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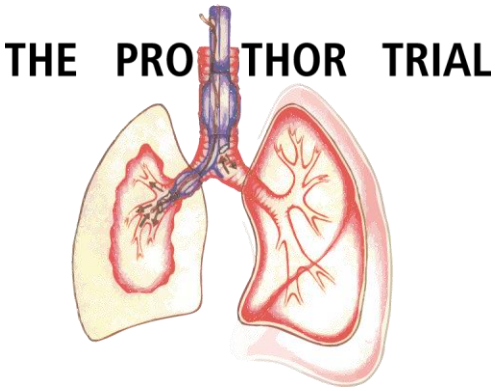

Case Report Form

version 1.5

Protective Ventilation with Higher versus Lower PEEP during one-lung ventilation for thoracic surgery

Patient Serial Number |__|__|__|__|__|__|
center patient

Local investigator 1 (intraoperative) _____

Local investigator 2 (postoperative) _____

Principal Investigator: Mert Sentürk, Department of Anesthesiology and Reanimation, Istanbul University, Turkey

Contact: Thomas Kiss, Department of Anesthesiology and Intensive Care Medicine, University of Dresden, Germany; thomas.kiss@uniklinikum-dresden.de

PREOPERATIVE ASSESSMENT

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0. General comments

For all scores, definitions and abbreviations refer to the appendix at the end of the document.
The use of neuromuscular monitoring during general anaesthesia is strongly recommended.
A standardized CPAP device with pressure limitation up to 20 cmH_2O is necessary for the study.
All calculations are based on measured bodyweight, except for tidal volume, which is based on ideal bodyweight (IBW).

1. Inclusion Criteria

	yes	no
patient scheduled for open thoracic or video-assisted thoracoscopic surgery under general anesthesia requiring OLV	☐	☐
BMI < 35 kg/m^2	☐	☐
age ≥ 18 years	☐	☐
expected duration of surgery > 60 min	☐	☐
most of ventilation time during surgery expected to be in OLV	☐	☐
planned lung separation with double lumen tube (DLT, not for study purpose only)	☐	☐

2. Exclusion Criteria

	yes	no
COPD GOLD Grade III and IV, lung fibrosis, documented bullae, severe emphysema, pneumothorax	☐	☐
uncontrolled asthma	☐	☐
Heart failure NYHA Grade 3 and 4, Coronary Heart Disease CCS Grade 3 and 4	☐	☐
previous lung surgery	☐	☐
documented pulmonary arterial hypertension >25mmHg MPAP at rest or > 40 mmHg syst. (estimated by ultrasound)	☐	☐
documented or suspected neuromuscular disease (thymoma, myasthenia, myopathies, muscular dystrophies, others)	☐	☐
planned mechanical ventilation after surgery	☐	☐
bilateral procedures	☐	☐
lung separation with other method than DLT (e.g. difficult airway, tracheostomy)	☐	☐
surgery in prone position	☐	☐
persistent hemodynamic instability, intractable shock	☐	☐
intracranial injury or tumor	☐	☐
enrollment in other interventional study or refusal of informed consent	☐	☐
pregnancy (excluded by anamnesis and/or laboratory analysis)	☐	☐
esophagectomy, pleural surgery only, sympathectomy surgery only, chest wall surgery only, mediastinal surgery only, lung transplantation	☐	☐
presence of one of the adverse events, listed as postoperative pulmonary complications (aspiration, moderate respiratory failure, severe respiratory failure, infiltrates, pulmonary infection, atelectasis, cardiopulmonary edema, pleural effusion, pneumothorax, pulmonary embolism, purulent pleuritis, lung hemorrhage)	☐	☐
documented preoperative hypercapnia > 45mmHg (6kPa)	☐	☐
Patient included in the study?	☐	☐

Patient details

Written informed consent yes ☐ no ☐	Date informed consent signed dd / mm / yyyy
Age [yrs]	Gender male ☐ female ☐
Height [cm]	Weight [kg]

3. ARISCAT Score

			Points			Points			Points
Age [years]	≤ 50	☐	0	51-80	☐	3	> 80	☐	16
Preoperative SpO_2 [%] 10 min in room air, supine position, upper body elevated 30-45°	≥ 96	☐	0	91-95	☐	8	≤ 90	☐	24
Respiratory Infection (last month)	No	☐	0	Yes	☐	17			
Preoperative Anemia (Hb ≤ 6,2 mmol/l or ≤10 g/dl)	No	☐	0	Yes	☐	11			
Emergency procedure	No	☐	0	Yes	☐	8			
Surgical Incision	peripheral	☐	0	upper abdominal	☐	15	thoracic	☐	24
Planned duration of surgery [hr]	<2	☐	0	> 2-3	☐	16	> 3	☐	23
Total Risk Score		☐		+	☐	+		☐	=

4 History of previous disease

ASA Score [1-5]				
Cumulated Ambulation Score [0-6]:				
Metabolic equivalents	<4 ☐	≥4 ☐		
Heart failure	yes ☐	no ☐	if yes	NYHA Score [1-4]:
Coronary heart disease	yes ☐	no ☐	if yes	CCS Score [0-4]:
Atrial flutter / fibrillation	yes ☐	no ☐	if yes	acute(duration <4 weeks) ☐ paroxysmal ☐ chronic ☐
Obstructive sleep apnea	yes ☐	no ☐	if yes	Apnea/Hypopnea Index [events/hr]:
			if no	STOP-Bang Score [0-8]:
COPD	yes ☐	no ☐	if yes	steroids use yes ☐ no ☐
				inhalation therapy yes ☐ no ☐
Respiratory infection within last month	yes ☐	no ☐	if yes	upper ☐ lower ☐ respiratory infection
Smoking status	never ☐	former (cessation >3months) ☐		current ☐
Use of noninvasive ventilatory support	yes ☐	no ☐	if yes	CPAP ☐ NPPV ☐
				duration [hrs/day]: intensity [pressure level]:
Active cancer	yes ☐	no ☐	if yes	cancer type:
				actual cancer classification: T___N___M___
Diabetes mellitus	yes ☐	no ☐	if yes	dietary ☐ oral medication ☐ insulin ☐
Arterial hypertension	yes ☐	no ☐		
Gastroesophageal reflux	yes ☐	no ☐	if yes	events ≥1/day ☐ ≥1/week ☐ ≥1/month ☐
Alcohol status (past 2 weeks)	0-2 drinks/day ☐	>2 drinks/day ☐		
Use of antibiotics (last 3 months)	yes ☐	no ☐	if yes	indication: drug name:
Use of statins	yes ☐	no ☐	if yes	drug name: dose [mg/day]:
Use of aspirin	yes ☐	no ☐	if yes	dose [mg/day]:

5 Actual organ function

SpO_2 supine position, upper body elevated 30-45°, 10 min in room air possible?	yes ☐	no ☐	if yes	SpO_2 [%]:
			if no	SpO_2 [%]: **and** FiO_2 [%]:
RR [/min]				
HR [/min]				ABP mean [mmHg]
Temperature [°C]				tympanic ☐ axillar ☐ inguinal ☐ oral ☐ rectal ☐ other ☐ if other specify:
Airway secretion	yes ☐	no ☐	if yes	purulent/yellow colour ☐ not purulent ☐
VAS dyspnea [1-10cm]				VAS thoracic rest pain [1-10cm]
				VAS coughing pain [1-10cm]

6 Non-mandatory measurements

Chest X-ray obtained	yes ☐	no ☐
if yes		
Infiltrates (any side)	yes ☐	no ☐
pleural effusion (any side)	yes ☐	no ☐
Atelectasis (any side)	yes ☐	no ☐
Pneumothorax (any side)	yes ☐	no ☐
cardiopulmonary edema (any side)	yes ☐	no ☐

Laboratory tests		
Hb	mmol/l ☐	g/dl ☐
WBC	GPt/L	
Hematocrit	%	
Creatinine	µmol/l ☐	mg/dl ☐
BUN	mmol/l ☐	mg/dl ☐
Platelets	GPt/L	
PT	sec	INR
PTT	sec	
ALT	µmol/s*l ☐	U/L ☐
AST	µmol/s*l ☐	U/L ☐
Bilirubin	µmol/l ☐	mg/dl ☐
CRP c-reactive protein	mg/l	
Procalcitonin	ng/ml	

7 Preoperative lung variables

pO2 (arterial partial pressure of oxygen) [mmHg/kPa]:	capillary ☐	arterial ☐
pCO2 (arterial partial pressure of carbon dioxide) [mmHg/kPa]:	capillary ☐	arterial ☐
pH (pH value) :		
FVC (forced vital capacity) [Liters] :		
FEV1 (Forced expiratory volume at 1 second) [Liters] :		
FEV_1/FVC (Tiffeneau) [%] :		
TLC (Total lung capacity) [Liters] :		
DLCO (Diffusing capacity for carbon monoxide)	[mmol/min/kPa] ☐	[ml/min/mmHg] ☐
VO_2max (maximal oxygen consumption) [ml/kg/min]		
Predicted postoperative respiratory function	predicted postoperative (ppo) FVC predicted postoperative (ppo) FEV1 predicted postoperative (ppo) DLCO	

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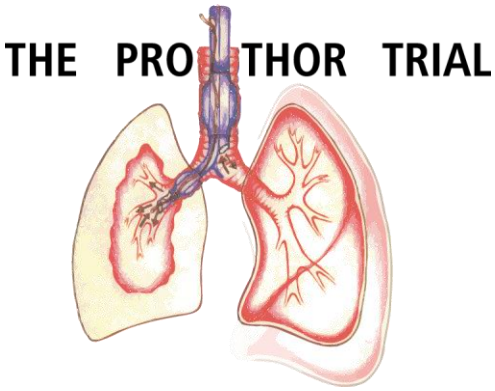

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INTRAOPERATIVE ASSESSMENT

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1 Randomization

Randomization	Low PEEP without RM		High PEEP with RM		

2 Anaesthetic Overview

Duration of anesthesia [min]
from intubation to extubation (or exit from OR if on mechanical ventilation)

Duration of OLV [min]

Duration of TLV [min]

Total Blood loss [ml] | Total Urine output [ml]

Side of OLV left ☐ right ☐

Side of surgery left ☐ right ☐

Method of OLV double lumen tube ☐ endobronchial blocker ☐ other ☐, specify:
double lumen tube(embedded camera) ☐

Confirmation of OLV fiberoptic bronchoscopy ☐ embedded camera ☐ other ☐, specify:

Antibiotics yes ☐ no ☐ if yes, specify drug name: prophylaxis ☐ therapy ☐

Regional anesthesia yes ☐ no ☐ if yes epidural ☐ paravertebral ☐
other ☐, specify:

Use of NIV during induction yes ☐ no ☐ if yes CPAP ☐ NPPV ☐

Patient's position during induction angle of upper body elevation 0-15° ☐ 15-30° ☐ 30-45° ☐ >45° ☐

Temperature [°C] at end of surgery tympanic ☐ axillar ☐ inguinal ☐ oral ☐ rectal ☐
other ☐ if other specify:

Neuromuscular function monitored? yes ☐ no ☐ if yes Residual curarization at Extubation (TOF < 90%) yes ☐ no ☐

Curarization antagonized? yes ☐ no ☐ if yes sugammadex ☐ cholinesterase inhibitor ☐
other ☐, specify:

