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Guideline

The European Respiratory Society and European Society of Thoracic Surgeons clinical guidelines for evaluating fitness for radical treatment (surgery and chemoradiotherapy) in patients with lung cancer

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Summary

The European Respiratory Society (ERS) and the European Society of Thoracic Surgeons (ESTS) established a joint task force with the purpose to develop clinical evidence-based guidelines on evaluation of fitness for radical therapy in patients with lung cancer. The following topics were discussed, and are summarized in the final report along with graded recommendations: Cardiologic evaluation before lung resection; lung function tests and exercise tests (limitations of ppoFEV1; DLCO: systematic or selective?; split function studies; exercise tests: systematic; low-tech exercise tests; cardiopulmonary (high tech) exercise tests); future trends in preoperative work-up; physiotherapy/rehabilitation and smoking cessation; scoring systems; advanced care management (ICU/HDU); quality of life in patients submitted to radical treatment; combined cancer surgery and lung volume reduction surgery; compromised parenchymal sparing resections and minimally invasive techniques: the balance between oncological radicality and functional reserve; neoadjuvant chemotherapy and complications; definitive chemo and radiotherapy: functional selection criteria and definition of risk; should surgical criteria be re-calibrated for radiotherapy?; the patient at prohibitive surgical risk: alternatives to surgery; who should treat thoracic patients and where these patients should be treated?

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The paper published in the July issue of the European Respiratory Journal entitled 'ERS-ESTS clinical guidelines on fitness for radical therapy in lung cancer patients (surgery and radiochemotherapy)' [1] summarizes the work of the joint task force created by the European Respiratory Society (ERS) and the European Society of Thoracic Surgeons (ESTS). The objective of this working group, which was composed of

Table 1

Summary of recommendations. For the complete list of recommendations and details of literature and grading please refer to the original paper [1]. Reproduced with permission from Brunelli et al., European Respiratory Journal, 2009 [1].

Recommendations	Level of evidence	Grade of recommendation
Who should treat thoracic patients and where they should be treated		
The management of lung cancer patients must be performed by multidisciplinary teams (a thoracic surgeon specialized in lung cancer, a medical oncologist, a radiation oncologist, and a pulmonologist)	2++	B
The surgical treatment of lung cancer patients must be performed in specialized centers by qualified thoracic surgeons, since specialization has been shown to have a positive impact on resectability, postoperative mortality and long-term survival	2++	B
Surgical volume has been shown a positive impact on resectability, postoperative mortality and long-term survival. Lung cancer surgery should be performed in centers with adequate volume of cases (although volume thresholds reported in the literature varies in size and definition, a minimum surgical volume of 20–25 major lung resections lobectomy or pneumonectomy per year should be advised)	2+	C
Cardiac evaluation		
Patients should be risk-stratified using validated risk indexes, which should direct any additional testing	2++	B
Patients with (a) poor functional status (<4 METS) and 1–2 RCRI criteria and (b) a history of angina or claudicatio should be generally appropriate for noninvasive testing to assess risks for surgery	2++	B
Patients at >20% risk according to initial estimates (RCRI >3) may still have high perioperative risks despite a negative noninvasive study (>5% post test probability with negative test)	2++	B
Patients with physical findings consistent with aortic outflow tract obstruction should have preoperative echocardiography	2++	B
Preoperative echocardiography should also be obtained when other valvular disease, left ventricle dysfunction, or pulmonary hypertension is suspected, according to published guidelines	2++	B
Few if any non-cardiac surgery patients must receive routine pulmonary artery catheterization	1++	A
Patients with ischemic heart disease generally do not benefit from newly prescribed perioperative beta blockade	1++	A
Beta blockers should be continued in patients who are already taking them	2++	B
Beta blockers may be beneficial as new therapy in very high risk patients	1–	B
Prophylactic nitrates can reduce ischemia but not major events; prophylactic calcium channel blockers could be of uncertain benefit	2++	B
Perioperative coronary revascularization. Patients at high risk clinically or based on noninvasive testing must be considered for diagnostic catheterization. Coronary revascularization must be recommended only for patients who would benefit in the absence of the planned surgery	1++	A
ppoFEV1 and ppoDLCO		
ppoFEV1 should not be used alone to select patients with lung cancer for lung resection, particularly patients with moderate to severe COPD. It tends to underestimate the functional loss in the early postoperative phase and does not appear a reliable predictor of complications in COPD patients. A ppoFEV1 value of 30% of predicted is suggested as high risk threshold for this parameter when included in an algorithm for assessment of pulmonary reserve before surgery	2+	C
DLCO should be routinely measured during pre-operative evaluation of lung resection candidates regardless of whether the spirometric evaluation is abnormal. A ppoDLCO value of 30% of predicted is suggested as high risk threshold for this parameter when included in an algorithm for assessment of pulmonary reserve before surgery	2++	B
The first estimate of residual lung function should be calculated based on segment counting. Only not totally obstructed segments should be taken into account: the patency of bronchus (bronchoscopy) and segment structure (CT scan) should be preserved.	2+	C
Patients with borderline function should need imaging-based calculation of residual lung function: ventilation or perfusion scintigraphy, before pneumonectomy, or quantitative CT scan before lobectomy or pneumonectomy	2+	C
Exercise tests		
Exercise tests should be indicated in all patients undergoing surgery for lung cancer with FEV1 or DLCO under 80% of normal values	2++	B
Standardized symptom-limited stair climbing test is a cost-effective test capable to predict morbidity and mortality after lung resection better than traditional spirometric values. It should be used as a first line functional screening test to select those patients that can undergo safely to operation (height of ascent > 22m) or those who need more sophisticated exercise tests in order to optimize their perioperative management	2++	B
Shuttle walk test distance underestimates exercise capacity at the lower range and was not found to discriminate between patients with and without complications. Thus, it should not be used alone to select patients for operation. It could be used as a screening test: patients walking less than 400 m may have a VO ₂ peak <15 ml/kg/min	2+	C
Cardiopulmonary exercise tests are performed in a controlled environment, reproducible and safe. Peak VO ₂ measured during incremental exercise on treadmill or cycle should be regarded as the most important parameter to consider, as a measure of exercise capacity and highly predictive of postoperative complications	2++	B
The following basic cut-off values for peak VO ₂ should be considered: peak VO ₂ >75% of predicted value or 20 ml/kg/min qualifies for pneumonectomy; peak VO ₂ <35% or <10 ml/kg/min indicates high risk for any resection. Evidence is thin to recommend cut-off values for lobectomy	2++	C
Admission to ICU		
A systematic admission to ICU after thoracotomy should not be recommended	2++	C

