Ventilation de l'obèse: les 10 points clés

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FRANCE

OBJECTIVES. Ventilation in obese patient : 10 Tips

1. **Background** : what every physicians should know about obese patient
2. **Preoxygenation and intubation** procedures
3. **Ventilatory modes**
4. **Tidal volume**
5. **Pressures** : PEEP, Pplat, Driving Pressure (ΔP); Esophageal (Pes)
6. **Recruitment Maneuver**
7. **Position**
8. **Weaning** : spontaneous breathing trial (SBT) and Extubation
9. **Post-extubation period**: Ventilatory Support
10. **Take home messages**

OBESITE = PATHOLOGIE FREQUENTE

ARTICLE SÉLECTIONNÉ DANS LA MATINALE DU 24/10/2016 > Découvrir l'application

Santé : un Français sur deux est en surpoids

Le suivi de près de [illegible] personnes montre que l'obésité reste un problème majeur de santé publique, en particulier chez les plus pauvres.

LE MONDE | 25.10.2016 à 00h40 • Mis à jour le 25.10.2016 à 21h02 |

Par **Pierre Le Hir**

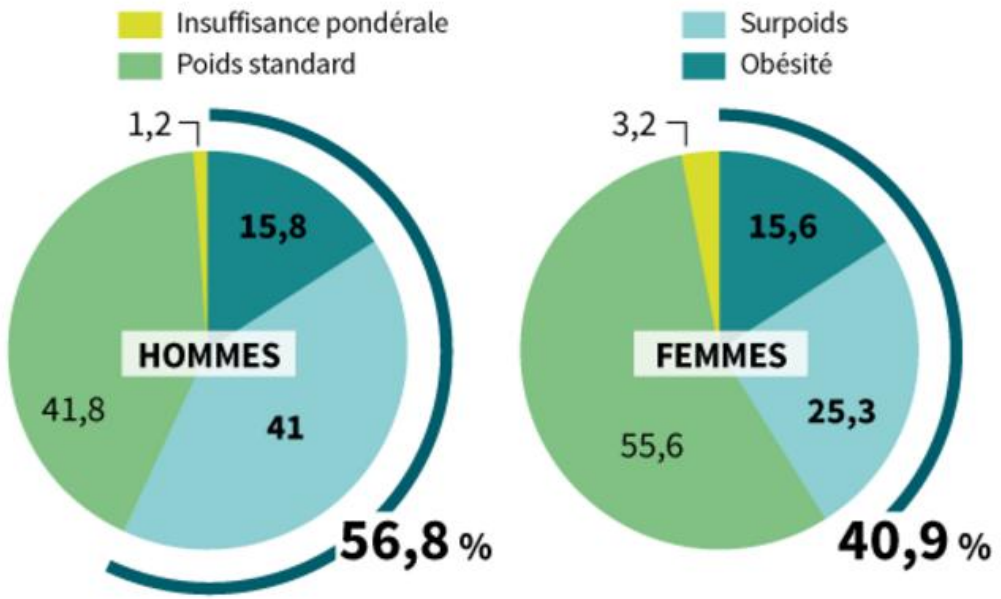
En France, la moitié de la population est obèse ou en surpoids selon une étude

il y a 5 heures | 29 | MIDI LIBRE

Le Monde.fr

Un Français sur deux concerné par un excès de poids

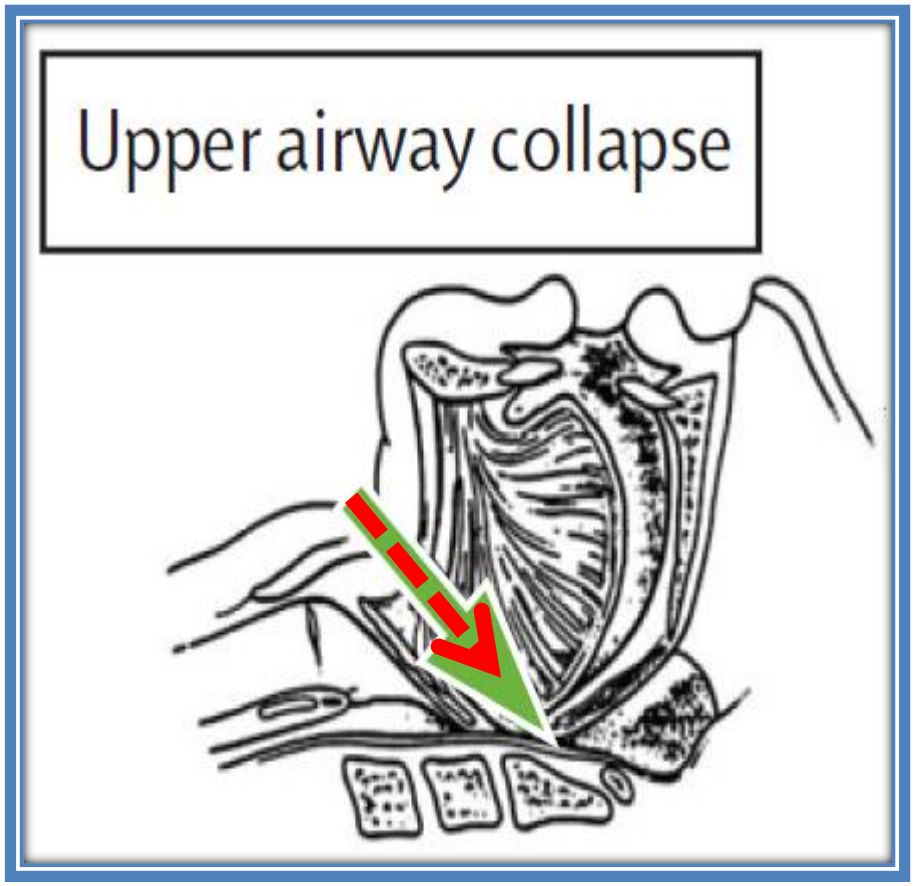
RÉPARTITION SUIVANT L'INDICE DE MASSE CORPORELLE, EN %

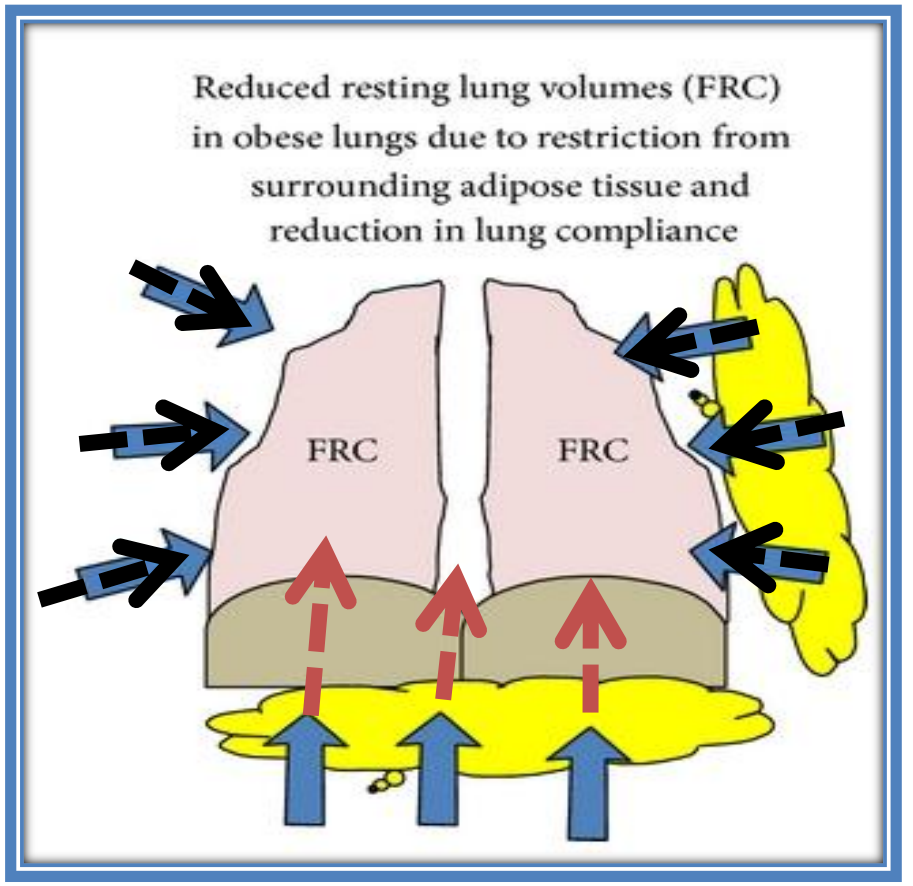


ÉCHANTILLON : 28 895 PERSONNES, AFFILIÉES AU RÉGIME GÉNÉRAL, ÂGÉES DE 30 À 69 ANS EN 2013 ET RÉSIDANT DANS 16 DÉPARTEMENTS DE FRANCE MÉTROPOLITAINE

SOURCE : SANTÉ PUBLIQUE FRANCE, « BULLETIN ÉPIDÉMIOLOGIQUE HEBDOMADAIRE », 25 OCTOBRE 2016

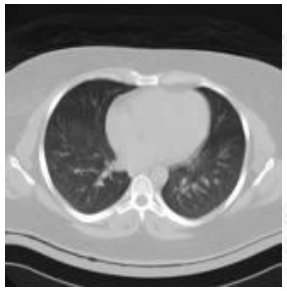
Obesity : Main impacts on ventilatory system





LUNG VOLUMES AND OXYGENATION

OBESITY



Atelectasis

HYPOXEMIA

Volume Pulmonaire (CRF…)

Oxygénation (PaO2/PAO2)

Non aerated tissue (+ 20%)

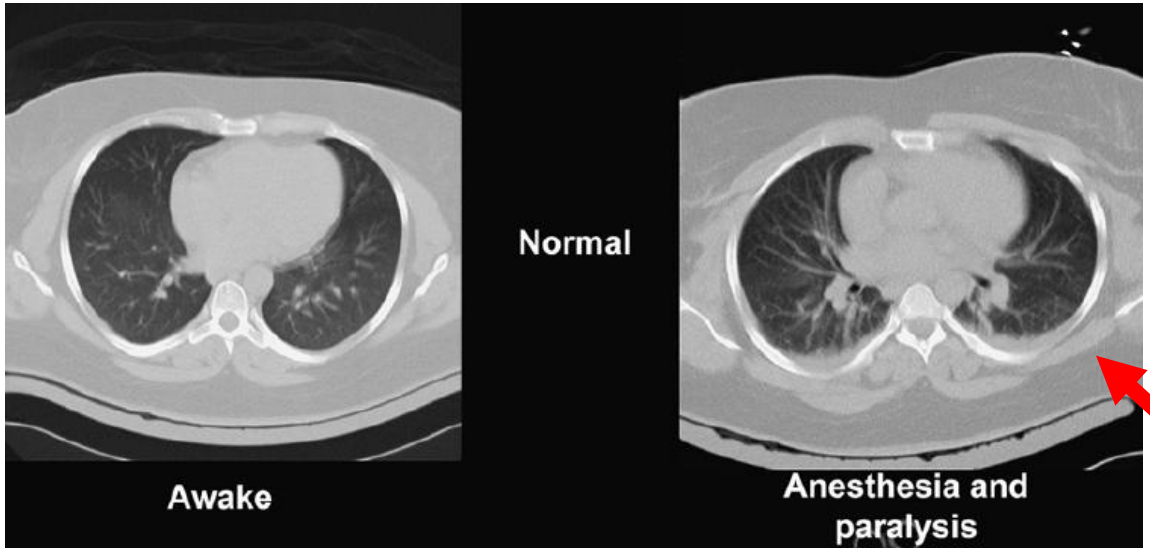
Poorly aerated tissue (+ 70%)

0 10 20 30 40 50 60 70

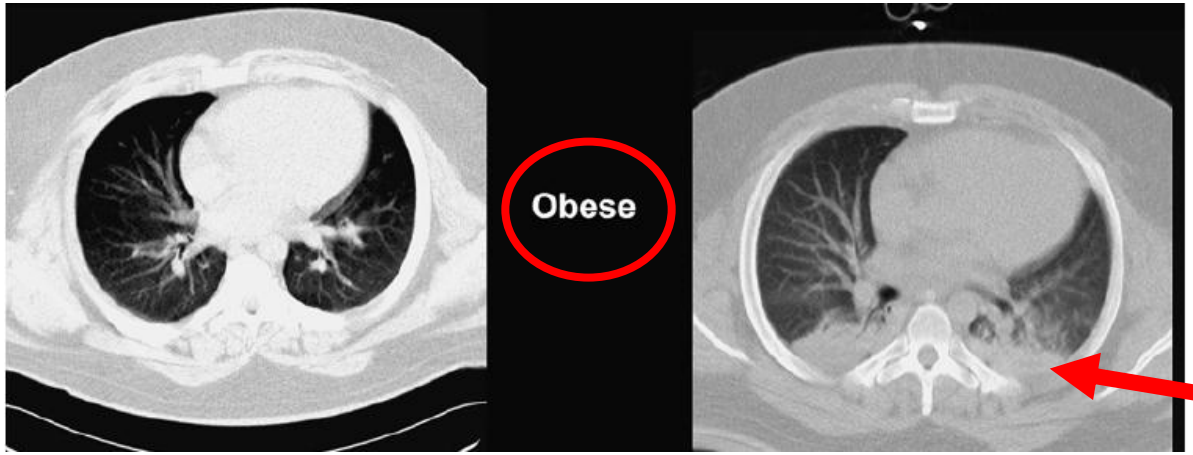
BMI (kg · m^{-2})

