

Optimisation respiratoire péri-opératoire d'une anesthésie générale

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Special Article

RESPIRATION AND THE AIRWAY

Lung-protective ventilation for the surgical patient: international expert panel-based consensus recommendations

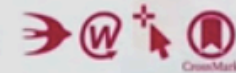
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- 1-6 % complications pulmonaires post opératoires (CPP)
- ↑ mortalité à 30 jours post-op ;

Sans CPP : 3 %

Avec CPP : 15-30 %

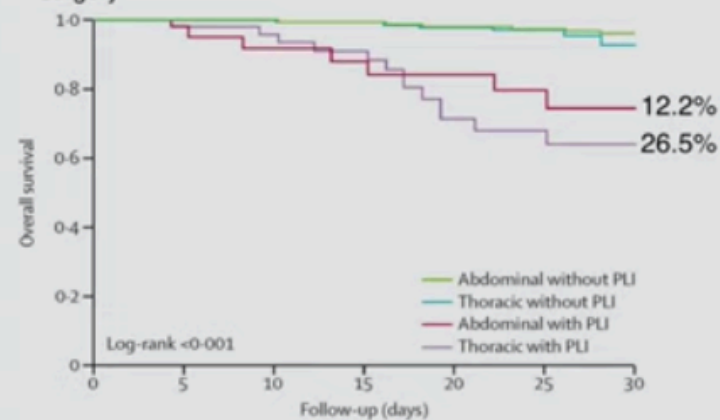
Incidence of mortality and morbidity related to postoperative lung injury in patients who have undergone abdominal or thoracic surgery: a systematic review and meta-analysis



Ary Serpa Neto, Sabine NT Hemmes, Carmen SV Barbas, Martin Beiderlinden, Ana Fernandez-Bustamante, Emmanuel Futier, Markus W Hollmann, Samir Jaber, Alf Kozian, Marc Licker, Wen-Qian Lin, Pierre Moine, Federica Scavonetto, Thomas Schilling, Gabriele Selmo, Paolo Severgnini, Juraj Sprung, Tanja Treschan, Carmen Unzueta, Toby N Weingarten, Esther K Wolthuis, Hermann Wrigge, Marcelo Gama de Abreu, Paolo Pelosi, Marcus J Schultz, for the the PROVE Network investigators


- Individual data analysis of 3365 patients from 12 observational and RCTs
- Postoperative lung injury: 3.65%
- The estimated overall attributable mortality due to postoperative lung injury was 19.0% (95% CI 18.0–19.1%).

Figure 5: Kaplan-Meier estimates of overall survival by type of surgery



Score ARISCAT

Risk Factor	Risk Score
Age, years	
≤ 50	0
51-80	3
> 80	16
Preoperative O ₂ saturation	
≥ 96%	0
91%-95%	8
≤ 90%	24
Respiratory infection in the last month	17
Preoperative anemia, hemoglobin ≤ 10 g/dL	11
Surgical incision	
Upper abdominal	15
Intrathoracic	24
Duration of surgery	
≤ 2 hours	0
2-3 hours	16
> 3 hours	23
Emergency surgery	8
Risk class, No. of points in risk score (pulmonary complication rate)	
Low	< 26 points (1.6%)
Intermediate	26-44 points (13.3%)
High	> 44 points (42.1%)

- BPCO :
 - handicap : préparation 48h, kiné, aérosols
 - handicap majeur : consult pneumo, EFR
- SAOS :
 - score **STOP BANG** ≥ 3 : polysomnographie, consult spécialisée
 - découverte SAOS nécessitant un appareillage : 15 jours de VPPC pré-opératoire
- Tabagisme  - 25 % de CPP si arrêt 4 semaines avant

Position

↓ CRF : – 800 ml, soit - $\frac{1}{3}$ d'une CRF de 2,5 L

➤ **proclive 30°**

- Eviter atélectasies de compression
- Allonge le délai avant hypoxémie en apnée

Pré oxygénation

Sans pré-O₂

- **Sang :**

$$\text{CaO}_2 = 1,34 \times \text{Hb} \times \text{SaO}_2 + 0,003 \times \text{PaO}_2$$
$$= 950 \text{ ml} / 5 \text{ L}$$

- **CRF** : fraction alvéolaire en O₂ = 16 %

$$0,16 \times 2500 \text{ ml} = 400 \text{ ml}$$

→ Au total, 1350 ml de réserve en oxygène lorsque SpO₂ 100%
vs 1104 ml lorsque SpO₂ 90%

→ Délai 1 min 15 sec avant hypoxémie sans pré-oxygénation.

Avec pré-O₂

- **Sang** : 1028 ml / 5L
- **CRF** : 2375 ml **↗↗**

→ Au total, > 3000 ml de réserve en oxygène lorsque SpO₂ 100% après pré-oxygénation, dont la majorité dans la CRF

→ Délai 11 min avant hypoxémie avec pré-oxygénation.

