Recrutement alvéolaire

C.P.A.P. : le Pour

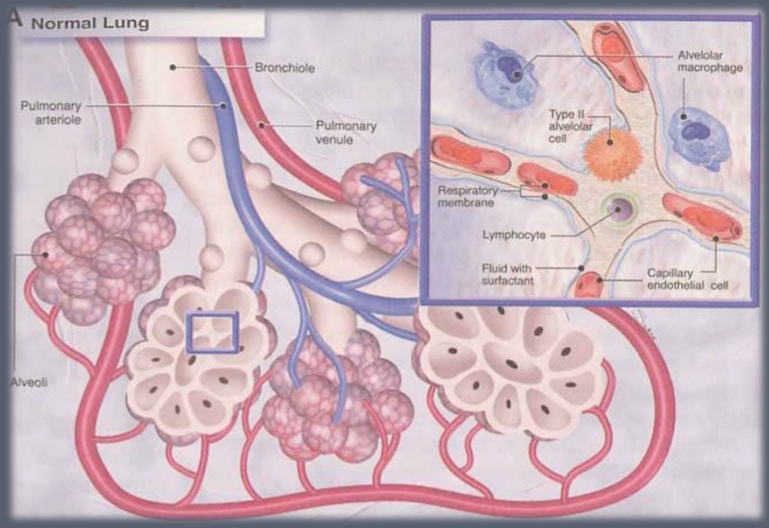
Marianne Devroey

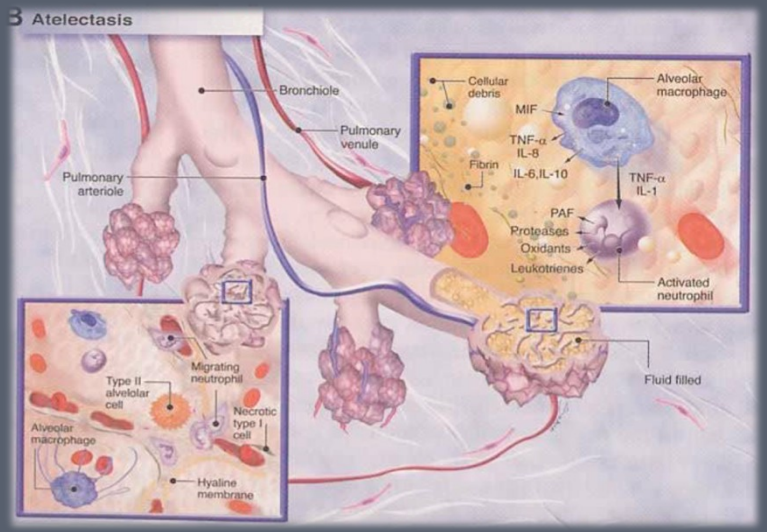
Département des Soins Intensifs

CUB Erasme (1070 Bruxelles)