3 Surgical overview

Duration of surgery [min] from incision to closure	
Priority of surgery	elective ☐ urgent ☐ emergency ☐
Surgical wound classification	clean ☐ clean-contaminated ☐ contaminated ☐ dirty ☐
Surgical procedure	thoracoscopic ☐ open ☐ conversion from open to thoracoscopic ☐
Type of resection (multiple answers are possible):	pneumonectomy ☐ lobectomy ☐ wedge resection ☐ sleeve lobectomy ☐ segment resection ☐ pleurectomy ☐ other ☐, specify:
Patient's position during surgery	supine ☐ lateral ☐ prone ☐ other ☐,specify:
estimated amount of resection: (as a percentage of one lung)	0-10% ☐ ≤20% ☐ ≤30% ☐ ≤40% ☐ ≤50% ☐ ≤60% ☐ ≤70% ☐ ≤80% ☐ ≤90% ☐ 90-100%(e.g pneumonectomy) ☐

4 Anesthesia Drugs

			cumulative dose
Analgetics	Alfentanyl	yes ☐	
[mg]	Fentanyl	yes ☐	
	Lidocaine	yes ☐	
	Morphine	yes ☐	
	Procaine	yes ☐	
	Remifentanil	yes ☐	
	Sufentanil	yes ☐	
	Ketamine	yes ☐	
	other	yes ☐	
	other	yes ☐	
	other	yes ☐	
	other	yes ☐	

			mean	*targeted MAC*
Vapors				
[vol%*min]	Desflurane	yes ☐		
	Enflurane	yes ☐		
	Halothane	yes ☐		
	Isoflurane	yes ☐		
	Sevoflurane	yes ☐		
	other	yes ☐		

			cumulative dose
Anesthetics	Dexmedetomidine	yes ☐	
[mg]	Etomidate	yes ☐	
	Midazolam	yes ☐	
	Propofol	yes ☐	
	Thiopental	yes ☐	
	other	yes ☐	
	other	yes ☐	
	other	yes ☐	
	other	yes ☐	
Muscle	Atracurium	yes ☐	
Relaxants	Cis-Atracurium	yes ☐	
[mg]	Mivacurium	yes ☐	
	Pancuronium	yes ☐	
	Rocuronium	yes ☐	
	Succinylcholine	yes ☐	
	Vecuronium	yes ☐	
	other	yes ☐	
	other	yes ☐	

5 Fluids

			cumulative dose
Artificial Colloids [ml]	HES	yes ☐	
	Gelatine	yes ☐	
	Dextran	yes ☐	
	other, specify:	yes ☐	
Vaso-active Drugs [mg]	Dobutamine	yes ☐	
	Ephedrine	yes ☐	
	Epinephrine	yes ☐	
	Norepinephrine	yes ☐	
	Phenylephrine	yes ☐	
	other	yes ☐	
	other	yes ☐	
	other:	yes ☐	

		cumulative dose
Crystalloids [ml]	yes ☐	
Albumin (any concentration)[ml]	yes ☐	
other, specify:	yes ☐	

6 Transfusion

Transfusion from anesthesia induction until end of anesthesia (or leaving OR if on mechanical ventilation)

		cumulative dose(ml)			*cumulative dose(ml)*
Packed red blood cells	yes ☐	_____	Plasma	yes ☐	_____
Autologous blood transfusion	yes ☐	_____	Platelets	yes ☐	_____

7 Protocol adherence

1)	Hypotension (BPsys < 90mmHg) unresponsive to fluids and/or vasoactive drugs (give details below)	yes ☐
2)	New arrhythmias unresponsive to intervention (according to ACLS-Guidelines) (give details below)	yes ☐
3)	Need for a dosage of vasoactive drugs at the tolerance limit of the treating physician (give details below)	yes ☐
4)	Need for massive transfusion (4 units of PRBC in 4 hours) (give details below)	yes ☐
5)	Life-threatening surgical complication (injury to the hemodynamic and respiratory system and brain, including major bleeding, tension pneumothorax, intracranial injury) (give details below)	yes ☐
6)	Hypoxemia rescue other than prescribed was necessary due to prolonged SpO2<90% (give details below)	yes ☐
7)	Hypercapnia rescue other than prescribed was necessary due to respiratory acidosis pH<7.20 (give details below)	yes ☐
8)	Deviation from prescribed PEEP(give details below)	yes ☐
9)	Deviation from tidal volume(give details below)	yes ☐
10)	Other reason, specify: (give details below)	yes ☐

Any deviation from the protocol? yes ☐ no ☐ if yes, specify:

Could the protocol be continued? yes ☐ no ☐

8 Adverse events (AE) / severe adverse events (SAE)

Any adverse events yes ☐ no ☐ if yes specify according to table:

Event (details, including treatment)	Severe AE	Causality	Severity	Outcome
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐

9 Mechanical ventilation protocol

Patient's height [cm]	Measured bodyweight [kg]
Ideal bodyweight(IBW) [kg] M: 50+0.91*(height-152.4), F: 45.5+0.91*(height-152.4)	

TWO LUNG VENTILATION	
Modus	Volume controlled ventilation
FiO_2	≥40%, adjust to maintain SpO_2 ≥90%
I:E ratio	Range from 1:1 to 1:2
RR	adjust to normocapnia ($ETCO_2$ 35-45mmHg or 4,6-6kPa)
PEEP	according to randomization with suspected intrinsic-PEEP, resp. rate or I:E ratio change allowed acc. to physician
Inspiratory V_T	7 ml/kg ideal bodyweight = _____ml

ONE LUNG VENTILATION	
Modus	Volume controlled ventilation
FiO_2	≥40%, adjust to maintain SpO_2 ≥90%
I:E ratio	Range from 1:1 to 1:2 (change to 1:1 if If P_{peak} > 40 cm H_2O, or P_{plat} > 30 cmH_2O)
RR	adjust to normocapnia ($ETCO_2$ 35-45mmHg or 4,6-6kPa)
PEEP	according to randomization with suspected intrinsic-PEEP, resp. rate or I:E ratio change allowed acc. to physician
Inspiratory V_T	5 ml/kg ideal body weight (change to 4ml/kg if Ppeak > 40 cm H2O, or Pplat > 30 cmH_2O)

9.1 Recruitment maneuver

Recruitment maneuver of the ventilated lung(s) – HIGH PEEP GROUP	1. Increase FIO_2 to 1.0 2. Set peak inspiratory pressure limit to 45 cmH_2O 3. Set respiratory rate to 6 breaths/min 4. Set inspiratory to expiratory ratio (I:E) to 1:1 5. Increase VT in steps of around 2 mL/kg until plateau pressure reaches 30 to 40 cmH_2O 6. If the maximum VT allowed by the anesthesia ventilator is achieved and the plateau pressure is lower than 30 cmH_2O, increase the PEEP as needed, but maximum 20 cmH_2O 7. Allow three breaths while maintaining plateau pressure of 30 to 40 cmH_2O 8. Set VT, PEEP, respiratory rate, and I:E back to pre-recruitment values
	RM will be performed • after bronchoscopy, • at begin of OLV, • every one hour during OLV, • at the end of OLV, and • at end of surgery in supine position • following each disconnection from the mechanical ventilator.

Recruitment maneuver of the non-ventilated lung – BOTH GROUPS	A recruitment maneuver of the non-ventilated lung may be necessary in both groups due to different reasons: a) detection of air leaks by request of surgeons; b) as part of a rescue strategy due to hypoxemia; c) before switching from OLV to TLV to re-expand the collapsed lung.
	1. Keep the non-ventilated under visual inspection 2. Connect the CPAP device with adequate oxygen flow /FiO2 1,0) to the non-ventilated lung 3. Set CPAP to 10 cmH2O during 20 seconds 4. Set CPAP to 15 cmH2O during 20 seconds 5. Set CPAP to 20 cmH2O during 20 seconds If performed as part of a rescue therapy, reduce CPAP to 10 cmH2O and then 5 cmH2O, otherwise disconnect the CPAP device.

9.2 Hypoxemia rescue therapy

If hypoxemia, defined as **SpO2 < 90%** for **> 1 min**, occurs, rescue is performed.

Hypoxemia Rescue – HIGH PEEP GROUP - before and after one-lung ventilation	1. Apply “recruitment maneuver of the ventilated lung(s)” 2. Increase PEEP to 12 cmH2O and apply “recruitment maneuver of the ventilated lung(s)” 3. Increase FIO2 in steps of 0.1 until 1.0 4. Consider stepwise decrease of PEEP of the ventilated lung down to 8 cmH2O

Hypoxemia Rescue - LOW PEEP GROUP - before and after one-lung ventilation	1. Increase FIO2 in steps of 0.1 until 1.0 2. Apply “recruitment maneuver of the ventilated lung(s)” 3. Increase PEEP to 6 cmH2O 4. Apply “recruitment maneuver of the ventilated lung(s)” 5. Increase PEEP to 7 cmH2O 6. Apply “recruitment maneuver of the ventilated lung(s)”

Hypoxemia Rescue - HIGH PEEP GROUP - during one-lung ventilation	1. Apply “recruitment maneuver of the ventilated lung(s)” 2. Increase PEEP to 12 cmH2O and apply “recruitment maneuver of the ventilated lung(s)” 3. Increase FIO2 in steps of 0.1 up to 1.0 4. Apply oxygen to the non-ventilated lung, consider CPAP therapy (recruitment maneuver of the non-ventilated lung) up to a pressure of 20 cmH2O or selective oxygen insufflation via fiberscope 5. Consider stepwise decrease of PEEP of the ventilated lung down to 8 cmH2O 6. Consider surgical intervention (e.g. clamping of pulmonary artery) 7. Consider administration of inhalative nitric oxide or prostacyclin, or intravenous almitrin 8. Switch to TLV

Hypoxemia Rescue – LOW PEEP GROUP - during one-lung ventilation	1. Increase FIO2 in steps of 0.1 up to 1.0 2. Apply oxygen to the non-ventilated lung, consider CPAP therapy (recruitment maneuver of the non-ventilated lung) up to a pressure of 20 cmH2O or selective oxygen insufflation via fiberscope 3. Apply “recruitment maneuver of the ventilated lung(s)” 4. Increase PEEP to 6 cmH2O 5. Apply “recruitment maneuver of the ventilated lung(s)” 6. Increase PEEP to 7 cmH2O 7. Apply “recruitment maneuver of the ventilated lung(s)” 8. Consider surgical intervention (clamping of pulmonary artery) 9. Consider administration of inhalative nitric oxide or prostacyclin, or intravenous almitrin 10. Switch to TLV

9.3 Hypercapnia Rescue therapy

Hypercapnia Rescue – BOTH GROUPS - during one-lung ventilation	PaCO2 > 60 mmHg with respiratory acidosis (pHarterial < 7.20) 1. Increase the respiratory rate (maximum 30/min, while avoiding “intrinsic-PEEP”) 2. Increase VT in steps up to 7 mL/kg 3. Switch to TLV

10 Intraoperative variables: documentation of routine measurements (in chronological order)

Record variables within 5 min after anesthesia induction, 5 minutes before OLV, hourly thereafter, at end of surgery

In case of several changing episodes of TLV and OLV record first episode of OLV after start of surgery and last episode of OLV before end of surgery

	Induction	after start of surgery, prior to OLV	10 min after OLV	1 hour after OLV	2 hour after OLV	3 hour after OLV	4 hour after OLV	5 hour after OLV	6 hour after OLV	end of surgery with TLV in supine pos.
Time [hh:mm]		e.g. 14:20								
TLV/OLV		e.g. TLV								
Ppeak [cmH2O]		e.g. 28								
Pplat [cmH2O]		e.g. 26								
PEEP [cmH2O]		e.g. 10								
VT insp [ml]		e.g. 420								
RR [/min]		e.g. 16								
I:E [x:x]		e.g. 1:1,3								
FiO2 [%]		e.g. 80								
SpO2 [%]		e.g. 93								
etCO2 [mmHg/kPa]		e.g. 5,3 kPa								
MAP [mmHg]		e.g. 82								
HR [bpm]		e.g. 77								
paO2[mmHg/kPa]		e.g. 90 mmHg								
paCO2[mmHg/kPa]		e.g. 4,6 kPa								
pH		e.g. 7,33								
Hematocrit[%]		e.g. 33								