Pelosi Anesth Analg 1998

Effects of anesthesia on lung morphology in obese patients. Pelosi et al. 2010

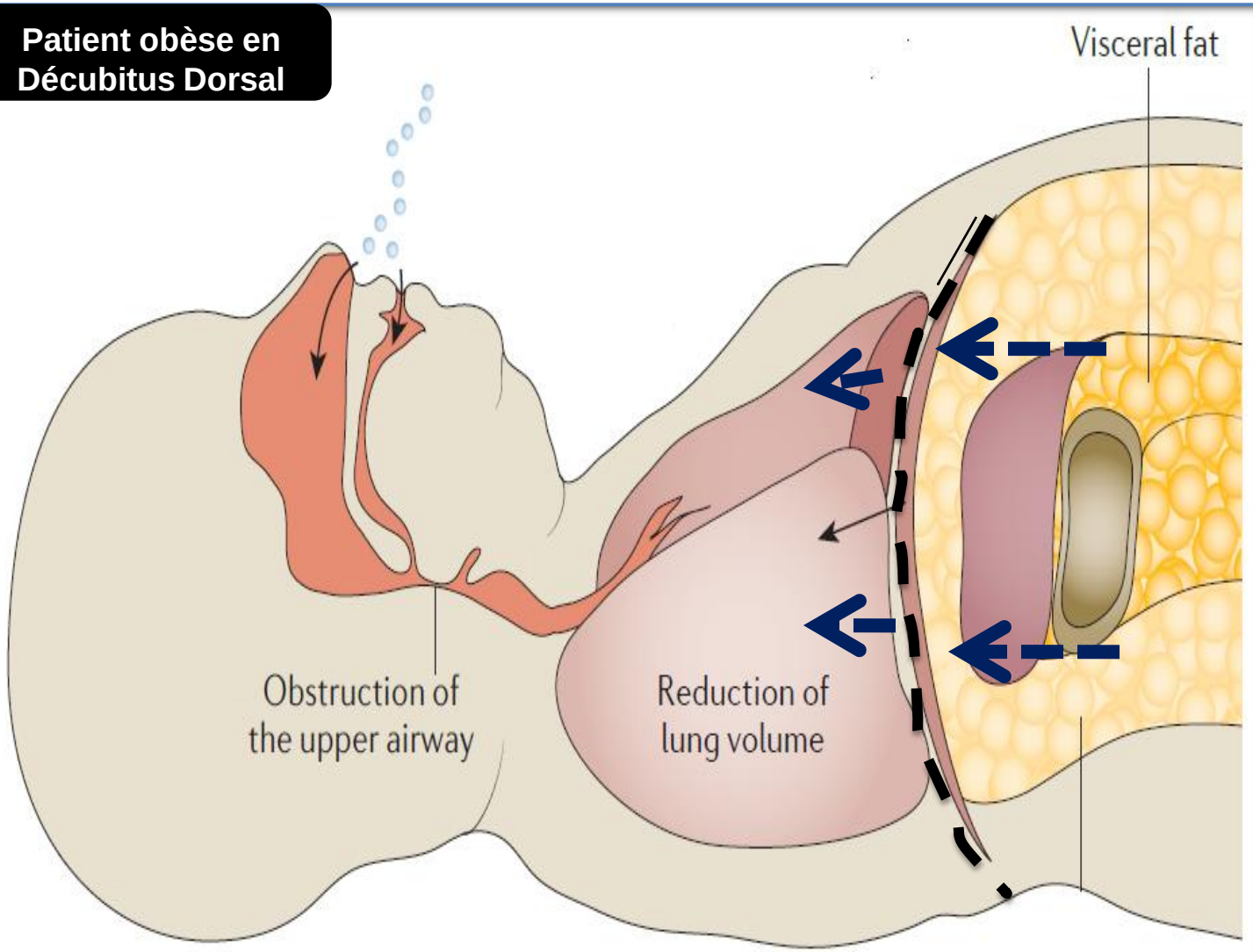


Atelectasis



Atelectasis++

Patient obèse en Décubitus Dorsal



OBJECTIVES. Ventilation in obese patient : 10 Tips

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2. **Preoxygenation and intubation procedures**
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4. Tidal volume
5. Pressures : PEEP, Pplat, Driving Pressure (ΔP); Esophageal (Pes)
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9. Post-extubation period: Ventilatory Support
10. 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.‖*

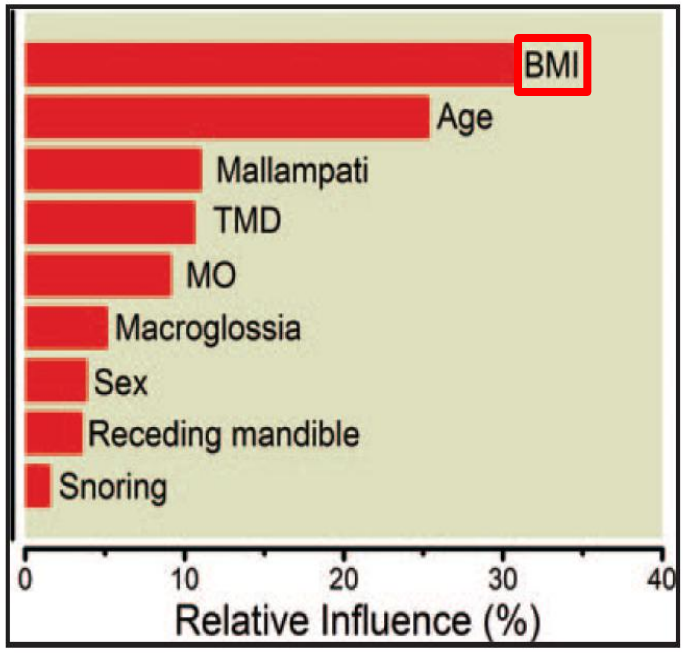


Fig. 4. Illustration of the relative influence of each variable (*i.e.*, the reduction of squared error attributable to each variable) used in the $SCORE_{Computer}$. BMI = body mass index; MO = mouth opening; TMD = thyromental distance.

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)

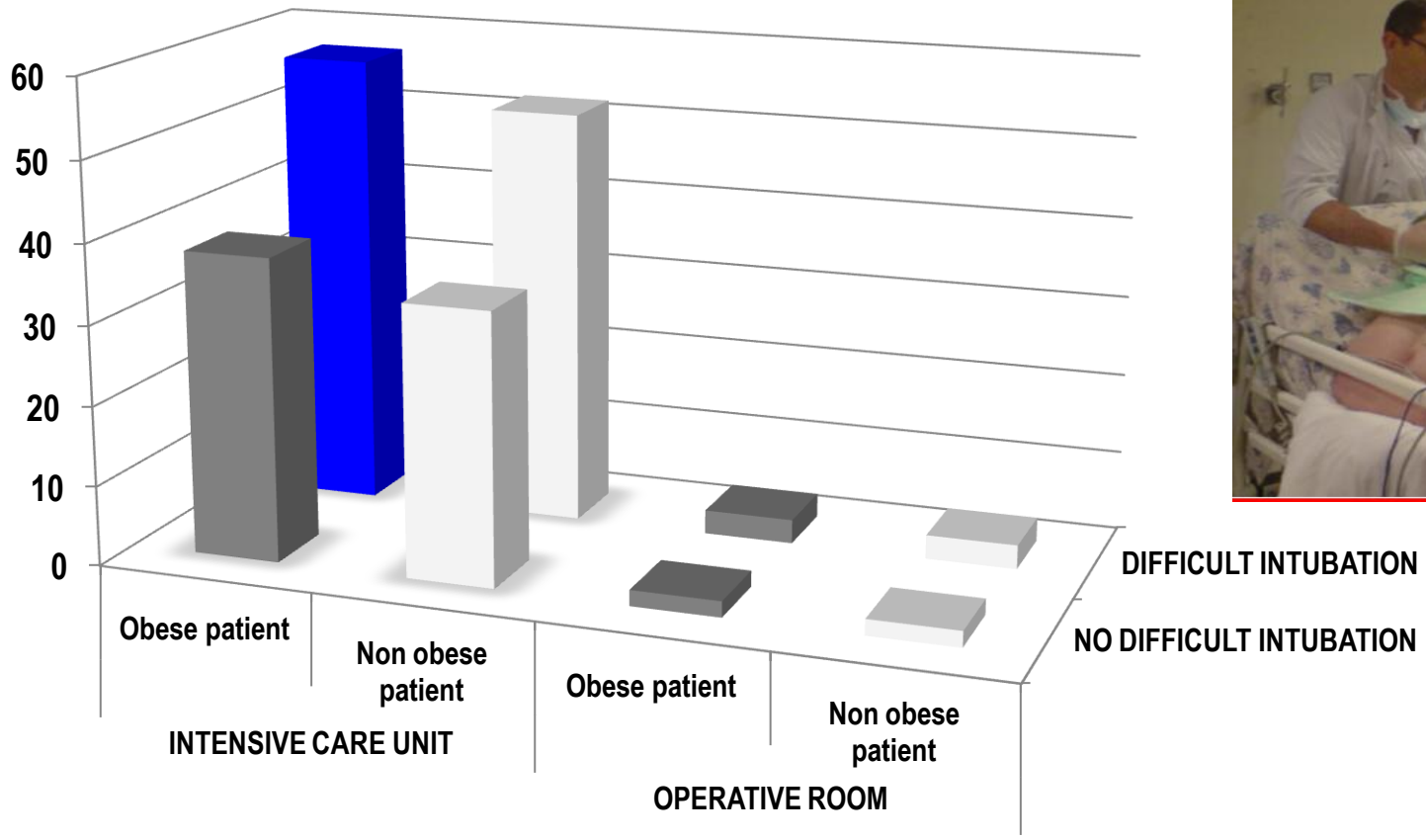
Variables	Odds Ratio (95% CI)	*P* Value
Presence of beard	3.18 (1.39–7.27)	0.006
Body mass index > 26 kg/m^2	2.75 (1.64–4.62)	<0.001
Lack of teeth	2.28 (1.26–4.10)	0.006
Age > 55 yr	2.26 (1.34–3.81)	0.002
History of snoring	1.84 (1.09–3.10)	0.02

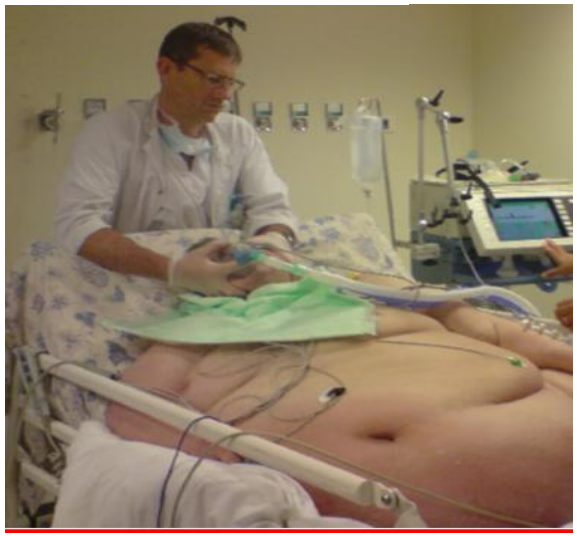
CI = confidence interval.

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*]





British Journal of Anaesthesia Page 1 of 10
doi:10.1093/bja/aeu373

BJA

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

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*]

Table 4 Results of multivariate mixed effects regression for final difficult intubation prediction model from the OT cohort in obese patients ($n=1579$). Centre variable was entered as a random effect. OR, odds ratio; CI, confidence interval. Reference: Mallampati score=I or II; reduced mobility of cervical spine=no; obstructive sleep apnoea syndrome=no

	OR	95% CI	*P*-value
Mallampati score III or IV	3.93	2.65–5.84	<0.0001
Reduced mobility of cervical spine	2.29	1.51–3.48	<0.0001
Obstructive sleep apnoea syndrome	1.96	1.19–3.22	0.009

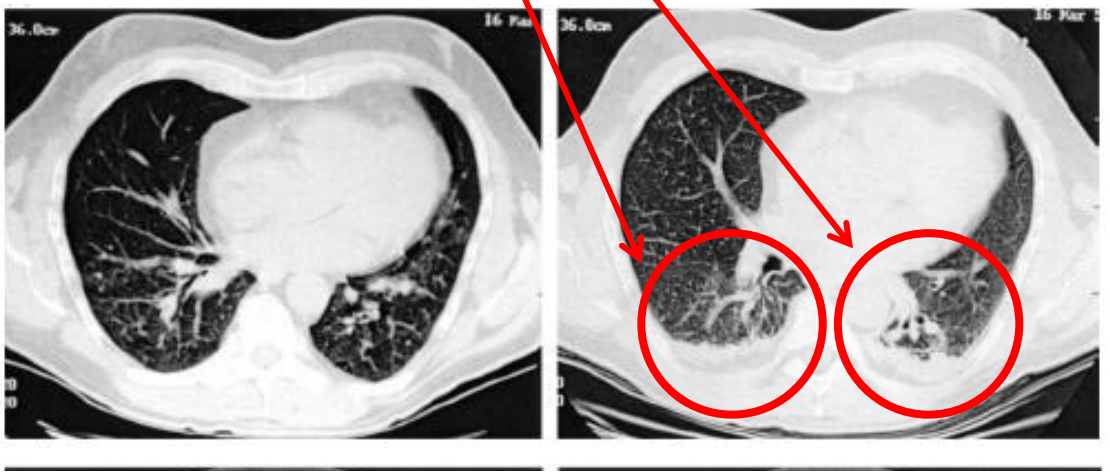
Prevention of derecruitment (atelectasis) during intubation

