Preoperative evaluation in patients for thoracic surgery

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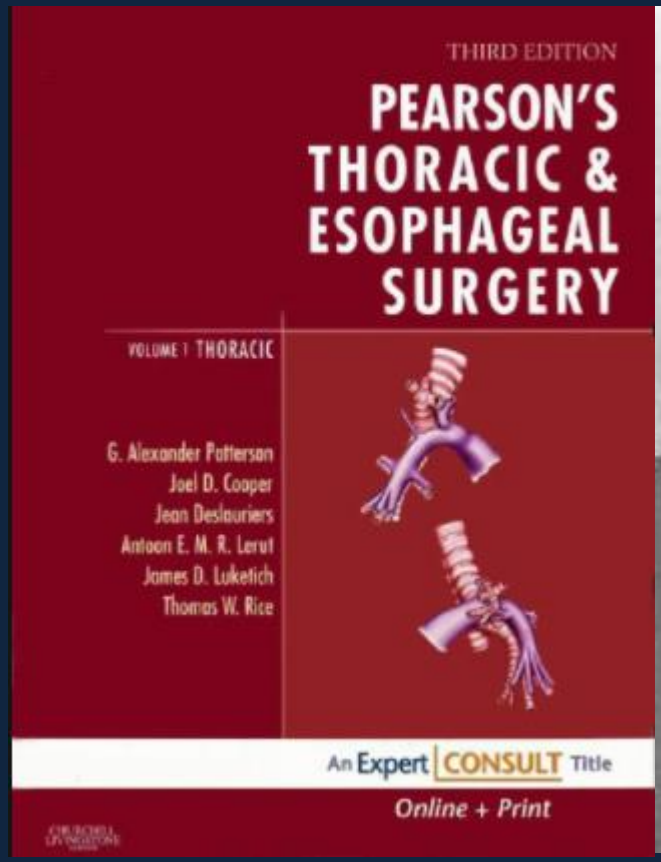
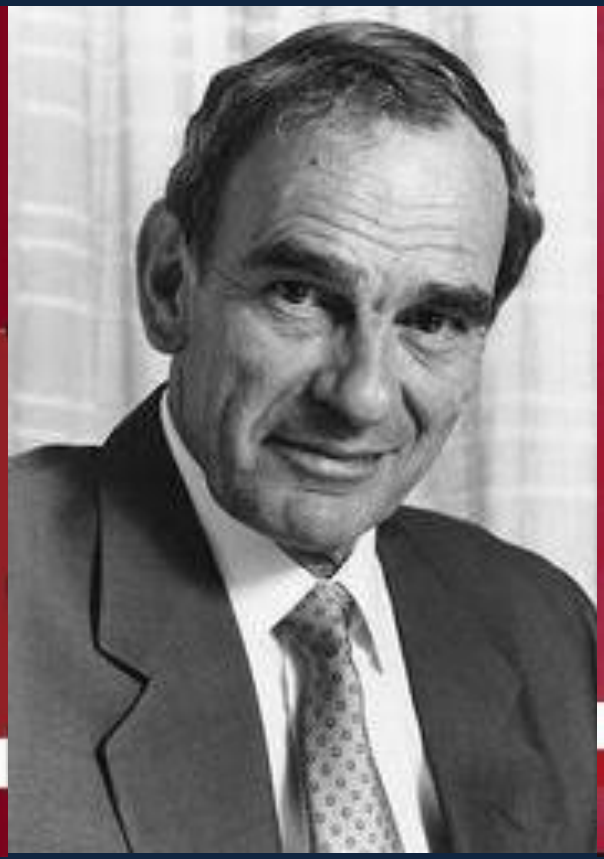
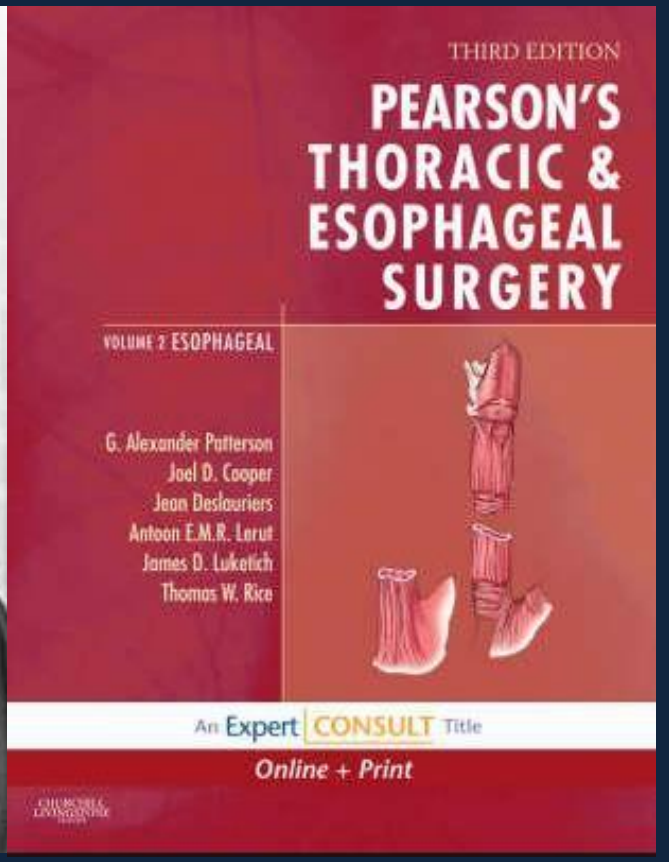
chapter **2**

