patients is a multidisciplinary process designed to offer appropriate surgical treatment with acceptable risk. Recently updated UK guidelines for pulmonary resection associated with malignant disease have reviewed available evidence concerning operative risk. Patients displaying cardiopulmonary physiological parameters above previously recommended threshold values remain classified as good risk. Less certainty now exists about the utility of predicted postoperative pulmonary function values and preoperative performance status to confer unacceptable risk. The new guidelines suggest a tripartite risk assessment combining risks of operative mortality, perioperative adverse cardiac events and postoperative dyspnoea – to be discussed by the multidisciplinary team and with the patient.

Keywords BTS guidelines; preoperative assessment; thoracic surgery

UK thoracic surgical outcomes are subject to rigorous audit. Latest annual mortality data – Society of Cardiothoracic Surgery UK & Ireland (SCTS) 2008–2009¹ – reveal a small but appreciable overall mortality of 1.6% in 21,000 open or video-assisted thoracoscopic surgery (VATS) procedures: pneumonectomy 5–8%, lobectomy 2% (open/VATS outcomes similar) and pleural procedures (eg decortications) 1–3%.

The British Thoracic Society and SCTS have published updated guidelines (2010)² for surgical risk assessment in pulmonary resection for malignant disease, which can be extrapolated to surgery for non-malignant disease. These suggest a tripartite risk assessment combining risks of **operative mortality**, **perioperative adverse events** and **postoperative dyspnoea** (Figure 1) – to be discussed by the multidisciplinary team and with the patient. The new guidelines are less proscriptive than previous versions in considering ‘cut-off’ values for fitness for surgery indicators. In previous series we highlighted Peter Slinger’s ‘three-legged stool’ defining threshold values for pre-thoracotomy respiratory parameters below which patients are at increased risk.³ Recent observational data suggests that applying these thresholds as ‘cut-off’ values, particularly postoperative predictive FEV₁ under 40% and

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Learning objectives

After reading this article, you should be able to:

- understand the concept of global risk assessment in patients undergoing thoracic surgery
- understand the principles of cardiovascular risk assessment and the approach to co-existing coronary artery or valve disease
- understand the quantitative approaches to predicting postoperative lung function and the uncertainty of threshold values used to assess operability

T_{LCO} less than 40%, might overestimate respiratory dysfunction and deny surgery to patients with the potential for acceptable outcomes. Patients exhibiting better than previous cut-off threshold values are classified as low risk. Interest now lies in further stratifying risk in the moderate and high risk groups.

In practice the thoracic anaesthetist usually sees the patient towards the end of a multidisciplinary assessment process. The new guidelines suggest that patients at moderate/high risk of postoperative dyspnoea might be offered surgery if they understand and accept the risks of dyspnoea and other complications, particularly in malignant disease in which surgery provides the most effective treatment and potential cure for early stage disease.

Patients presenting for thoracic surgery often have concomitant cardiac disease and smoking-related conditions. The anaesthetist should ensure medical therapy is optimized. Any history of previous airway or anaesthetic difficulties (which might influence the choice of lung isolation techniques) or of recent inter-current illness should be elicited.

Risk of operative mortality

The 2010 guidelines² recommend using a global risk score to predict operative mortality, suggesting that of those available, the Thoracscore, developed in France from more than 15,000 patients,⁴ is currently the most discriminating. This logistic regression-derived model combines the odds-ratios of nine variables (Table 1) to allow a quantitative mortality risk assessment. Variables examined independently are not discriminatory – so features such as advanced age that score highly should not preclude surgery if considered in isolation. Global risk scoring has not yet been universally adopted but is now recommended when assessing and consenting patients for lung cancer surgery.

Cardiovascular risk assessment

Assessment is based on American College of Cardiology/American Heart Association 2007 guidelines on perioperative cardiovascular evaluation for non-cardiac surgery.⁵ Cardiac history with functional status, physical examination and ECG must be performed in all patients and active cardiac conditions identified. Patients with cardiac murmur or unexpected dyspnoea should undergo at least transthoracic echocardiography. In patients without active cardiac conditions, a revised cardiac index⁶ may be applied (Table 2). Patients with good cardiac functional capacity and two risk factors or fewer may proceed to surgery without further cardiac assessment. Patients with poor cardiac functional