Standard Preoxygenation

Atelectasis +

Before induction

After intubation

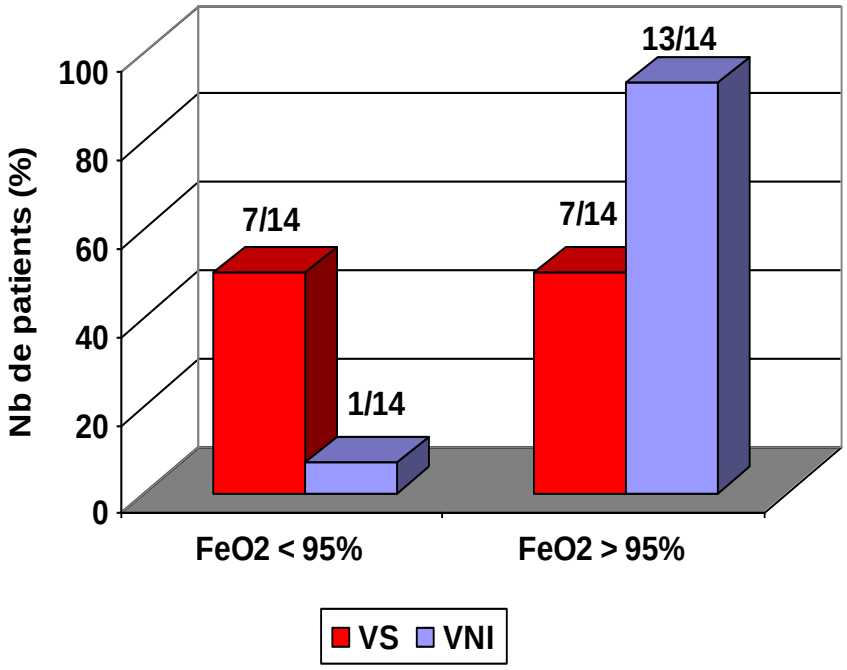


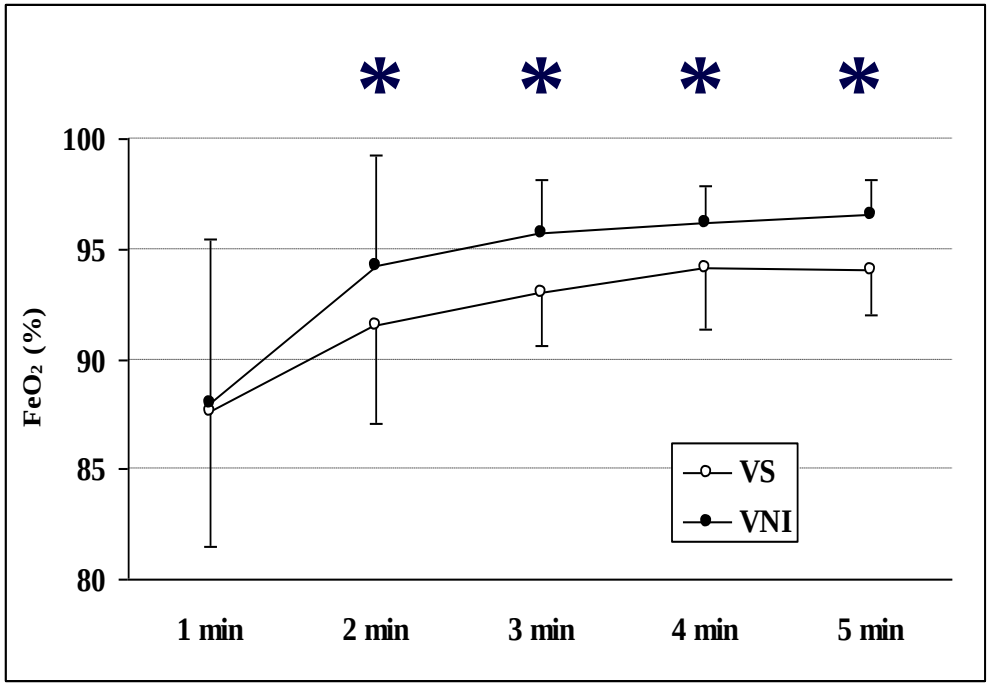
Rusca. Anesth Analg 2003

Jean-Marc Delay, MD*
Mustapha Sebbane, MD*
Boris Jung, MD*
David Nocca, MD†
Daniel Verzilli, MD*
Yvan Pouzeratte, MD*
Moez El Kamel, MD*
Jean-Michel Fabre, MD, PhD†
Jean-Jacques Eledjam, MD, PhD*
Samir Jaber, MD, PhD*

The Effectiveness of Noninvasive Positive Pressure Ventilation to Enhance Preoxygenation in Morbidly Obese Patients: A Randomized Controlled Study

Anesth Analg 2008;107:1707–13





➔ **Facial mask NIV in Pressure Support Ventilation (PSV) mode (8-10 cmH20) with PEEP (6 cmH20) improve preoxygenation before planned intubation in obese patients**

NIV for preoxygenation before intubation in non-selected ICU patients

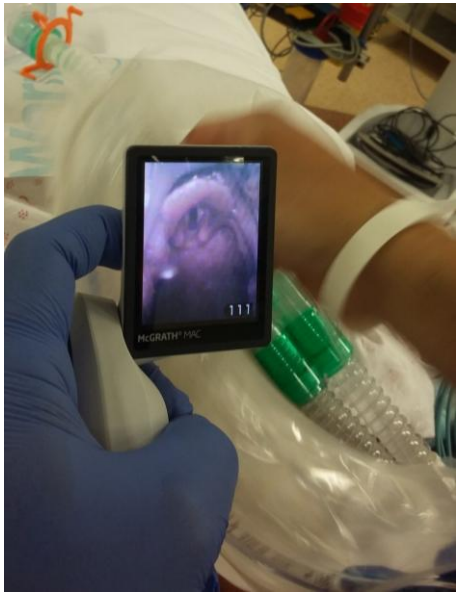
Noninvasive Ventilation Improves Preoxygenation before Intubation of Hypoxic Patients

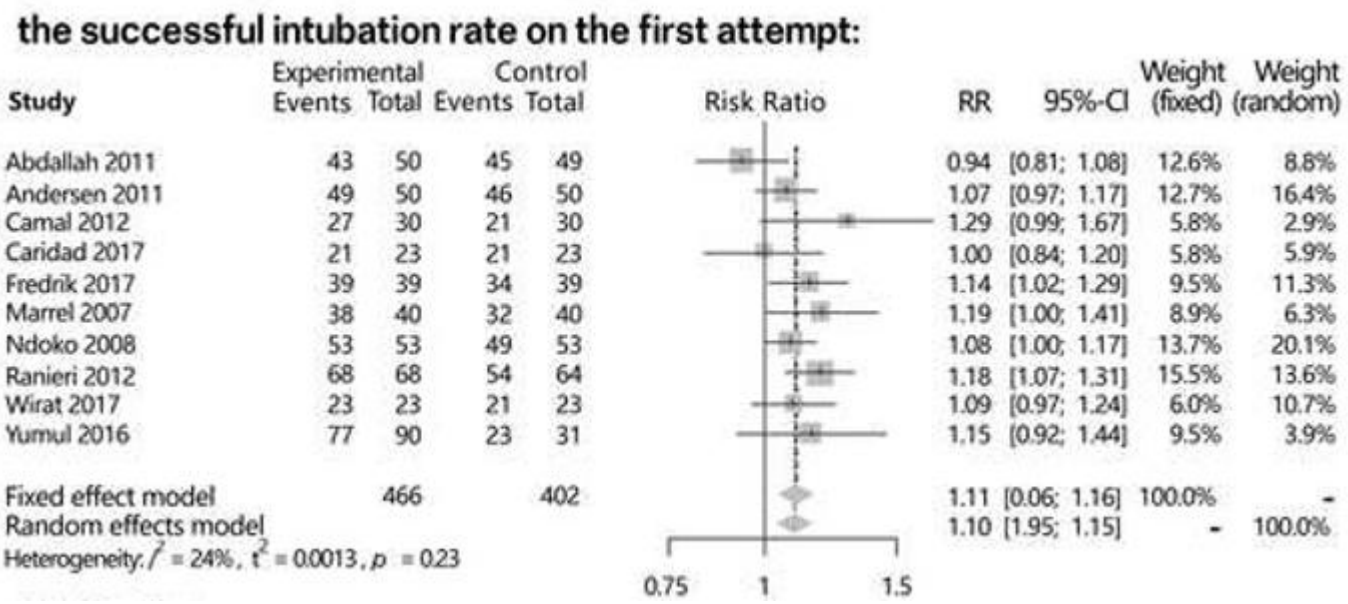
Christophe Baillard, Jean-Philippe Fosse, Mustapha Sebbane, Gérald Chanques, François Vincent, Patricia Courouble, Yves Cohen, Jean-Jacques Eledjam, Frédéric Adnet, and Samir Jaber

Am J Respir Crit Care Med Vol 174. pp 171–177, 2006

Comparative efficacy of different laryngoscopes in obese patients requiring endotracheal intubation: a systematic review and network meta-analysis

Miao Liu1, Zhaodi Zhang2, Guiyue Wang1, Yuhang Li1, Yue Bu1, Hongliang Wang3, Haitao Liu1, Pulin Yu1, Yanji Lv1, Xiaoya Zheng1, Kaili Yu1, Yi Yang4, Fangfang Niu1, Baicheng Zhang1, Qi Chen1, Yao Wang1, Jinwei Tian4, Kaijiang Yu1*, Changsong Wang1*





Conclusion: Compared with Direct Larynscopy (DL), Videolaryngoscope significantly increased the rate of endotracheal intubation on the first attempt and provided a superior glottis view with no increase in complications.

Submitted 2018

OBJECTIVES. Ventilation in obese patient : 10 Tips

1. Background : what every physicians should know about obese patient
2. Preoxygenation and intubation procedures
3. **Ventilatory modes (Volume or Pressure)**
4. Tidal volume
5. Pressures : PEEP, Pplat, Driving Pressure (ΔP); Esophageal (Pes)
6. Recruitment Maneuver
7. Position
8. Weaning : spontaneous breathing trial (SBT) and Extubation
9. Post-extubation period: Ventilatory Support
10. Take home messages

Volume (VCV) = Pressure (PCV) in obese patients

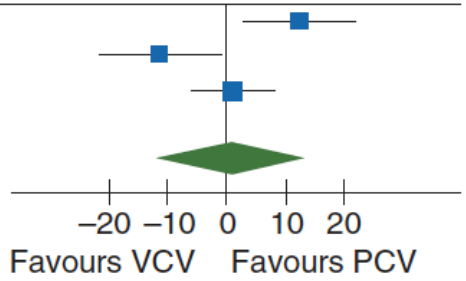
Aldenkortt M. et al. Br J Anaesth. 2012;109(4):493-502

Intraoperative PaO2/FiO2 (kPa)

Study or Subgroup	PCV Mean	PCV SD	PCV Total	VCV Mean	VCV SD	VCV Total	Weight	Mean difference IV, Random, 95% CI
Cadi 2008	37.5	14.3	18	26.5	10.3	18	32.8%	11.00 [2.86, 19.14]
De Baerdemaeker 2007	31.6	10.5	12	41.7	11.9	12	31.5%	–10.10 [–19.08, –1.12]
Hans 2007	36.4	13.5	39	35.5	14.4	40	35.7%	0.90 [–5.25, 7.05]
Total (95% CI)			69			70	100.0%	0.75 [–9.99, 11.48]

Heterogeneity: $\tau^2 = 74.21$; $\chi^2 = 11.66$, df = 2 ($P = 0.003$); $I^2 = 83\%$

Test for overall effect: $Z = 0.14$ ($P = 0.89$)

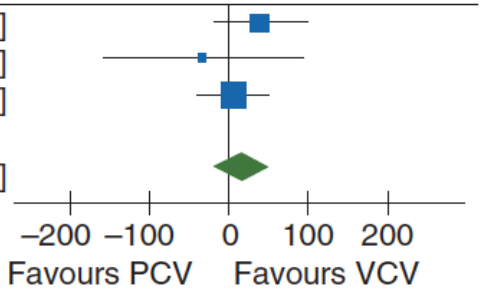


Intraoperative tidal volume (ml)

Study or Subgroup	PCV Mean	PCV SD	PCV Total	VCV Mean	VCV SD	VCV Total	Weight	Mean difference IV, Fixed, 95% CI
Cadi 2008	613	91	18	573	81	18	36.1%	40.00 [–16.28, 96.28]
De Baerdemaeker 2007	612	170	12	645	138	12	7.5%	–33.00 [–156.89, 90.89]
Hans 2007	650	104	39	643	100	40	56.4%	7.00 [–38.01, 52.01]
Total (95% CI)			69			70	100.0%	15.93 [–17.88, 49.75]

Heterogeneity: $x^2 = 1.45$, df = 2 ($P = 0.48$): $I^2 = 0\%$

Test for overall effect: $Z = 0.92$ ($P = 0.36$)



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4. **Tidal volume (VT)**
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Body mass index is associated with the development of acute respiratory distress syndrome

M N Gong,[1] E K Bajwa,[2] B T Thompson,[2] D C Christiani[3]

Thorax 2010;**65**:44–50.

Relationship between BMI and development of ARDS ?