Table 1 (Continued)

Recommendations	Level of evidence	Grade of recommendation
In the presence of appropriate high-dependency units (HDU) (intermediate care units), nobody should be admitted to ICU on an elective basis. In an emergency basis, those patients requiring support for organ failure (i.e. ventilatory mechanical assistance) should be admitted to ICU	2++	C
Patients undergoing complex pulmonary resections, those with marginal cardiopulmonary reserve and those with moderate to high risk (see Table 2 ERJ paper) should be admitted to HDU	2++	C
After surgery, low risk patients should be sent to a dedicated thoracic surgical unit, and not to a general surgical ward	2++	B
Induction treatment		
After induction chemotherapy and/or radiotherapy a new functional evaluation (particularly DLCO) before surgery should be recommended	2+	C

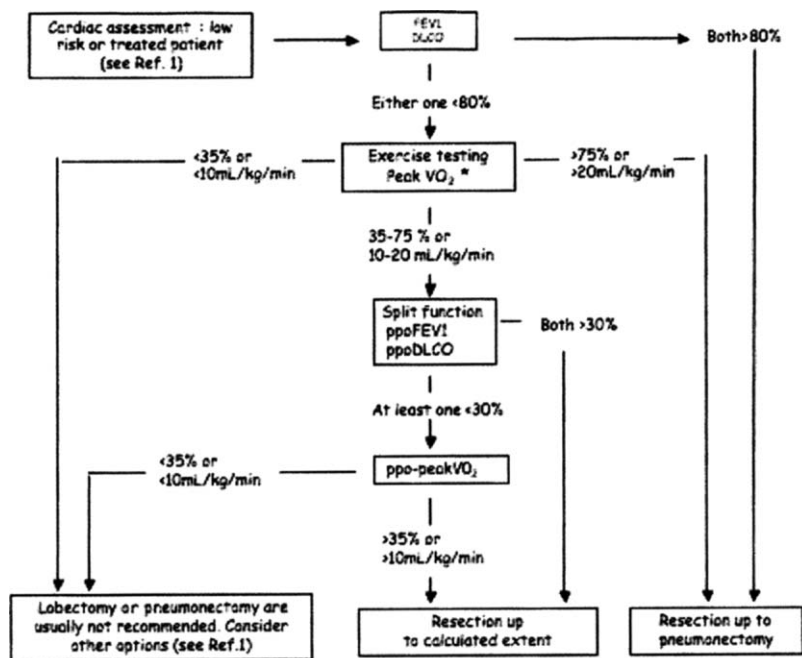
METS: metabolic equivalents; RCRI: Revised Cardiac Risk Index.

leading multidisciplinary experts on functional evaluation of lung cancer patients, was to develop up-to-date clinical guidelines on fitness for surgery and chemoradiotherapy.