PREOPERATIVE ASSESSMENT OF THE THORACIC SURGICAL PATIENT

Mark K. Ferguson







ART OR SCIENCE?

The preoperative evaluation of candidates for thoracic surgery is an art as much as it is a science. Despite the plethora of noninvasive and invasive tests that is available for assessing operative risks and predicting outcomes, the final decision ultimately is based on the surgeon's impression of the likelihood of success of the planned operation

THE 2 GOALS…

- Define the morbidity and risks of surgery (short and long term)
- Identify factors or conditions that can be addressed preoperatively to modify the patient's risk of morbidity

…AND AN ADDITIONAL TASK

The comprehensive evaluation of a patient as part of the preoperative assessment allows the identification of risk factors and health issues INDEPENDENT of the planned surgery and facilitates the institution of interventions indicated regardless of plans for surgery

THE SURGEON'S PERSPECTIVE

Plan the operative approach

Anticipate potential operative challenges and postoperative complications

Decide on the necessary level of postoperative care

Determine what resources might be required to support the patient until full recovery takes place

THE PATIENT'S PERSPECTIVE

Ask relevant questions about the recommended procedure

Gain an understanding of the short and long term consequences of having surgery

Make an informed decision about whether to proceed

MAJOR THORACIC PROCEDURES

- **ANATOMICAL LUNG RESECTIONS**
- **LVRS**
- **DECORTICATION**
- **CHEST WALL RESECTIONS**
- **THYMECTOMY/MEDIASTINAL MASS EXCISION**
- **OESOPHAGECTOMY**
- **TRACHEAL SURGERY**

COMMON COMPLICATIONS

- ATELECTASIS
- PNEUMONIA
- ARRHYTHMIAS (*atrial fibrillation)*
- PAIN
- CONGESTIVE HEART FAILURE
- PULMONARY OEDEMA
- PROLONGED AIR LEAK
- MYOCARDIAL INFARCTION
- EMPYEMA
- BRONCHO-PLEURAL FISTULA (p*neumonectomy)*

PARAMOUNT KNOWLEDGE

- Natural history of the disease in question in ABSENCE of surgery
- Effects of thoracic surgery on patients
- Characteristics of patients

WHAT IF WE DON'T OPERATE?

Chest. 1986 Jan;89(1):127-35. doi: 10.1378/chest.89.1.127.

Preoperative pulmonary function testing to predict postoperative morbidity and mortality

G D Gass, G N Olsen

"What is an acceptable surgical mortality in a disease with 100% mortality?"