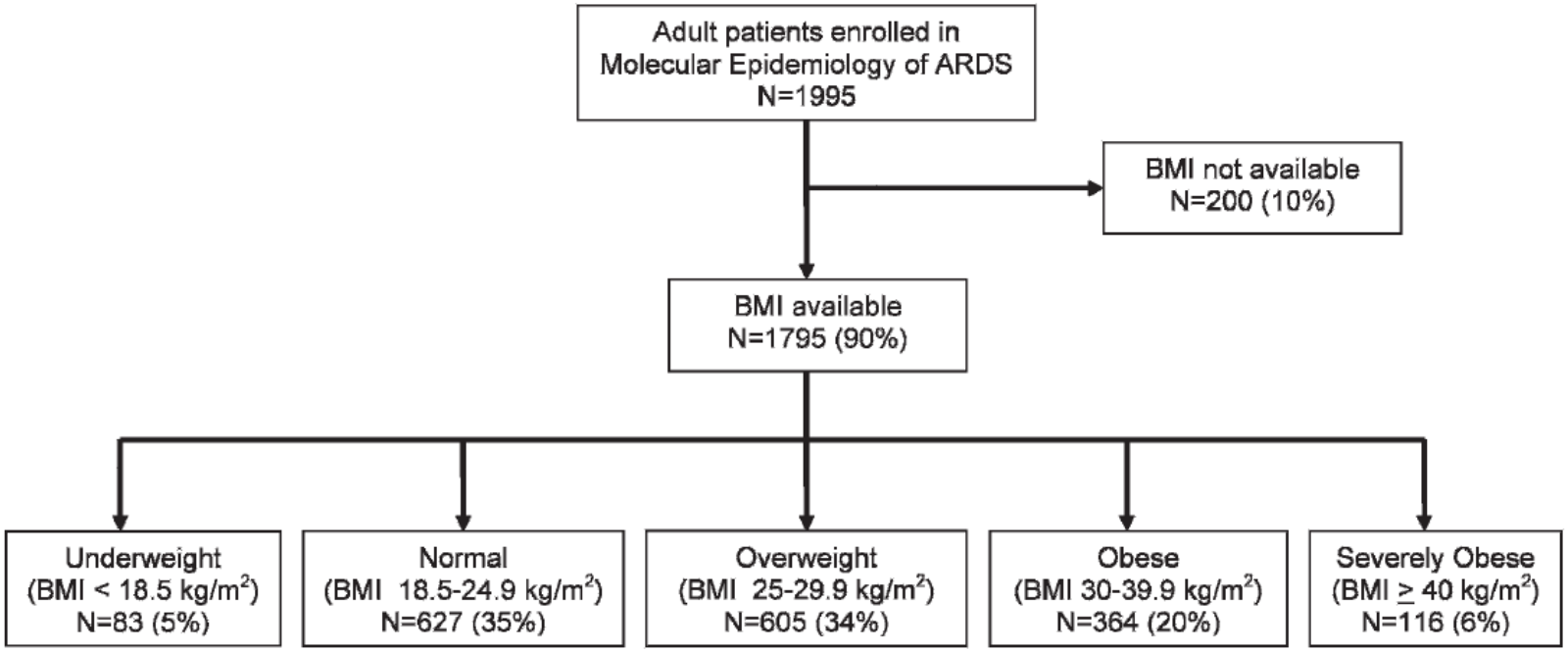
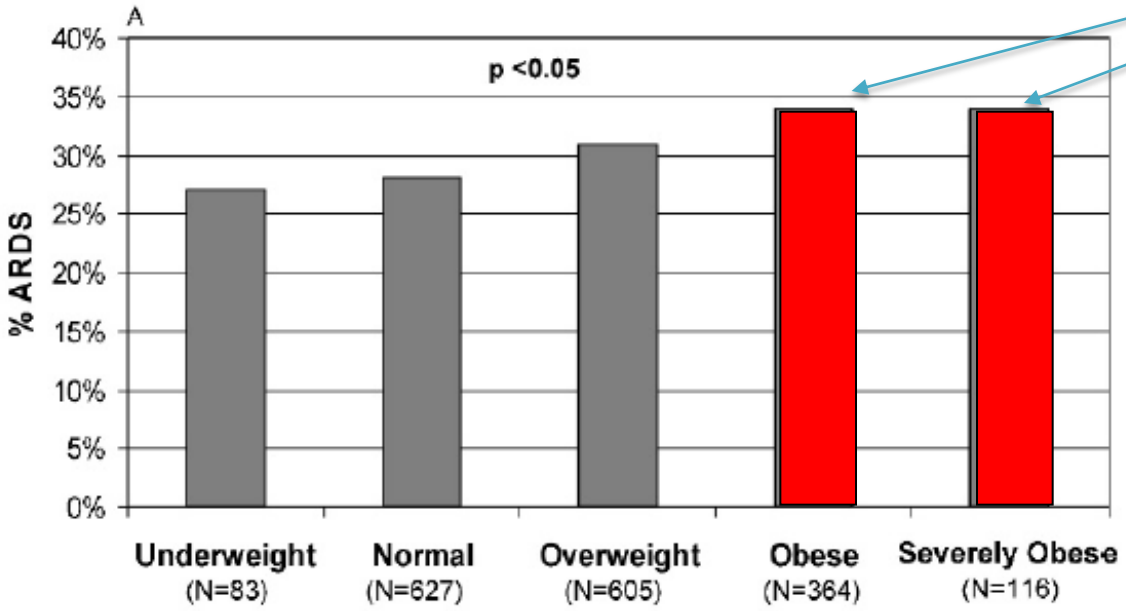


Figure 1 Breakdown of patients by weight in the Molecular Epidemiology of ARDS cohort. ARDS, adult respiratory distress syndrome; BMI, body mass index.



Development of ARDS increased significantly with increasing weight

Gong. Thorax 2010

Body mass index is associated with the development of acute respiratory distress syndrome

M N Gong,[1] E K Bajwa,[2] B T Thompson,[2] D C Christiani[3]

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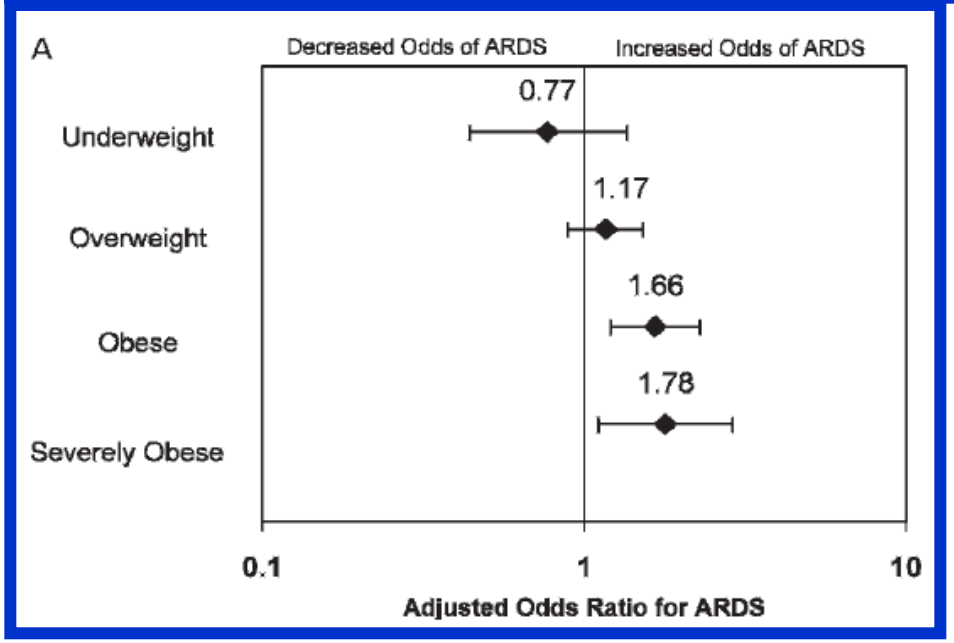
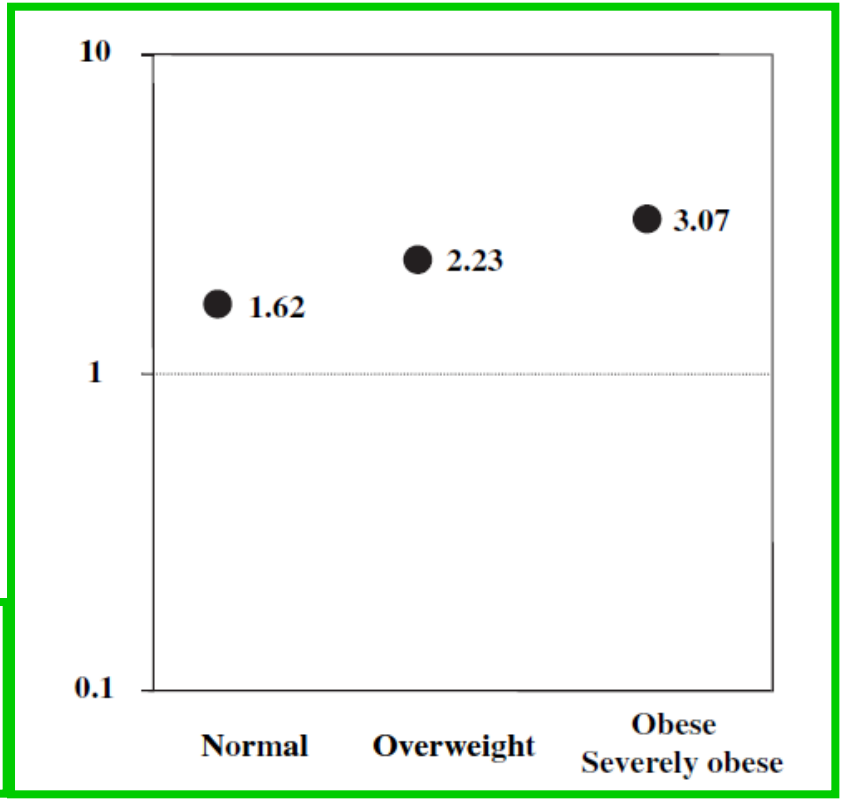


OR for the development of ARDS



Influence of body mass index on outcome of the mechanically ventilated patients

Thorax 2011;**66**

A Anzueto,[1] F Frutos-Vivar,[2] A Esteban,[2] N Bensalami,[1] D Marks,[1] K Raymondos,[3] C Apezteguía,[4] Y Arabi,[5] J Hurtado,[6] M González,[7] V Tomicic,[8] F Abroug,[9] J Elizalde,[10] N Cakar,[11] P Pelosi,[12] N D Ferguson;[13] for the Ventila group

De Jong et al. Critical Care (2017) 21:63
DOI 10.1186/s13054-017-1641-1

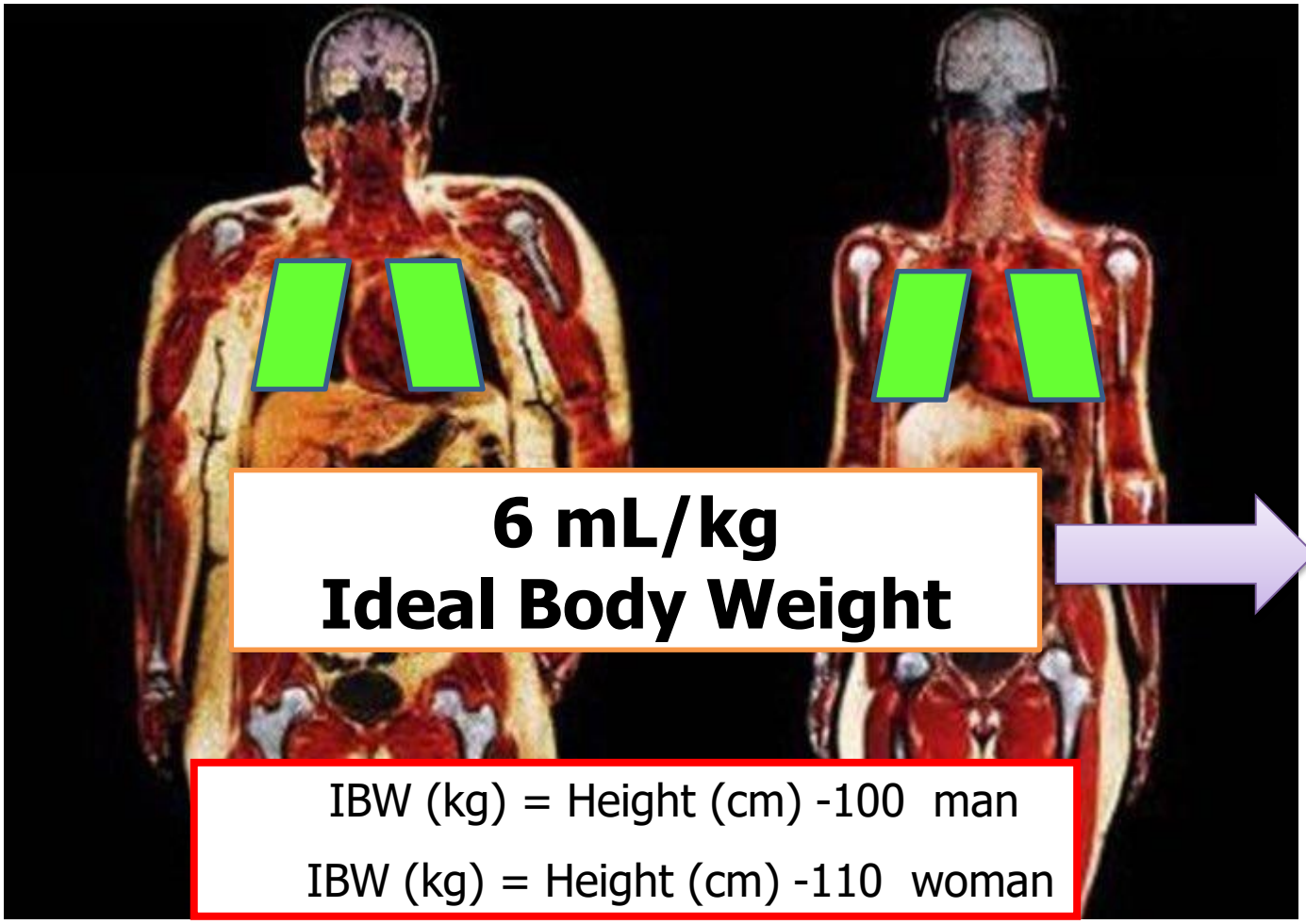
Critical Care

REVIEW Open Access

Mechanical ventilation in obese ICU patients: from intubation to extubation

Audrey De Jong[1,2], Gerald Chanques[1,2] and Samir Jaber[1,2*]

Tidal volume (VT) setting



6 mL/kg
Ideal Body Weight

IBW (kg) = Height (cm) -100 man

IBW (kg) = Height (cm) -110 woman

But increase PEEP

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Need of an individualized monitoring in the obese patient

1. Electrical Impedance Tomography (EIT) (Atelectasis visualization)

2. Monitoring of esophageal pressure (calculation of transpulmonary pressure)

Digestive surgery (laparoscopy)

Optimal PEEP= 18 cm H20

More hemodynamic complications

Nestler et al. *BJA* 2018

Bariatric surgery

Optimal PEEP =

17 cmH20 before pneumoperitoneum,
23 cm20 after pneumoperitoneum
No hemodynamic difference

Eichler et al. *Obesity surgery* 2017

Recruitment Maneuvers and Positive End-Expiratory Pressure Titration in Morbidly Obese ICU Patients

Massimiliano Pirrone, MD[1,2]; Daniel Fisher, RRT[3]; Daniel Chipman, RRT[3]; David A. E. Imber, BA[1]; Javier Corona, MD[1,4]; Cristina Mietto, MD[1,2]; Robert M. Kacmarek, RRT, PhD[1,3]; Lorenzo Berra, MI