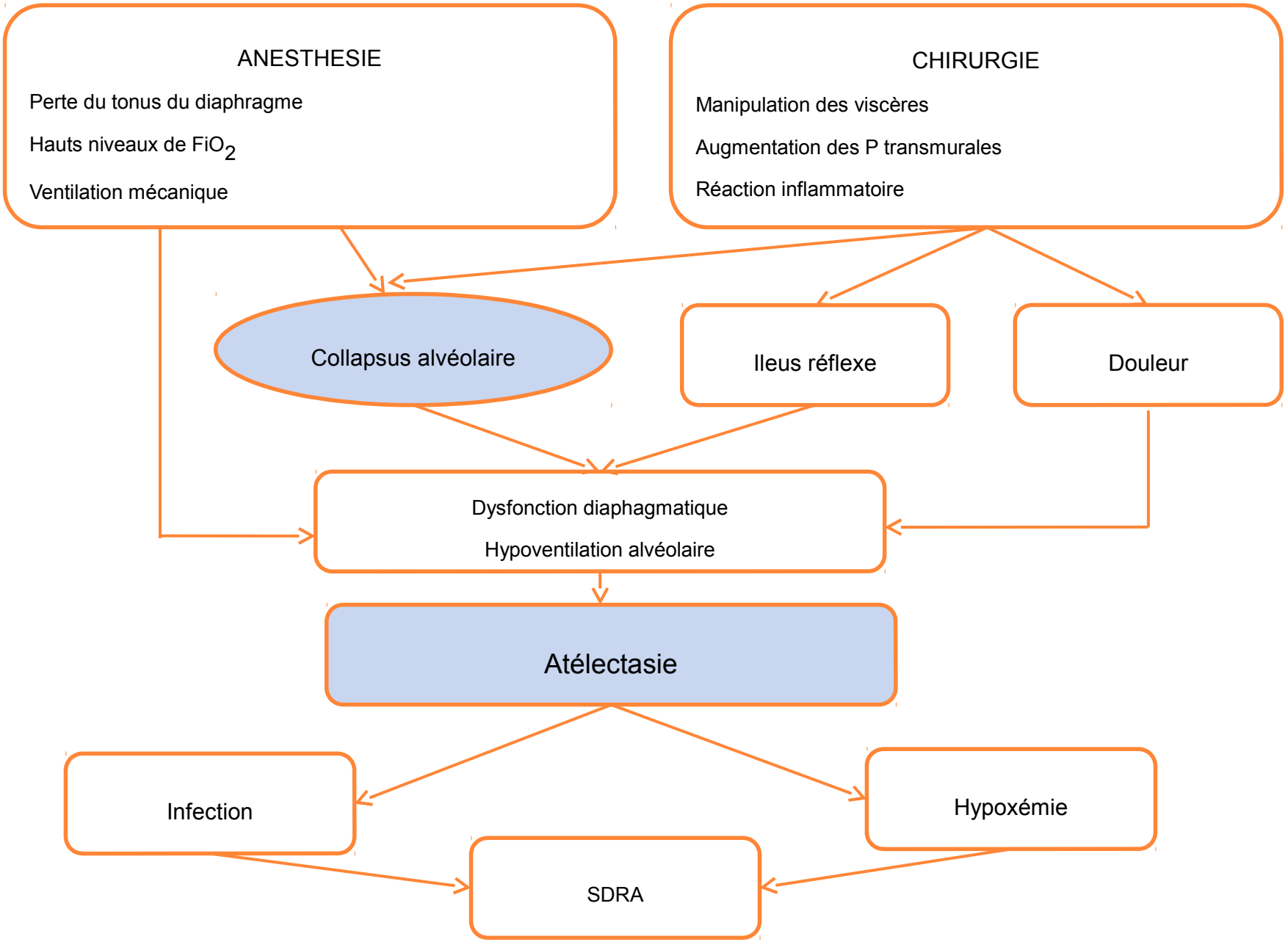
Hôpital Erasme

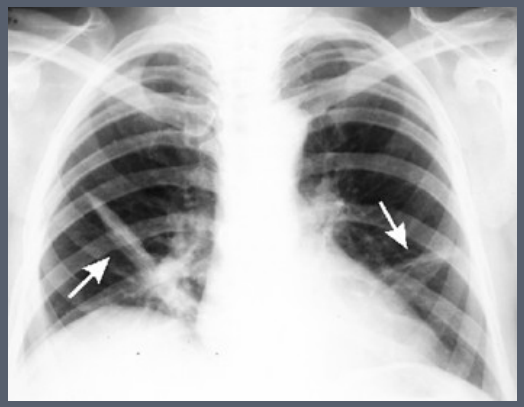
ULB

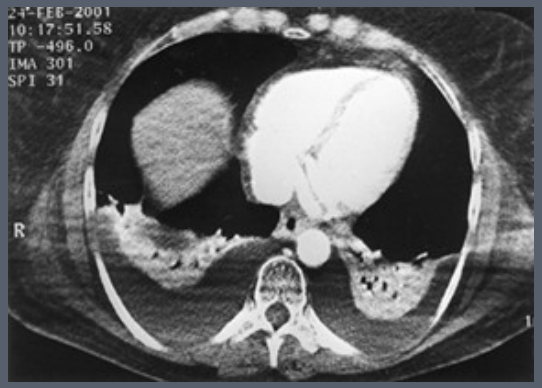


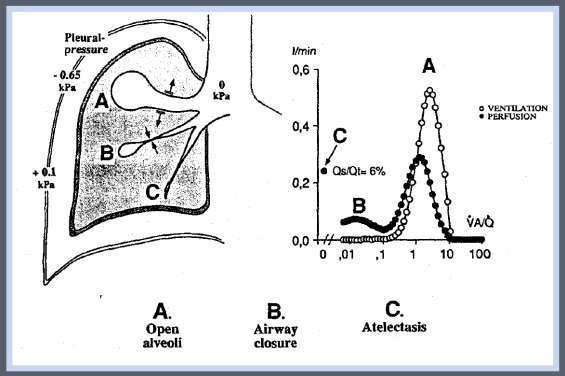


Dérecrutement alvéolaire: Physiopathologie et prise en charge


ANESTHESIE
Perte du tonus du diaphragme
Hauts niveaux de FiO_2
Ventilation mécanique
CHIRURGIE
Manipulation des viscères
Augmentation des P transmurales
Réaction inflammatoire
Collapsus alvéolaire
Ileus réflexe
Douleur
Dysfonction diaphagmatique
Hypoventilation alvéolaire
Atélectasie
Infection
Hypoxémie
SDRA