THORACIC SURGERY PHYSIOLOGY

LOW VENTILATION/PERFUSION AREAS
(*effect of inhaled volatile agents)*

ALTERATION OF BREATHING PATTERNS

PAIN

DIAPHRAGMATIC DYSFUNCTION

INEFFECTIVE COUGH

POD 1 THORACOTOMY CAUSES 35% DECLINE OF FRC & 60% OF FEV1 AND FVC

PATIENT POPULATION

- **ELDERLY**
- **PROLONGED AND SIGNIFICANT SMOKING HISTORY**
- **COMORBID CONDITIONS**
- **COPD**

HISTORY

Box 3-1

Important Components of History in Preoperative Evaluation

- Presenting symptoms and circumstances of diagnosis
- Prior diagnosis of pulmonary or cardiac disease
- Comorbid conditions: diabetes mellitus, liver disease, renal disease
- Prior experiences with general anesthesia and surgery
- Cigarette smoking: never, current, ex-smoker (if ex-smoker, when did patient stop?) *
- Inventory of functional capacity of patient (e.g., Duke Activity Status Index)
- Medications and allergies
- Alcohol use, including prior history of withdrawal syndromes

IDEALLY ALLOW
AT LEAST ONE MONTH
OF SMOKING CESSATION
BEFORE PROCEDING TO SURGERY

PHYSICAL EXAMINATION

- **GENERAL APPEARANCE** *(signs of wasting?)*
- **RESPIRATORY RATE** *(accessory muscles?)*
- **HEAD&NECK** *(adenopathy? Horner? Petit?)*
- **PULMONARY** *(breath sounds? diaphragm motion?*
- **CARDIOVASCULAR** *(murmurs? sounds? rhythm?)*
- **ABDOMEN** *(liver? masses? adenopathy? tenderness?)*
- **LIMBS** *(oedema? clubbing?)*

PERFORMANCE STATUS

Grade	ECOG[1]	Score	Karnofsky[2]
0	Fully active, able to carry on all predisease performance without restriction	100 90	Normal, no complaints; no evidence of disease Able to carry on normal activity; minor signs or symptoms of disease
1	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature (e.g., light housework, office work)	80	Normal activity with effort; some signs or symptoms of disease
2	Ambulatory and capable of all self-care but unable to carry out any work activities; up and about more than 50% of waking hours	70 60	Cares for self; unable to carry on normal activity or to do active work Requires occasional assistance, but is able to care for most personal needs
3	Capable of only limited self-care; confined to bed or chair more than 50% of waking hours	50	Requires considerable assistance and frequent medical care
4	Completely disabled; cannot carry on any self-care; totally confined to bed or chair	40 30 20 10	Disabled; requires special care and assistance Severely disabled; hospital admission is indicated although death is not imminent Very sick; hospital admission necessary; active supportive treatment necessary Moribund; fatal processes progressing rapidly
5	Dead	0	Dead

[1]*Oken MM, Creech RH, Tormey DC, et al: Toxicity and response criteria of the Eastern Cooperative Oncology Group. Am J Clin Oncol 5:649-655, 1982.*
[2]*Hollen PJ, Gralla RJ, Kris MG, et al: Measurement of quality of life in patients with lung cancer in multicenter trials of new therapies. Cancer 73:2087-2098, 1994.*

Performance Status is an INDEPENDENT prognosticator of morbidity and mortality

WHAT ABOUT AGE?

