L'Association Tunisienne de Réanimation

La Société Tunisienne d'Anesthésie d'Analgésie et de Réanimation

3ème JOURNÉE COMMUNE de RÉANIMATION

Le 30 Juin 2018, à L'Hôtel Le Royal Hammamet

Weaning from mechanical ventilation in obese patient

Samir JABER

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FRANCE

OBJECTIVES: Weaning and extubation

1. Background : specifities in obese patient

2. Weaning : spontaneous breathing trial ?

3. Extubation

4. Post-extubation period

5. Take home messages

No specificities about obese patient

Weaning from mechanical ventilation

Avril 2005
Budapest
(Hongrie)

J-M. Boles*, J. Bion#, A. Connors¶, M. Herridge+, B. Marsh§, C. Melotƒ, R. Pearl**, H. Silverman##, M. Stanchina¶¶, A. Vieillard-Baron++, T. Welte§§

Statement of the Sixth International Consensus Conference on Intensive Care Medicine

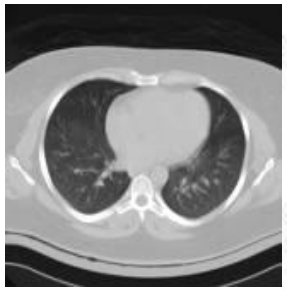
Organised jointly by the European Respiratory Society (ERS), the American Thoracic Society (ATS), the European Society of Intensive Care Medicine (ESICM), the Society of Critical Care Medicine (SCCM) and the Société de Réanimation de Langue Française (SRLF), and approved by the ERS Executive Committee, February 2007

Eur Respir J 2007; 29: 1033–1056

Effets of obesity on lung volumes and oxygeation…

LUNG VOLUMES AND OXYGENATION

OBESITY



Atelectasis

HYPOXEMIA

Volume Pulmonaire (CRF…)

Oxygénation (PaO2/PAO2)

Non aerated tissue (+ 20%)

Poorly aerated tissue (+ 70%)

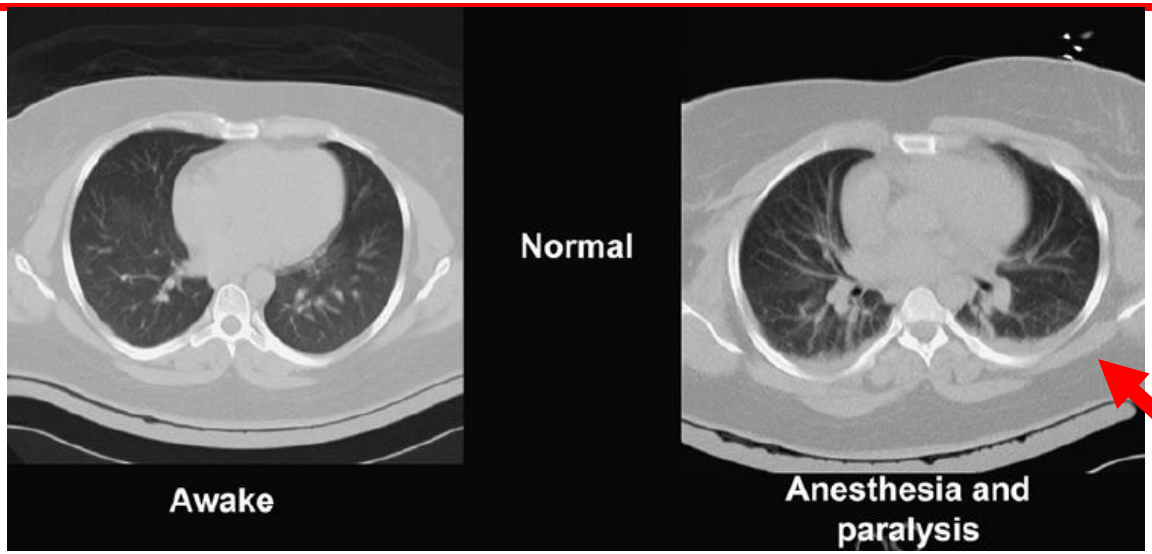
0 10 20 30 40 50 60 70

BMI (kg · m^{-2})

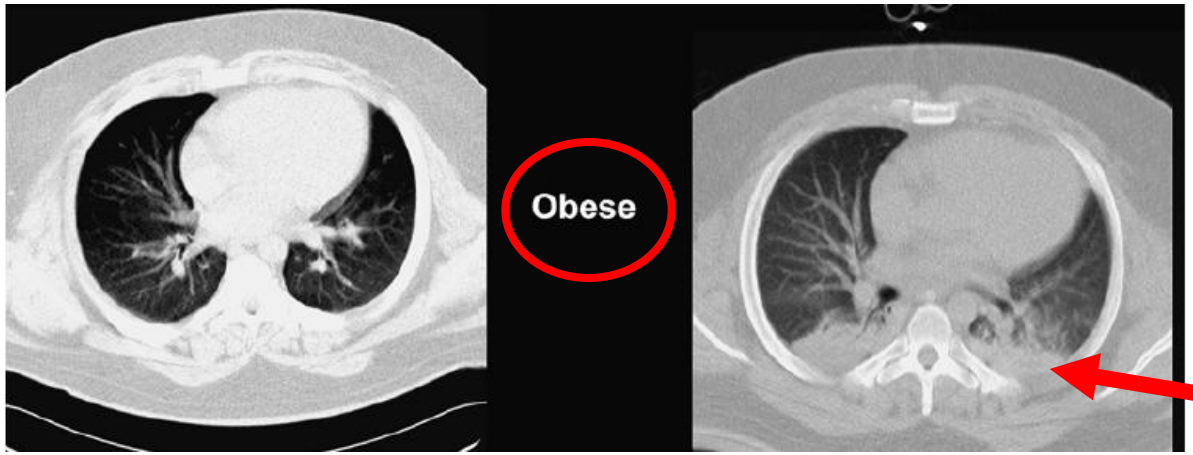
Pelosi Anesth Analg 1998

Effects of anesthesia on lung morphology in obese patients

PelosiP, Gregoretti C. Best Pract Res Clin Anaesthesiol. 2010 Jun;24(2):211-25



Atelectasis



Atelectasis++

↑ airways obstruction in SAOS – obese patients

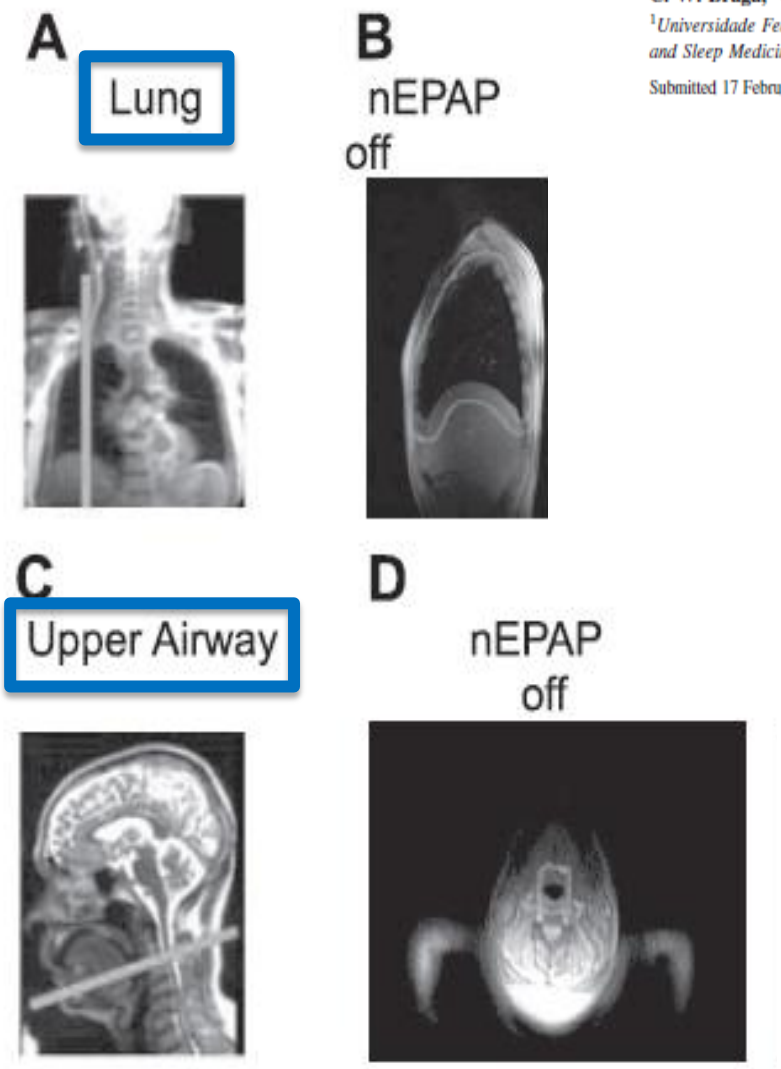
Impact of CPAP ?

J Appl Physiol 111: 1400–1409, 2011.
First published July 28, 2011; doi:10.1152/japplphysiol.00218.2011.