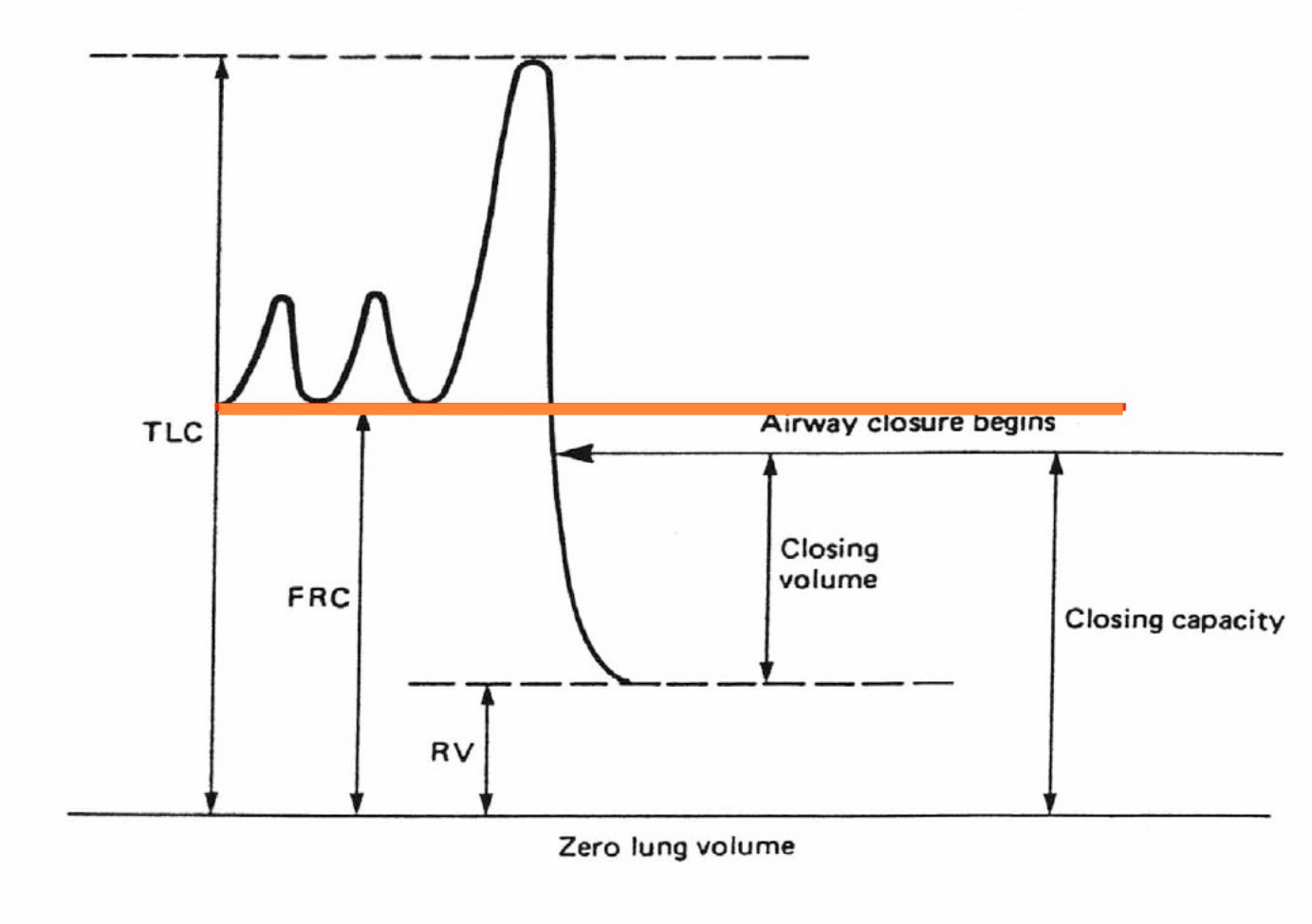




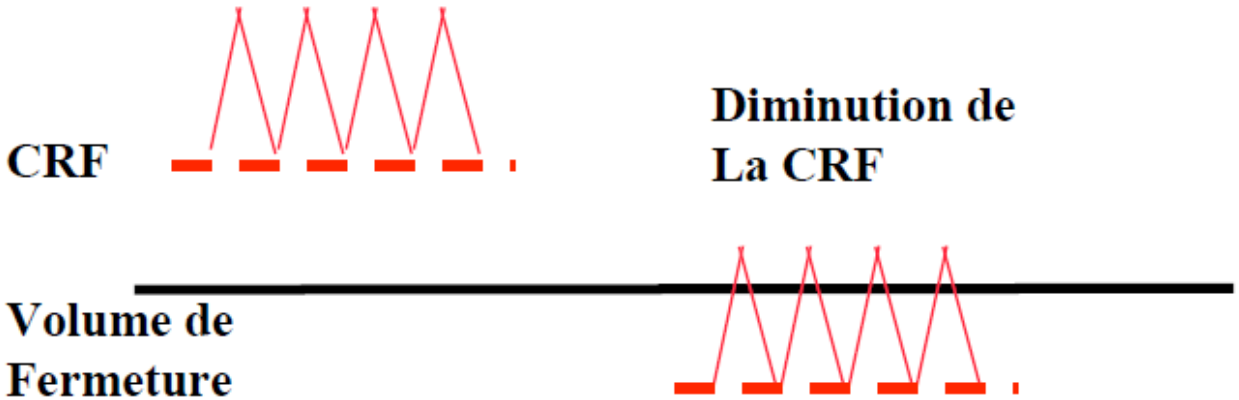


Principales causes des atélectasies

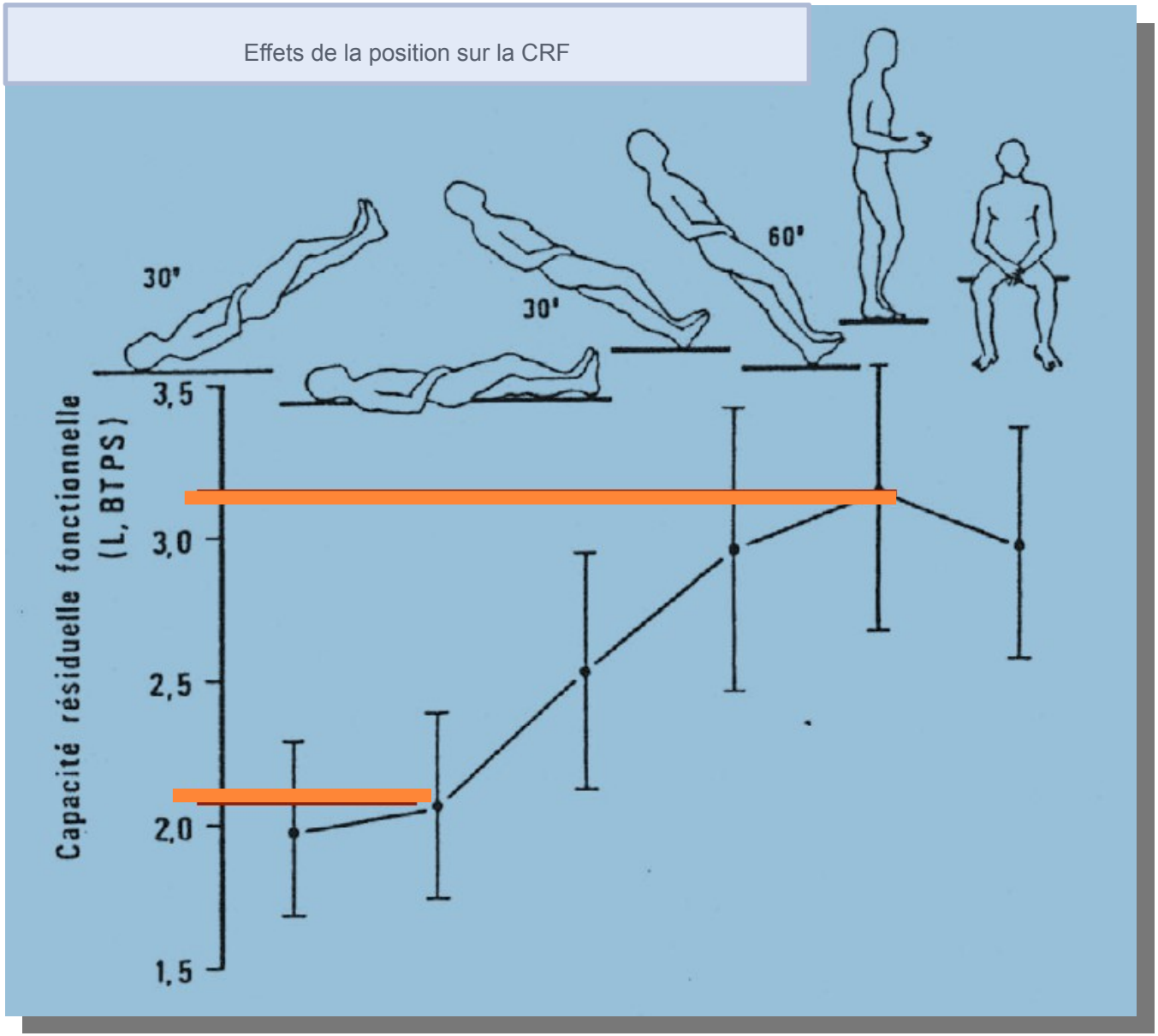
Les volumes et les capacités pulmonaires