…age **ALONE**

is not an

INDEPENDENT

predictor of mortality and

should not be used

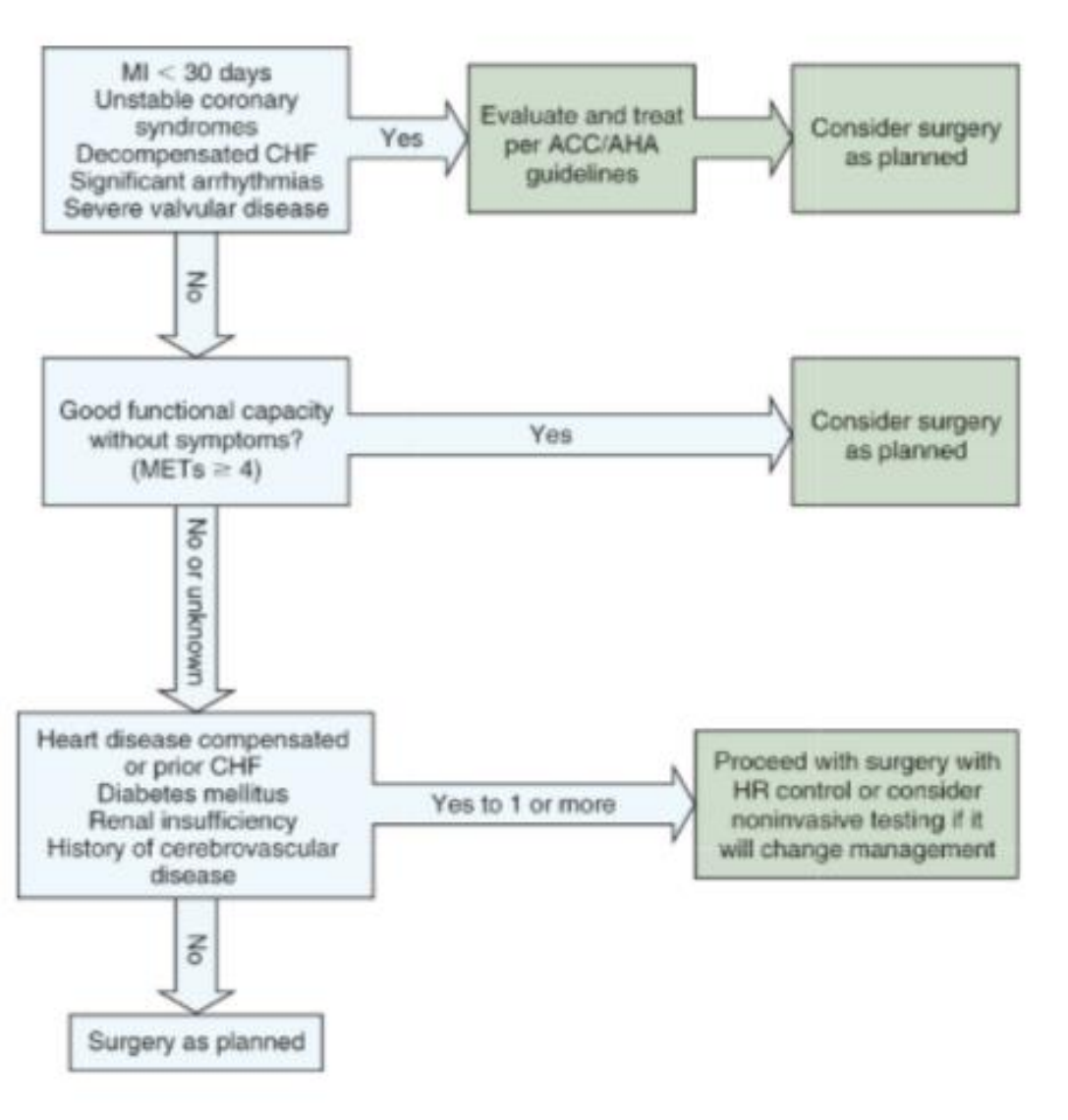
to **CONTRAINDICATE** surgery…

ESTIMATION OF CARDIAC RISK

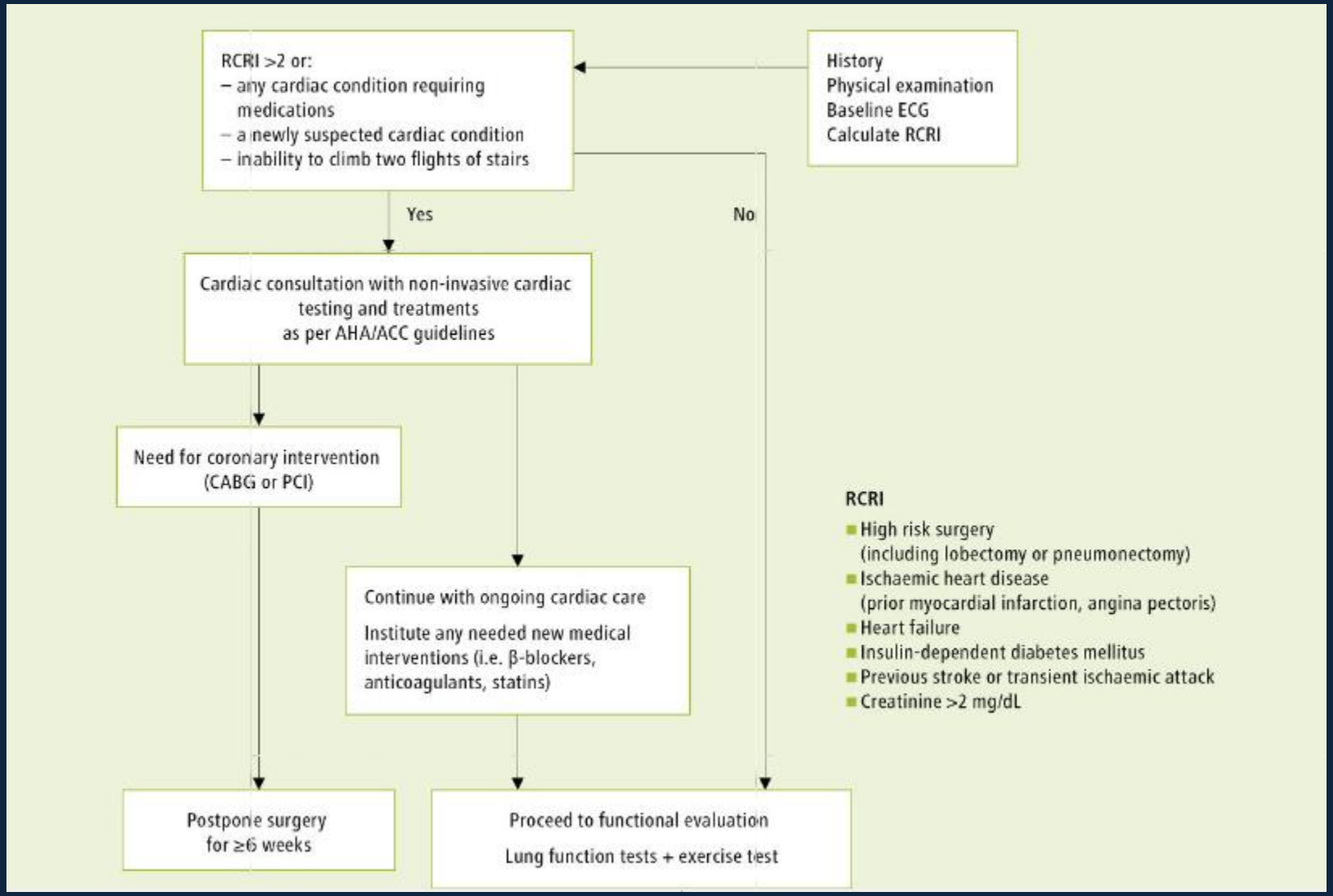
- TYPICAL CANDIDATES FOR ELECTIVE LUNG CANCER SURGERY ARE AT INTERMEDIATE/HIGH RISK OF CARDIOVASCULAR EVENTS

- THE RISK OF MAJOR CARDIAC EVENTS (ventricular fibrillation, pulmonary oedema, complete heart block, cardiac arrest, cardiac death) AFTER MAJOR ANATOMICAL LUNG RESECTION IS ~3%

ACC/AHA CARDIAC EVALUATION



ERC/ESTS CARDIAC EVALUATION



PULMONARY FUNCTION TESTS

- Required for ALL major lung resections
- NOT NECESSARY for videomediastinoscopy, pleural cases, wedge resections, pneumothorax
- FEV1
- DLCO

FEV1 AND ppoFEV1

Traditionally used to stratify respiratory risk in lung resection patients

DO NOT COUNT obstructed segments

ALWAYS use percentage

ppoFEV1= (FEV1 x remaining segments)/segments

ppo FEV1 <40% TRADITIONAL cut-off for higher perioperative risk

RECENT CONCEPTS

In patients with FEV1<70%, ppoFEV1 is not a reliable predictor of complications

ppoFEV1<40% morbidity 28.6% and mortality 4.8%

Patient with COPD have SIGNIFICANTLY lower loss of FEV1, in some cases it may even improve (LVRS effect)

ppoFEV1 is far lower than predicted on POD 1

EXERCISE TESTING (low technology)