Esophageal Pressure Use

Optimal PEEP = 20 cmH20

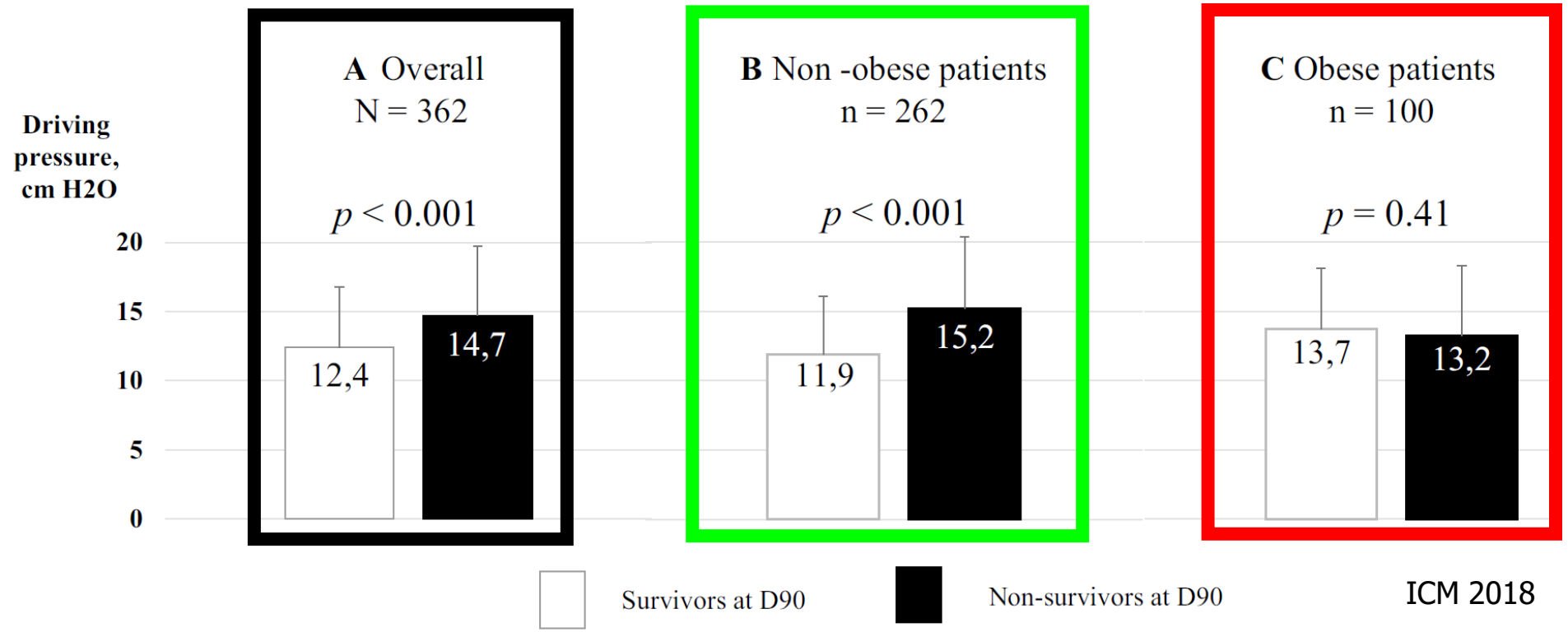
	Baseline	Zero PEEP[a]	Lowest PEEP With Positive Ptpe	Lowest PEEP With Positive Ptpe After RM	Best Decremental PEEP After RM	Best Decremental PEEP–Head of Bed 30 Degree
PEEP cm H_2O	11.6±2.9	0	20.7±4.0[b]	20.7±4.0[b]	21.3±3.8[b]	21.5±3.7[b]
End-expiratory lung volume, mL/kg ideal body weight	19.5±8.3	14.6±3.9	27.1±9.2	30.1±8.2[b,c]	30.6±8.7[b]	38.5±11.5[b]
Ppeak, cm H_2O	34.6±5.8	22.4±4.9	41.7±6.0[b]	40.2±6.1[b,c]	40.4±5.2[b]	41.6±5.5[b]
Pplat, cm H_2O	22.5±4.1	11.7±2.1	30.4±4.2[b]	29.1±4.1[b,c]	29.8±3.8[b]	30.8±3.2[b]
Pao_2/Fio_2, torr	179±60			270±67[b]	266±72[b]	
Ptpi, cm H_2O	1.6±5.0	-3.2±2.8	8.1±2.5[b]	6.6±3.3[b,c]	7.5±2.6[b]	10.3±3.8[b]
Ptpe, cm H_2O	-5.8±5.8	-11.5±1.7[b]	1.1±1.5[b]	1.4±2.4[b]	2.3±2.3[b]	4.2±3.8[b]
Elastance of the respiratory system, cm H_2O/L	23.2±6.8	23.2±1.3	22.1±5.1	17.9±4.0[b,c]	18.2±4.4[b]	20.8±5.2
Elastance of the lung, cm H_2O/L	17.8±6.8	18.4±1.6	16.8±3.6	12.4±3.4[b,c]	12.7±3.2[b]	15.1±5.3
Elastance of the chest wall, cm H_2O/L	5.4±2.9	4.8±1.0	5.6±2.8	5.6±2.2	5.5±2.7	5.7±2.9
Airway resistance, cm H_2O/L/s	18.8±6.1	16.8±3.0	17.5±6.1	17.4±6.2	16.5±7.3	17.2±7.4

ORIGINAL

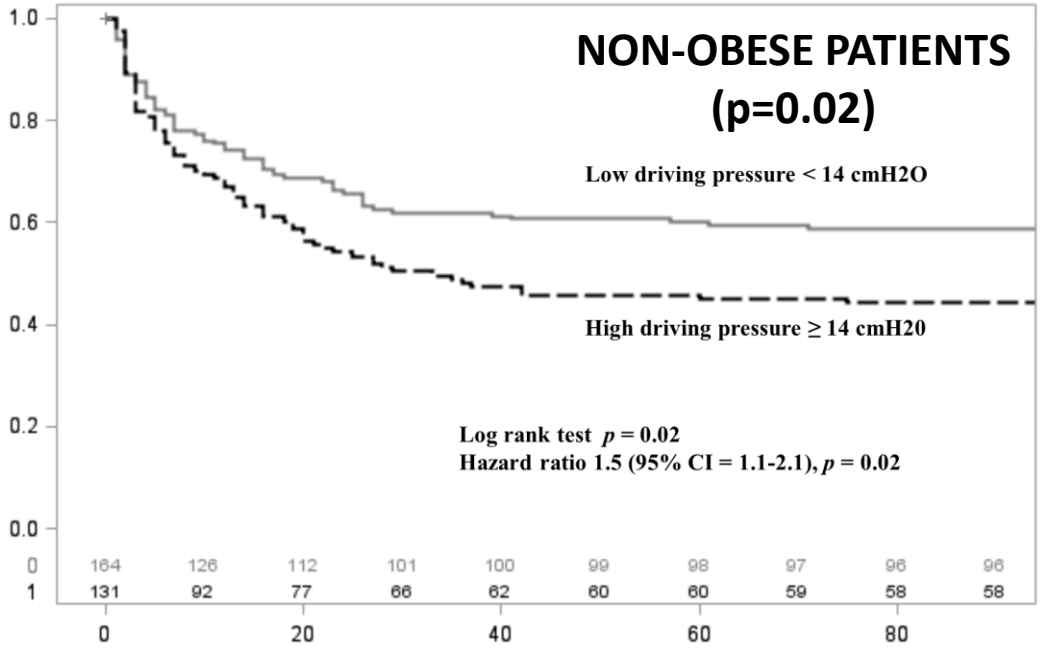
Impact of the driving pressure on mortality in obese and non-obese ARDS patients: a retrospective study of 362 cases

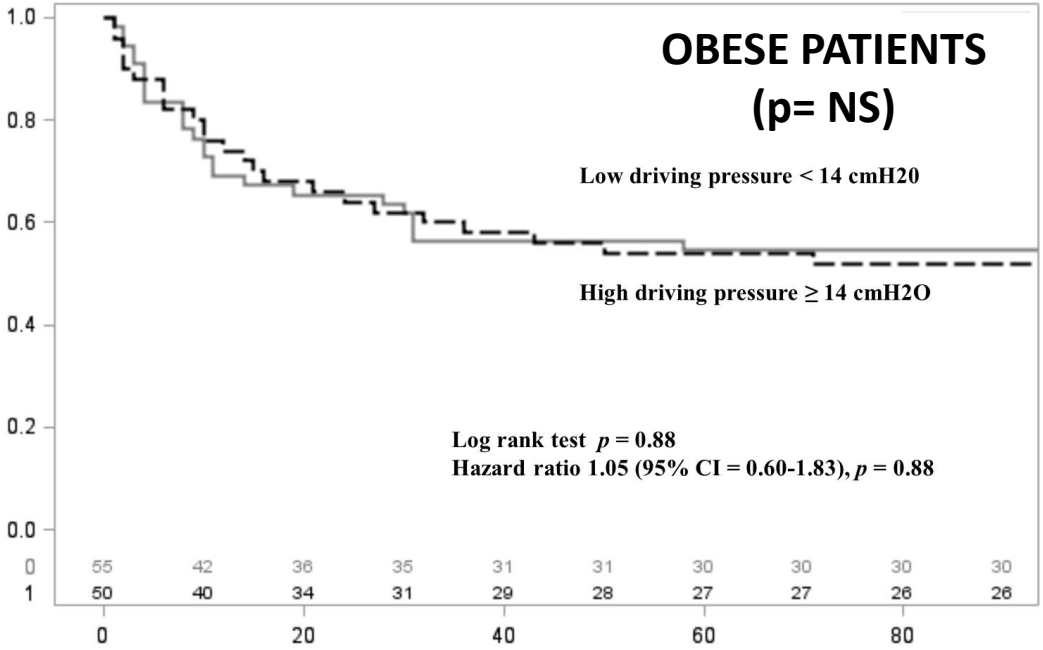
Audrey De Jong[1], Jeanne Cossic[2], Daniel Verzilli[2], Clément Monet[2], Julie Carr[2], Mathieu Conseil[2], Marion Monnin[2], Moussa Cisse[2], Fouad Belafia[2], Nicolas Molinari[3], Gérald Chanques[1] and Samir Jaber[1*]

Driving pressure (ΔP)= Plateau pressure - PEEP



ICM 2018


NON-OBESE PATIENTS
(p=0.02)
Low driving pressure < 14 cmH2O
High driving pressure ≥ 14 cmH20
Log rank test p = 0.02
Hazard ratio 1.5 (95% CI = 1.1-2.1), p = 0.02
1.0
0.8
0.6
0.4
0.2
0.0
0 164 126 112 101 100 99 98 97 96 96
1 131 92 77 66 62 60 60 59 58 58
0 20 40 60 80


OBESE PATIENTS
(p= NS)
Low driving pressure < 14 cmH20
High driving pressure ≥ 14 cmH2O
Log rank test p = 0.88
Hazard ratio 1.05 (95% CI = 0.60-1.83), p = 0.88
1.0
0.8
0.6
0.4
0.2
0.0
0 55 42 36 35 31 31 30 30 30 30
1 50 40 34 31 29 28 27 27 26 26
0 20 40 60 80

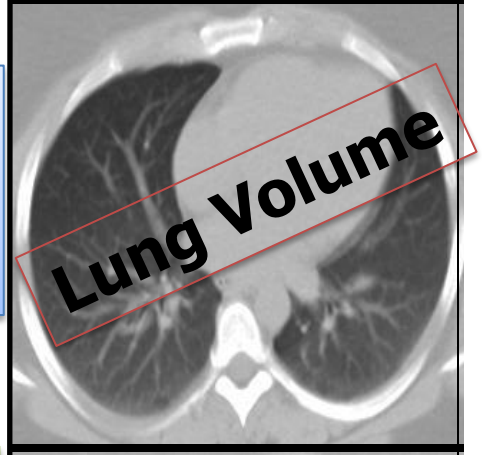
OBJECTIVES. Ventilation in obese patient : 10 Tips

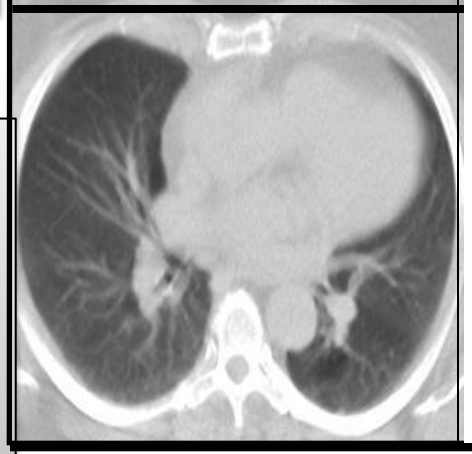
1. Background : what every physicians should know about obese patient
2. Preoxygenation and intubation procedures
3. Ventilatory modes
4. Tidal volume
5. Pressures : PEEP, Pplat, Driving Pressure (ΔP); Esophageal (Pes)
6. **Recruitment Maneuver**
7. Position
8. Weaning : spontaneous breathing trial (SBT) and Extubation
9. Post-extubation period: Ventilatory Support
10. Take home messages

PEEP

RM + PEEP

RECRUITMENT (RM)





?