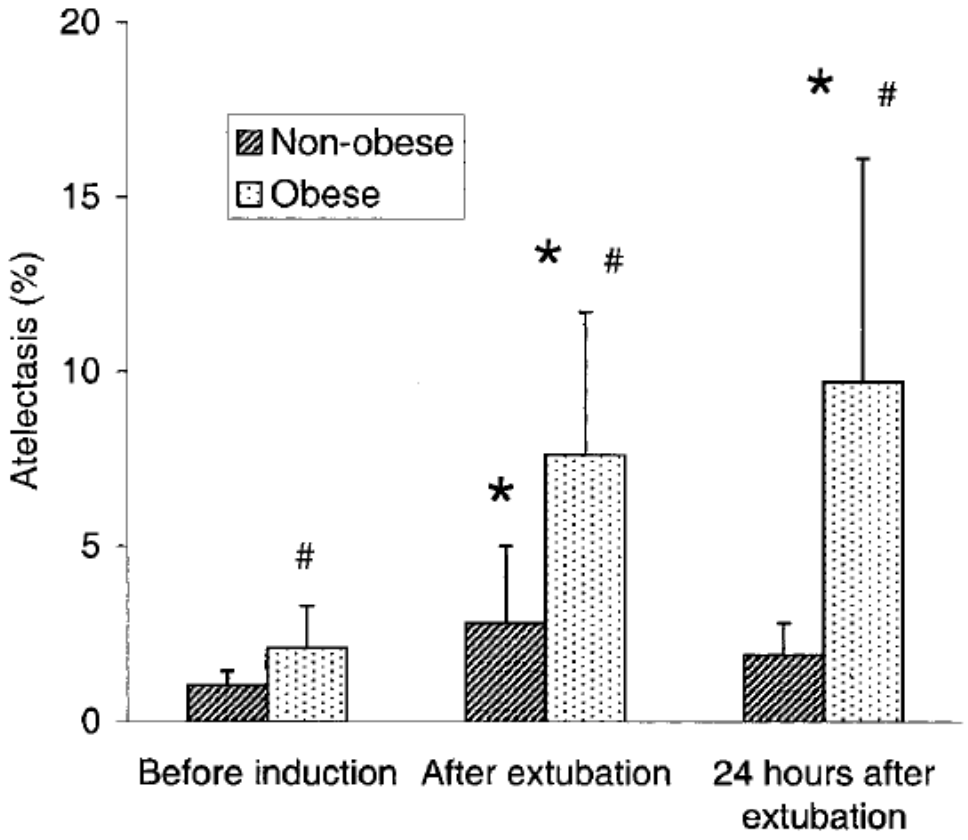
Principale cause:
baisse de la CRF en dessous du volume de fermeture



Effets de la position sur la CRF



Obésité et atélectasies post-opératoires



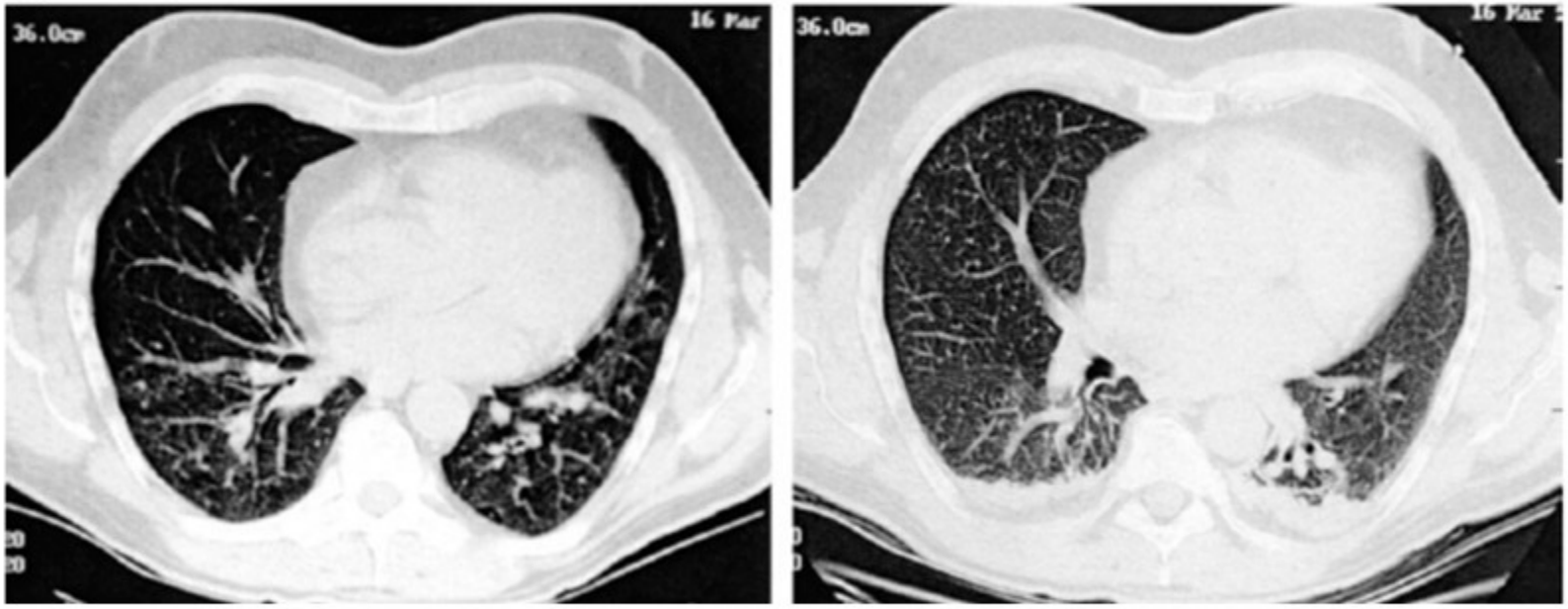
Eichenberger AS et al Anesth Analg 2002,95:1788-1792