Changes in lung volume and upper airway using MRI during application of nasal expiratory positive airway pressure in patients with sleep-disordered breathing

C. W. Braga,[1] Q. Chen,[2] O. E. Burschtin,[2] D. M. Rapoport,[2] and I. Ayappa[2]
[1]*Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brasil; and* [2]*Division of Pulmonary, Critical Care, and Sleep Medicine, New York University School of Medicine, New York, New York*

Submitted 17 February 2011; accepted in final form 25 July 2011



OBJECTIVES: Weaning and extubation

1. Background : specifities in obese patient

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Ventilation : SBT ?

Mahul *et al. Critical Care* (2016) 20:346
DOI 10.1186/s13054-016-1457-4

Critical Care

RESEARCH Open Access

Spontaneous breathing trial and post-extubation work of breathing in morbidly obese critically ill patients

Martin Mahul[1†], Boris Jung[1,4†], Fabrice Galia[1], Nicolas Molinari[2], Audrey de Jong[1], Yannaël Coisel[1,4], Rosanna Vaschetto[3], Stefan Matecki[4], Gérald Chanques[1,4], Laurent Brochard[5,6] and Samir Jaber[1,4*]

How performed Spontaneous Breathing Trial in obese patients ?

Conclusions: In obese patients, inspiratory effort measured during weaning tests with either a T-piece or a PSV 0 and PEEP 0 was not different to post-extubation inspiratory effort. In contrast, weaning tests with positive pressure overestimated post-extubation inspiratory effort.

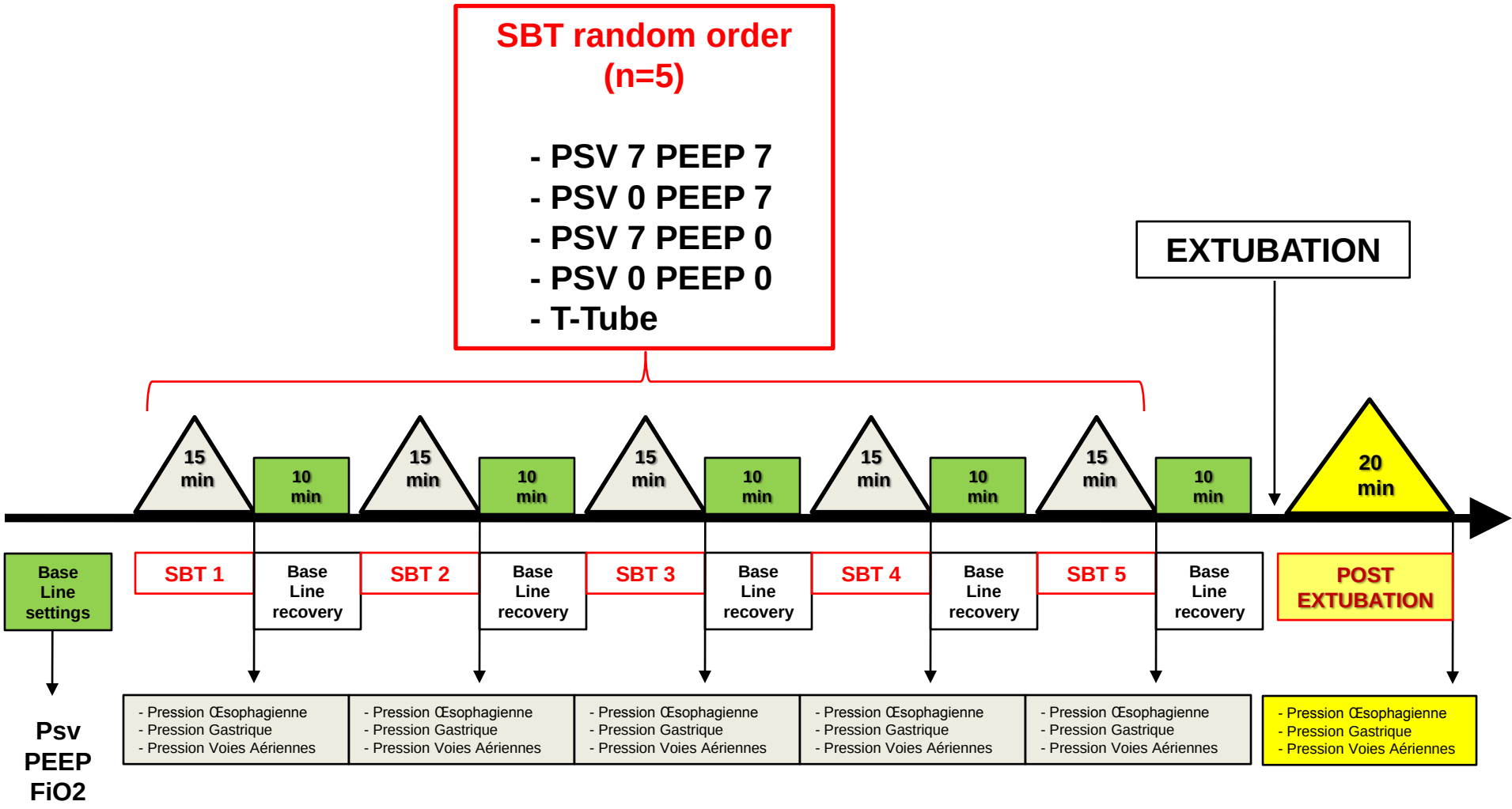
Crit Care 2016 Dec

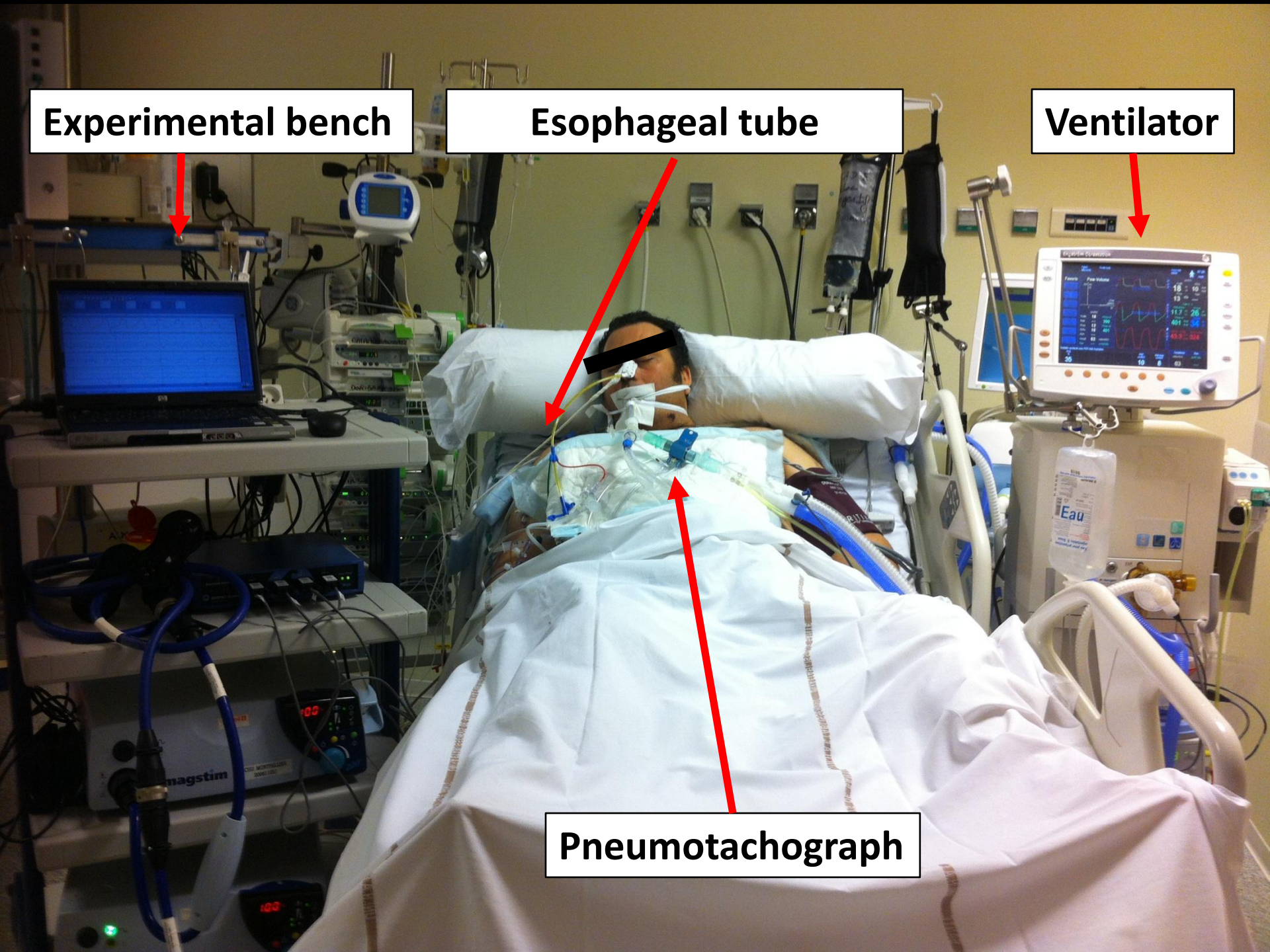
Aim of the study

To determine which (SBT) test most accurately approximates the inspiratory effort after extubation in morbidly obese patients (BMI ≥ 35 kg/m²)