➤ **FiO₂ = 100 % en VS** jusqu'à EtO₂ > 90%

Si **IMC > 30** ou hypoxémie :

➤ **VSAI : AI = 5 cmH₂O, PEP = 5 cmH₂O, FiO₂ = 100 %**

Recrutement alvéolaire, allongement du délai avant hypoxémie en apnée

Volume courant, PEP

$$PM = P_{\text{plat}} - PEP = V_t / \text{compliance}$$

- **6-8 ml/kg** du poids idéal théorique (PIT), **fixe**
- fréquence respiratoire selon EtCO_2

 formation atélectasies si PEP non adéquate...

- **PEP ≥ 5 cmH₂O**

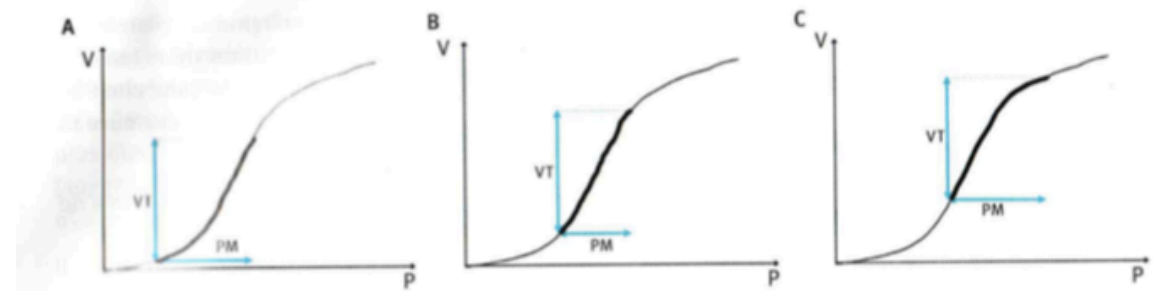


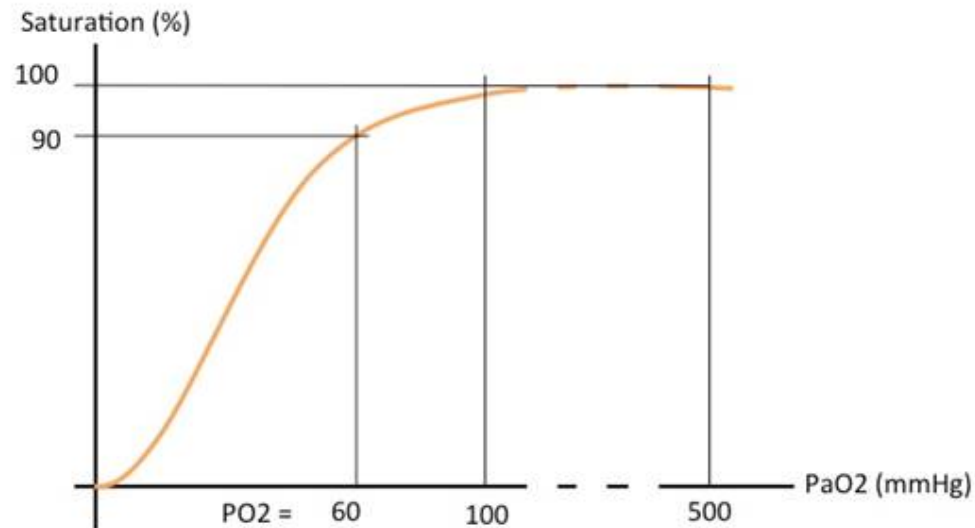
Figure 5. Évolution de la pression motrice à VT constant.

La PM varie en fonction du niveau de PEP appliqué, à volume courant constant. A. PEP insuffisante : il se forme des atélectasies ; il faut appliquer une pression importante pour ouvrir les alvéoles collabées afin de fournir le VT. B. PEP optimisée : la relation entre la pression et le volume est linéaire. C. PEP excessive : une partie du VT entraîne une surdistension alvéolaire.

FiO₂ per opératoire

➤ Après intubation :

FiO₂ = 40 %, puis **QSP SpO₂ ≥ 95 %**.



Éviter atélectasies de résorption, de dénitrogénéation

Lung-protective ventilation for the surgical patient: International expert panel-based consensus recommendations