..continued	Induction	after start of surgery, prior to OLV	10 min after OLV	1 hour after OLV	2 hour after OLV	3 hour after OLV	4 hour after OLV	5 hour after OLV	6 hour after OLV	end of surgery with TLV
New hypotension	if sudden BPsys drop > 20% or equivalent increase of catecholamine dose									
	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
New bradycardia	if sudden HR drop > 20%									
	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
New hypoxemia	SpO_2 < 90% for > 1 minute									
	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
Disconnection from the ventilator	Disconnection of the ventilated lung or bronchoscopy									
	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
Hypoxemia rescue maneuver	if $SpO_2 \leq 90\%$ for > 1 minute									
	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
Hypercapnia rescue maneuver	$PaCO_2$ > 60 mmHg and $pH_{arterial}$ < 7.20									
	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
Other event, specify:										
	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
iNO/Prostacyclin/selective fiberoscope insufflation, specify:	use of inhalative nitrous oxygen, prostacyclin therapy or selective oxygenation through fiberoscopy									
	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
CPAP non ventilated lung	use of CPAP for the surgical/non-ventilated lung necessary									
	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no

11 intraoperative variables: Documentation of Recruitment maneuver (in chronological order)

Record values when reaching target pressure P_{plat} 30-40cmH_2O

Routine/Rescue	e.g. Routine	e.g. Routine	e.g. Rescue							
Indication for RM(tick one)										
bronchoscopy/disconnection	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
after begin of OLV	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
every one hour during OLV	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
at the end of OLV	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
at end of surgery(supine)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Time [hh:mm]	e.g. 14:15									
Ppeak [cmH2O]		e.g. 30								
Pplat [cmH2O]		e.g. 28								
PEEP [cmH2O]		e.g. 10								
VT insp [ml]		e.g. 480								
RR [/min]		e.g. 16								
I:E [x:x]		e.g. 1:1,3								
FiO2 [%]		e.g. 80								
SpO2 [%]		e.g. 95								
MAP [mmHg]		e.g. 72								
HR [bpm]		e.g. 83								
Adverse Events										
New hypotension	e.g. no									
New bradycardia	e.g. no									
New hypoxemia	e.g. no		e.g. yes							
Other event, specify:	e.g. no									

2 Intraoperative Visit

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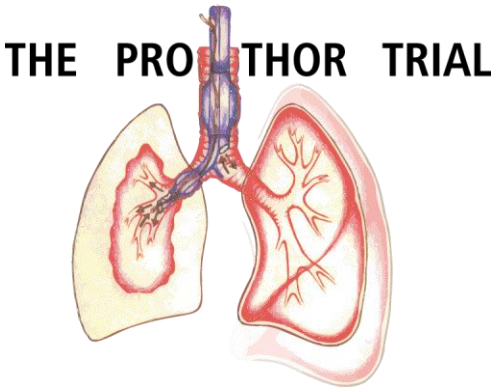

Case Report Form

version 1.5

Protective Ventilation with Higher versus Lower PEEP during one-lung ventilation for thoracic surgery

Patient Serial Number |__|__|__|__|__|__|
center patient

Local investigator 1 (intraoperative) _____

Local investigator 2 (postoperative) _____

Principal Investigator: Mert Sentürk, Department of Anesthesiology and Reanimation, Istanbul University, Turkey

Contact: Thomas Kiss, Department of Anesthesiology and Intensive Care Medicine, University of Dresden, Germany; thomas.kiss@uniklinikum-dresden.de

POSTOPERATIVE ASSESSMENT

Day 1

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6 Pulmonary complications 9

7 Extrapulmonary complications 11

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POSTOPERATIVE DAY 1

(report events within first 24hrs after end of anesthesia/exit of OR if on mech. vent.)

1 Recovery

Lost to follow up	yes ☐	no ☐	if yes	discharged ☐ death ☐ consent withdrawal ☐ other ☐, specify:
Continuation of MV directly after surgery	yes ☐	no ☐	if yes	duration [hrs] indication:
Indication hypothermia ☐ bleeding ☐ cardiovascular ☐ respiratory failure ☐ other ☐,specify:				
New requirement of NIV	yes ☐	no ☐	if yes	CPAP ☐ NPPV ☐ other ☐ specify: duration [hrs] maximum intensity [pressure level]:
			indication	standard of care ☐ resp. failure ☐ other ☐, specify:
New requirement of invasive MV	yes ☐	no ☐	if yes	duration [hrs]
			indication	re-surgery ☐ resp. failure ☐ other ☐ , specify:
unplanned ICU admission	yes ☐	no ☐	if yes	indication:
Physiotherapy	yes ☐	no ☐		
Breathing exercises	yes ☐	no ☐	if yes	incentive spirometry yes ☐ no ☐
Cumulated Ambulation Score [0-6]:				
Impairment of wound healing	yes ☐	no ☐	if yes	superficial ☐ deep ☐
Surgical wound infection	yes ☐	no ☐	if yes	superficial ☐ deep ☐
			if yes	abscess ☐ empyema ☐ phlegmon ☐
Antibiotics	yes ☐	no ☐	if yes, specify drug name:	prophylaxis ☐ therapy ☐
PONV	yes ☐	no ☐		
Return of bowel function	yes ☐	no ☐		

2 Fluids on day 1

first 24hrs after end of anesthesia (exit of OR if on mech. vent.)

			cumulative dose			*cumulative dose*
Artificial Colloids [ml]	HES	yes ☐		Crystalloids [ml]	yes ☐	
	Gelatine	yes ☐		Albumin (any concentration)[ml]	yes ☐	
	Dextran	yes ☐		other, specify:	yes ☐	
	other, specify:	yes ☐				
Vaso-active Drugs [mg]	Dobutamine	yes ☐				
	Ephedrine	yes ☐				
	Epinephrine	yes ☐				
	Norepinephrine	yes ☐				
	Phenylephrine	yes ☐				
	other	yes ☐				
	other	yes ☐				
	other:	yes ☐				

3 Transfusion on day 1

first 24hrs after end of anesthesia (exit of OR if on mech. vent.)

		cumulative dose(ml)			*cumulative dose(ml)*
Packed red blood cells	yes ☐	_____	Plasma	yes ☐	_____
Autologous blood transfusion	yes ☐	_____	Platelets	yes ☐	_____

4 Actual organ function

SpO_2 supine position, upper body elevated 30-45°, 10 min in room air possible?	yes ☐	no ☐	if yes	SpO_2 [%]:
			if no	SpO_2 [%]: **and** FiO_2 [%]:
RR [/min]				
HR [/min]				ABP mean [mmHg]
Temperature [°C]				tympanic ☐ axillar ☐ inguinal ☐ oral ☐ rectal ☐ other ☐ if other specify:
Airway secretion	yes ☐	no ☐	if yes	purulent/yellow colour ☐ not purulent ☐
VAS dyspnea [1-10cm]				VAS thoracic rest pain [1-10cm]
				VAS coughing pain [1-10cm]

5 Non-mandatory measurements

Chest X-ray obtained	yes ☐	no ☐
if yes		
Infiltrates (any side)	yes ☐	no ☐
pleural effusion (any side)	yes ☐	no ☐
Atelectasis (any side)	yes ☐	no ☐
Pneumothorax (any side)	yes ☐	no ☐
cardiopulmonary edema (any side)	yes ☐	no ☐

Laboratory tests		
Hb	mmol/l ☐	g/dl ☐
WBC	GPt/L	
Hematocrit	%	
Creatinine	µmol/l ☐	mg/dl ☐
BUN	mmol/l ☐	mg/dl ☐
Platelets	GPt/L	
PT	sec	INR
PTT	sec	
ALT	µmol/s*l ☐	U/L ☐
AST	µmol/s*l ☐	U/L ☐
Bilirubin	µmol/l ☐	mg/dl ☐
CRP c-reactive protein	mg/l	
Procalcitonin	ng/ml	

6 Pulmonary complications

Aspiration pneumonitis
resp. failure after inhalation of gastric contents
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Severe respiratory failure
need for non-invasive or invasive mechanical ventilation due to poor oxygenation
yes ☐ no ☐

Moderate respiratory failure
SpO2<90% or PaO2<60mmHg for 10min in room air, responding to oxygen > 2l/min
yes ☐ no ☐

ARDS according to Berlin definition yes ☐ no ☐
if yes
mild ☐ moderate ☐ severe ☐

Pulmonary infection
new/ progressive infiltrates + 2: antibiotics, fever, leukocytosis/ leucopenia and/or purulent secretions
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Atelectasis
lung opacification with shift of surrounding tissue/ organ towards the affected area
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Cardiopulmonary edema
clinical signs of congestion + interstitial infiltrates/ increased vascular markings on chest X-ray, not explained by poor cardiac function
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Pleural effusion
blunting of costophrenic angle (standing)/ hazy opacity in one hemithorax (supine) on chest X-ray, not explained by the preoperative patient condition alone
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Pneumothorax
free air in the pleural space on chest X-ray/ ultrasonic imaging
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐
for this study, pneumothorax at the operated side will not be considered as a PPC; please mark anyway

Pulmonary infiltrates
monolateral/ bilateral infiltrates without other clinical signs
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Prolonged air leakage
Air leak requiring at least 7 days of postoperative chest tube drainage
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Purulent pleuritis Receiving antibiotics for a suspected infection, as far as not explained by the preoperative patient condition alone
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Pulmonary Embolism As documented by pulmonary arteriogram or autopsy, or supported by a ventilation/perfusion radioisotope scans, or documented by echocardiography and receiving specific therapy
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Lung haemorrhage Bleeding through the chest tubes requiring reoperation, or three or more red blood cell packs left ☐ right ☐ both ☐ cannot be differentiated ☐	yes ☐ no ☐

Extended PPCs:

Bronchospasm newly expiratory wheezing treated with bronchodilators	yes ☐ no ☐
Mild respiratory failure SpO_2<90% or PaO_2<60mmHg for 10min in room air, responding to oxygen ≤ 2l/min	yes ☐ no ☐

7 Extrapulmonary complications

SIRS ≥2 findings: Temp < 36 ^{0}C or > 38 ^{0}C; HR > 90 bpm, RR > 20 bpm; WBC < 4.000 or > 12.000/µl	yes ☐ no ☐
Sepsis SIRS in response to a confirmed infective process	yes ☐ no ☐
Severe Sepsis Sepsis with organ dysfunction, hypoperfusion or hypotension	yes ☐ no ☐
Septic shock Sepsis with refractory hypoperfusion or hypotension despite adequate fluid resuscitation	yes ☐ no ☐
Extrapulmonary infection wound infection + any other (extrapulmonary) infection	yes ☐ no ☐
Coma Glasgow-Coma-Scale ≤ 8 without therapeutic coma/ sedatives	yes ☐ no ☐
Acute myocardial infarction rise/ fall of cardiac markers + symptoms/ ECG changes/ /imaging of cardiac ischemia/sudden death	yes ☐ no ☐
Acute renal failure **R**isk: Crea increased 1.5 times baseline or GFR decrease > 25% *or* urine output < 0.5 ml/kg/h within 6 hr **I**njury: Crea increased 2 times baseline or GFR decrease > 50% *or* urine output < 0.5 ml/kg/h within 12 hr **F**ailure: Crea increase 3 times baseline or GFR decrease > 75% *or* urine output < 0.3 ml/kg/h within 24 hr or anuria for 12 hrs **L**oss: complete loss of kidney function > 4 weeks(requiring dialysis) yes ☐ no ☐ if yes R ☐ I ☐ F ☐ L ☐	
Disseminated intravascular coagulation according to DIC score > 5	yes ☐ no ☐
Stroke New clinical signs of stroke lasting > 24h + corresponding findings in radiologic imaging	yes ☐ no ☐
Hepatic failure bilirubin on postop day5/day1 > 1,7 + INR on postop day5/day1 > 1,0	yes ☐ no ☐
Gastrointestinal failure 1 = enteral feeding with under 50% of calculated needs or no feeding 3 days after surgery 2 = food intolerance (FI) *or* intra–abdominal hypertension (IAH) 3 = FI and IAH 4 = abdominal compartment syndrome (ACS)	yes ☐ no ☐ if yes 1 ☐ 2 ☐ 3 ☐ 4 ☐ gastrointestinal bleeding ☐

