Preoperative Assessment for

Pulmonary Surgery

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Preanesthetic Assessment for Thoracic Surgery (the context):

Not gatekeepers

Short vs. long term survival

Disjoint assessment

55 y.o. Male, Carcinoma Right Middle and Lower lobes, Pneumonectomy



Pulmonary Resection Morbidity and Mortality

	All Cases
	(LCSG '89)
Mortality	4%
Respiratory	21%
Complications	
Cardiac	15%
Complications	

LUNG SUBSEGMENTS



Total subsegments = 42

Example: right lower lobectomy

Postoperative FEV₁ decrease = 12/42 (29%)

Prediction of Postoperative Respiratory Failure in Patients Undergoing Lung Resection for Cancer

 156 patients, lobect.88, pneumonect.26 respiratory complications 26%

•ppoFEV1 >50%: no/minor complic's.

• ppoFEV1 <40%: +/- major resp. complic's.</p>

ppoFEV1 <30%: 10/10 postop. ventilation
 6/10 died

Nakahara K, et al. Ann Thorac Surg 46: 549, 1988







Assessment of Operative Risk in Patients Undergoing Lung Resection mortal.=1%, complics: resp.=17%,cardiac=11%

Variable		p value (complic's.)	
Age >60 yr.		<.05	
Pneumonectomy (64/331)	<.001	
ppoFEV1		<.001 (independ.)	
preop. FEV1 <1I.		n.s.	
elevated pC02		n.s.	
	Kearney DJ,et	al. Chest 105: 753, 19	994

Diffusing Capacity Predicts Operative Mortality but not Long-term Survival Wang J, JTCVSurg 117: 581, 1999



National Emphysema Treatment Trial NEJM 348: 2059-78, 2003

Increased Risk of Death:

Homogeneous Emphysema

◆ FEV1 < 20%

◆ DCO < 20%

Resection of Lung Cancer Is Justified in High-risk Patients Selected by Exercise Oxygen Consumption mean preop. FEV1 =41%, lobect./wedge/segment.

VO2 max	n	complic's.	mortal.
> 20 ml/kg/min	10	1	0
15-20 ml/kg/min	5	3	0
<15 ml/kg/min	5	5	1

Walsh GL, et al. Ann Thorac Surg 58:704, 1995



Lance Armstrong

VO2 max = 85ml/kg/min

 J Appl Physiol 98: 2191, 2005

The "3-Legged Stool" of Pre-Thoracotomy Respiratory Assessment:



Post-thoracotomy Anesthetic Management:



Extubate in OR Extubate if if patient other facto "AWaC" favorable:

(alert, warm and comfortable) Extubate if other factors favorable: Exercise Tol., DLCO,V/Q scan Assoc. diseases Consider Extub. if all favorable plus TEA Other patients: staged wean of ventilation

Post-thoracotomy Cardiac Complications von Knorring, et al. Ann Thorac Surg 1992, 53:642



Days Post-op.

Cardiac Risk Assessment for Thoracotomy

(ACC/AHA Guidelines, Anesth Analg 2007, 104:15-26)



Pulmonary Resection Morbidity and Mortality

	All Cases	>80 Years
	(LCSG '89)	(Osaki '94)
Mortality	4%	3%
Respiratory Complications	21%	44%
Cardiac	15%	44%
Complications		





Stair Climbing Predicts Post-lobectomy Complications in the Elderly

n= 109, Age >70, mortal. 3%, morbid. 27%

♦ ppo FEV1 % p= 0.05

Cardiac co-morbidity p= 0.02



Brunelli A, et al. Ann Thorac Surg 77: 226-70, 2004

Pre-thoracotomy Cardiac Risk Assessment



Which Drug is <u>NOT</u> Effective in Preventing Post-thoracotomy Atrial Fib.?