Awake

After induction

5 min

20 min

OBJECTIVES. Ventilation in obese patient : 10 Tips

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7. **Position**
8. **Weaning** : spontaneous breathing trial (SBT) and Extubation
9. **Post-extubation period**: Ventilatory Support
10. **Take home messages**

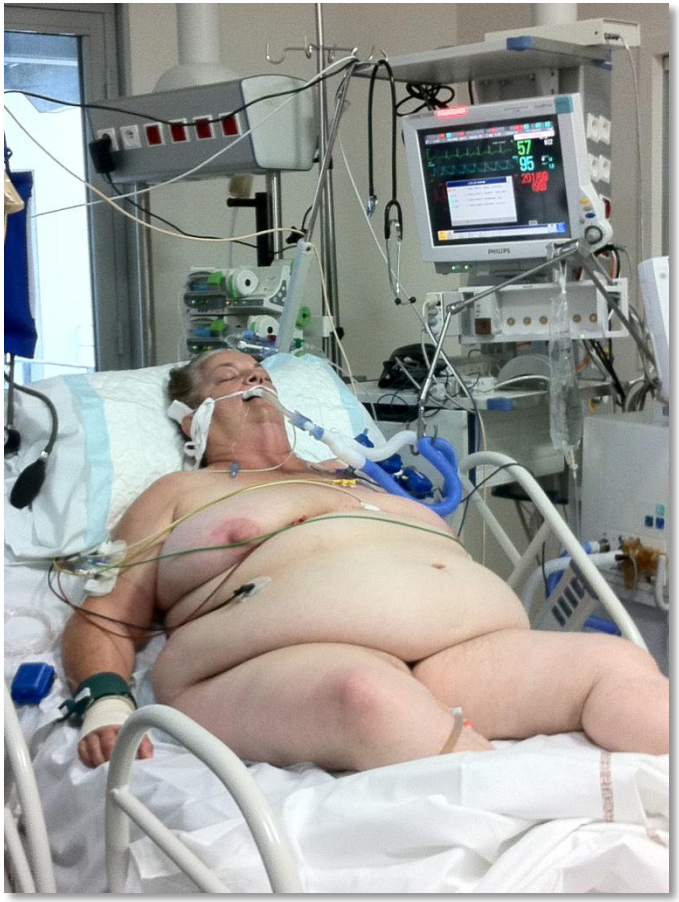
Positioning at 30-45º promotes better respiratory function (avoid 0º or 90º)

Upright positioning of the patient is strongly recommended so that the excess body tissue on the chest and against the diaphragm is displaced caudal, 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, abdominal distension and ascites". Am J Crit Care 1994;3:102-106*

- ***Neill et al."****Effects of sleep posture on upper airway stability in patients with 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

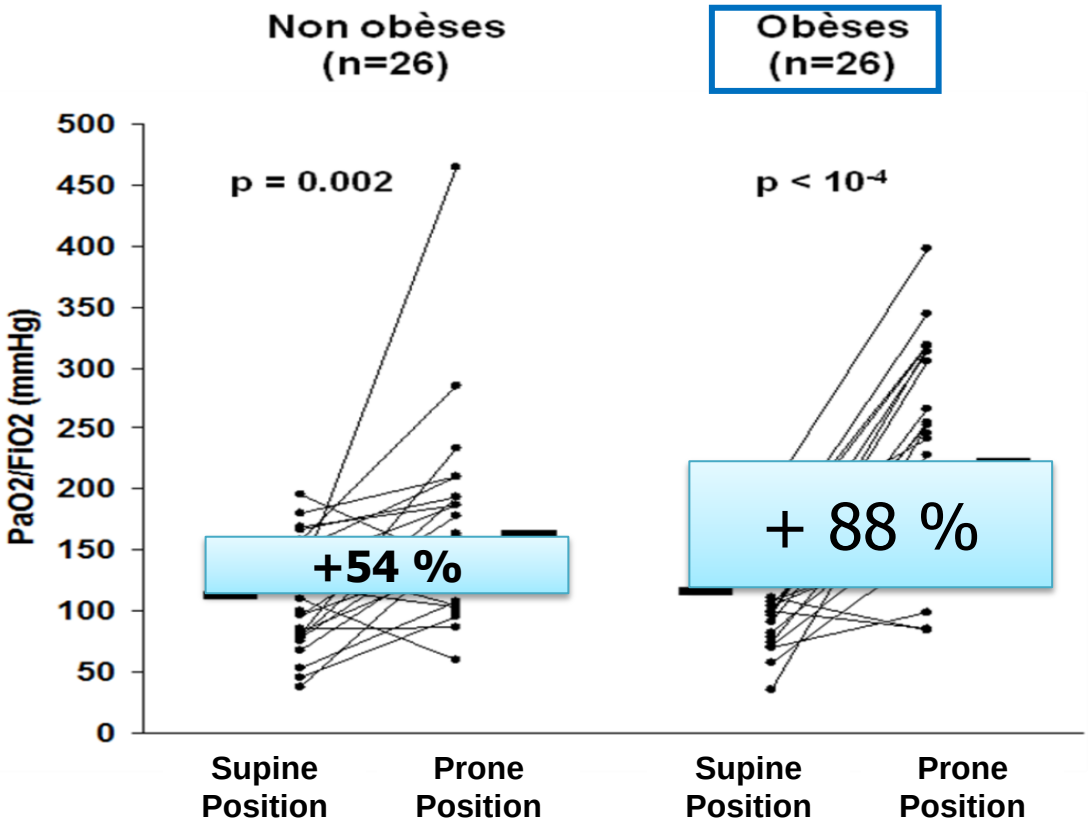
CHEST Original Research
CRITICAL CARE

Feasibility and Effectiveness of Prone Position in Morbidly Obese Patients With ARDS 2013

A Case-Control Clinical Study

Audrey De Jong, MD; Nicolas Molinari, PhD; Mustapha Sebbane, MD; Albert Prades, Nursing Fellow; Emmanuel Futier, MD; Boris Jung, ME Gérald Chanques, MD; and Samir Jaber, MD

1. Feasibility
2. Safety
3. Efficiency



Prone Position more efficient
in obese patient than in non-obese patient

Steps of switch from supine to prone position in an obese patient

OBJECTIVES. Ventilation in obese patient : 10 Tips

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7. Position
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9. **Post-extubation period: Ventilatory Support**
10. **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

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

Critical Care

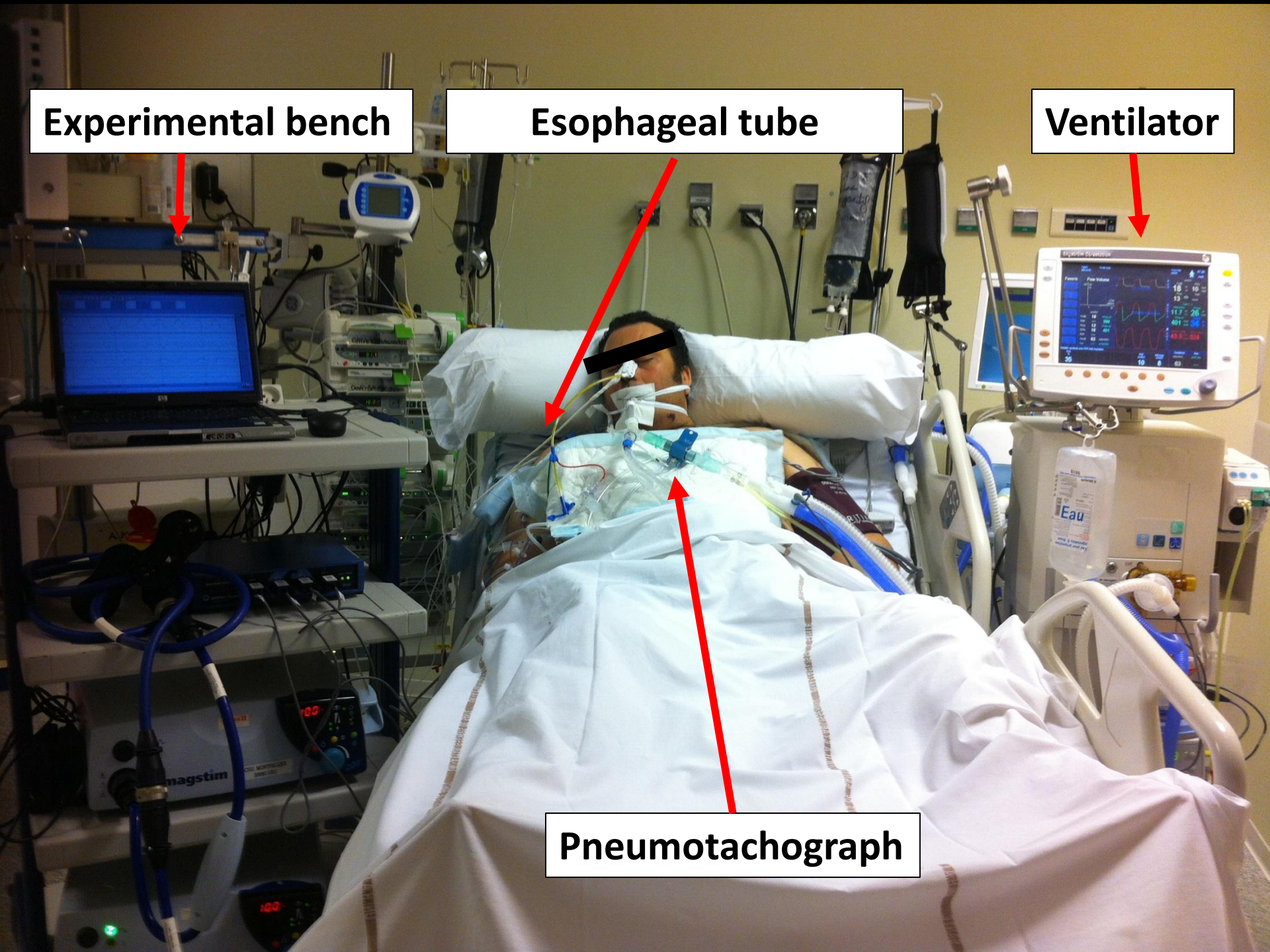
RESEARCH Open Access

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

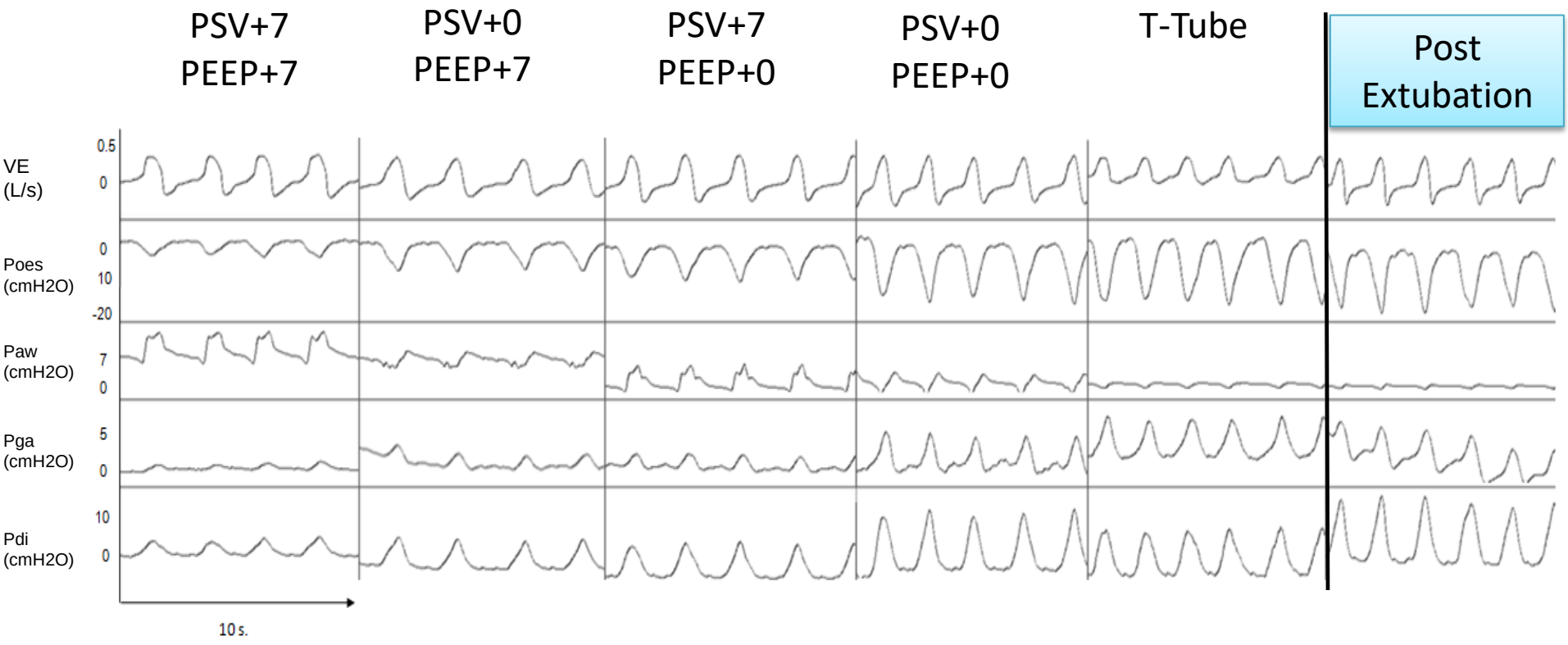
Martin Mahul[1†], Boris Jung[1,4†], Fabrice Galia[1], Nicolas Molinari[2], Audrey de Jong[1], Yannaël Coisel[1,4], Rosanna Vaschetto[3], Stefan Matecki[4], Gérald Chanques[1,4], Laurent Brochard[5,6] and Samir Jaber[1,4*]

How to perform Spontaneous Breathing Trial in obese patients ?

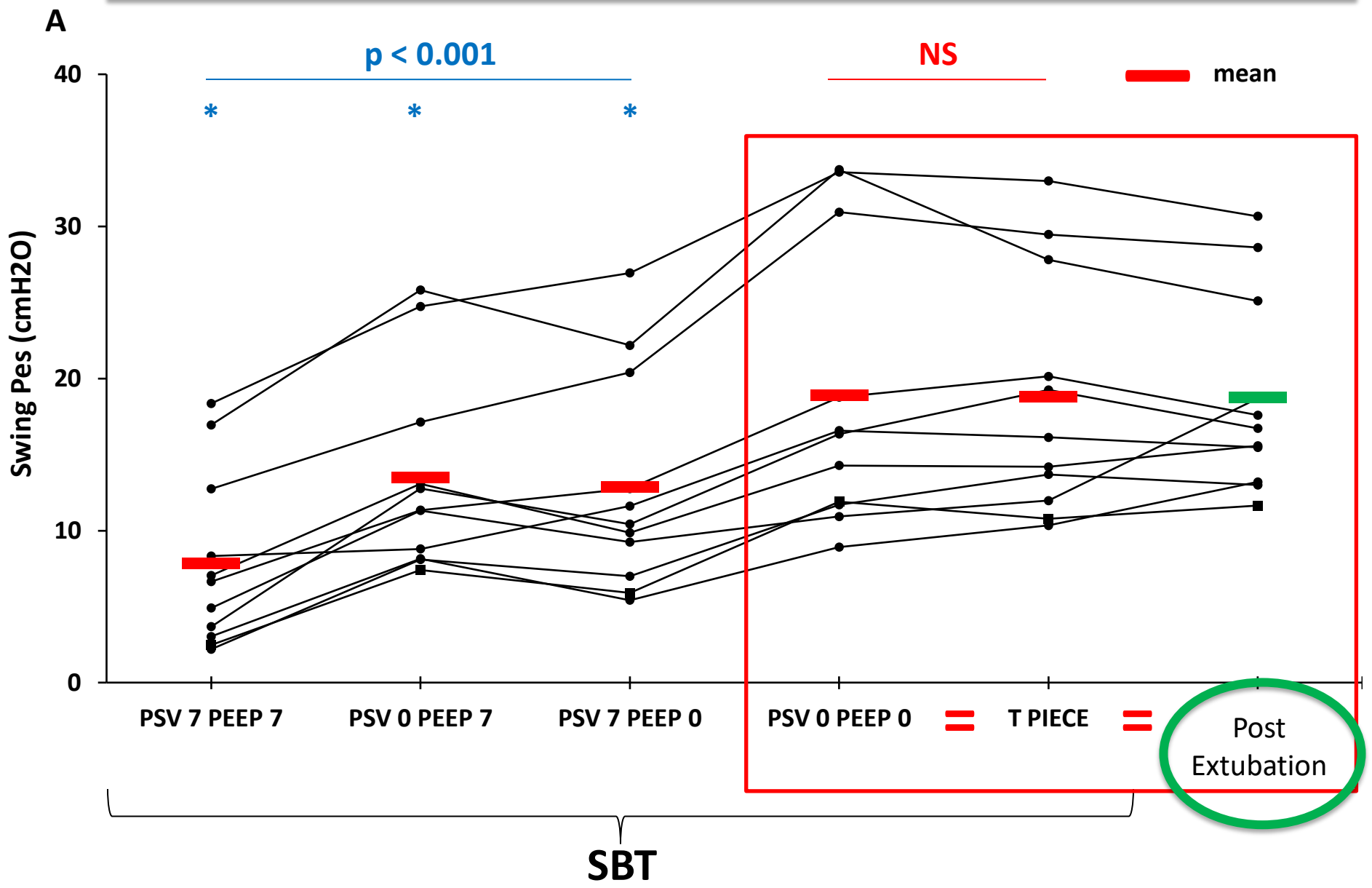
Conclusions: In obese patients, inspiratory effort measured during weaning tests with either a T-piece or a PSV 0 and PEEP 0 was not different to post-extubation inspiratory effort. In contrast, weaning tests with positive pressure overestimated post-extubation inspiratory effort.