8 Adverse events (AE) / severe adverse events (SAE)

Any adverse events yes ☐ no ☐ if yes specify according to table:

Event (details, including treatment)	Severe AE	Causality	Severity	Outcome
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐

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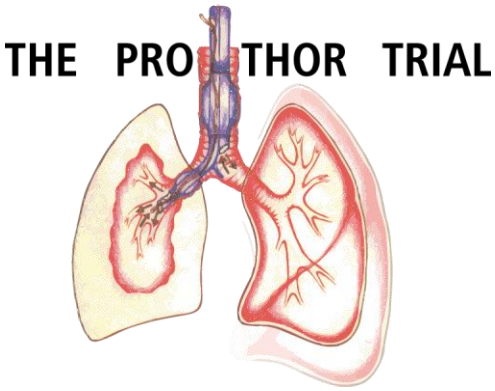

Case Report Form

version 1.5

Protective Ventilation with Higher versus Lower PEEP during one-lung ventilation for thoracic surgery

Patient Serial Number |__|__|__|__|__|__|
center patient

Local investigator 1 (intraoperative) _____

Local investigator 2 (postoperative) _____

Principal Investigator: Mert Sentürk, Department of Anesthesiology and Reanimation, Istanbul University, Turkey

Contact: Thomas Kiss, Department of Anesthesiology and Intensive Care Medicine, University of Dresden, Germany; thomas.kiss@uniklinikum-dresden.de

POSTOPERATIVE ASSESSMENT

Day 2-5

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POSTOPERATIVE DAY

2 ☐ 3 ☐ 4 ☐ 5 ☐

(report events within 24 hour period if not stated otherwise)

1 Recovery

Lost to follow up	yes ☐	no ☐	if yes	discharged ☐ death ☐ consent withdrawal ☐ other ☐, specify:
New requirement of NIV	yes ☐	no ☐	if yes	CPAP ☐ NPPV ☐ other ☐ specify: duration [hrs] maximum intensity [pressure level]:
			indication	standard of care ☐ resp. failure ☐ other ☐, specify:
New requirement of invasive MV	yes ☐	no ☐	if yes	duration [hrs]
			indication	re-surgery ☐ resp. failure ☐ other ☐ , specify:
unplanned ICU admission	yes ☐	no ☐	if yes	indication:
Physiotherapy	yes ☐	no ☐		
Breathing exercises	yes ☐	no ☐	if yes	incentive spirometry yes ☐ no ☐
Cumulated Ambulation Score [0-6]:				
Impairment of wound healing	yes ☐	no ☐	if yes	superficial ☐ deep ☐
Surgical wound infection	yes ☐	no ☐	if yes	superficial ☐ deep ☐
			if yes	abscess ☐ empyema ☐ phlegmon ☐
Antibiotics	yes ☐	no ☐	if yes, specify drug name:	prophylaxis ☐ therapy ☐
PONV	yes ☐	no ☐		
Return of bowel function	yes ☐	no ☐		

2 Actual organ function

SpO_2 supine position, upper body elevated 30-45°, 10 min in room air possible?	yes ☐	no ☐	if yes	SpO_2 [%]:
			if no	SpO_2 [%]: **and** FiO_2 [%]:
RR [/min]				
HR [/min]				ABP mean [mmHg]
Temperature [°C]				tympanic ☐ axillar ☐ inguinal ☐ oral ☐ rectal ☐ other ☐ if other specify:
Airway secretion	yes ☐	no ☐	if yes	purulent/yellow colour ☐ not purulent ☐
VAS dyspnea [1-10cm]				VAS thoracic rest pain [1-10cm]
				VAS coughing pain [1-10cm]

3 Non-mandatory measurements

Chest X-ray obtained	yes ☐	no ☐
if yes		
Infiltrates (any side)	yes ☐	no ☐
pleural effusion (any side)	yes ☐	no ☐
Atelectasis (any side)	yes ☐	no ☐
Pneumothorax (any side)	yes ☐	no ☐
cardiopulmonary edema (any side)	yes ☐	no ☐

Laboratory tests		
Hb	mmol/l ☐	g/dl ☐
WBC	GPt/L	
Hematocrit	%	
Creatinine	µmol/l ☐	mg/dl ☐
BUN	mmol/l ☐	mg/dl ☐
Platelets	GPt/L	
PT	sec	INR
PTT	sec	
ALT	µmol/s*l ☐	U/L ☐
AST	µmol/s*l ☐	U/L ☐
Bilirubin	µmol/l ☐	mg/dl ☐
CRP c-reactive protein	mg/l	
Procalcitonin	ng/ml	

4 Pulmonary complications

Aspiration pneumonitis
resp. failure after inhalation of gastric contents
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Severe respiratory failure
need for non-invasive or invasive mechanical ventilation due to poor oxygenation
yes ☐ no ☐

Moderate respiratory failure
SpO2<90% or PaO2<60mmHg for 10min in room air, responding to oxygen > 2l/min
yes ☐ no ☐

ARDS according to Berlin definition yes ☐ no ☐
if yes
mild ☐ moderate ☐ severe ☐

Pulmonary infection
new/ progressive infiltrates + 2: antibiotics, fever, leukocytosis/ leucopenia and/or purulent secretions
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Atelectasis
lung opacification with shift of surrounding tissue/ organ towards the affected area
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Cardiopulmonary edema
clinical signs of congestion + interstitial infiltrates/ increased vascular markings on chest X-ray, not explained by poor cardiac function
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Pleural effusion
blunting of costophrenic angle (standing)/ hazy opacity in one hemithorax (supine) on chest X-ray, not explained by the preoperative patient condition alone
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Pneumothorax
free air in the pleural space on chest X-ray/ ultrasonic imaging
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐
for this study, pneumothorax at the operated side will not be considered as a PPC; please mark anyway

Pulmonary infiltrates
monolateral/ bilateral infiltrates without other clinical signs
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Prolonged air leakage
Air leak requiring at least 7 days of postoperative chest tube drainage
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Purulent pleuritis Receiving antibiotics for a suspected infection, as far as not explained by the preoperative patient condition alone
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Pulmonary Embolism As documented by pulmonary arteriogram or autopsy, or supported by a ventilation/perfusion radioisotope scans, or documented by echocardiography and receiving specific therapy
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Lung haemorrhage Bleeding through the chest tubes requiring reoperation, or three or more red blood cell packs left ☐ right ☐ both ☐ cannot be differentiated ☐	yes ☐ no ☐
Extended PPCs:	
Bronchospasm newly expiratory wheezing treated with bronchodilators	yes ☐ no ☐
Mild respiratory failure SpO_2<90% or PaO_2<60mmHg for 10min in room air, responding to oxygen ≤ 2l/min	yes ☐ no ☐

5 Extrapulmonary complications

SIRS ≥2 findings: Temp < 36 ^{0}C or > 38 ^{0}C; HR > 90 bpm, RR > 20 bpm; WBC < 4.000 or > 12.000/µl	yes ☐ no ☐
Sepsis SIRS in response to a confirmed infective process	yes ☐ no ☐
Severe Sepsis Sepsis with organ dysfunction, hypoperfusion or hypotension	yes ☐ no ☐
Septic shock Sepsis with refractory hypoperfusion or hypotension despite adequate fluid resuscitation	yes ☐ no ☐
Extrapulmonary infection wound infection + any other (extrapulmonary) infection	yes ☐ no ☐
Coma Glasgow-Coma-Scale ≤ 8 without therapeutic coma/ sedatives	yes ☐ no ☐
Acute myocardial infarction rise/ fall of cardiac markers + symptoms/ ECG changes/ /imaging of cardiac ischemia/sudden death	yes ☐ no ☐
Acute renal failure **R**isk: Crea increased 1.5 times baseline or GFR decrease > 25% *or* urine output < 0.5 ml/kg/h within 6 hr **I**njury: Crea increased 2 times baseline or GFR decrease > 50% *or* urine output < 0.5 ml/kg/h within 12 hr **F**ailure: Crea increase 3 times baseline or GFR decrease > 75% *or* urine output < 0.3 ml/kg/h within 24 hr or anuria for 12 hrs **L**oss: complete loss of kidney function > 4 weeks(requiring dialysis) yes ☐ no ☐ if yes R ☐ I ☐ F ☐ L ☐	
Disseminated intravascular coagulation according to DIC score > 5	yes ☐ no ☐
Stroke New clinical signs of stroke lasting > 24h + corresponding findings in radiologic imaging	yes ☐ no ☐
Hepatic failure bilirubin on postop day5/day1 > 1,7 + INR on postop day5/day1 > 1,0	yes ☐ no ☐
Gastrointestinal failure 1 = enteral feeding with under 50% of calculated needs or no feeding 3 days after surgery 2 = food intolerance (FI) *or* intra–abdominal hypertension (IAH) 3 = FI and IAH 4 = abdominal compartment syndrome (ACS)	yes ☐ no ☐ if yes 1 ☐ 2 ☐ 3 ☐ 4 ☐ gastrointestinal bleeding ☐

6 Adverse events (AE) / severe adverse events (SAE)

Any adverse events yes ☐ no ☐ if yes specify according to table:

Event (details, including treatment)	Severe AE	Causality	Severity	Outcome
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐

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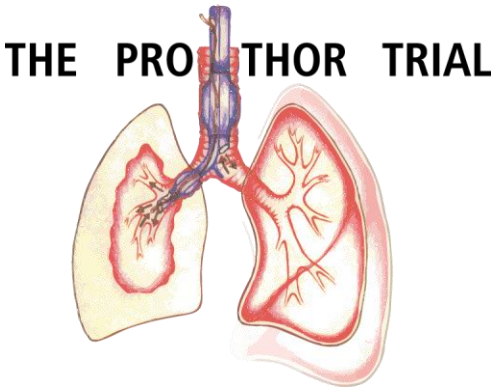

Case Report Form

version 1.5

Protective Ventilation with Higher versus Lower PEEP during one-lung ventilation for thoracic surgery

Patient Serial Number |__|__|__|__|__|__|
center patient

Local investigator 1 (intraoperative) _____

Local investigator 2 (postoperative) _____

Principal Investigator: Mert Sentürk, Department of Anesthesiology and Reanimation, Istanbul University, Turkey

Contact: Thomas Kiss, Department of Anesthesiology and Intensive Care Medicine, University of Dresden, Germany; thomas.kiss@uniklinikum-dresden.de

POSTOPERATIVE ASSESSMENT

Discharge and Followup

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DISCHARGE

(report events within last visit to discharge from hospital)

1 Discharge

Lost to follow up	yes ☐	no ☐	if yes	reason
Death	yes ☐	no ☐		
Date of discharge/death	/ / 20			Postop day of discharge/death [1-90] (day of discharge/death since randomisation)
Discharge destination:	Home ☐	Other hospital/Care ☐	Death ☐	