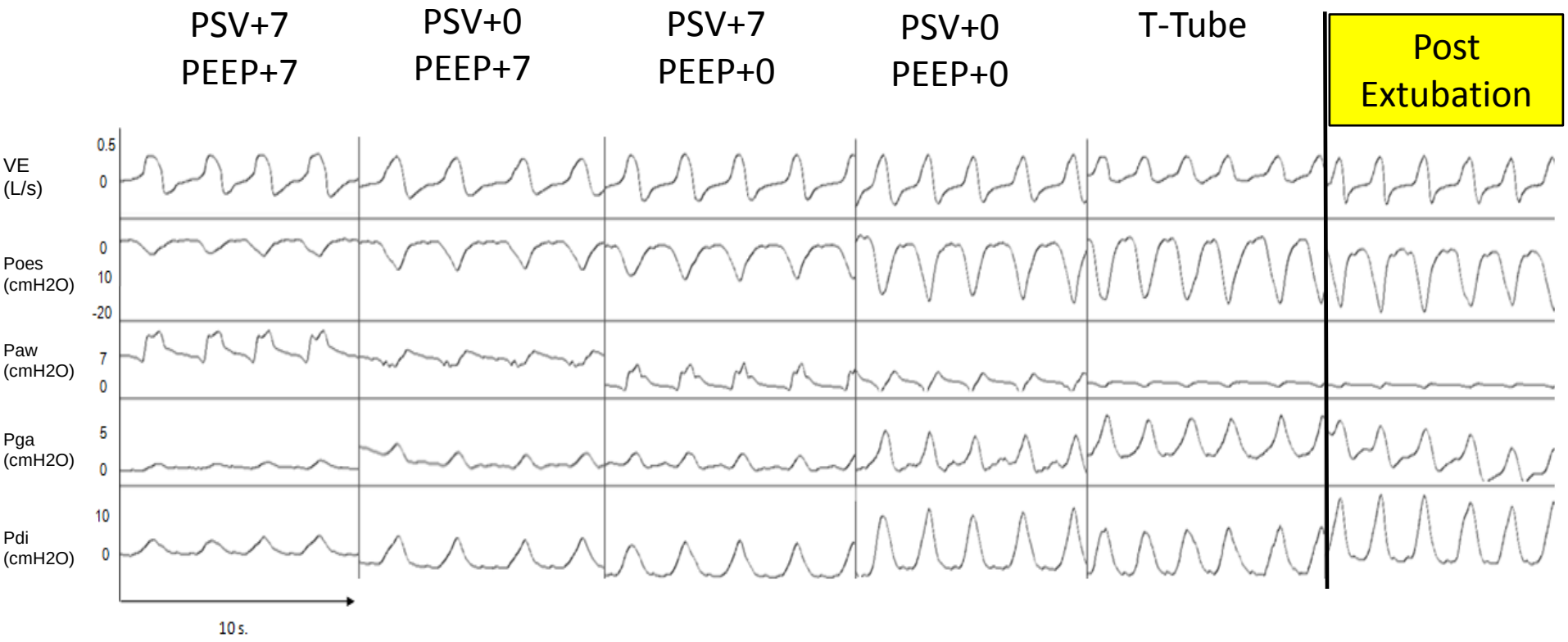
Mahul, Jung, …Brochard, Jaber, Crit Care 2016