Prevention of Atelectasis Formation During Induction of General Anesthesia

Marco Rusca, MD*, Stefania Proietti, MD†, Pierre Schnyder, MD†, Philippe Frascarolo, PhD*, Göran Hedenstierna, MD, PhD‡, Donat R. Spahn, MD*, and Lennart Magnusson, MD, PhD*

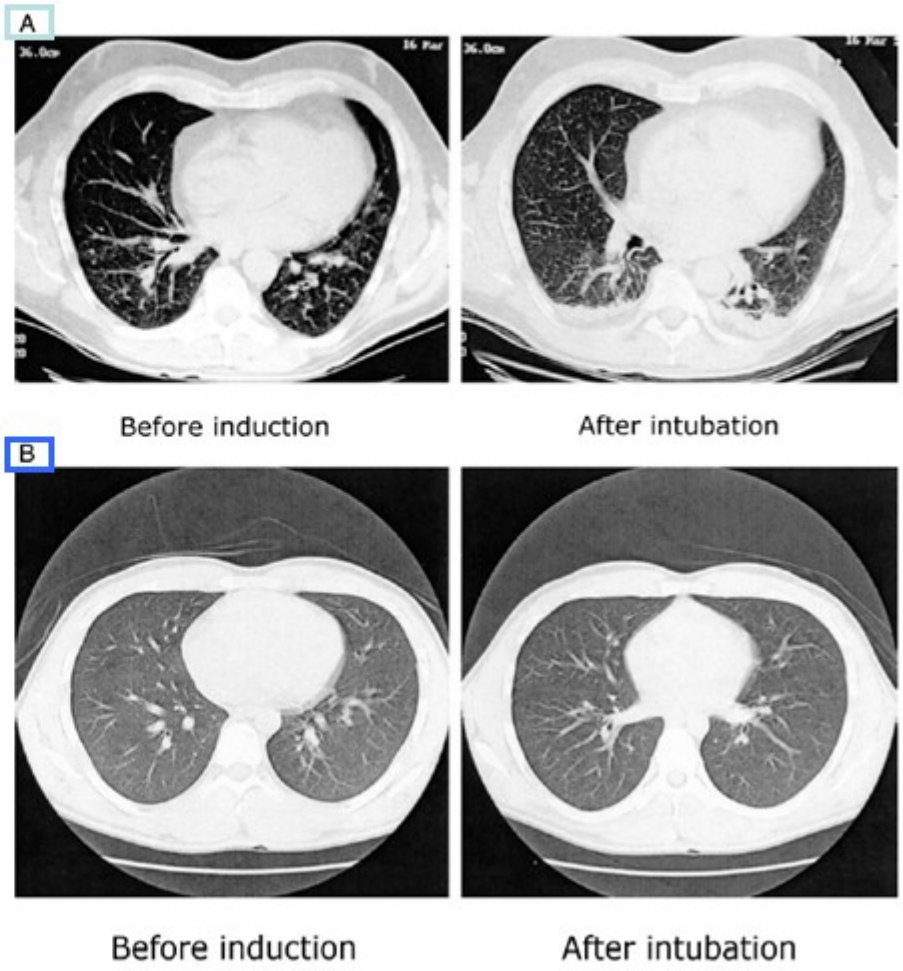
Anesth Analg 2003;97:1835–9

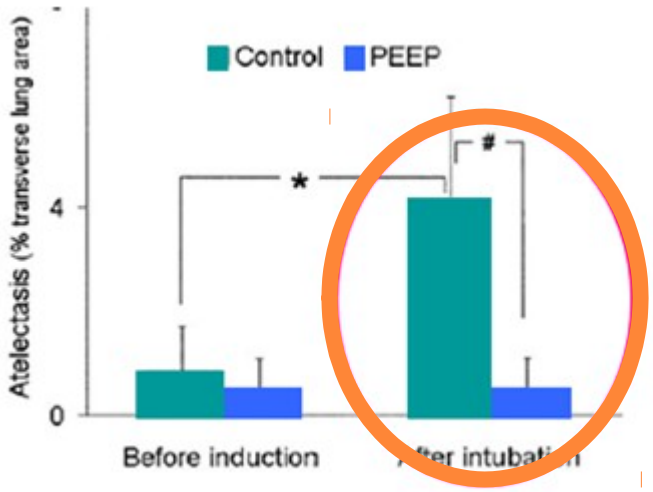
A

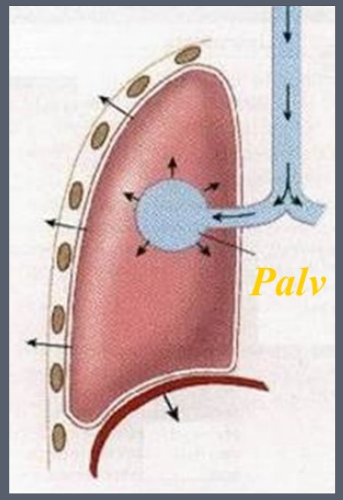


Après quelques minutes

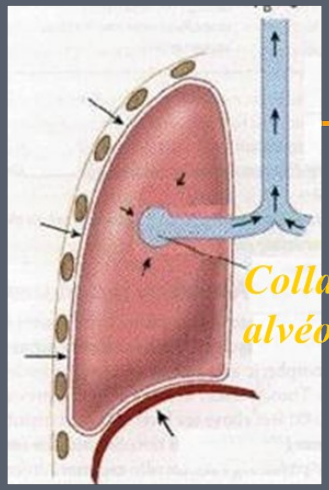
PEEP (B) ou non (A) à l'induction et prévention des atélectasies