Experimental bench
Esophageal tube
Ventilator
Pneumotachograph

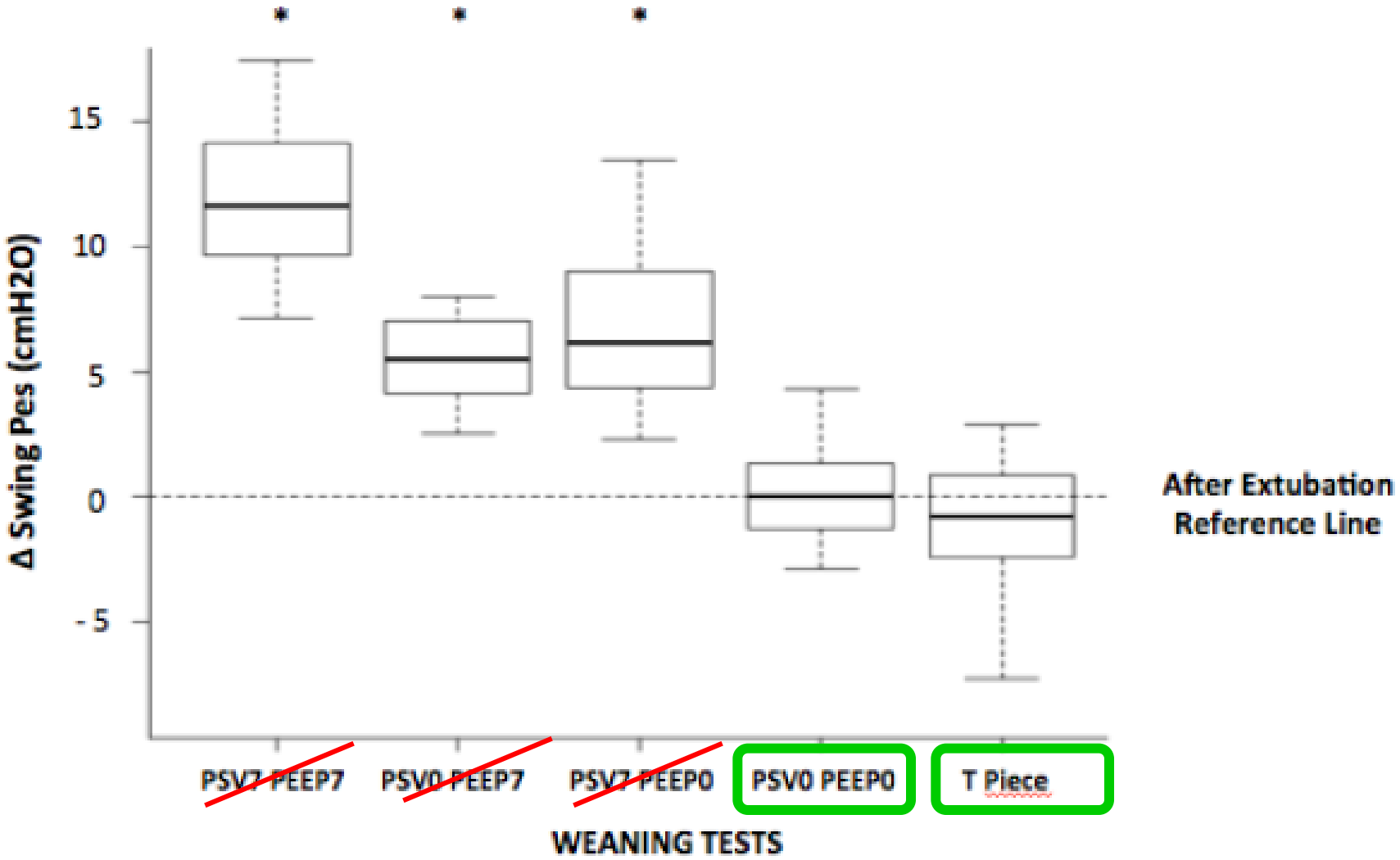
Inspiratory effort



Esophageal pressure Swing



Obese SBT-extubation ?



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.

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%

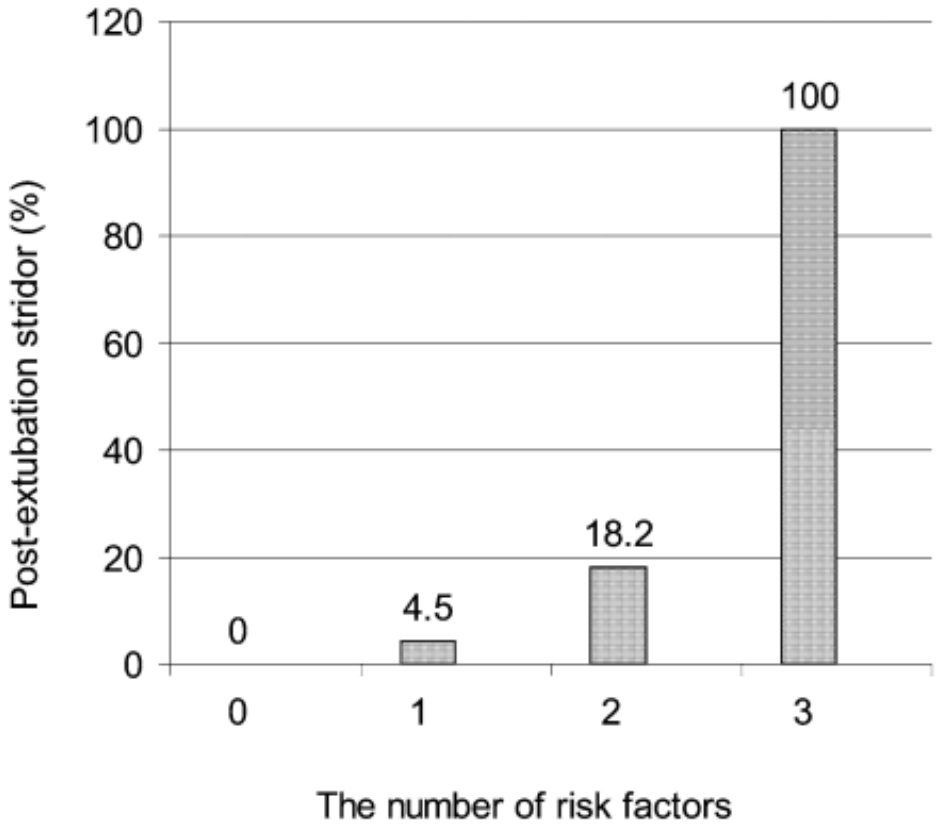


Fig. 1. The frequency of PES according to the number of risk factors.

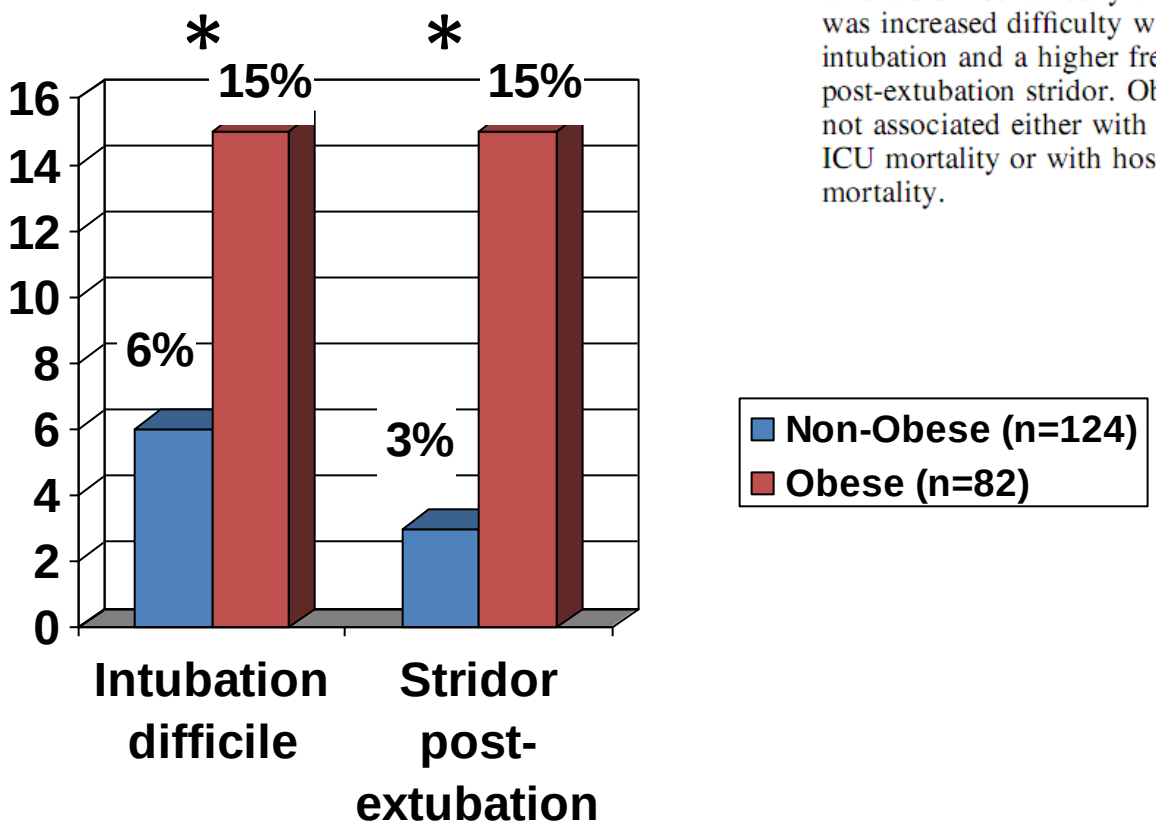
Intensive Care Med (2008) 34:1991–1998
DOI 10.1007/s00134-008-1245-y

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.



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10. Take home messages

“Preventive” High flow nasal cannula (HFNC) oxygen therapy, noninvasive ventilation (NIV) and obesity ?

- Prevention acute respiratory failure following thoracic surgery
- No difference NIV vs HFNC

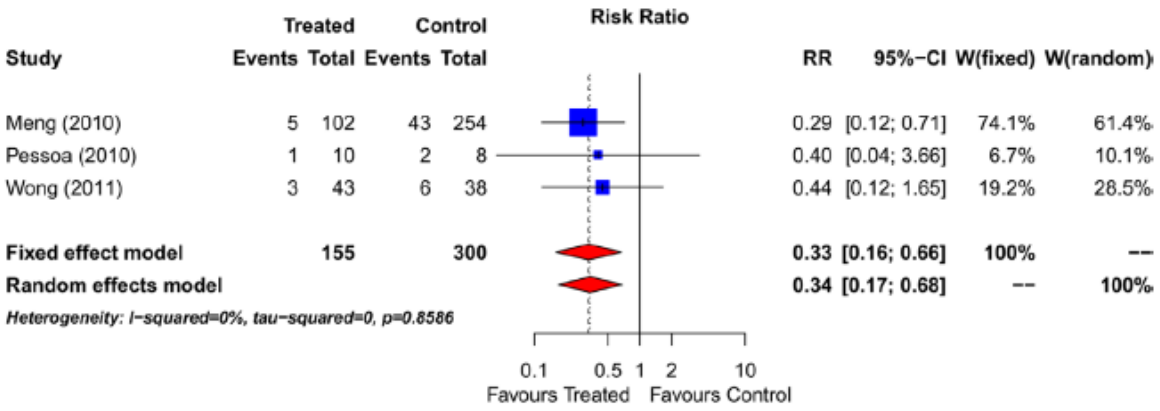
Stephan et al. *Respiratory Care* 2017

Perioperative noninvasive ventilation (NIV) in obese pts: a qualitative review and meta-analysis.