Study design

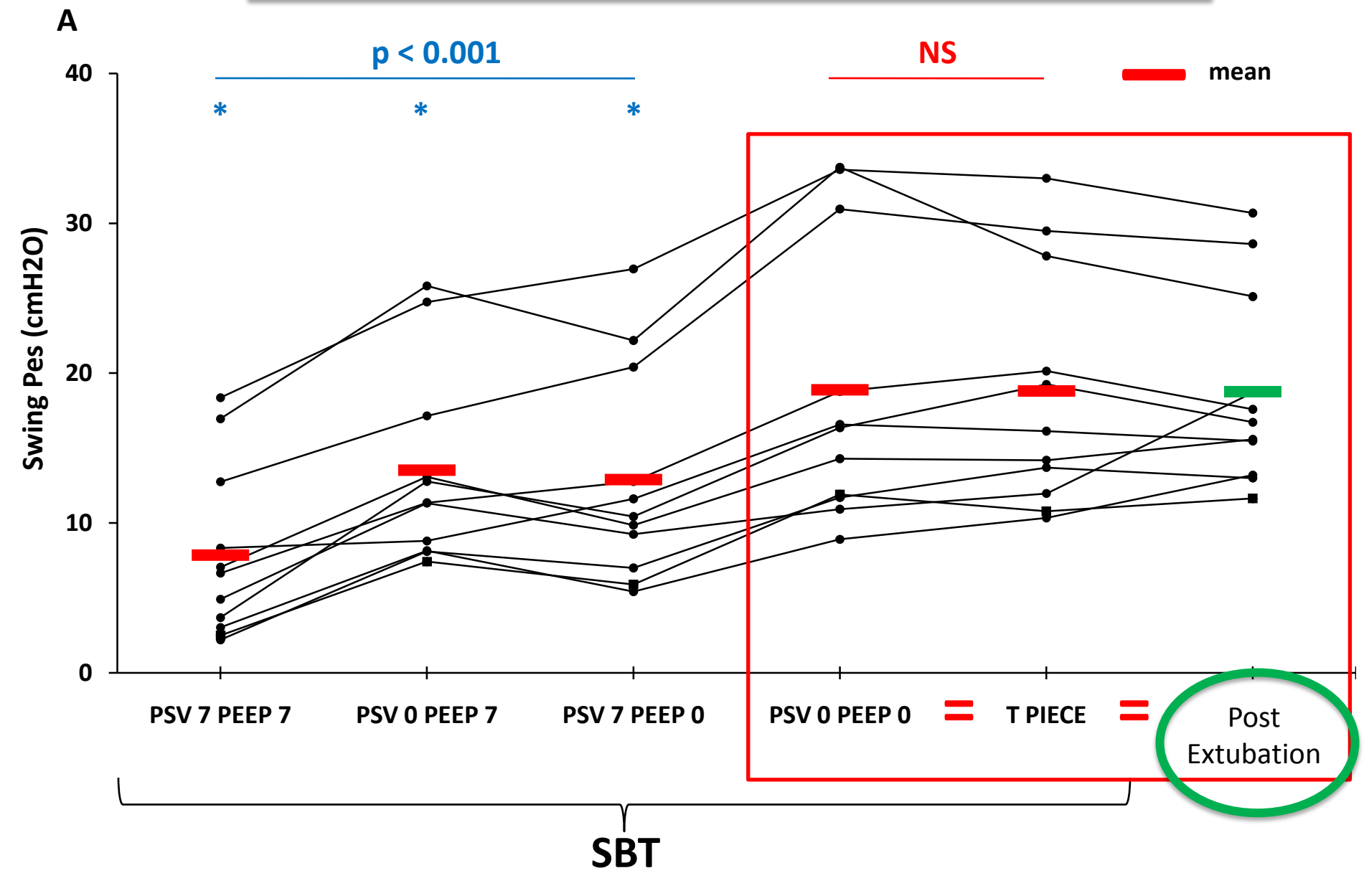



Experimental bench
Esophageal tube
Ventilator
Pneumotachograph
magstim
Eau

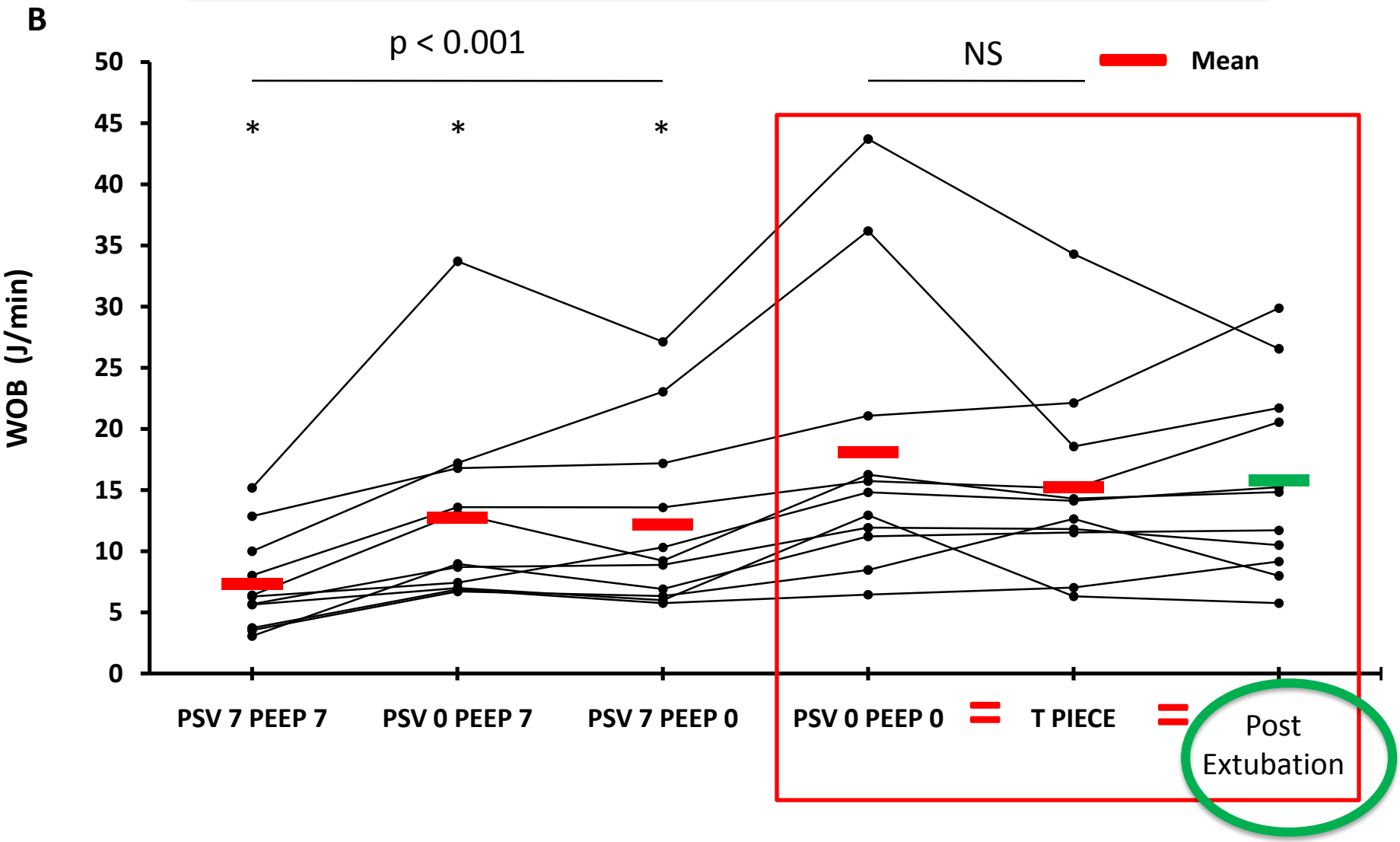
Inspiratory effort



Esophageal pressure Swing

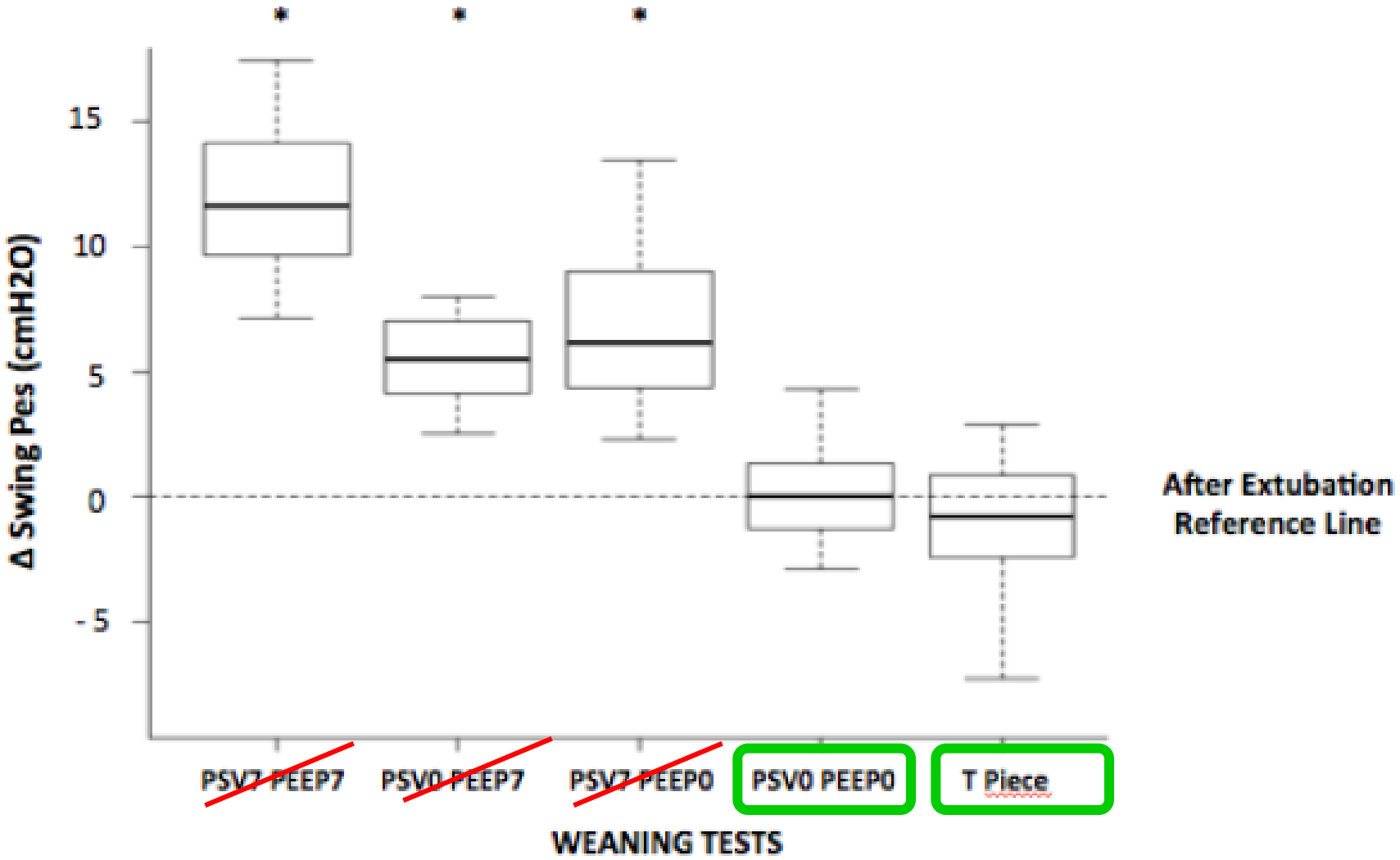


Work Of Breathing (Joules/ minutes)



Obese SBT-extubation ?

Crit Care 2016 dec



Conclusions: In obese patients, inspiratory effort measured during weaning tests with either a T-piece or a PSV 0 and PEEP 0 was not different to post-extubation inspiratory effort. In contrast, weaning tests with positive pressure overestimated post-extubation inspiratory effort.

In clinical practice ?

	OBESE	NON OBESE
T-Tube	YES	YES

OBJECTIVES: Weaning and extubation

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4. Post-extubation period

5. Take home messages

DIFFICULT MASK VENTILATION AND INTUBATION

Prediction of Difficult Tracheal Intubation

Time for a Paradigm Change

Olivier Langeron, M.D., Ph.D.,* Philippe Cuvillon, M.D.,† Cristina Ibanez-Esteve, M.D.,‡
François Lenfant, M.D., Ph.D.,§ Bruno Riou, M.D., Ph.D.,‖ Yannick Le Manach, M.D., Ph.D.#

Anesthesiology 2012;117:1223-33

■ CLINICAL INVESTIGATIONS

Anesthesiology
2000; 92:1229-36

Prediction of Difficult Mask Ventilation

Olivier Langeron, M.D., Eva Masso, M.D.,† Catherine Huraux, M.D.,‡ Michel Guggiari, M.D.,‡
André Bianchi, M.D.,‡ Pierre Coriat, M.D.,§ Bruno Riou, M.D., Ph.D.‖*

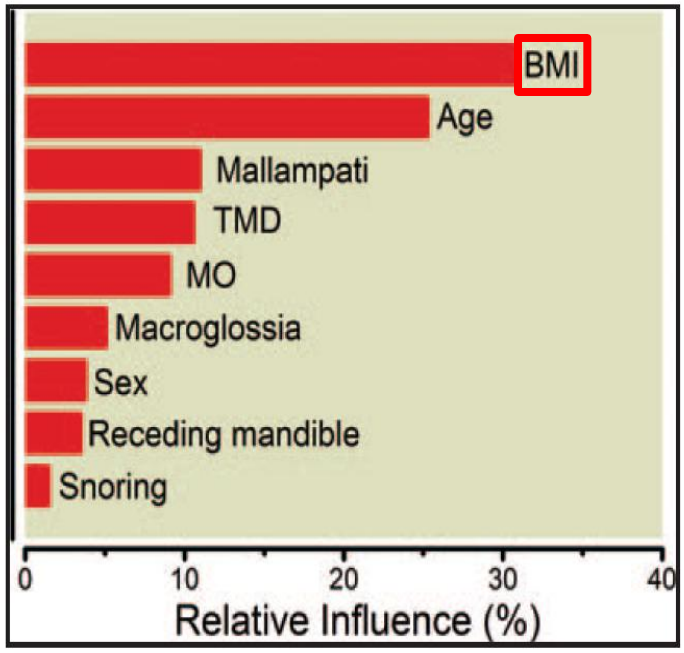


Fig. 4. Illustration of the relative influence of each variable (*i.e.*, the reduction of squared error attributable to each variable) used in the $SCORE_{Computer}$. BMI = body mass index; MO = mouth opening; TMD = thyromental distance.