2 Recovery

New requirement of NIV	yes ☐	no ☐	if yes	CPAP ☐ NPPV ☐ other ☐ specify: duration [hrs] maximum intensity [pressure level]:
			indication	standard of care ☐ resp. failure ☐ other ☐, specify:
New requirement of invasive MV	yes ☐	no ☐	if yes	duration [hrs]
			indication	re-surgery ☐ resp. failure ☐ other ☐, specify:
unplanned ICU admission	yes ☐	no ☐	if yes	indication:
Cumulated Ambulation Score [0-6]:				
Impairment of wound healing	yes ☐	no ☐	if yes	superficial ☐ deep ☐
Surgical wound infection	yes ☐	no ☐	if yes	superficial ☐ deep ☐
			if yes	abscess ☐ empyema ☐ phlegmon ☐
Antibiotics	yes ☐	no ☐	if yes, specify drug name:	prophylaxis ☐ therapy ☐

2 Actual organ function

SpO_2 supine position, upper body elevated 30-45°, 10 min in room air possible?	yes ☐	no ☐	if yes	SpO_2 [%]:
			if no	SpO_2 [%]: **and** FiO_2 [%]:
RR [/min]				
HR [/min]				ABP mean [mmHg]
Temperature [°C]				tympanic ☐ axillar ☐ inguinal ☐ oral ☐ rectal ☐ other ☐ if other specify:
Airway secretion	yes ☐	no ☐	if yes	purulent/yellow colour ☐ not purulent ☐
VAS dyspnea [1-10cm]				VAS thoracic rest pain [1-10cm]
				VAS coughing pain [1-10cm]

3 Non-mandatory measurements

Chest X-ray obtained	yes ☐	no ☐
if yes		
Infiltrates (any side)	yes ☐	no ☐
pleural effusion (any side)	yes ☐	no ☐
Atelectasis (any side)	yes ☐	no ☐
Pneumothorax (any side)	yes ☐	no ☐
cardiopulmonary edema (any side)	yes ☐	no ☐

Laboratory tests		
Hb	mmol/l ☐	g/dl ☐
WBC	GPt/L	
Hematocrit	%	
Creatinine	µmol/l ☐	mg/dl ☐
BUN	mmol/l ☐	mg/dl ☐
Platelets	GPt/L	
PT	sec	INR
PTT	sec	
ALT	µmol/s*l ☐	U/L ☐
AST	µmol/s*l ☐	U/L ☐
Bilirubin	µmol/l ☐	mg/dl ☐
CRP c-reactive protein	mg/l	
Procalcitonin	ng/ml	

4 Pulmonary complications

Aspiration pneumonitis
resp. failure after inhalation of gastric contents
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Severe respiratory failure
need for non-invasive or invasive mechanical ventilation due to poor oxygenation
yes ☐ no ☐

Moderate respiratory failure
SpO2<90% or PaO2<60mmHg for 10min in room air, responding to oxygen > 2l/min
yes ☐ no ☐

ARDS according to Berlin definition yes ☐ no ☐
if yes
mild ☐ moderate ☐ severe ☐

Pulmonary infection
new/ progressive infiltrates + 2: antibiotics, fever, leukocytosis/ leucopenia and/or purulent secretions
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Atelectasis
lung opacification with shift of surrounding tissue/ organ towards the affected area
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Cardiopulmonary edema
clinical signs of congestion + interstitial infiltrates/ increased vascular markings on chest X-ray, not explained by poor cardiac function
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Pleural effusion
blunting of costophrenic angle (standing)/ hazy opacity in one hemithorax (supine) on chest X-ray, not explained by the preoperative patient condition alone
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Pneumothorax
free air in the pleural space on chest X-ray/ ultrasonic imaging
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐
for this study, pneumothorax at the operated side will not be considered as a PPC; please mark anyway

Pulmonary infiltrates
monolateral/ bilateral infiltrates without other clinical signs
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Prolonged air leakage
Air leak requiring at least 7 days of postoperative chest tube drainage
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Purulent pleuritis Receiving antibiotics for a suspected infection, as far as not explained by the preoperative patient condition alone
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Pulmonary Embolism As documented by pulmonary arteriogram or autopsy, or supported by a ventilation/perfusion radioisotope scans, or documented by echocardiography and receiving specific therapy
yes ☐ no ☐
left ☐ right ☐ both ☐ cannot be differentiated ☐

Lung haemorrhage Bleeding through the chest tubes requiring reoperation, or three or more red blood cell packs left ☐ right ☐ both ☐ cannot be differentiated ☐	yes ☐ no ☐

Extended PPCs:

Bronchospasm newly expiratory wheezing treated with bronchodilators	yes ☐ no ☐
Mild respiratory failure SpO_2<90% or PaO_2<60mmHg for 10min in room air, responding to oxygen ≤ 2l/min	yes ☐ no ☐

5 Extrapulmonary complications

SIRS ≥2 findings: Temp < 36 ^{0}C or > 38 ^{0}C; HR > 90 bpm, RR > 20 bpm; WBC < 4.000 or > 12.000/µl	yes ☐ no ☐
Sepsis SIRS in response to a confirmed infective process	yes ☐ no ☐
Severe Sepsis Sepsis with organ dysfunction, hypoperfusion or hypotension	yes ☐ no ☐
Septic shock Sepsis with refractory hypoperfusion or hypotension despite adequate fluid resuscitation	yes ☐ no ☐
Extrapulmonary infection wound infection + any other (extrapulmonary) infection	yes ☐ no ☐
Coma Glasgow-Coma-Scale ≤ 8 without therapeutic coma/ sedatives	yes ☐ no ☐
Acute myocardial infarction rise/ fall of cardiac markers + symptoms/ ECG changes/ /imaging of cardiac ischemia/sudden death	yes ☐ no ☐
Acute renal failure **R**isk: Crea increased 1.5 times baseline or GFR decrease > 25% *or* urine output < 0.5 ml/kg/h within 6 hr **I**njury: Crea increased 2 times baseline or GFR decrease > 50% *or* urine output < 0.5 ml/kg/h within 12 hr **F**ailure: Crea increase 3 times baseline or GFR decrease > 75% *or* urine output < 0.3 ml/kg/h within 24 hr or anuria for 12 hrs **L**oss: complete loss of kidney function > 4 weeks(requiring dialysis) yes ☐ no ☐ if yes R ☐ I ☐ F ☐ L ☐	
Disseminated intravascular coagulation according to DIC score > 5	yes ☐ no ☐
Stroke New clinical signs of stroke lasting > 24h + corresponding findings in radiologic imaging	yes ☐ no ☐
Hepatic failure bilirubin on postop day5/day1 > 1,7 + INR on postop day5/day1 > 1,0	yes ☐ no ☐
Gastrointestinal failure 1 = enteral feeding with under 50% of calculated needs or no feeding 3 days after surgery 2 = food intolerance (FI) *or* intra–abdominal hypertension (IAH) 3 = FI and IAH 4 = abdominal compartment syndrome (ACS)	yes ☐ no ☐ if yes 1 ☐ 2 ☐ 3 ☐ 4 ☐ gastrointestinal bleeding ☐

6 Adverse events (AE) / severe adverse events (SAE)

Any adverse events yes ☐ no ☐ if yes specify according to table:

Event (details, including treatment)	Severe AE	Causality	Severity	Outcome
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐

FOLLOWUP

(report events within DISCHARGE to DAY-28 and 90 after randomisation)

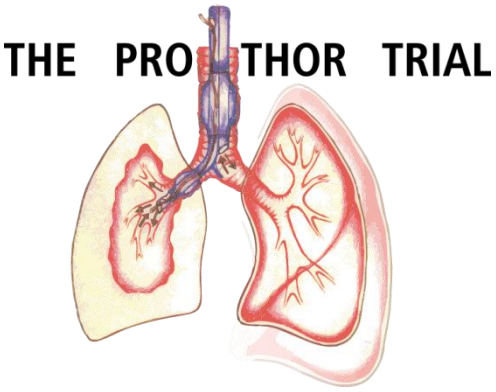
7 Followup

Lost to follow up	yes ☐ no ☐ if yes	reason
Death	yes ☐ no ☐	
Date of discharge/death	/ / 20	Postop day of discharge/death [1-90] (day of discharge/death since randomisation)
Discharge destination:	Home ☐ Other hospital/Care ☐ Death ☐	
Alive hospital free days at day 28 [0-28] (the number of alive hospital-free days will be calculated as 28 minus the number of days or part-days in a hospital since randomisation (including days of hospital readmission due to any reason). All patients who die before the day 28 follow-up will be counted as having zero hospital free days)		
Alive or dead at day 90 after study inclusion		Alive/dead

8 Adverse events (AE) / severe adverse events (SAE)

Any adverse events yes ☐ no ☐ if yes specify according to table:

Event (details, including treatment)	Severe AE	Causality	Severity	Outcome
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐
	yes ☐ no ☐	unrelated ☐ possible ☐ probable ☐ unassessable ☐	mild ☐ moderate ☐ severe ☐ unassessable ☐	resolved - no sequelae ☐ resolved - sequelae ☐ unresolved ☐ death ☐ unknown ☐



Protective Ventilation with Higher versus Lower PEEP during one-lung ventilation for thoracic surgery

APPENDIX
DEFINITIONS AND SCORES

DEFINITIONS and SCORES

NPPV	Noninvasive Positive-Pressure Ventilation
CPAP	Continuous Positive Airway Pressure
NIV	Noninvasive ventilation
BUN	Blood urea nitrogen
ALT	alanine aminotransferase, serum glutamic-pyruvic transaminase (SGPT)
AST	aspartate aminotransferase, serum glutamic-oxaloacetic transaminase (SGOT)
Hb	Hemoglobin
WBC	White blood cell count
PTT	Partial Thromboplatin time
INR	International normalized ratio
PT	Prothombin time (acc. To “Quick”)

CCS Score : Canadian Cardiovascular Society Grading System score for describing and categorising effort-related angina pectoris.

Class I
Angina with strenuous, rapid, or prolonged exertion (Ordinary physical activity such as climbing stairs does not provoke angina.)
Class II
Slight limitation of ordinary activity (Angina occurs with postprandial, uphill, or rapid walking; when walking more than 2 blocks of level ground or climbing more than one flight of stairs; during emotional stress; or in the early hours after awakening)
Class III
Symptoms with everyday living activities, ie. moderate limitation. Marked limitation of ordinary activity (Angina occurs with walking 1-2 blocks or climbing a flight of stairs at a normal pace.)
Class IV
Inability to perform any activity without angina or angina at rest, ie. severe limitation

NYHA Score : New York Heart Association Functional Classification

Class I:
Cardiac disease, but no symptoms and no limitation in ordinary physical activity, e.g. no shortness of breath when walking, climbing stairs etc.
Class II:
Mild symptoms (mild shortness of breath and/or angina) and slight limitation during ordinary activity.
Class III:
Marked limitation in activity due to symptoms, even during less-than-ordinary activity, e.g. walking short distances (20–100 m). Comfortable only at rest.
Class IV:
Severe limitations. Experiences symptoms even while at rest. Mostly bedbound patients.