The subject was divided into different topics, which were in turn assigned to at least two members of the task force. The authors searched the literature according to their own strategies; no central literature review was performed. The draft reports written by the experts on each topic were then reviewed, discussed, and voted by the entire expert panel. The evidence supporting each recommendation was summarized, and was graded as described by the Scottish Intercollegiate Guidelines Network (SIGN) Grading Review Group: grades of recommendation were based on the strength of supporting evidence, taking into account its

overall level and the considered judgment of the guideline developers [2].

The following topics were discussed, and are summarized in the final report along with graded recommendations: Cardiological evaluation before lung resection; lung function tests and exercise tests (limitations of ppoFEV1; DLCO: systematic or selective?; split function studies; exercise tests: systematic; low-tech exercise tests; cardiopulmonary (high tech) exercise tests); future trends in preoperative work-up; physiotherapy/rehabilitation and smoking cessation; scoring systems; advanced care management (ICU/HDU); quality of life in patients submitted to radical treatment; combined cancer surgery and lung volume reduction surgery; compromised parenchymal sparing resections and minimally invasive



*: if not available, CPET can be replaced by stair climbing (see Ref. 1); however if altitude reached at stair climbing < 22m, cardiopulmonary exercise test with peakVO2 measurement is highly recommended

Fig. 1. Algorithm for assessment of cardiopulmonary reserve before lung resection in lung cancer patients [reproduced with permission from Brunelli et al., European Respiratory Journal, 2009 [1]. FEV1: forced expiratory volume in one second. DLCO: diffusing lung capacity for carbon monoxide. VO₂: oxygen consumption. CPET: cardio-pulmonary exercise test.

techniques: the balance between oncological radicality and functional reserve; neoadjuvant chemotherapy and complications; definitive chemo and radiotherapy: functional selection criteria and definition of risk; should surgical criteria be recalibrated for radiotherapy?; the patient at prohibitive surgical risk: alternatives to surgery; who should treat thoracic patients and where these patients should be treated?

A summary of the most important recommendations is reported in [Table 1](#). We recommend readers to refer to the primary publication [[1](#)] for a detailed background of these levels of evidences.

Finally, all available information was integrated in a functional algorithm for the preoperative evaluation of the lung resection candidate. This algorithm was generated based on the best available scientific evidence and consensus opinion of experts ([Fig. 1](#)).

The algorithm emphasizes the importance of a preliminary cardiologic assessment. Those patients at low cardiologic risk or with an optimized cardiologic treatment may proceed with pulmonary evaluation. Complete spirometry and DLCO assessment is recommended in all patients. All those patients with either FEV1 or DLCO or both below 80% of predicted should ideally undergo a formal cardiopulmonary exercise test (CPET) with peak VO_2 measurement. However, the group recognized that many centers may have logistic problems in systematically performing this test. In this latter circumstance, a low-technology exercise test, preferentially a stair climbing test (or, as second choice, a shuttle walk test) may be used as a screening test. Those patients showing sub-optimal performance at these tests (<22 m at stair climbing) should necessarily undergo a formal CPET.

Patients with peak VO_2 lower than 35% of predicted value or lower than 10 ml/kg/min and those with ppoFEV1 or ppoDLCO or both lower than 30% of predicted values in

association with ppo VO_2 peak lower than 35% of predicted value or lower than 10 ml/kg/min are to be regarded at prohibitive risk for major lung resection (lobectomy or pneumonectomy) and other therapeutic options should be considered.

A certain proportion of lung resection candidates may be unable to perform any type of reliable exercise test due to concomitant incapacitating co-morbidities. As such patients have been shown to have an increased risk of death after major lung resection, after a careful selection based on the available cardiac and pulmonary parameters, they should be regarded as high-risk patients and monitored in an advanced care management setting.

Although these guidelines were designed to be broadly accepted, implemented and validated in all European centers, the scientific evidence upon which they were based were mainly generated in settings specialized in the management of lung cancer patients. Based on best scientific evidence, treatment of these patients outside specialized settings or multidisciplinary environments is strongly discouraged and application of our guidelines and recommendations outside specialized centers is discouraged.

References

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