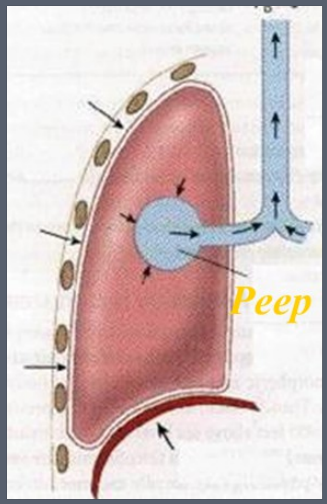


Inspiration



Expiration

+ Peep



Expiration

Conséquences ventilatoires de la CPAP

- Amélioration des échanges gazeux:
  - Augmentation du recrutement alvéolaire, avec redistribution du liquide alvéolaire si œdème
  - Elévation de la CRF et amélioration de l'oxygénation
  - Augmentation du rapport ventilation/perfusion
- Baisse des résistances pulmonaires
- Diminution du travail respiratoire

Bradley et al, ARRD 1992
Baratz et al, Chest 1992
Lenique et al, AJRCCM 1997
Chadda et al, CCM 2002

CPAP & Chirurgie cardiaque

- Comparaison entre CPAP et prise en charge standard (oxygénothérapie + kinésithérapie)
  - Amélioration de l'oxygénation et de certains paramètres ventilatoires
  - Aucune diminution de l'incidence des atélectasies dans les groupes traités par CPAP

Jousela I et al, Acta Anaesthesiol Scand 1994

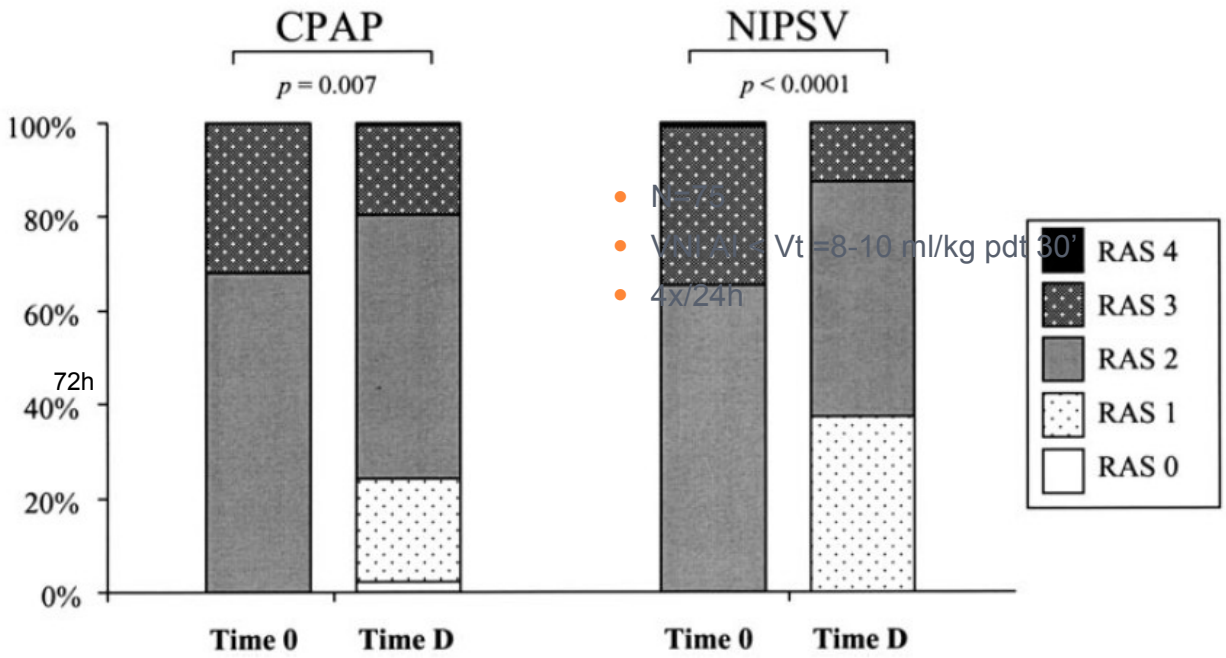
- Utilisation préventive de la VNI pendant 48h post chirurgie (N=96)
  - Groupe 1: BiPAP(1h/3) AI = 12cmH2O - Peep = 5 cmH_2O
  - Groupe 2: CPAP (1h/3) Peep = 5 cmH_2O
  - Groupe 3: IS (20 minutes/2h)
  - Amélioration de l'oxygénation et réduction de l 'amputation des volumes pulmonaires dans les groupes 1 et 2
  - Incidence des atélectasies (12-15%) comparables dans les 3 groupes

Matte P et al Acta Anaesthesiologica Scandinavica 2000

Continuous Positive Airway Pressure Versus Noninvasive Pressure Support Ventilation to Treat Atelectasis After Cardiac Surgery

Patrick Pasquina, RN*, Paolo Merlani, MD†, Jean Max Granier, RN*, and Bara Ricou, MD†

- N=7
- CPAP 5 cmH_2O pdt 30'
- 4x/24h



- N=7
- VNI AVQ : Vt =8-10 ml/kg pdt 30'
- 4x/24h

72h

(Anesth Analg 2004;99:1001–8)