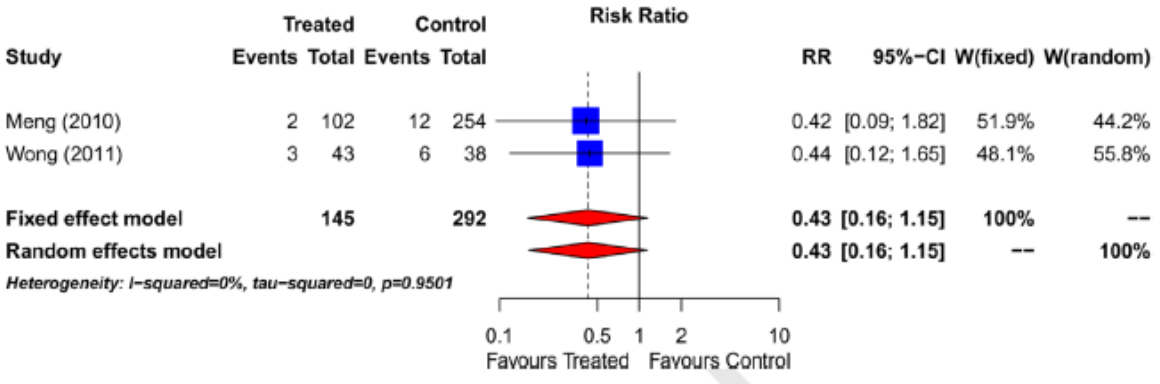
Carron M et al. Surg Obes Relat Dis. 2015 Dec 10.

- **768 patients included**

Postoperative Respiratory Complications



ICU Admission



Intensive Care Med
DOI 10.1007/s00134-006-0229-z

ORIGINAL

Alexandre Demoule
Emmanuelle Girou
Jean-Christophe Richard
Solenne Taillé
Laurent Brochard

Increased use of noninvasive ventilation in French intensive care units

Independent risk factors for NIV failure were high SAPS II and de novo respiratory failure, whereas factors associated with success were good NIV tolerance and high body mass index.

↑ airway obstruction in SAOS – obese patients

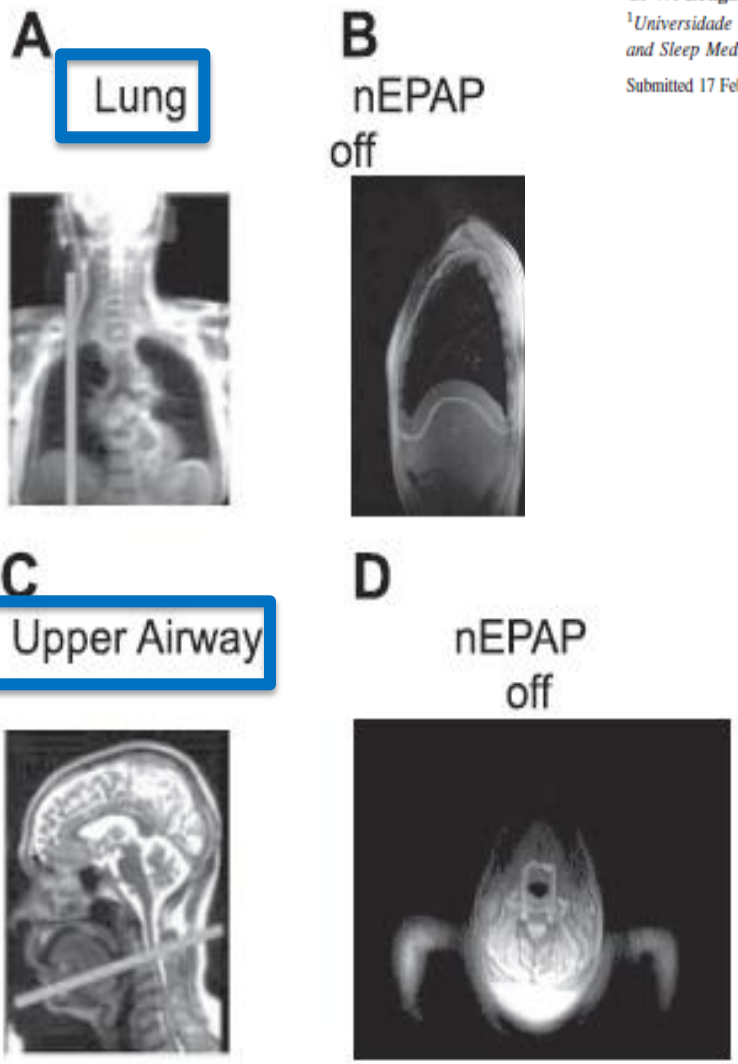
J Appl Physiol 111: 1400–1409, 2011.
First published July 28, 2011; doi:10.1152/japplphysiol.00218.2011.

Impact of CPAP ?

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



Impact of PEEP on :

1. Lung

2. Upper Airway

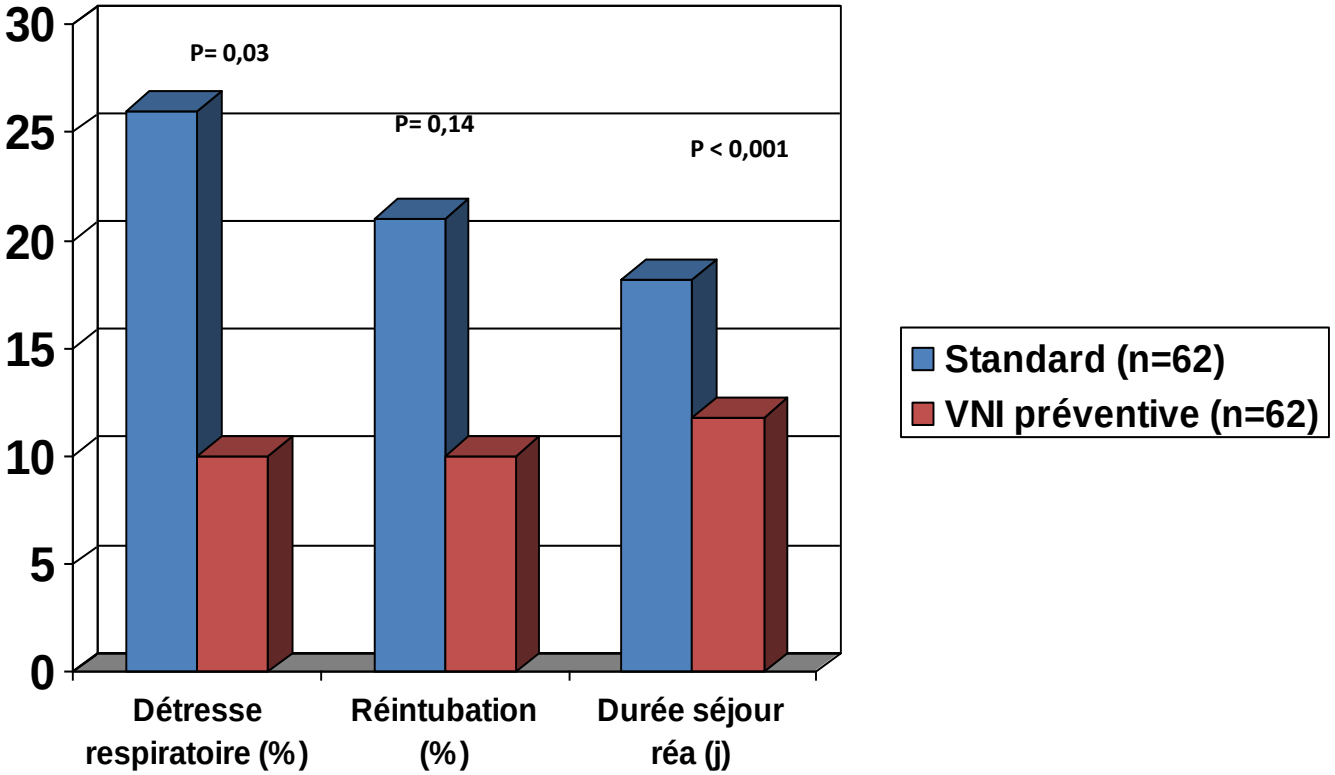
NIV in Upright position

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



Barriers and Strategies for Early Mobilization of Patients in Intensive Care Units

Rolf Dubb[1]*, Peter Nydahl[2]*, Carsten Hermes[3], Norbert Schwabbauer[4], Amy Toonstra[5], Ann M. Parker[6], Arnold Kaltwasser[1], and Dale M. Needham[7]

[1]Department of Continuing Education of Critical Care Nursing, District Hospital of Reutlingen, Reutlingen, Germany; [2]Neurological Intensive Care Unit and Stroke Unit, University Hospital of Schleswig-Holstein, Kiel, Germany; [3]Intensive Care Unit, Helios Klinikum Siegburg, Siegburg, Germany; [4]Department of Medicine, University Hospital Tübingen, Tübingen, Germany; and [5]Physical Medicine and Rehabilitation, Johns Hopkins Hospital, [6]Division of Pulmonary and Critical Care Medicine, Johns Hopkins University School of Medicine, and [7]Pulmonary and Critical Care Medicine, Johns Hopkins University, Baltimore, Maryland

Ann Am Thorac Soc Vol 13, No 5, pp 724–730, May 2016

Table 1. Patient-related barriers to early mobilization and related strategies to overcome barriers

Barriers	Strategy (References)
Physical barriers	
High severity of illness, patients "too sick" or "too well"	Interprofessional meetings*†; PT screening of ICU patients*† (32, 41, 42, 46)
Hemodynamic instability, arrhythmias	Stepwise approach*†‡; protocols*†‡; safety criteria*†‡; avoid mobilization until 2 h after increase in vasopressor dose*†, valid assessment *†‡ (9, 10, 19, 23, 24, 26, 31, 44, 46, 48, 50)
Respiratory instability/distress, ventilator asynchrony	Stepwise approach to mobility, including a safety check after each step*†‡; protocol for standardized mobilization, including safety criteria*†‡; adjust F_{IO_2}, PEEP, or other ventilator settings for mobilization*† (9, 10, 19, 24, 26, 31)
Pain	Screen for pain*†; provide pain medication before mobilization*† (10, 48)
Poor nutritional status	Perform nutritional screening‡* (38)
Obesity (e.g., BMI ⩾30)	Use protocol for standardized mobilization*†‡ (33, 47, 48)

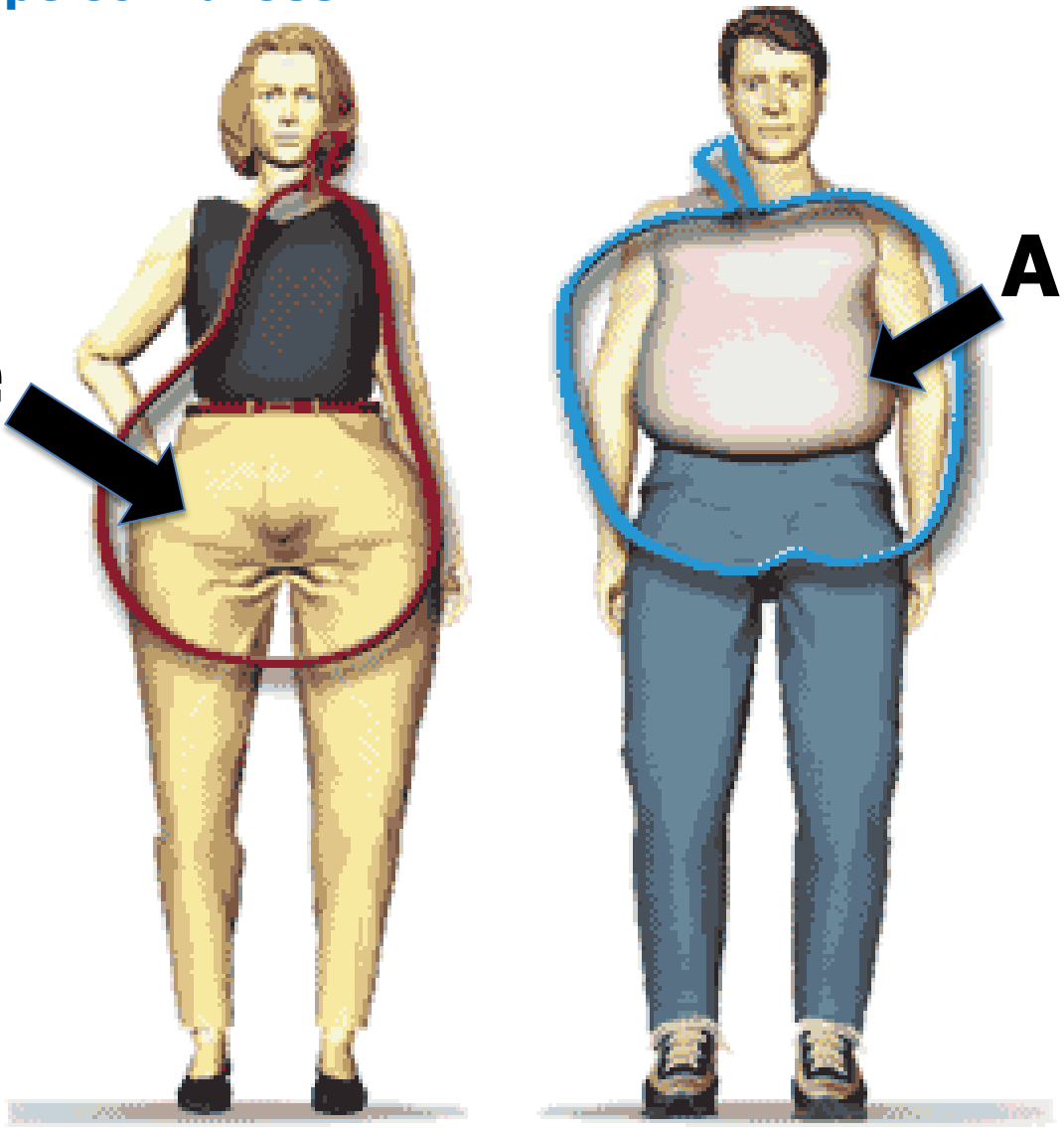
COMPRESSION PNEUMATIQUE INTERMITTENTE

Il n'y a pas « une obésité » mais « des obésités »

= possible explication des résultats controversés d'études sur les patients obèses

= médecine « personnalisée »

Gynoïde
(hanches,
cuisses,
Fesses)



Androïde
(tronc)

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7. Position
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9. Post-extubation period: Ventilatory Support
10. **Take home messages**

Take Home Messages

1. Difficult intubation: anticipate and optimize (NIV…)
2. Volume=Pressure at similar assistance level
3. Tidal Volume set according Predicted Body Weight
4. « High PEEP »
5. SBT= T-tube or PSV=0+PEEP=0
6. Post-extubation : at risk for acute airway obstruction
7. CPAP-NIV post-extubation++

Thanks for the attention