Obesity =
Risk factor for
Difficult mask ventilation and intubation

Table 3. Identification of Risk Factors for Difficult Mask Ventilation with Multivariate Analysis (n = 1,502)

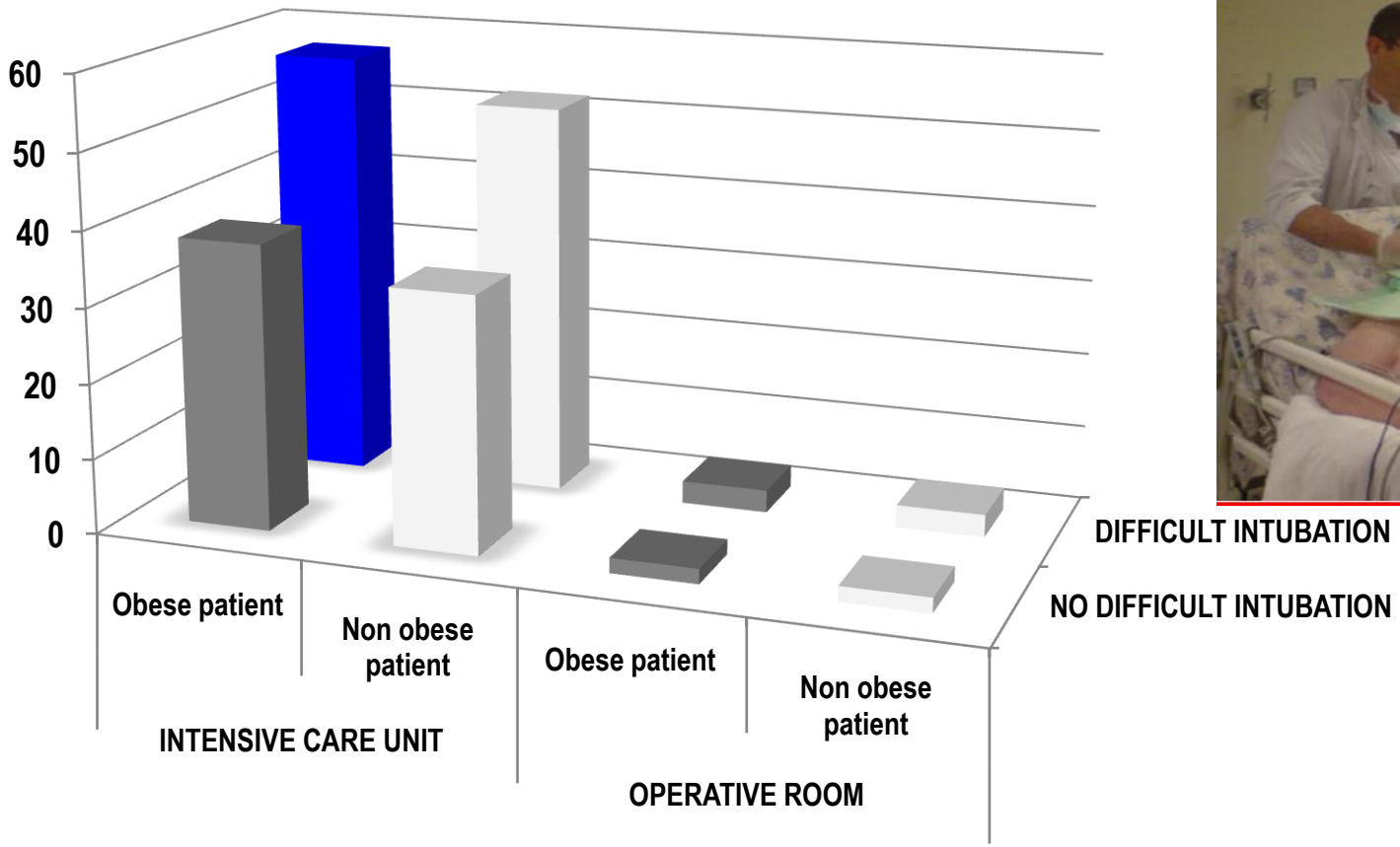
Variables	Odds Ratio (95% CI)	*P* Value
Presence of beard	3.18 (1.39–7.27)	0.006
Body mass index > 26 kg/m^2	2.75 (1.64–4.62)	<0.001
Lack of teeth	2.28 (1.26–4.10)	0.006
Age > 55 yr	2.26 (1.34–3.81)	0.002
History of snoring	1.84 (1.09–3.10)	0.02

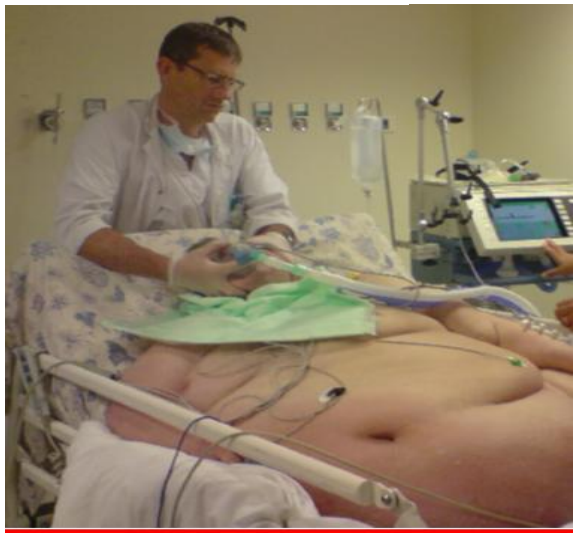
CI = confidence interval.

Difficult intubation in obese patients: incidence, risk factors, and complications in the operating theatre and in intensive care units

BJA
2015

A. De Jong[1], N. Molinari[2], Y. Pouzeratte[1], D. Verzilli[1], G. Chanques[1], B. Jung[1,3], E. Futier[1], P.-F. Perrigault[6], P. Colson[4], X. Capdevila[5] and S. Jaber[1,3*]





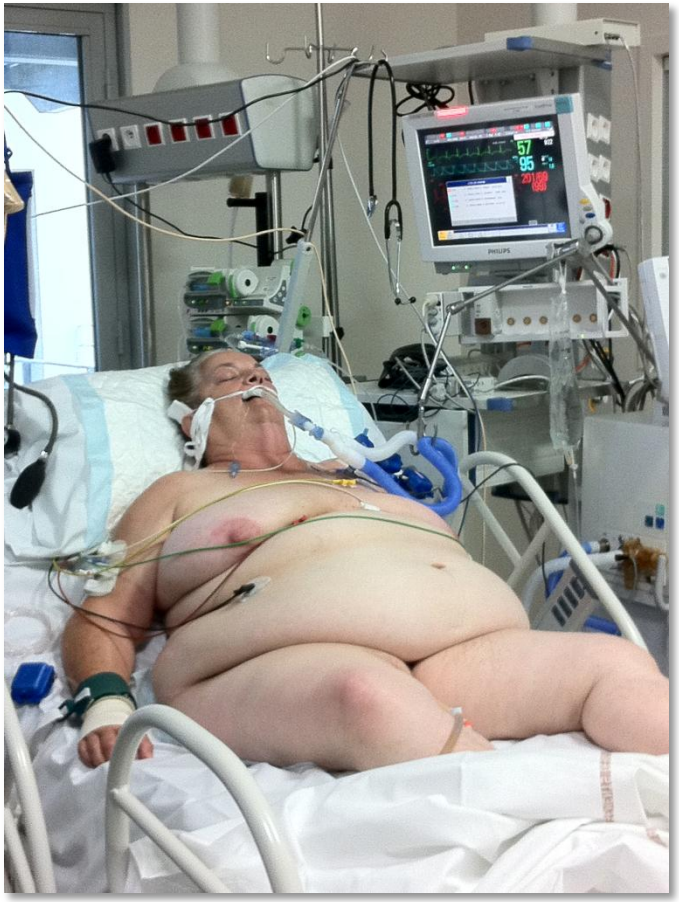
Positioning at 30-45º promotes better respiratoty function (avoid 0º or 90º)

Upright positioning of the patient is strongly recommended so that the excess body tissue on the chest and against the diaphragm is displaced caudad, which will reduce the WOB and increase the FRC.