Continuous Positive Airway Pressure Versus Noninvasive Pressure Support Ventilation to Treat Atelectasis After Cardiac Surgery

Patrick Pasquina, RN*, Paolo Merlani, MD†, Jean Max Granier, RN*, and Bara Ricou, MD†

Variables	CPAP N=75	VNI N=75
pH	7.47	7.46
$PaCO_2$ (mmHg)	36	35
PaO_2/FiO_2 (mmHg)	280	301
Vt (ml)	1080	1110
VEMS (ml)	880	900
Durée de séjour en réa (H)	65	60
Durée de séjour à l'hôpital (J)	14	13
Mortalité en réa (n)	1	0
Mortalité à l'hôpital (n)	0	0

(Anesth Analg 2004;99:1001–8)

CPAP & Chirurgie digestive

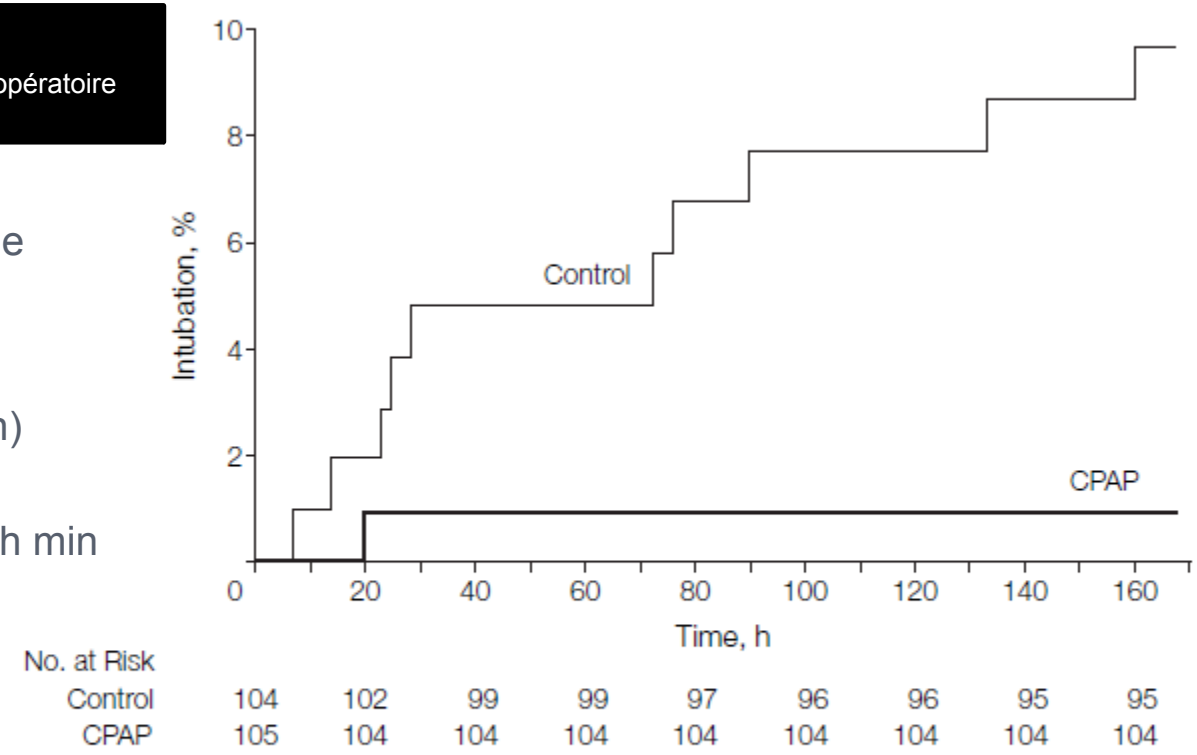
Continuous Positive Airway Pressure for Treatment of Postoperative Hypoxemia

A Randomized Controlled Trial

N=209

Fréquence d'intubation en post opératoire

- Chir abdominale lourde
  p < 0.005
- Inclusion: PA/FI < 300
  (1ère heure extubation)
- CPAP 7,5 cmH_2 pdt 6h min
  vs O_2



Squadrone et al, JAMA 2005, 293(5):589-595

Hypoxémie post-opératoire: Intérêt de la CPAP

	Contrôle	CPAP	p
Durée de séjour en réa (J)	2.6	1.4	0.09
Pneumopathie (n)	10	2	0.02
Infection (n)	11	3	0,03
Sepsis (n)	9	2	0.03
Fistule	6	1	
pneumopathie	3	1	
Décès (n)	3	1	NS

Squadrone et al, JAMA 2005, 293(5):589-595

CMAJ. 2005 March 15; 172(6): 744.
doi: 10.1503/cmaj.050193
PMCID: PMC552885
In the Literature

Can CPAP prevent the need for endotracheal intubation in patients with hypoxemia after abdominal surgery?

Ryan Foster and Damon C. Scales

Results: The trial was stopped after the first interim analysis (n = 209) because the intubation rate in the oxygen plus CPAP group was lower than in the oxygen only group (1% [1/105] v. 10% [10/104], p = 0.005). Severe hypoxemia was the indication for intubation in 9 of the 11 patients. Several secondary end points also favoured the CPAP group, including reduced incidence of pneumonia, infection and sepsis. There were no significant differences between the groups in hospital mortality or in ICU or hospital lengths of stay.

Continuous positive airway pressure for treatment of respiratory complications after abdominal surgery: a systematic review and meta-analysis.

Ferreyra GP, Baussano I, Squadrone V, Richiardi L, Marchiaro G, Del Sorbo L, Mascia L, Merletti F, Ranieri VM.

METHODS:

Medical literature databases were searched for randomized controlled trials examining the use of CPAP versus standard therapy in patients undergoing abdominal surgery. The meta-analysis estimated the pooled risk ratio and the number needed to treat to benefit (NNTB) for PPCs, atelectasis, and pneumonia.

Ann. Surg. 2008, 247(4):617-26.

