Comment prévenir l'échec de l'extubation chez le patient obèse

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### Obesity in the critically ill: a narrative review



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Body mass index (kg/m²)	Class	Body mass index (kg/m²)	Class
25–29.9	Overweight	25–29.9	Overweight
30–34.9	Class I obesity	≥30	Obese
35–39.9	Class II obesity	35–39.9	Severe obesity
≥40	Class III obesity	40–49.9	Morbid obesity
		≥50	Super obesity

Worldwide trends in underweight and obesity from 1990 to 2022: a pooled analysis of 3663 population-representative studies with 222 million children, adolescents, and adults NCD Risk Factor Collaboration, Lancet 2024



There is no a « single » obesity but « several » obesity



#### Ventilatory Mechanics in the Patient with Obesity

Luigi Grassi, M.D., Robert Kacmarek, Ph.D., Lorenzo Berra, M.D.

Anesthesiology 2020; 132:1246-56



Changes induced by central obesity in Upright position

#### Changes induced by central obesity in **Supine** position



Weaning obese from MV: Conflicting Results Association of obesity with prolonged mechanical ventilation (Early Studies)

Protective effect of obesity on the weaning process, including a shorter time to successful extubation, without differences in reintubation rates

A recent meta-analysis excluded BMI in the final model for predicting extubation failure

#### Effect of obesity on intensive care morbidity and mortality: A meta-analysis, Akinnusi ME, Crit Care Med 2008; 36:151–158



# **Protective effects of Obesity**

#### First successful Extubation, O'Brien Jr Crit Care Med 2012



#### Extubation Failure Predictors, Torrini. Critical Care 2021

Variables		LnOR (95%IC)
History of cardiac disease		0.35 [0.14, 0.56]
History of respiratory disease	<b>⊢</b> −	0.39 [0.16, 0.64]
Age	⊢■→	0.42 [0.25, 0.6]
Pneumonia at cause of MV	<b>⊢</b> −−−1	0.39 [0.16, 0.64]
Duration of MV before extubation		0.64 [0.4, 0.87]
SAPS II		0.54 [0.32, 0.71]
Heart rate at extubation	· <b>■</b> +	0.39 [0.15, 0.68]
Lower GCS at extubation	·	1.08 [0.44, 1.7]
RSBI at extubation		0.83 [0.52, 1.16]
Lower PaO2/FiO2 at extubation		0.34 [0.19, 0.47]
Lower hemoglobin at extubation	· · · · · · · · · · · · · · · · · · ·	0.9 [0.5, 1.4]
NIF at extubation	·	0.74 [0.24, 1.24]
2.5 -1.5 -0.5	0.5 1.5	2.5 3.5

### The Obesity paradox

- in chronic diseases
  - heart failure
  - coronary artery disease
  - end-stage kidney disease
- in acute conditions
  - pneumonia
  - sepsis
  - acute respiratory distress syndrome (ARDS)
  - or critical illness in general



# Weaning Issues in Obese Patients

The controversy regarding weaning Obese patients primarily involves the use of PEEP/CPAP during the SBT.

Essentially, all other aspects of weaning are the same as with lean patients.

There are no RCTs comparing approaches to weaning the obese patient.

# work of breathing in morbidly obese critically ill 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.

PostExtubation Ventilatory Support: Conflicting Results

#### Noninvasive ventilation for prevention of postextubation respiratory failure in obese patients. *A.A. El Solh ERJ 2006*



Beneficial Effects of Noninvasive Ventilation after Extubation in Obese or Overweight Patients. A Post Hoc Analysis of a Randomized Clinical Trial, *Thille et al AJRCCM 2022* 

	Intubation at day 7/to	tal number of patlents					
Subgroup	NonInvasive Ventilation group	High-Flow Oxygen Therapy group	Odds Ratio (95% Cl)				I
All patlents	40/330 (12%)	53/293 (18%)	0.62 (0.40-0.97)				
Body mass Index							
< 25 kg/m <sup>2</sup>	25/126 (20%)	12/87 (14%)	1.55 (0.73–3.28)	-	-		
25 to 29 kg/m <sup>2</sup>	8/92 (9%)	24/112 (21%)	0.35 (0.15–0.82)				
≥ 30 kg/m²	7/112 (6%)	17/94 (18%)	0.30 (0.12-0.76)				
					2	3	4
			Nonin Ventilatio	vasive on Better	High-l The	Flow C rapy B	)xygen letter

#### **Obese**

#### **Overweight**



Benefit with preventive noninvasive ventilation in subgroups of patients at high-risk for reintubation: a post hoc analysis, Hernandez et al JIC 2022



Reintubation according to the type of noninvasive respiratory supportive

# Effect of non-invasive ventilation after extubation in critically ill patients with obesity in France: a multicentre, unblinded, pragmatic randomised clinical trial

Audrey De Jong, Anne Bignon, François Stephan, Thomas Godet, Jean-Michel Constantin, Karim Asehnoune, Aude Sylvestre, Juliette Sautillet, Raiko Blondonnet, Martine Ferrandière, Philippe Seguin, Sigismond Lasocki, Amélie Rollé, Pierre-Marie Fayolle, Laurent Muller, Emmanuel Pardo, Nicolas Terzi, Séverin Ramin, Boris Jung, Paer-Selim Abback, Philippe Guerci, Benjamine Sarton, Hadrien Rozé, Claire Dupuis, Joel Cousson, Marion Faucher, Virginie Lemiale, Bernard Cholley, Gerald Chanques, Fouad Belafia, Helena Huguet, Emmanuel Futier, Elie Azoulay, Nicolas Molinari, Samir Jaber, on behalf on the EXTUB-OBESE trial group\*

Lancet Respiratory Medicine. Jan 2023

<u>**OBJECTIVE</u>**: To determine whether NIV is superior to oxygen (HFNO or standard) following extubation of critically obese patients (ventilated more than 6h). <u>**Composite endpoint</u></u>: reintubation (72h), crossover**, or the premature discontinuation for intolerance</u></u>

#### **Primary outcome (Treatment failure)**



### **Reintuation within 3 days**



Humidified Noninvasive Ventilation versus High-Flow Therapy to Prevent Reintubation in Obese Patients: A Randomized Clinical Trial, Hernandez et al AJRCCM 2024



# **Primary Outcome: Reintubation**



ARR: 9.7% [95%CI -4.9 to 24.4]

# Specificities of weaning in patients with obesity

- Prolonged release of drugs: stop sedation as early as possible (as in patients without obesity)
- Spontaneous breathing trial: prefer T-tube or pressure support with 0 pressure support and 0 PEEP
- Extubation as soon as possible
- Preventive/curative NIV and HFNC might help

## Thanks for the attention