- ***Burns et al.*** *"Effect of body position on spontaneous respiratory effort and tidal volume in patients with obesity, adominal distension and ascites". Am J Crit Care 1994;3:102-106*

- ***Neill et al."****Effects of sleep posture on upper airway stability in patientswith obstructive sleep apnea". Am J Respir Crit Care Med 1997;155:199-204*

Obese – position



Effects of the Beach Chair Position, Positive End-expiratory Pressure, and Pneumoperitoneum on Respiratory Function in Morbidly Obese Patients during Anesthesia and Paralysis

Franco Valenza, M.D., Federica Vagginelli, M.D.,† Alberto Tiby, M.D.,† Silvia Francesconi, M.D.,† Giulio Ronzoni, M.D.,† Massimiliano Guglielmi, M.D.,† Marco Zappa, M.D.,‡ Ezio Lattuada, M.D.,‡ Luciano Gattinoni, M.D., F.R.C.P.§*

Beach chair position improves Respiratory fonction

Alveolar collapse during airways aspiration

Courtesy Dr. Strang

EXTUBATION PROCEDURE (tube remove) at the end of a maximal inspiration (auto-recruitment)

Tohoku J. Exp. Med., 2005, **207**, 125-132

High Body Mass Index and Long Duration of Intubation Increase Post-Extubation Stridor in Patients with Mechanical Ventilation

TABLE 3. *Multiple logistic regression ana*

BMI > 26.5 (kg/m^2)
Duration of MV > 5 days
Cuff-leak volume < 57.2%

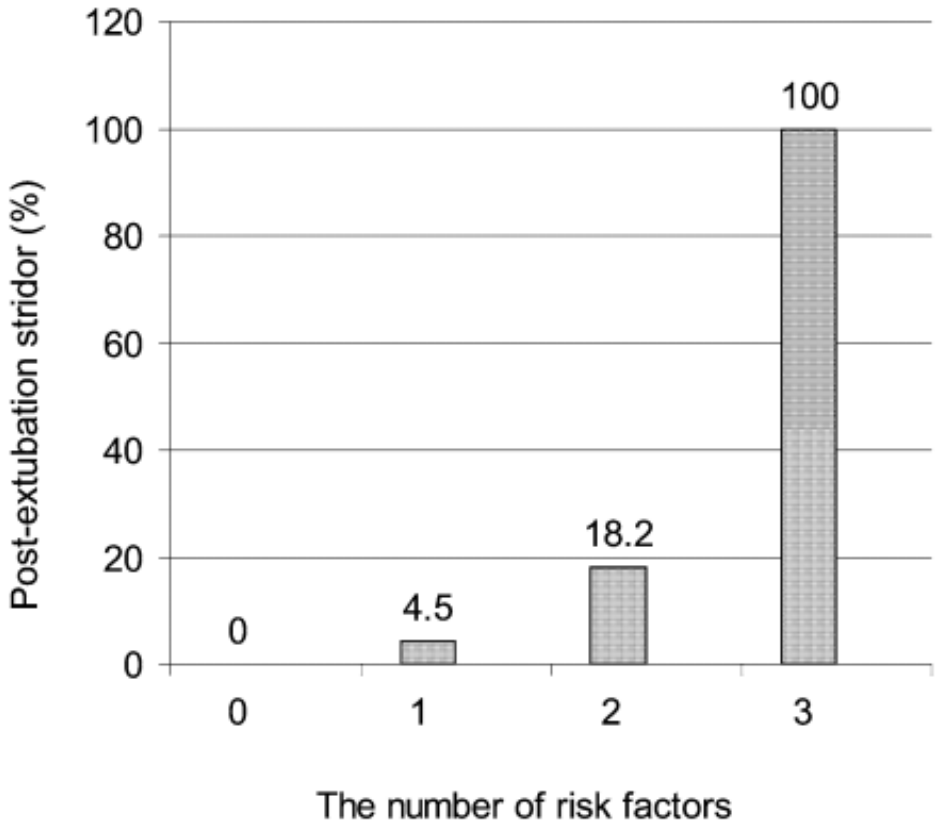


Fig. 1. The frequency of PES according to the number of risk factors.

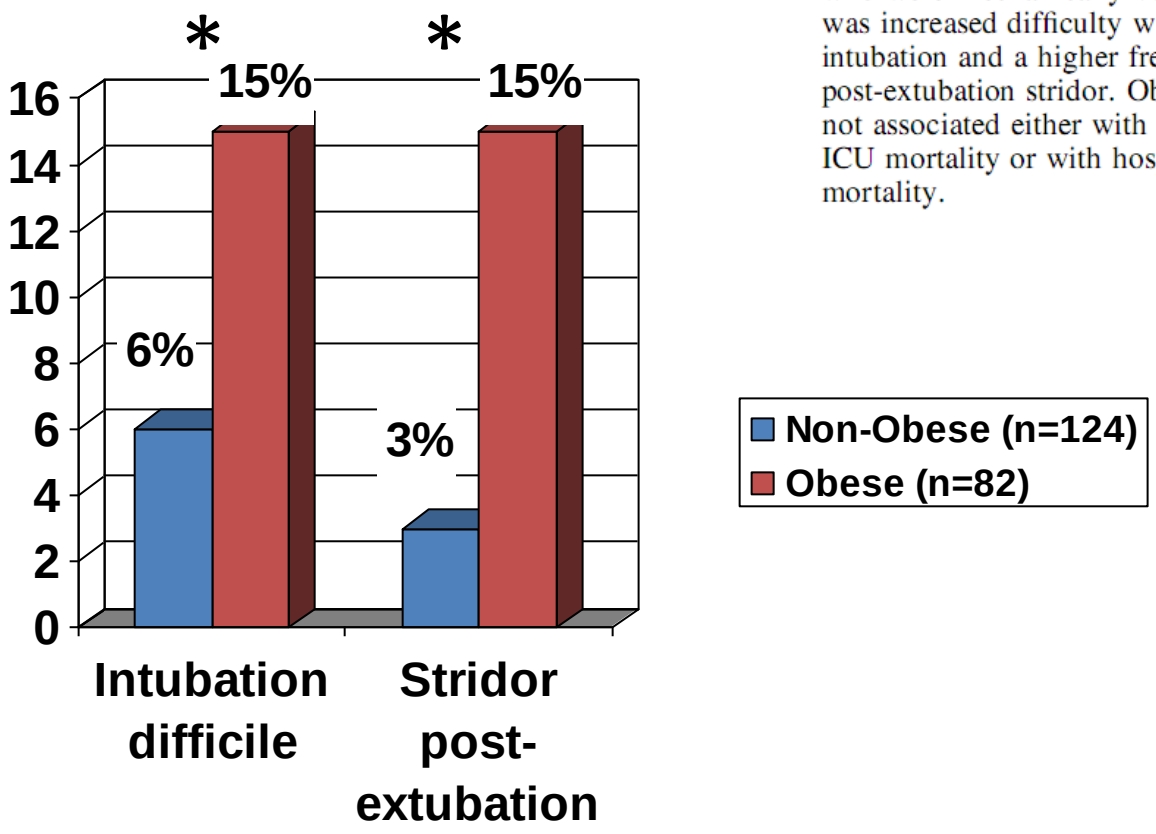
Intensive Care Med (2008) 34:1991–1998
DOI 10.1007/s00134-008-1245-y

ORIGINAL

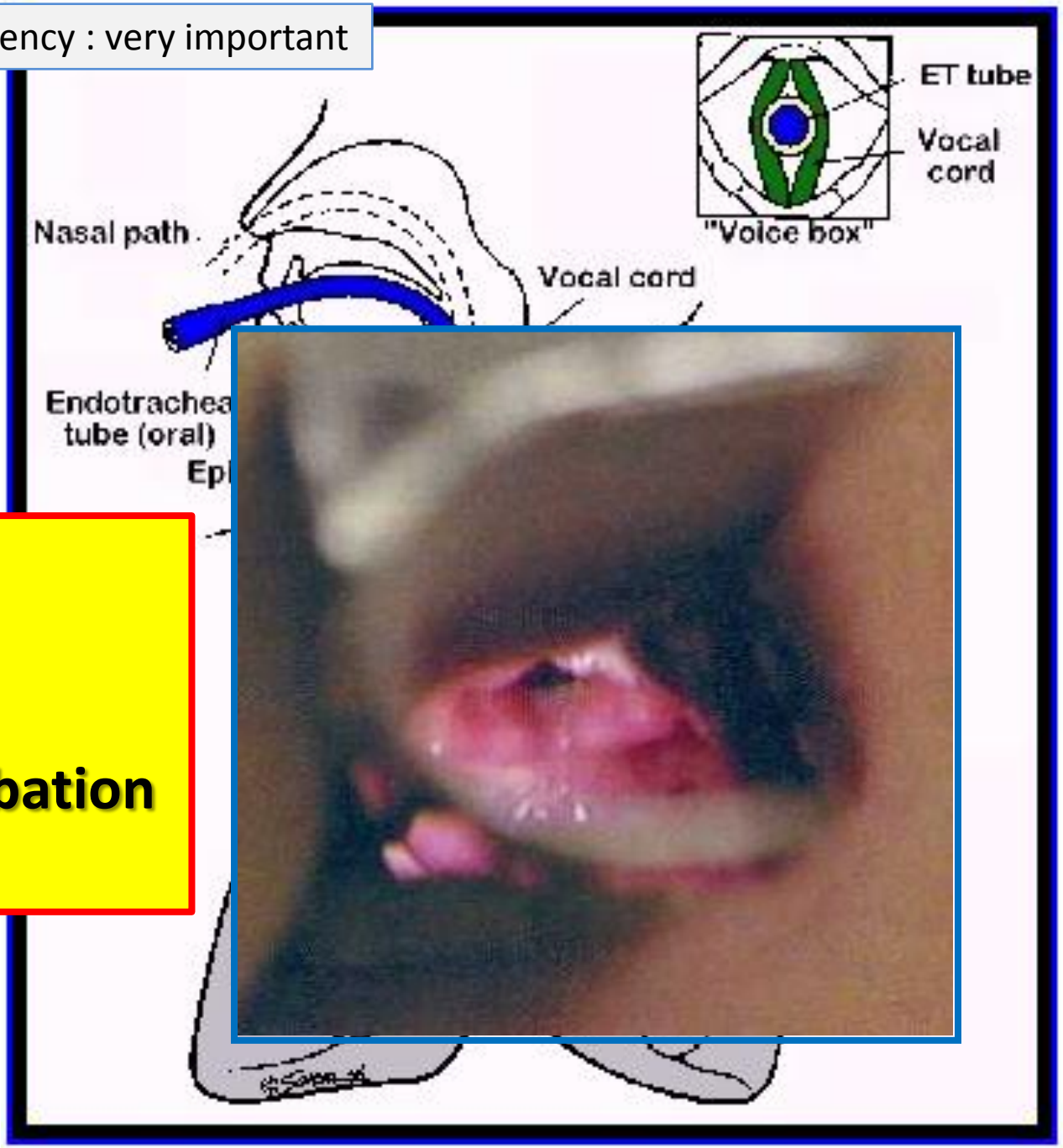
Jean-Pierre Frat
Valérie Gissot
Stéphanie Ragot
Arnaud Desachy
Isabelle Runge
Christine Lebert
René Robert
for the Association des Réanimateurs du Centre-Ouest (ARCO) study group

Impact of obesity in mechanically ventilated patients: a prospective study

obesity. *Conclusion:* The only difference in morbidity of obese patients who were mechanically ventilated was increased difficulty with tracheal intubation and a higher frequency of post-extubation stridor. Obesity was not associated either with increased ICU mortality or with hospital mortality.