COPD GOLD Classification

Stage I	FEV1/FVC<0.70	FEV1≥ 80% normal
Stage II	FEV1/FVC<0.70	FEV1 50-79% normal
Stage III	FEV1/FVC<0.70	FEV1 30-49% normal
Stage IV	FEV1/FVC<0.70	FEV1 <30% normal, or <50% normal with chronic respiratory failure present (usually, this means requiring long-term oxygen therapy)

STOP-BANG Score

1. Snoring	Do you snore loudly (loud enough to be heard through closed doors)?	yes ☐	no ☐
2. Tired	Do you often feel tired, fatigued, or sleepy during daytime?	yes ☐	no ☐
3. Observed	Has anyone observed you stop breathing during your sleep?	yes ☐	no ☐
4. Blood pressure	Do you have or are you being treated for high blood pressure?	yes ☐	no ☐
5. BMI	BMI more than 35 kg m^{-2}?	yes ☐	no ☐
6. Age:	Age over 50 years old?	yes ☐	no ☐
7. Neck circumference	Neck circumference >40 cm?	yes ☐	no ☐
8. Gender	Male?	yes ☐	no ☐
Total score	**Yes to _____ questions**		

Cumulated Ambulation Score (CAS)

The patient is assessed on the following functions:

	Able to perform function independently	Only able to perform function with assistance from one or two people	Unable to perform function despite assistance from two people
Transfer from supine-to-sitting-to-supine	2	1	0
Transfer from sitting-to-standing-to-sitting (from armchair)	2	1	0
Walking (with appropriate walking aid)	2	1	0

Total Score [Sum of all values on a given day]: _____

Converting oxygen therapy from O_2 to FiO_2

Method	O_2 flow (l/min)	Estimated FiO_2 (%)
Nasal cannula	1	24
	2	28
	3	32
	4	35
	5	40
	6	44
Nasopharyngeal catheter	4	40
	5	50
	6	60
Face mask	5	40
	6-7	50
	7-8	60
Face mask with reservoir	6	60
	7	70
	8	80
	9	90
	10	95

Surgical wound classification

Clean	Elective, not emergency, non-traumatic, primarily closed; no acute inflammation; no break in technique; respiratory, gastrointestinal, biliary and genitourinary tracts not entered.
Clean-contaminated	Urgent or emergency case that is otherwise clean; elective opening of respiratory, gastrointestinal, biliary or genitourinary tract with minimal spillage (e.g. appendectomy) not encountering infected urine or bile; minor technique break.
Contaminated	Non-purulent inflammation; gross spillage from gastrointestinal tract; entry into biliary or genitourinary tract in the presence of infected bile or urine; major break in technique; penetrating trauma <4 hours old; chronic open wounds to be grafted or covered.
Dirty	Purulent inflammation (e.g. abscess); preoperative perforation of respiratory, gastrointestinal, biliary or genitourinary tract; penetrating trauma >4 hours old.

Priority of surgery

Elective	Surgery that is scheduled in advance because it does not involve a medical emergency
Urgent	Surgery required within < 48 hrs
Emergency	Non-elective surgery performed when the patient's life or well-being is in direct jeopardy

All variables of the algorithm

Prediction of postoperative values of FEV1, FVC

The predicted values of FEV1, FVC can be obtained by consideration of the lung volume removed at surgery. For lobectomy, the simple calculation uses the number of bronchopulmonary segments removed compared with the total number (19) in both lungs. For right upper lobectomy (3 segments) in a patient with a preoperative FEV1 of 1.6 liter which is 80% of predicted normal, the ppo-FEV will be 1.6 * 16/19 = 1.35 liter, and the ppo-FEV1% will be 80% * 16/19 = 67%.

DEFINITIONS of pulmonary post–operative complications

- Aspiration pneumonitis:

Defined as respiratory failure after the inhalation of regurgitated gastric contents

- Moderate respiratory failure:

SpO2<90% or PaO2<60mmHg for 10min in room air, responding to oxygen > 2l/min

- Severe respiratory failure:

need for non-invasive or invasive mechanical ventilation due to poor oxygenation

- ARDS:

Mild, moderate or severe according to the Berlin definition:

Time	Within one week of a known clinical insult, or new/worsening respiratory symptoms		
Chest imaging*	Bilateral opacities not fully explained by effusions, lobar/lung collapse or nodules		
Origin of edema	Respiratory failure not fully explained by cardiac failure or fluid overload; need objective assessment to exclude hydrostatic edema if no risk factor present (e.g., echocardiography)		
	Mild	**Moderate**	**Severe**
Oxygenation**	200 < PaO_2 / FiO_2 < 300	100 < PaO_2 / FiO_2 < 200	PaO_2 / FiO_2 ≤ 100
	PEEP or CPAP ≥ 5 cmH_2O***	PEEP ≥ 5 cmH_2O	PEEP ≥ 5 cmH_2O

ARDS: acute respiratory distress syndrome; PaO_2: partial pressure of arterial oxygen; FiO_2: inspired fraction of oxygen; PEEP: positive end-expiratory pressure; CPAP: continuous positive airway pressure

*: chest X-ray or CT scan

**: if altitude higher than 1,000 meters, correction factor should be made as follows: PaO_2 / FiO_2 9 (barometric pressure/760)

***: this may be delivered non-invasively in the mild ARDS group

- Pulmonary infection:

Defined as new or progressive radiographic infiltrate plus at least two of the following: antibiotic treatment, tympanic temperature > 38ªC, leukocytosis or leucopenia (WBC count < 4,000cells/mm3 or > 12,000cells/mm3) and/or purulent secretions

- Atelectasis:

Suggested by lung opacification with shift of the mediastinum, hilum, or hemidiaphragm towards the affected area, and compensatory overinflation in the adjacent nonatelectatic lung

- Cardiopulmonary edema:

Defined as clinical signs of congestion, including dyspnea, edema, rales and jugular venous distention, with the chest X–ray demonstrating increase in vascular markings and diffuse alveolar interstitial infiltrates

- Pleural effusion:

Chest X–ray demonstrating blunting of the costophrenic angle, loss of the sharp silhouette of the ipsilateral hemidiaphragm in upright position, evidence of displacement of adjacent anatomical structures, or (in supine position) a hazy opacity in one hemithorax with preserved vascular shadows

- Pneumothorax:

Defined as air in the pleural space with no vascular bed surrounding the visceral pleura

- Pulmonary infiltrates:

Chest X–ray demonstrating new monolateral or bilateral infiltrate without other clinical signs

- Prolonged air leakage

Air leak requiring at least 7 days of postoperative chest tube drainage

- Purulent pleuritis

Receiving antibiotics for a suspected infection, as far as not explained by the preoperative patient condition alone

- Pulmonary embolism

As documented by pulmonary arteriogram or autopsy, or supported by a ventilation/perfusion radioisotope scans, or documented by echocardiography and receiving specific therapy

- Lung hemorrhage

Bleeding through the chest tubes requiring reoperation, or three or more red blood cell packs

Extended PPCs

- Bronchospasm:

Defined as newly detected expiratory wheezing treated with bronchodilators

- Mild respiratory failure:

SpO2<90% or PaO2<60mmHg for 10min in room air, responding to oxygen ≤ 2l/min

DEFINITIONS of extra–pulmonary post–operative complications

- Systemic inflammatory response syndrome (SIRS):

Presence of two or more of the following findings: Body temperature < 36^0C or > 38^0C – Heart rate > 90 beats per minute – Respiratory rate > 20 breaths per minute or, on blood gas, a P_aCO_2 < 32 mmHg (4.3 kPa) – WBC count < 4,000 cells/mm3 or > 12,000 cells/mm3 or > 10% band forms

- Sepsis:

SIRS in response to a confirmed infectious process; infection can be suspected or proven (by culture, stain, or polymerase chain reaction (PCR)), or a clinical syndrome pathognomonic for infection. Specific evidence for infection includes WBCs in normally sterile fluid (such as urine or cerebrospinal fluid (CSF), evidence of a perforated viscera (free air on abdominal x–ray or CT scan, signs of acute peritonitis), abnormal chest x–ray (CXR) consistent with pneumonia (with focal opacification), or petechiae, purpura, or purpura fulminans

- Severe sepsis:

Sepsis with organ dysfunction, hypoperfusion, or hypotension

- Septic shock:

Sepsis with refractory arterial hypotension or hypoperfusion abnormalities in spite of adequate fluid resuscitation; signs of systemic hypoperfusion may be either end-organ dysfunction or serum lactate greater than 4 mmol/dL. Other signs include oliguria and altered mental status. Patients are defined as having septic shock if they have sepsis plus hypotension after aggressive fluid resuscitation, typically upwards of 6 liters or 40 ml/kg of crystalloid

- Extra–pulmonary infection:

Wound infection + any other infection

- Coma:

Glasgow Coma Score $\leq$ 8 in the absence of therapeutic coma or sedation

- Acute myocardial infarction:

Detection of rise and/or fall of cardiac markers (preferably troponin) with at least one value above the 99th percentile of the upper reference limit, together with: symptoms of ischemia, ECG changes indicative of new ischemia, development of pathological Q-waves, or imaging evidence of new loss of viable myocardium or new regional wall motion abnormality *Or:* sudden unexpected cardiac death, involving cardiac arrest with symptoms suggestive of cardiac ischemia (but death occurring before the appearance of cardiac markers in blood)

- Acute renal failure:

Renal failure documented as follows: Risk: increased creatinine x1.5 or GFR decrease > 25% *or* urine output (UO) < 0.5 ml/kg/h x 6 hr – Injury: increased creatinine x2 or GFR decrease > 50% *or* UO < 0.5 ml/kg/h x 12 hr – Failure: increase creatinine x3 or GFR decrease > 75% *or* UO < 0.3 ml/kg/h x 24 hr or anuria x 12 hrs – Loss: persistent ARF = complete loss of kidney function > 4 weeks

- Disseminated intravascular coagulation:

DIC score documented as follows: Platelet count < 50 (2 points), < 100 (1 point), or ≥ 100 (0 points) – D–dimer > 4 µg/ml (2 points), > 0.39 µg/ml (1 point) or ≤ 0.39 µg/ml (0 points) – prothrombin time > 20.5 seconds (2 points), > 17.5 seconds (1 point) or ≤ 17.5 seconds (0 points); if ≥ 5 points: overt DIC

- Stroke

New clinical signs of stroke lasting longer than 24 hours and corresponding findings in radiologic imaging.

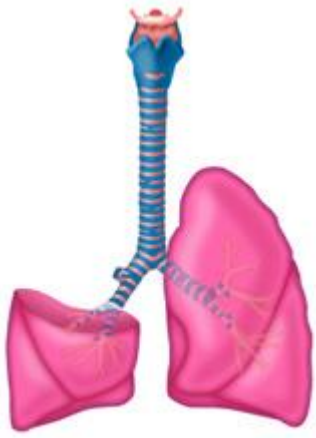
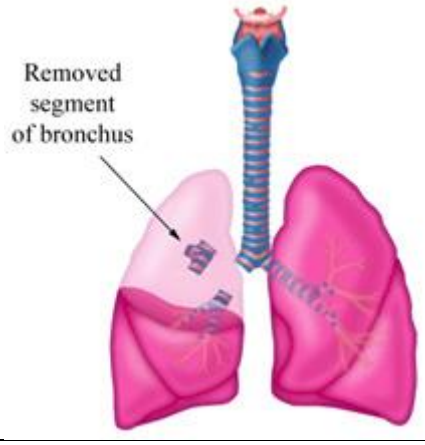
- Hepatic failure:

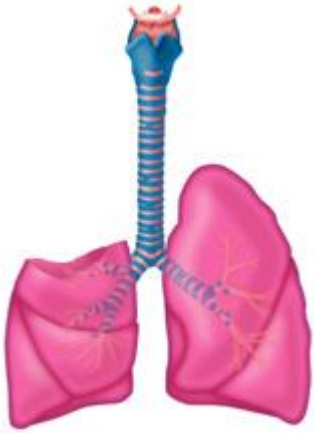
Hepatic failure during short term follow up (5 postoperative days) is considered as follows: Ratio of total bilirubin on postoperative day 5 to postoperative day 1 > 1,7 and ratio of international normalized ratio (INR) on postoperative day 5 to postoperative day 1 >1,0; during long term follow up (until postoperative day 90) at new presence of hepatic encephalopathy and coagulopathy (INR > 1,5) within 8 weeks after initial signs of liver injury (e.g. jaundice) without evidence for chronic liver disease