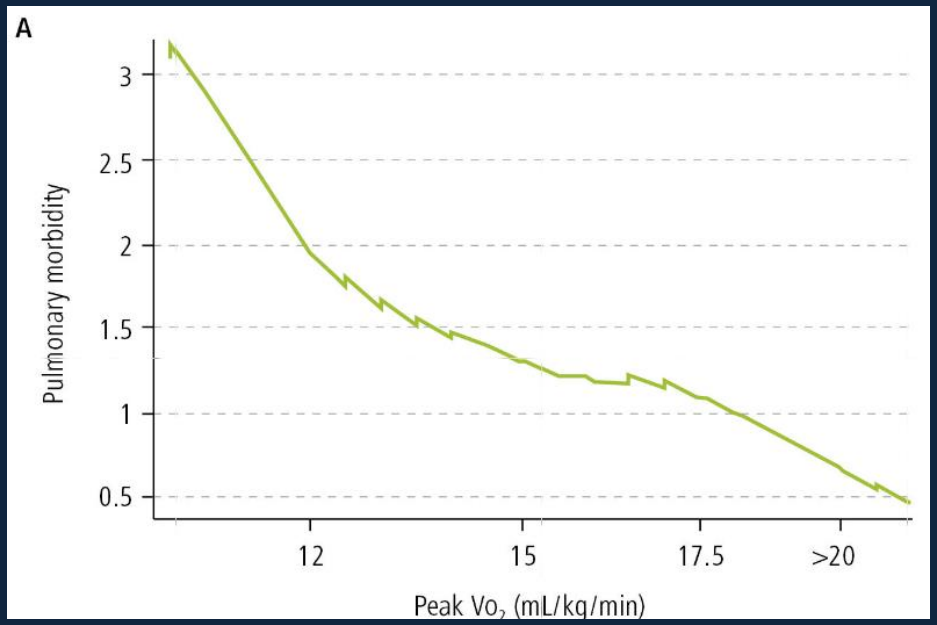
6-12 minute walking test
NOT RECOMMENDED

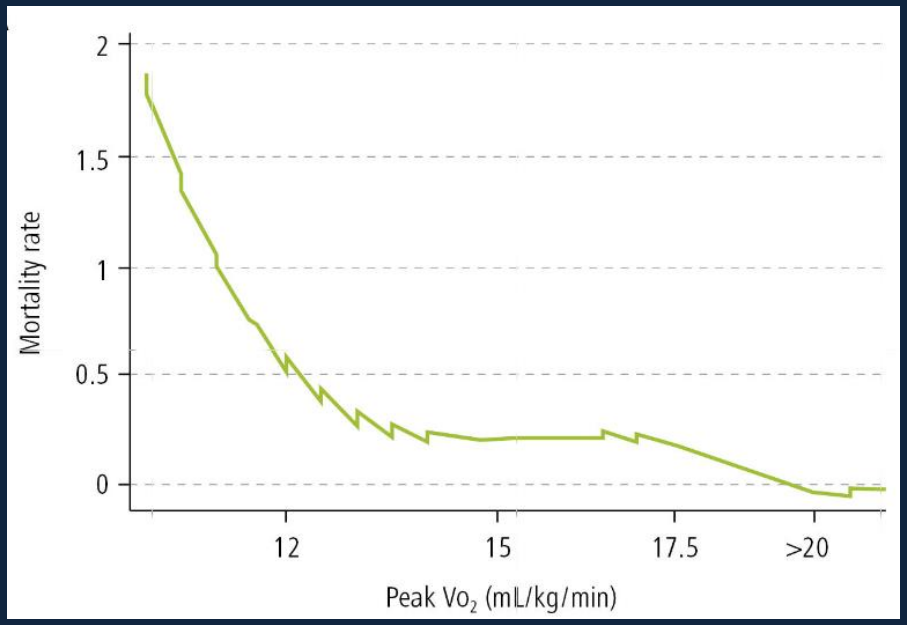
Shuttle walk test 25 SHUTTLES
= VO2max >15 (90% of cases)