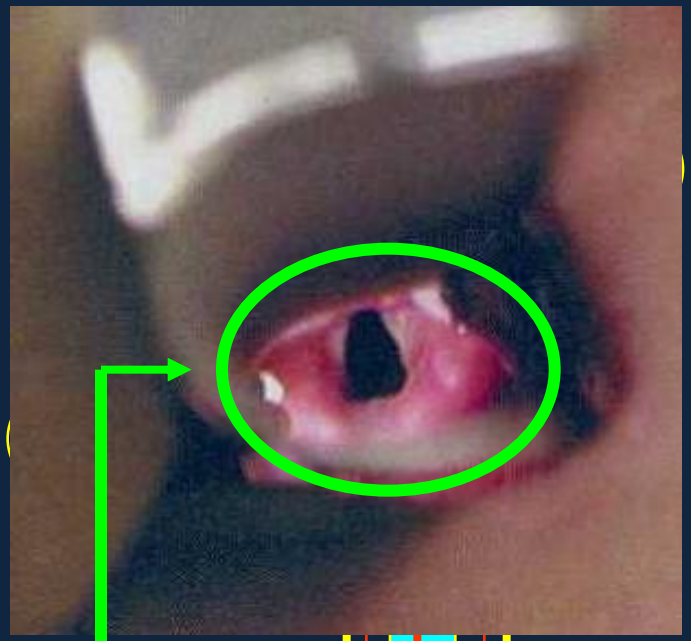


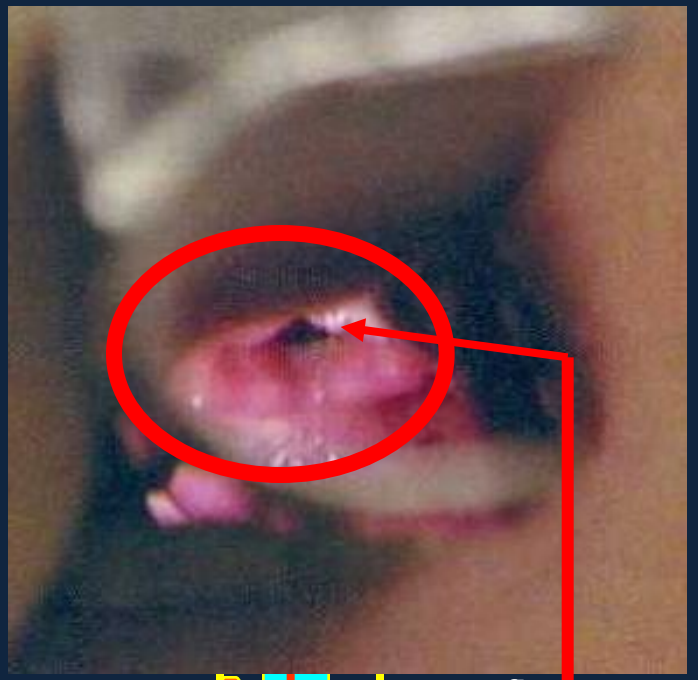
maintain airway patency : very important



- Laryngeal edema

- Post-extubation stridor





Leaks around
the tube when
Cuff is deflated

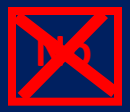
Inflammation,
Edema…

LEAKS + + +

LEAKS = 0

Conclusion = When to wean and extubate ?

1. **Stop** sedation+**Stop** control ventilation
(switch pressure spontaneous mode ASAP)

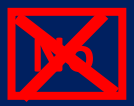


OK

2. Spontaneous Breathing Trial (SBT)

OK

3. Fluid balance (avoid excess: depletion ?)



OK

4. Normal mental status

OK

5. Respiratory secretions

OK

6. Adequate cough

OK

7. Upper airway obstruction
(cuff-leak in selected patients)

OK

YES, you can extubate !

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1. Background : specifities in obese patient

2. Weaning : spontaneous breathing trial ?

3. Extubation

4. Post-extubation period

5. Take home messages

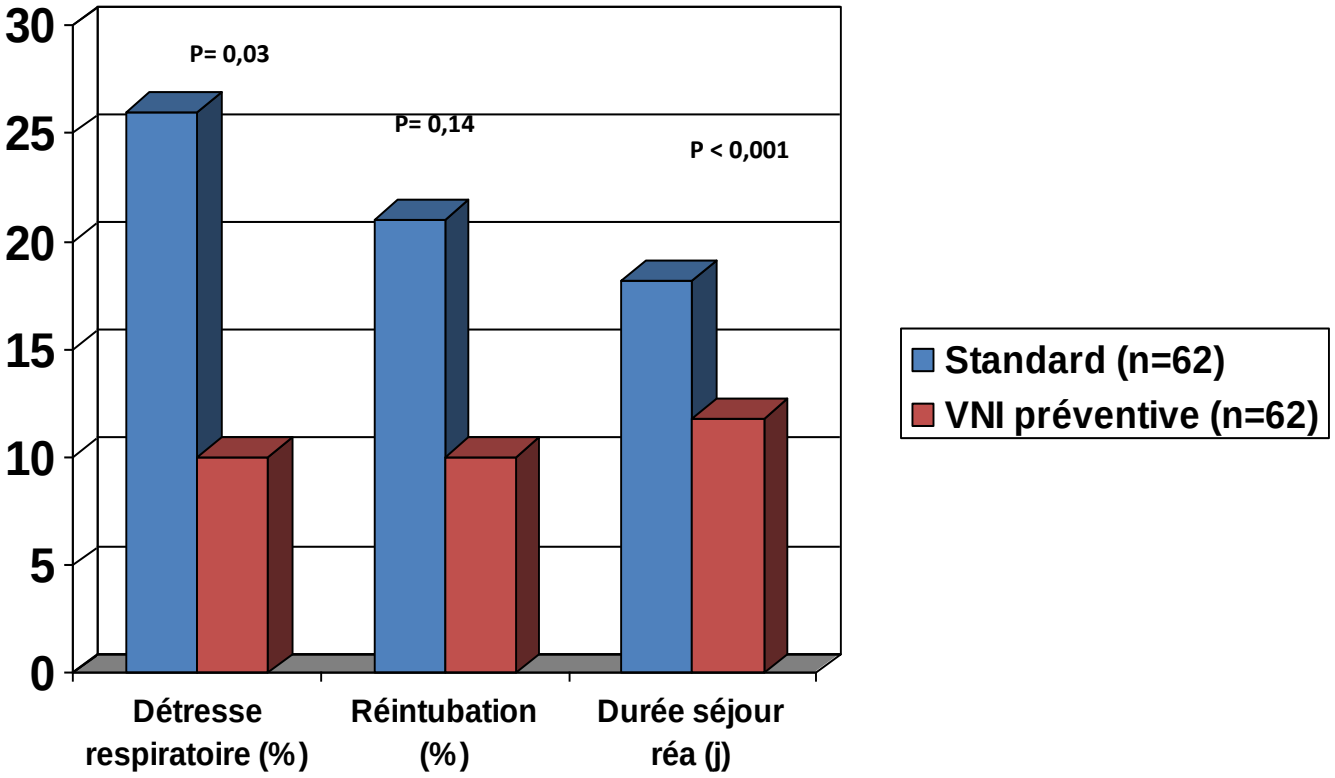
NIV in Upright position

Eur Respir J 2006; 28: 588–595
DOI: 10.1183/09031936.06.00150705

Noninvasive ventilation for prevention of post-extubation respiratory failure in obese patients

A.A. El Solh*, A. Aquilina*, L. Pineda*, V. Dhanvantri*, B. Grant*,# and P. Bouquin*