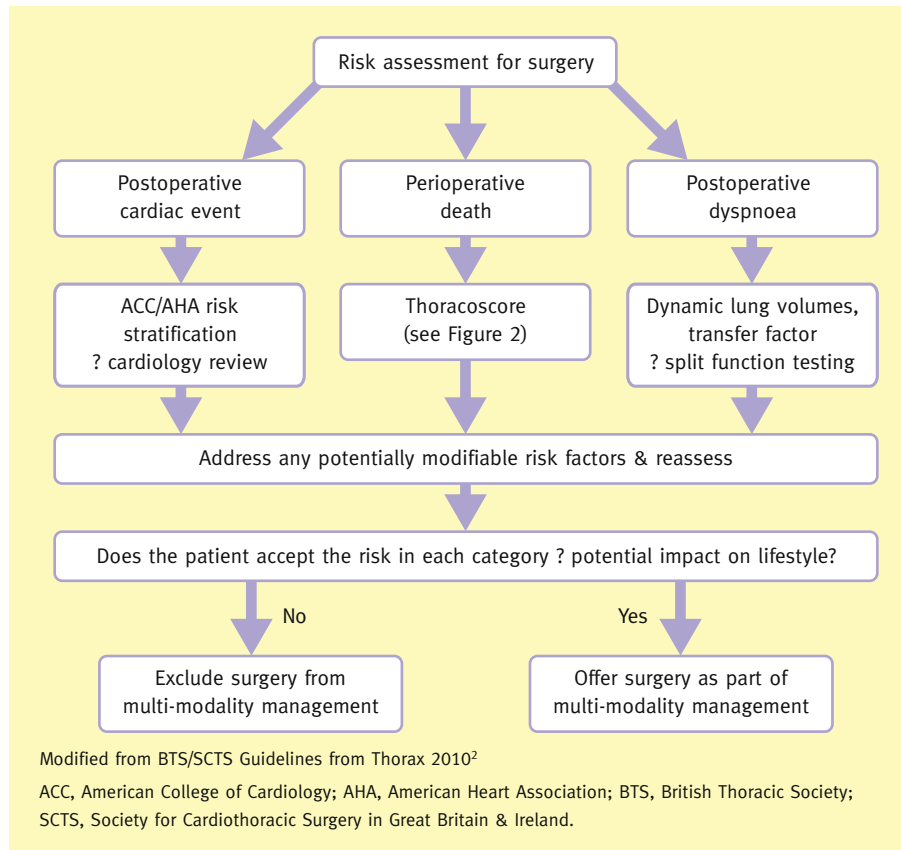


Figure 1 Tripartite risk assessment. Source: Reproduced from Thorax, Lim E et al., volume 65, Supplement III, iii1–iii27, 2010 with permission from BMJ Publishing Group Ltd.

capacity or three or more risk factors or with severe active cardiac conditions (Table 3) require further cardiology investigation and review.

Patients who have suffered myocardial infarction within the previous 6 months require cardiology assessment, and in recent infarction, should wait at least 30 days before surgery for lung resection. Anti-ischaemia therapy (aspirin, β -blockers, statins) should be continued perioperatively. Coronary revascularization by surgery or percutaneous intervention (PCI) is indicated on cardiac benefit grounds, independent of planned thoracic surgery. SCTS guidelines² recommend pre-surgery PCI be limited to balloon angioplasty, or deployment of a bare-metal stent to avoid dual antiplatelet aspirin and clopidogrel therapy (required 1 year without cessation for drug-eluting stents). Controversy persists in balancing the risks of thoracic surgical bleeding with continuation of optimal antithrombotic therapy in patients previously treated with drug-eluting coronary stents.

Patients with severe heart valve disease are at increased risk of adverse perioperative events and valve surgery should be undertaken if medically indicated. If cardiac surgery is undertaken for any reason, it is usual to delay thoracic surgery for 4–6 weeks, even in the presence of malignant disease.

Respiratory assessment

American Society of Anesthesiologists (ASA) class I or II patients, with normal exercise tolerance, do not require specialized investigation before thoracic surgery not involving pulmonary resection.

ASA III patients, those with impaired performance status and those requiring pulmonary resection require detailed assessment. All patients should have chest radiography.

Lung function assessment

Simple spirometry measuring forced expiratory volume in 1 second (FEV_1) has previously been used to predict mortality. More recent large series data suggests FEV_1 may predict performance status rather than mortality and correlates poorly with carbon monoxide transfer factor (T_{LCO}). Both may overestimate reduced functional capacity after pulmonary resection. The new guidelines² focus on lung function assessment as a predictor of post-operative dyspnoea rather than mortality, and propose a simple dyspnoea risk assessment algorithm (Figure 2).

Absolute values of FEV_1 or T_{LCO} may negatively bias female, elderly or small-stature patients so percentage predicted post-operative (*ppo*) values based on tables of normal values may be used. *ppo* values are calculated as in Figure 3 and patients with *ppo* FEV_1 less than 40% predicted and/or T_{LCO} less than 40% require further assessment. If assessed as good functional capacity, they should be informed of the risk of mild/moderate dyspnoea post-surgery. Those with moderate/poor function face high risk of severe postoperative dyspnoea, long-term oxygen dependency and possible ventilator dependency. V/Q scanning allows more accurate prediction of *ppo* values and is particularly useful if a V/Q mismatch exists (eg emphysema/bullous disease, obstructed lobes/segments or compression of pulmonary artery). Resection may be feasible in these circumstances even in high risk patients if minimal

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