Stair climbing test 22 m
= VO2max >15 (86% predicted value)

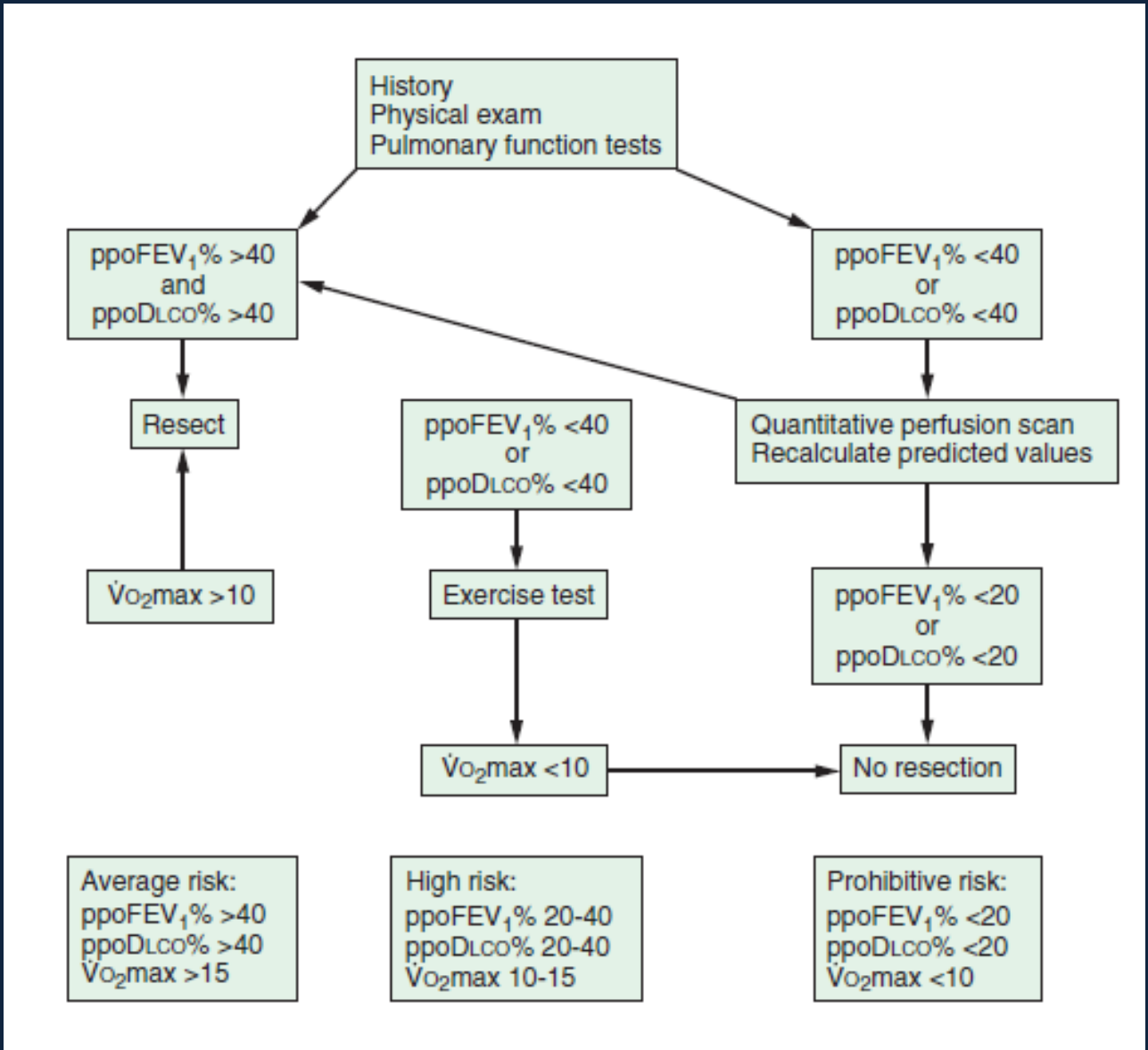
Cardio Pulmonary Exercise Test CPET

- GOLD standard
- Ideally in ALL patients FEV1 or DLCO < 80%

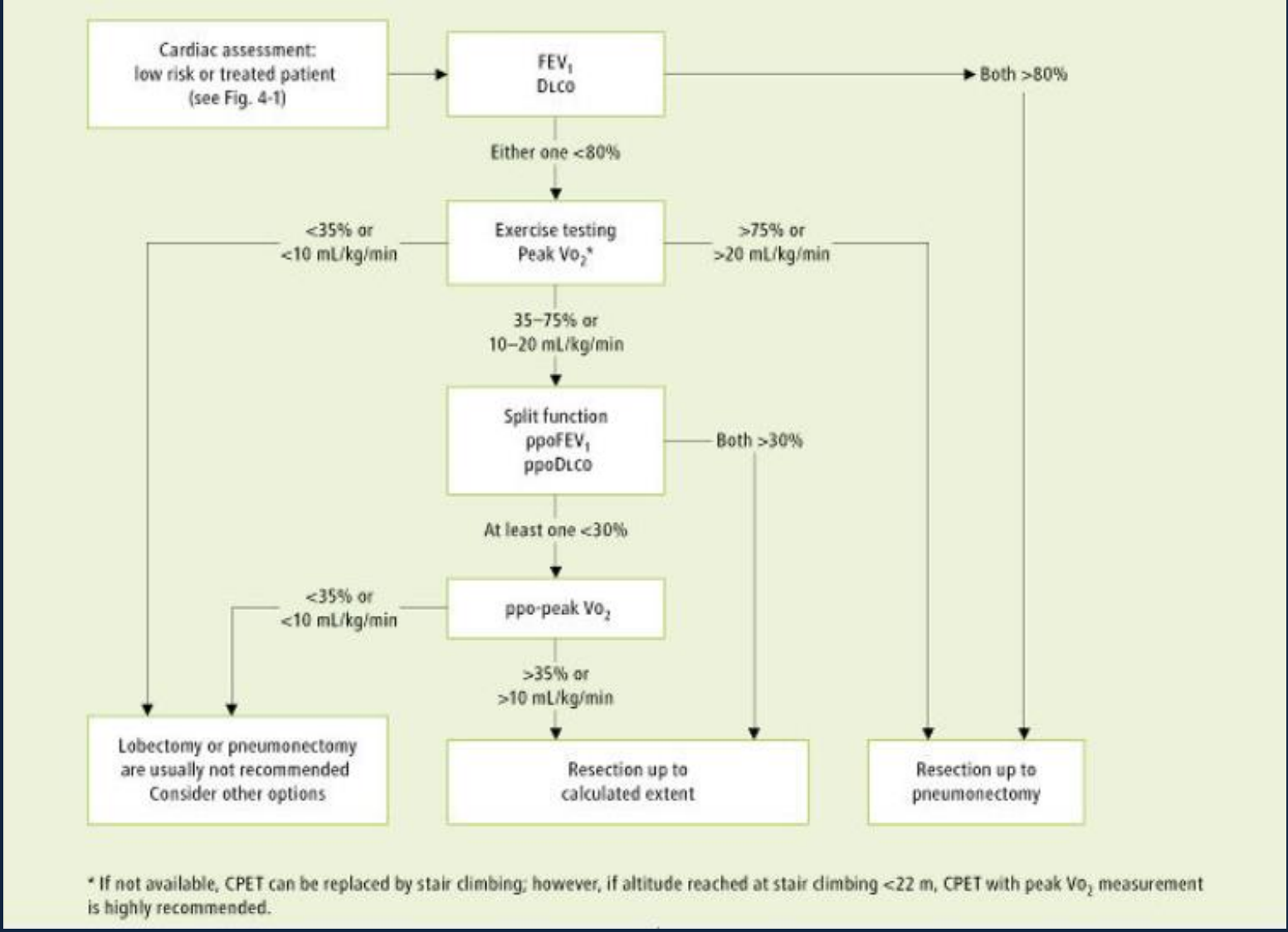




TRADITIONAL ALGORITHM



MODERN ERS/ESTS ALGORITHM



* If not available, CPET can be replaced by stair climbing; however, if altitude reached at stair climbing <22 m, CPET with peak Vo_2 measurement is highly recommended.

MODERN ACCP ALGORITHM