- 1. Amiodarone
- 2. Digoxin
- 3. Flecanide
- 4. Metoprolol
- 5. Verapamil
- 6. Diltiazem

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COPD patients in Ac. Resp. Failure ABG's air vs. 100% Oxygen

	Air	100% O2 (15 min)
PaCO2 (mm Hg)	65 +/- 3	88 +/- 5
PaO2 (mm Hg)	38 +/- 2	225 +/- 23
Min Vent (I/min)	10.2 +/- 0.5	9.5 +/- 0.7

Milic-Emilie J, Aubier M. Anes Analg 1980

COPD Ventilation-Perfusion Matching



Air

COPD Ventilation-Perfusion Matching





High FiO2

Air

Arterial Blood Gases 16 yr. male, grain aspiration

pHpCO2pO2HCO36.550084306.930040029









Intercurrent Respiratory Problems in COPD

- Bronchospasm
- Atelectasis
- Infection
- Pulmonary edema
- (nutrition/ exercise tolerance)

Pre-anesthetic Considerations for Lung Cancer (the "4 Ms")

Mass Effects
Metabolic Effects: Na+, Ca++, Eaton-Lambert
Metastases
Medications: Bleomycin, Adriamycin,

Cis-Platinum

Helping Surgical Patients Quit Smoking Warner DO, Anesth Analg 2005; 101: 481-7

Surgical Benefits:

- Decrease ST changes intraop.: 2 days
- Decrease wound complic's: <u>></u>4wk.
- ◆ Decrease Resp.
 Complications : Cardiac: ≥8 wk.
 Thoracic: >4 weeks

Abstinence @ 1yr:
After ACB: 55%
Angioplasty : 25%
Angiography: 14%

Preoperative Phyisotherapy

Proven decrease in pulmonary complications in COPD

Particularly in patients with excessive secretions

No proven superior modality

Warner DO, Anesthesiology 2000, 92: 1467

Reduction of Respiratory Complications in Lung Resection by Thoracic Epidural

%



Licker M, et al. Ann Thorac Surg 2006; 81: 1830-8

Will this patient tolerate a pneumonectomy?



Will this patient tolerate a pneumonectomy?

- Age 55
- •FEV1 50%
- DLCO 45%
- Exercise tol. 3 flights
- V/Q R:L 40: 60
 pH 7.44
 PaCO2 48
 PaO2 68



Will this patient will tolerate a pulmonary resection?

Surgical Options:

Sleeve Resection
Bi-lobectomy
Segment/Wedge Resection
VATS
Emphysema Surg. LVR/Bullectomy



Initial Pre-Anesthetic Assessment for Pulmonary Resection

 <u>All patients:</u> Exercise tolerance, ppoFEV1%, D/C smoking, Regional analg., ? Imaging
 <u>ppoFEV1 < 40 %:</u> DLCO, Exercise test, V/Q scan

<u>Cancer patients</u>: the "4-Ms", s. electrolytes
<u>COPD</u>: ABG, chest physio., bronchodilators

Final Pre-Anesthetic Assessment for Pulmonary Resection

Review Initial Assessment and Test Results

Examine the Chest X-ray and CT scan

 Assess the Risk of Hypoxemia During One-Lung Ventilation





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Which Patient more likely Desaturate during OLV?

55 y.o. F, Emphysema FEV1= 28%

60 y.o. M, Lung Ca. Non-smoker, FEV1= 98%





R Thoracotomy, Upper Lobx.

Left VATS LVR

Prediction of Desaturation During One-lung Ventilation



60 y.o. M, Lung Ca. Non-smoker, FEV1= 98% Right vs. Left Thoracotomy
Lung elastic recoil
low PaO2 during 2-lung ventilation
V/Q ratio to surgical side Preoperative Assessment for Thoracic Surgery References:

- Beckles MA, et al. Physiologic Evaluation of patients with lung cancer for surgery. Chest 123: 105s-114s, 2003
- Slinger P, Johnston M.
 Preoperative assessment: an anesthesiologist's perspective.
 Thorac Surg Clin. 2005 Feb;15(1):11-25

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