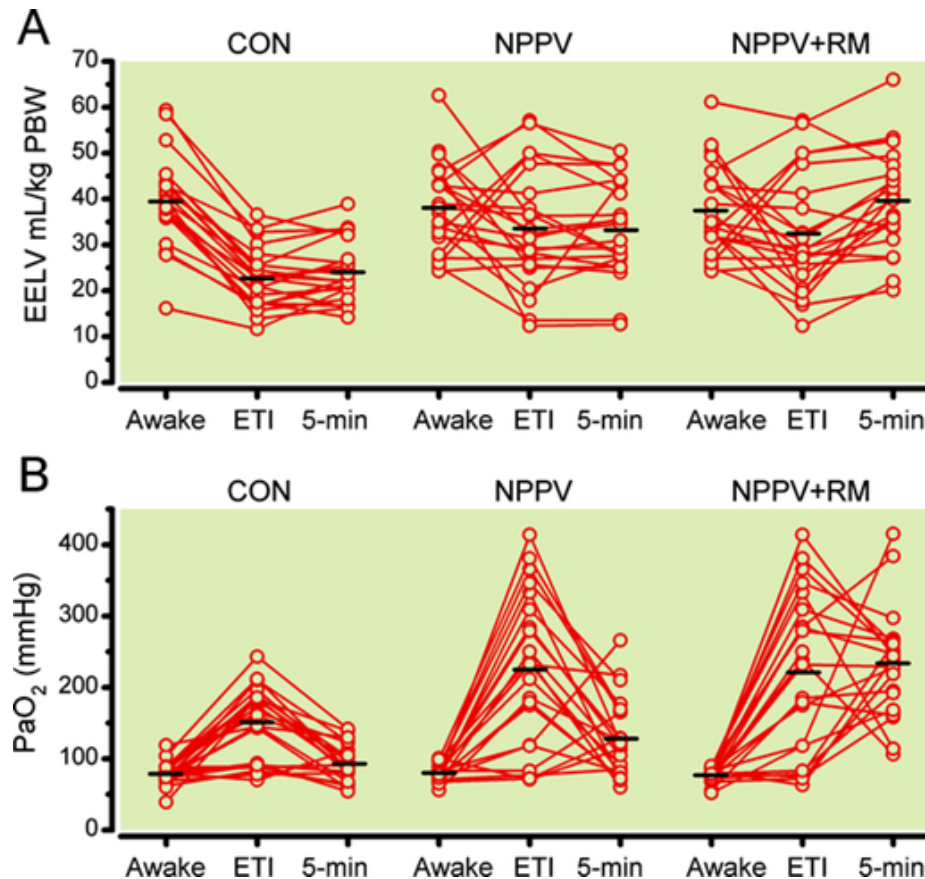
Table 1 Recommendations and statements concerning ventilation management during anesthesia induction

Question	Statement/Recommendation	Consensus	Quality of evidence	Strength of recommendation
2.2	The ventilator should initially be set to deliver VT \leq 6-8 ml/kg PBW and PEEP=5 cmH ₂ O	86%	Moderate	Strong
2.3	PEEP should be individualized to the patient in order to avoid increases in driving pressure (P _{plat} -PEEP) whilst maintaining a low VT	100%	Low	Strong
3.3	After intubation, FIO ₂ should be set to 0.4. Thereafter, use the lowest possible FIO ₂ to achieve SpO ₂ \geq 94%	100%	Very low	Weak
3.4	No specific mode of controlled mechanical ventilation is recommended.	100%	Very low	Statement

Manœuvre de recrutement

Noninvasive Ventilation and Alveolar Recruitment Maneuver Improve Respiratory Function during and after Intubation of Morbidly Obese Patients: A Randomized Controlled Study

Futier E et al. *Anesthesiology*, 2011



➤ En **VS-PEP**

➤ PEP augmentée jusqu'à **30** ou **40 cmH₂O** si **obésité** pendant **30 sec**

1. Après l'intubation
2. /30min
3. A chaque déconnexion du circuit
4. A l'insufflation d'un pneumopéritoine
5. Avant de réveiller

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Table 3 Recommendations and statements concerning recruitment maneuvers

Question	Statement/Recommendation	Consensus	Quality of evidence	Strength of recommendation
5.2	The bag-squeezing ARM should be avoided in favour of a ventilator-driven ARM	100%	Very low	Weak
5.3	ARMs should be performed using the lowest [†] effective Pplat (30-40 cmH ₂ O in non-obese; 40-50 cmH ₂ O in obese) and shortest effective time or fewest number of breaths	100%	Low	Weak
5.4	Continuous hemodynamic and oxygen saturation monitoring is recommended before and during an ARM	100%	High	strong

Réveil

1. Aspiration trachéale si besoin
2. MRA
3. Extubation :
 - proclive
 - **VS PEP** ou **VS AI + PEP**
 - FiO_2 identique à celle en peropérateur.

Transfert salle/SSPI

- assis
- oxygénothérapie au masque **QSP SpO2 ≥ 95 %**
- si sortie intubé : sur ventilateur de transport

SSPI

- Oxygène si besoin **QSP SpO₂ ≥ 95 %**
- VNI :
 - Curative si IRA hypercapnique
 - Prophylactique **systematique et d'emblée** chez **BPCO, SAOS** appareillé

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Table 3 Recommendations and statements concerning ventilation management during anesthesia emergence

Question	Statement/Recommendation	Consensus	Quality of evidence	Strength of recommendation
6.5	Administration of postoperative supplemental oxygen is recommended when room air SpO ₂ decreases below 94% Avoid routine application of supplemental oxygen without investigating and treating the underlying cause	100%	Very low	Weak

Références

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