- Gastro–intestinal failure

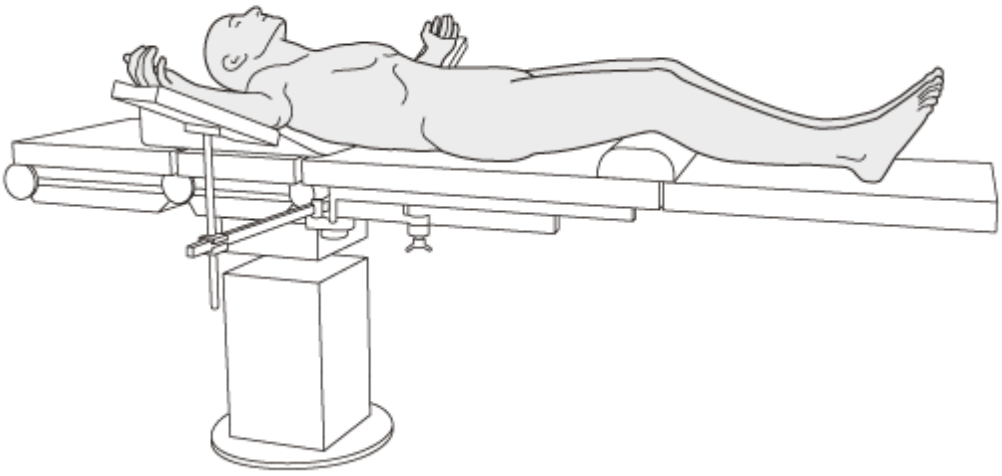
Any type of gastro-intestinal bleeding or gastro–intestinal failure (GIF) score documented as follows: 0 = normal gastrointestinal function; 1 = enteral feeding with under 50% of calculated needs or no feeding 3 days after abdominal surgery; 2 = food intolerance (FI) *or* intra–abdominal hypertension (IAH); 3 = FI and IAH; and 4 = abdominal compartment syndrome (ACS)

Types of Lung Surgery

Pneumonectomy A surgical procedure in which an entire lung is removed.A pneumonectomy is most often done for cancer of the lung that cannot be treated by removal of a smaller portion of the lung. A pneumonectomy is an open chest technique (thoracotomy).	
Lobectomy Also called a pulmonary lobectomy, it is a common surgical procedure that removes one lobe of the lung that contains cancerous cells. Removal of two lobes is called bilobectomy.	
Sleeve Lobectomy A surgical procedure that removes a cancerous lobe of the lung along with part of the bronchus (air passage) that attaches to it. The remaining lobe(s) is then reconnected to the remaining segment of the bronchus. This procedure preserves part of a lung, and is an alternative to removing the lung as a whole (pneumonectomy).	

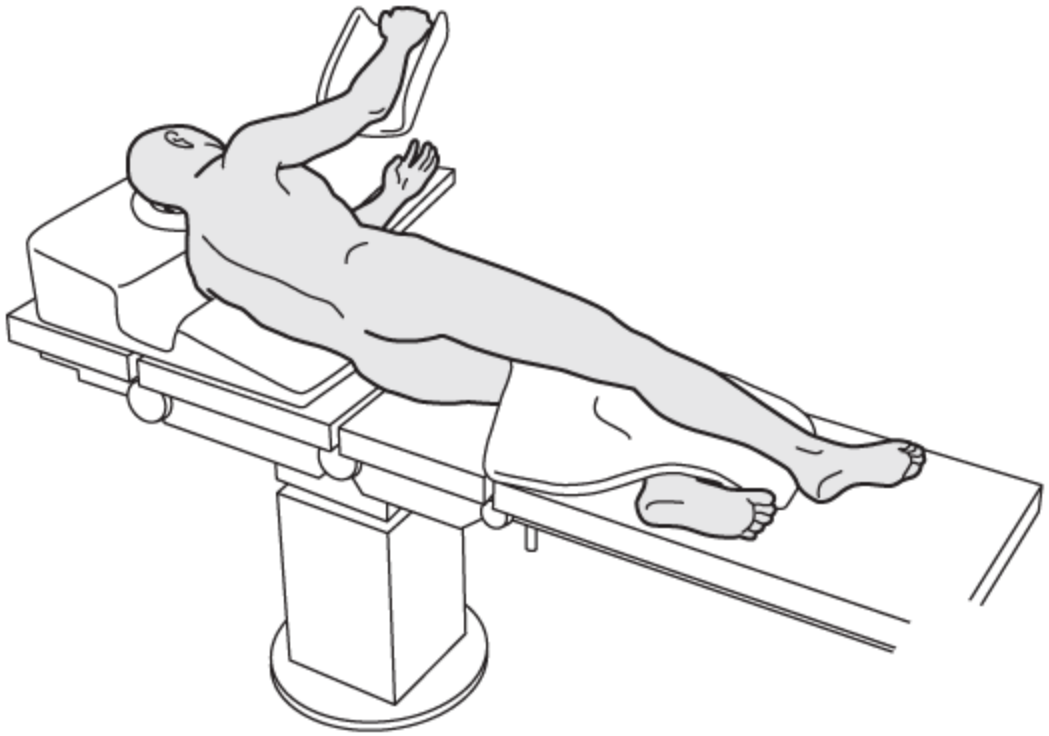
Wedge Resection A wedge resection is a surgical procedure during which the surgeon removes a small, wedge-shaped portion of the lung containing the cancerous cells along with healthy tissue that surrounds the area. The surgery is performed to remove a small tumor or to diagnose lung cancer. A wedge resection is performed instead of a lobectomy (removing a complete lung lobe) when there is a danger of decreased lung function if too much of the lung is removed. A wedge resection can be performed by minimally-invasive video-assisted thoracoscopic surgery (VATS) or a thoracotomy (open chest surgery).	
Segment Resection (Segmentectomy) A segment resection removes a larger portion of the lung lobe than a wedge resection, but does not remove the whole lobe.	
Text and pictures from University of Southern California, Keck School of Medicine	