NIV Curative



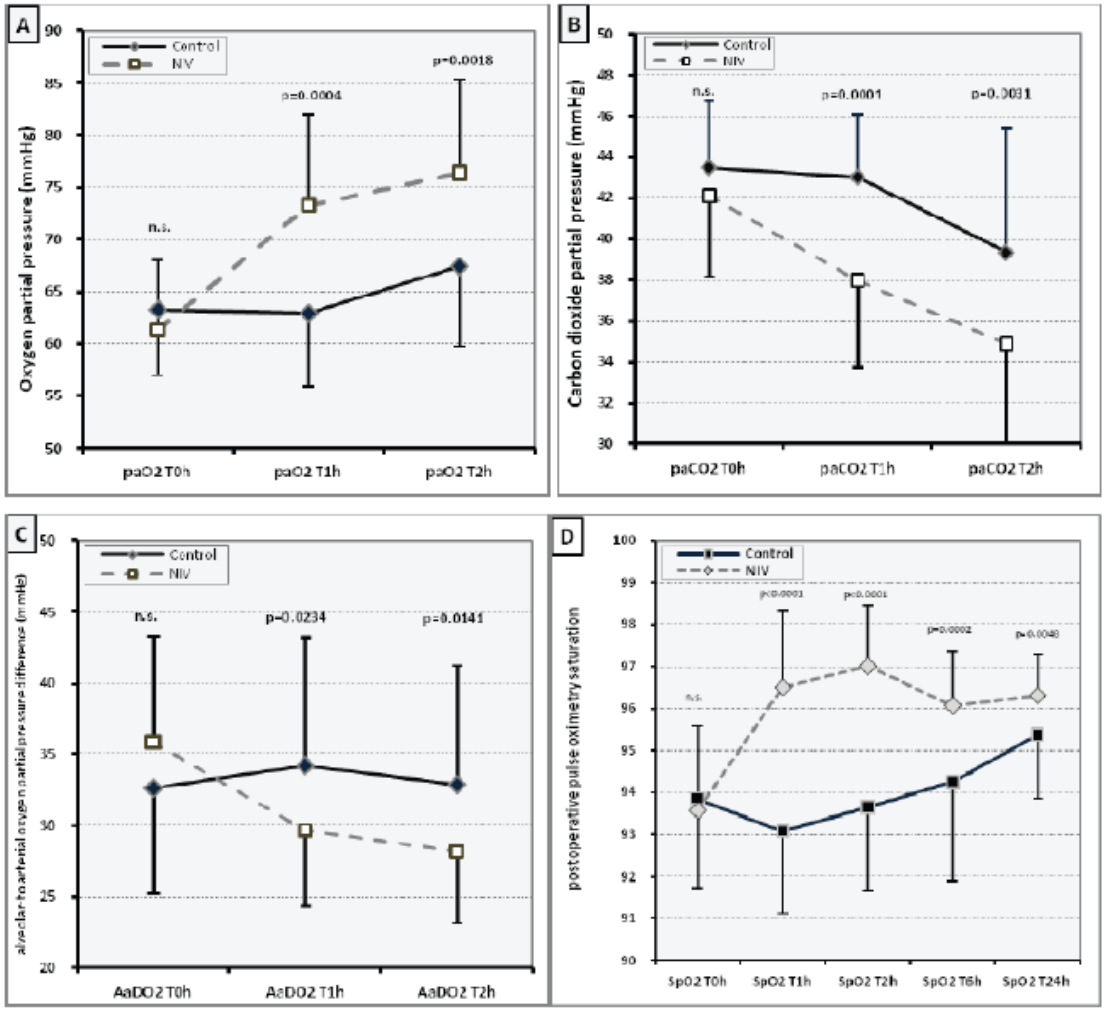
Short term non-invasive ventilation post-surgery improves arterial blood-gases in obese subjects compared to supplemental oxygen delivery - a randomized controlled trial

BMC Anesthesiology 2011, 11:10

Martin Zoremba[1*], Gerald Kalmus[1], Domenique Begemann[1], Leopold Eberhart[1], Norbert Zoremba[2], Hinnerk Wulf[1] and Frank Dette[1]

- Oxygenation improvement

- CO2 decrease



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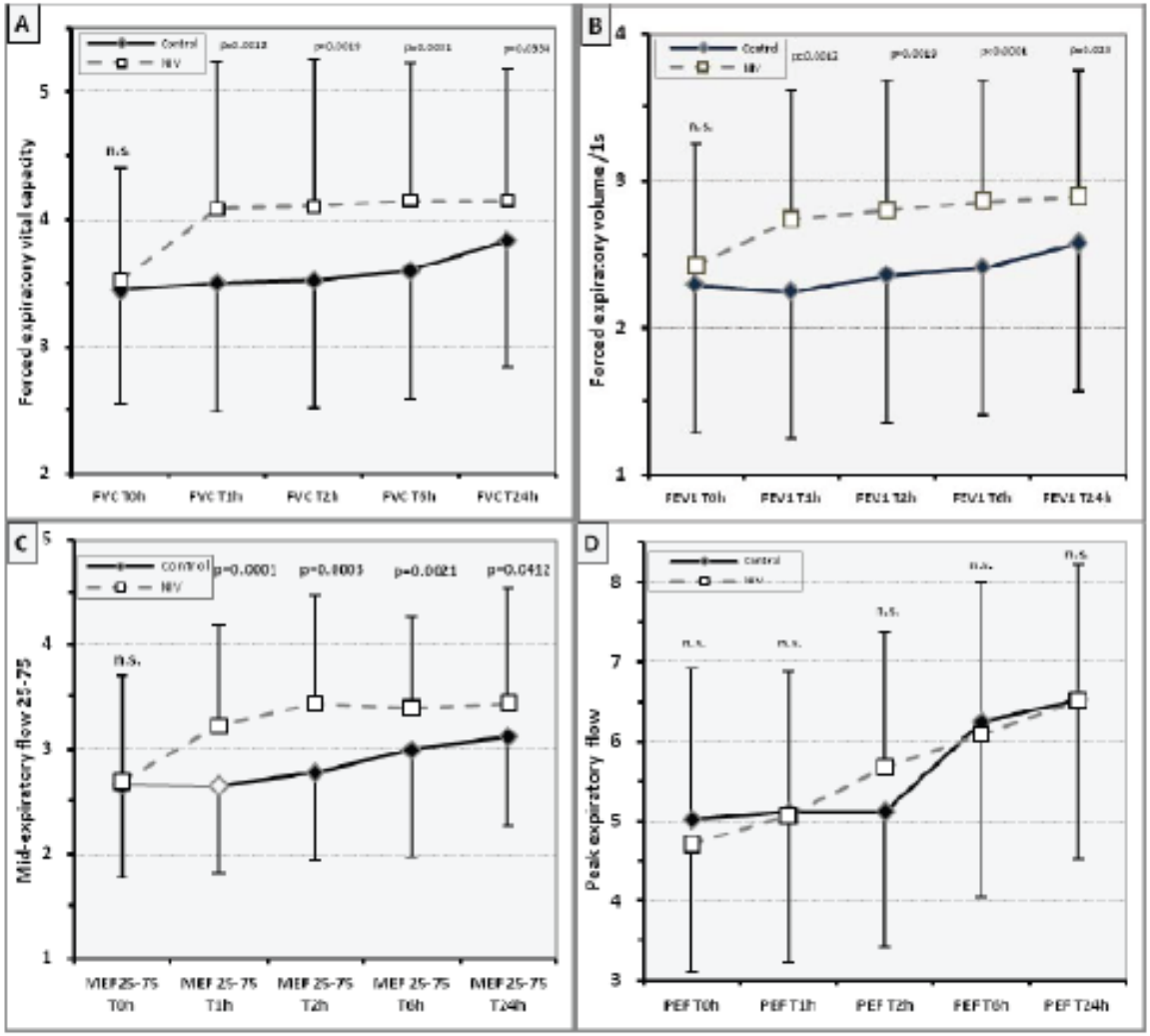
Martin Zoremba[1*], Gerald Kalmus[1], Domenique Begemann[1], Leopold Eberhart[1], Norbert Zoremba[2], Hinnerk Wulf[1] and Frank Dette[1]

Pulmonary function improvement/ revovery



Noninvasive ventilation in the immediate postoperative of gastrojejunal derivation with Roux-en-Y gastric bypass

Kivânia C. Pessoa[1], Gutemberg F. Araújo[1], Alcimar N. Pinheiro[1], Maria R. S. Ramos[1], Sandra C. Maia[2]

Rev Bras Fisioter. 2010;14(4):290-5.

Variable	Group NIV (n=10)	Control Group (n=8)	p value
PaO_2 (mmHg) 1st PO	71.6±6.69	64.03±6.1	0.04
SaO_2 (%) 1st PO	95.5±1.6	93.4±1.8	0.02
VC (ml)	32.28±9.81	30.03±9.15	0.62
MEP (cmH_2O)	39.32±15.24	22.93±10.20	0.01
MIP (cmH_2O)	32.87±4.87	31.78±10.97	0.53
Loss of PaO_2 (%)	6.96±3.52	13.31±5.30	0.02


Eau

Take Home Messages

1. **Upright positioning (SBT , before and after extubation)**
2. **SBT= T-tube or PSV=0+PEEP=0 or CPAP= 7**
3. **Post-extubation : at risk for acute airway obstruction**
4. **CPAP-NIV post-extubation++**

Thanks for the attention