Definitions of body position during surgery

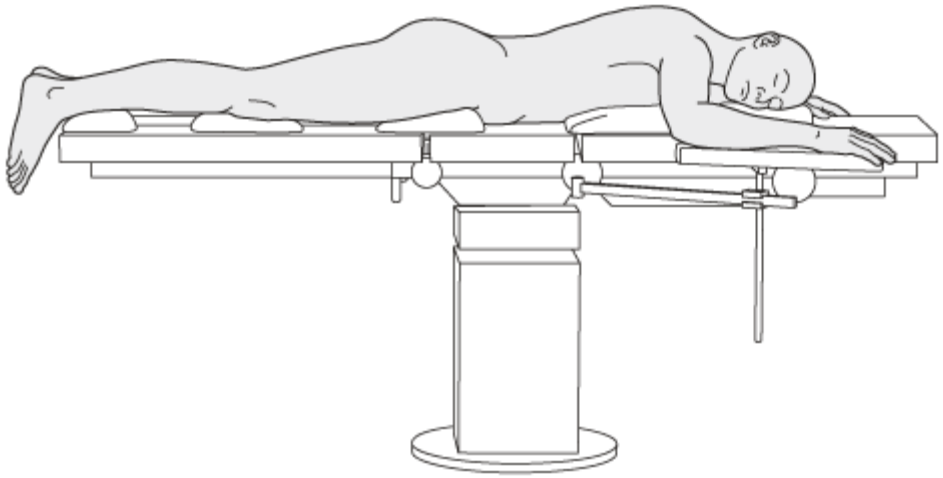


Supine position

5 Appendix



Lateral position



Prone position

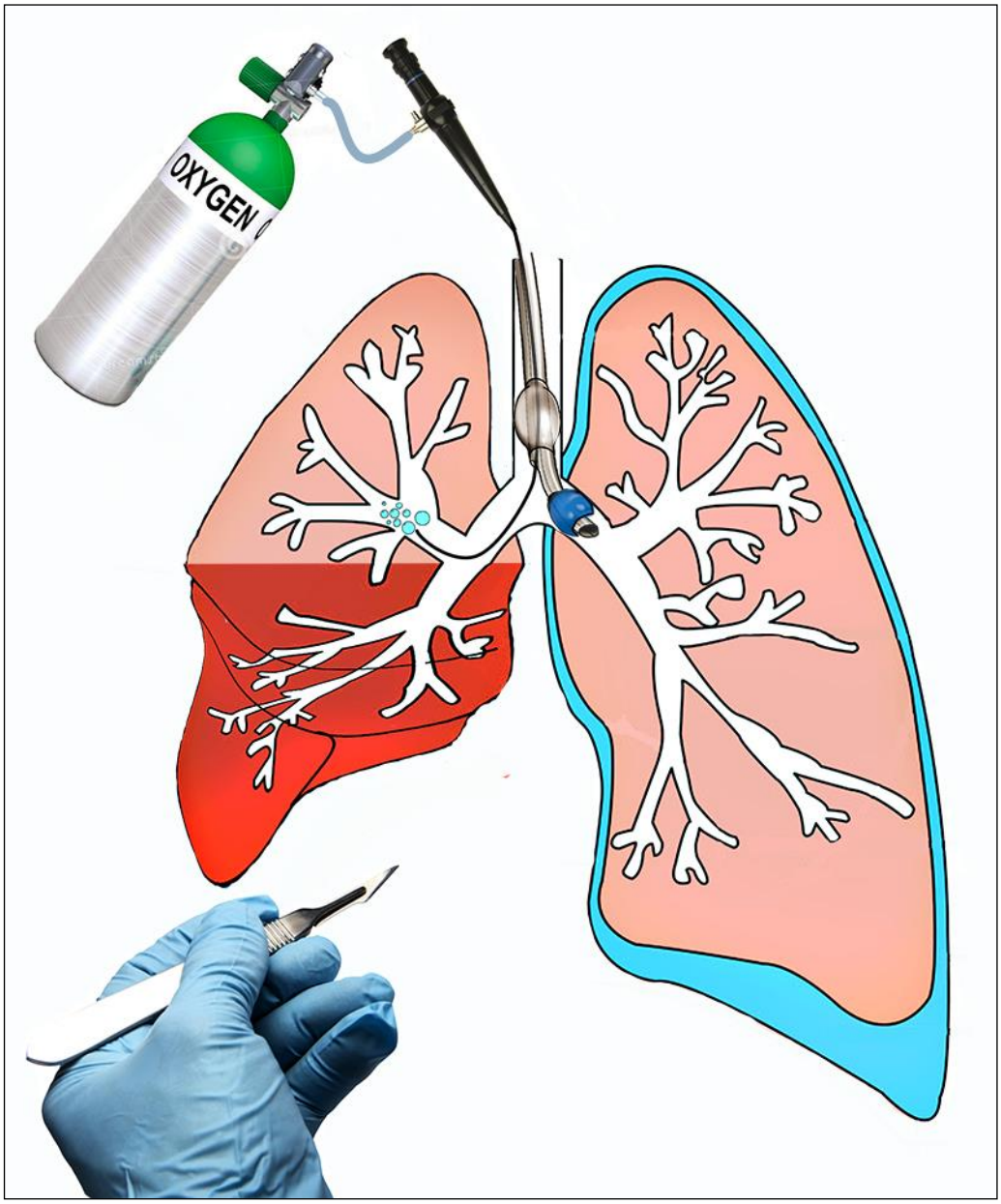
5 Appendix

Table of body height correlated to ideal body weight

Formula: **Male: 50+0.91*(height-152.4)** **Female: 45.5+0.91*(height-152.4)**

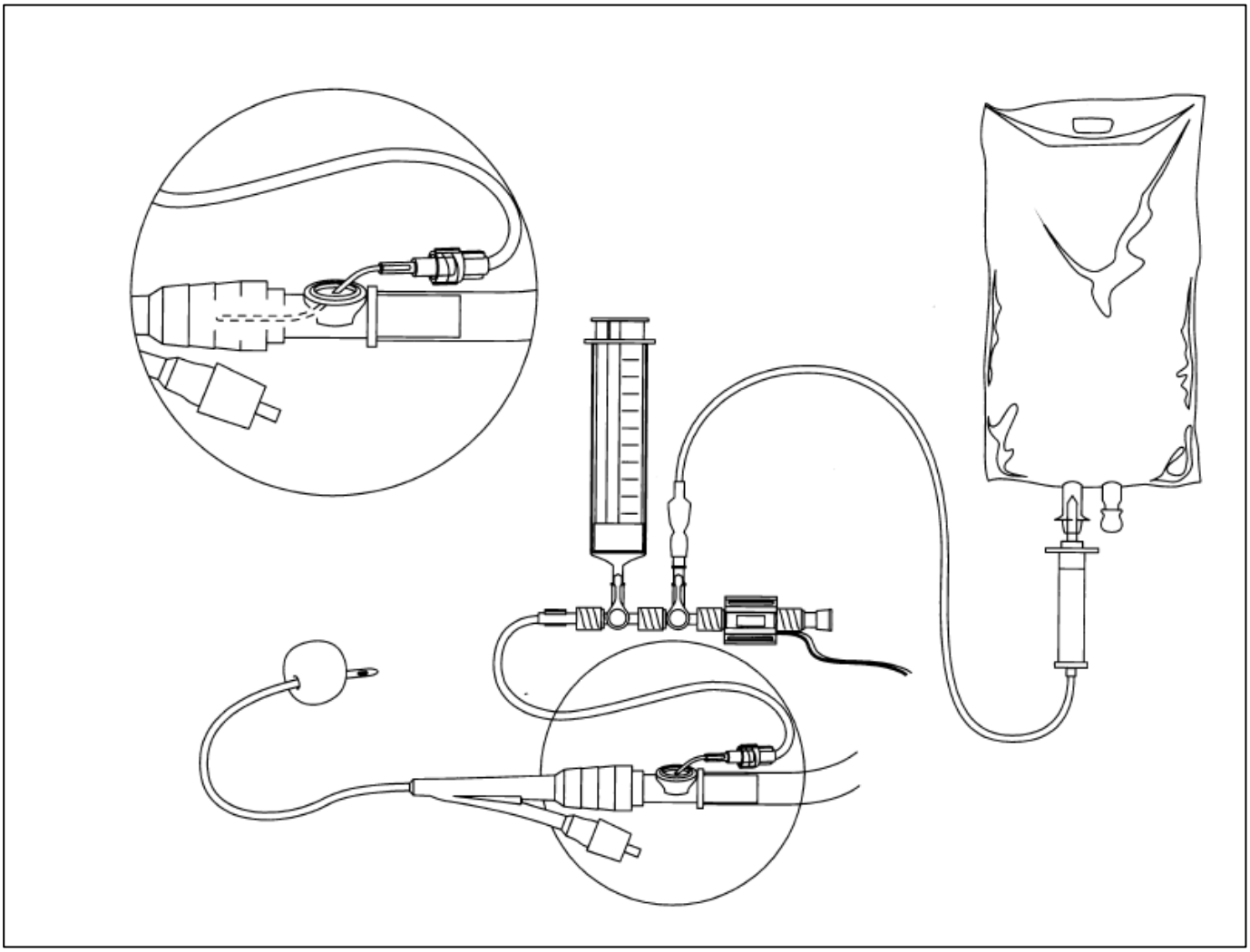
Ideal body weight(kg)		
Height	Gender	
cm	male	female
145	43,3	38,8
146	44,2	39,7
146	44,2	39,7
147	45,1	40,6
147	45,1	40,6
148	46,0	41,5
148	46,0	41,5
149	46,9	42,4
149	46,9	42,4
150	47,8	43,3
150	47,8	43,3
151	48,7	44,2
151	48,7	44,2
152	49,6	45,1
152	49,6	45,1
153	50,5	46,0
153	50,5	46,0
154	51,5	47,0
154	51,5	47,0
155	52,4	47,9
155	52,4	47,9
156	53,3	48,8
156	53,3	48,8
157	54,2	49,7
157	54,2	49,7
158	55,1	50,6
158	55,1	50,6
159	56,0	51,5
159	56,0	51,5
160	56,9	52,4
160	56,9	52,4
161	57,8	53,3
161	57,8	53,3
162	58,7	54,2
162	58,7	54,2
163	59,6	55,1
163	59,6	55,1
164	60,6	56,1
164	60,6	56,1
165	61,5	57,0
165	61,5	57,0
166	62,4	57,9
166	62,4	57,9
167	63,3	58,8
167	63,3	58,8
168	64,2	59,7
168	64,2	59,7
169	65,1	60,6
169	65,1	60,6
170	66,0	61,5
170	66,0	61,5
171	66,9	62,4
171	66,9	62,4
172	67,8	63,3
172	67,8	63,3
173	68,7	64,2
173	68,7	64,2
174	69,7	65,2
174	69,7	65,2
175	70,6	66,1
175	70,6	66,1
176	71,5	67,0
176	71,5	67,0
177	72,4	67,9
177	72,4	67,9
178	73,3	68,8
178	73,3	68,8
179	74,2	69,7
179	74,2	69,7
180	75,1	70,6
180	75,1	70,6
181	76,0	71,5
181	76,0	71,5
182	76,9	72,4
182	76,9	72,4
183	77,8	73,3
183	77,8	73,3
184	78,8	74,3
184	78,8	74,3
185	79,7	75,2
185	79,7	75,2
186	80,6	76,1
186	80,6	76,1
187	81,5	77,0
187	81,5	77,0
188	82,4	77,9
188	82,4	77,9
189	83,3	78,8
189	83,3	78,8
190	84,2	79,7
190	84,2	79,7

Scheme of selective oxygen insufflation during one lung ventilation



Selective oxygen insufflation to the right upper lobe via fiberscope during one lung ventilation. The remaining part of the right lung is collapsed. The left lung is ventilated through the double lumen tube.

Measurement of abdominal pressure

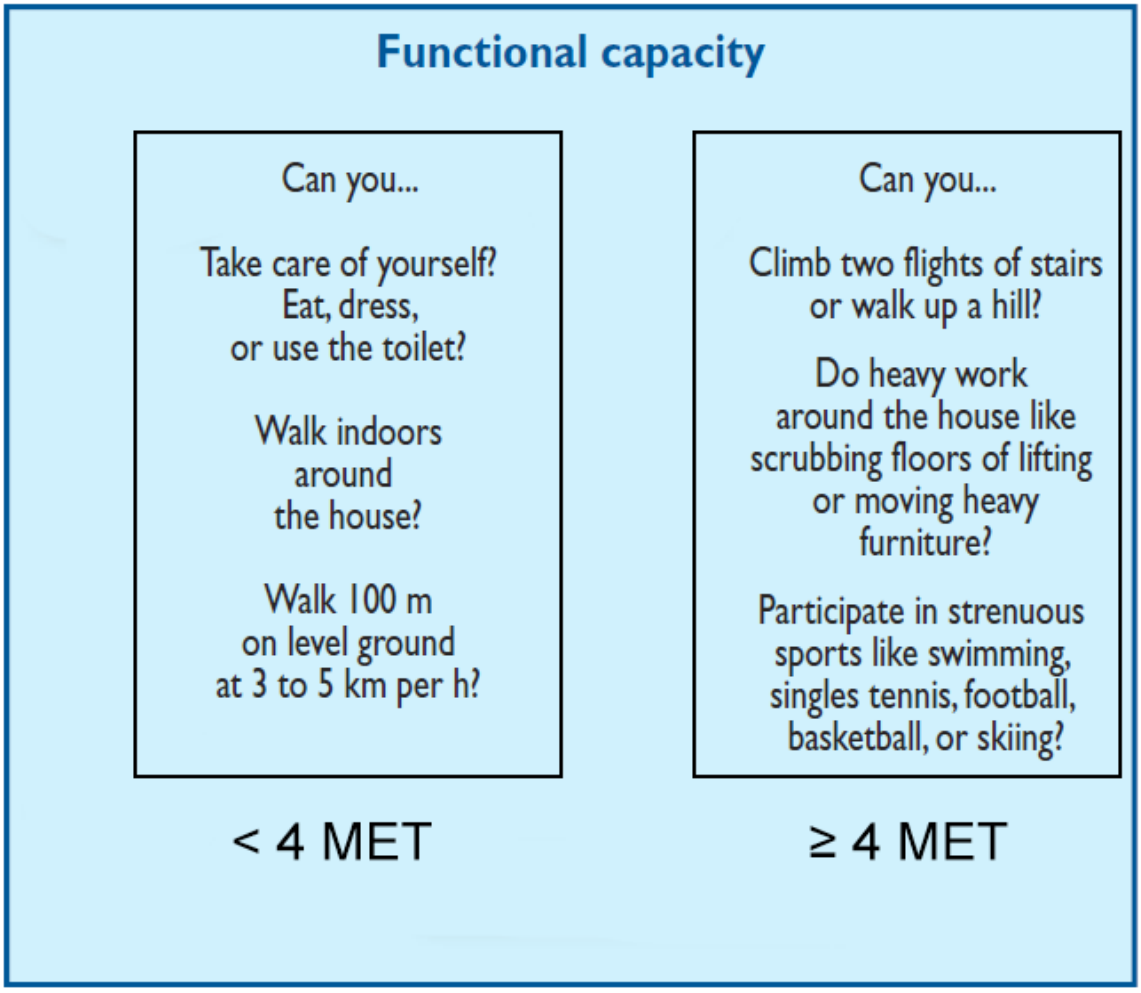


A closed, needle-free system for measurement of intravesicular pressure. Normal saline (1,000 mL), a 60-mL Luer lock syringe, and a segment of pressure tubing are attached to a disposable pressure transducer connected to two stopcocks. An 18-gauge angiocatheter is inserted into the culture aspiration port of the urinary drainage tubing and the needle removed leaving the plastic infusion catheter in place. The infusion catheter is connected to the pressure tubing and the system flushed with normal saline. The infusion catheter may be taped to the urinary drainage tubing for added security.

To measure intraabdominal pressure, the urinary drainage tubing is clamped immediately distal to the catheter. The stopcocks are turned “off ” to the patient and to the pressure transducer. Normal saline is aspirated from the IV bag using the 60-mL syringe. The first stopcock is turned “on” to the patient and the normal saline instilled into the bladder through the urinary catheter. The process is repeated until a total of 100 mL of normal saline has been instilled into the bladder. The stopcocks are then turned “off ” to the syringe and IV tubing. The clamp on the urinary drainage tubing is momentarily released to ensure that all air is flushed from the urinary catheter. The patient’s intraabdominal pressure is then measured at end-expiration. The clamp is removed, the bladder allowed to drain, and the 100 mL of fluid subtracted from the patient’s urinary output for that hour.

(from: Intraabdominal Pressure: A Revised Method for Measurement; Michael L Cheatham, MD, and Karen Safcsak, RN; 1998 by the American College of Surgeons)

Assessment of metabolic equivalents



Estimated energy requirements for various activities.

One MET equals the basal metabolic rate. Exercise testing provides an objective assessment of functional capacity. Without testing, functional capacity can be estimated from the ability to perform the activities of daily living. One MET represents metabolic demand at rest; climbing two flights of stairs demands 4 METs, and strenuous sports, such as swimming, > 10 METS. The inability to climb two flights of stairs or run a short distance (<4 METs) indicates poor functional capacity and is associated with an increased incidence of post-operative cardiac events. Abbreviations: km per h = kilometres per hour; MET = metabolic equivalent.

Based on **Hlatky MA, et al .** A brief self-administered questionnaire to determine functional capacity (the Duke Activity Status Index). Am J Cardiol 1989;64:651–654. and **Fletcher GF et al.** Exercise standards for testing and

training: A statement for healthcare professionals from the American Heart Association. Circulation 2001;104:1694–1740)

From: 2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management. European Heart Journal (2014) 35, 2383–2431