CRPO

N = 9 RCT

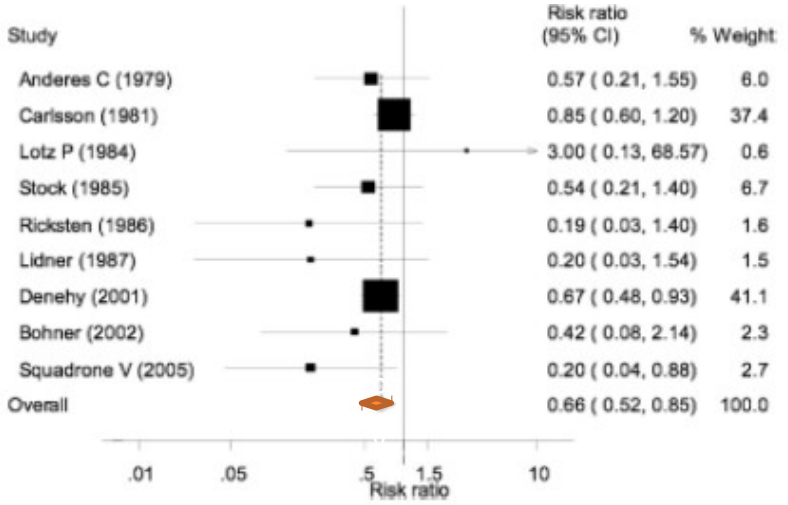


FIGURE 2. Forest plot showing the association of PPCs and CPAP versus standard treatment. CI indicates confidence interval.

atéletasies

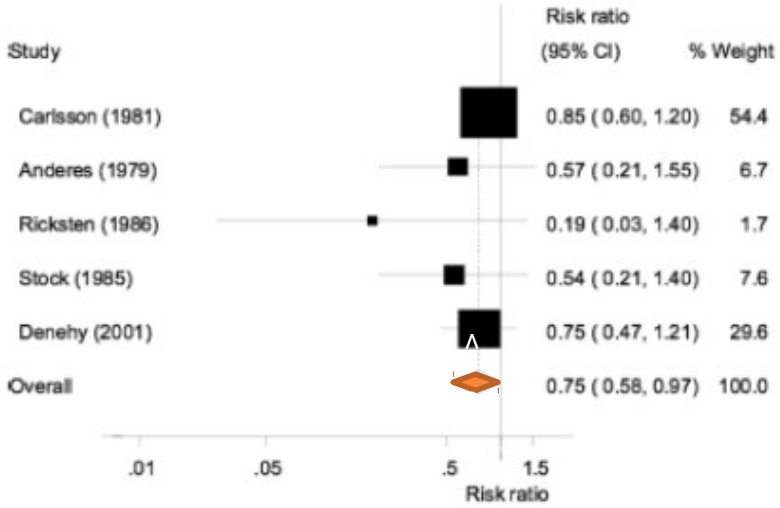


FIGURE 4. Forest plot showing the association of atelectasis and CPAP ventilation versus standard treatment. CI indicates confidence interval.

pneumonies

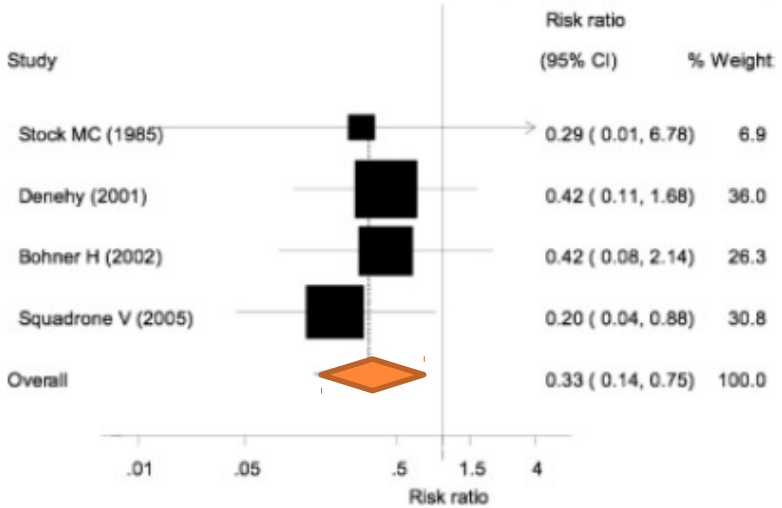


FIGURE 5. Forest plot showing the association of pneumonia and CPAP ventilation versus standard treatment. CI indicates confidence interval.

Strategies To Reduce Postoperative Pulmonary Complications after Noncardiothoracic Surgery: Systematic Review for the American College of Physicians

Ann Intern Med. 2006;144:596-608.

Valerie A. Lawrence, MD; John E. Cornell, PhD; and Gerald W. Smetana, MD

Strength of evidence for strategies to reduce risk of postoperative pulmonary complications*

Supported by good evidence	Postoperative lung expansion modalities
Supported by fair evidence	Selective postoperative nasogastric tube use Short-acting neuromuscular blockade
Balance of benefit and harm too close to justify recommendation	Laparoscopic (vs open) operation†
At least fair evidence that strategy does *not* reduce risk or harm outweighs benefit	Routine total parenteral or enteral nutrition Right heart catheterization
Insufficient or conflicting data	Intraoperative neuraxial blockade Postoperative epidural analgesia‡ Smoking cessation

QUICK LOOK

Strength of evidence for strategies to reduce risk of postoperative pulmonary complications*

Supported by good evidence	Postoperative lung expansion modalities
Supported by fair evidence	Selective postoperative nasogastric tube use Short-acting neuromuscular blockade
Balance of	Laparoscopic (vs open) operation†
At least fair evidence that strategy does *not* reduce risk or harm outweighs benefit	Routine total parenteral or enteral nutrition Right heart catheterization
Insufficient or conflicting data	Intraoperative neuraxial blockade Postoperative epidural analgesia‡ Smoking cessation

CPAP & Chirurgie thoracique

CPAP Increases 6-Minute Walk Distance After Lung Resection Surgery

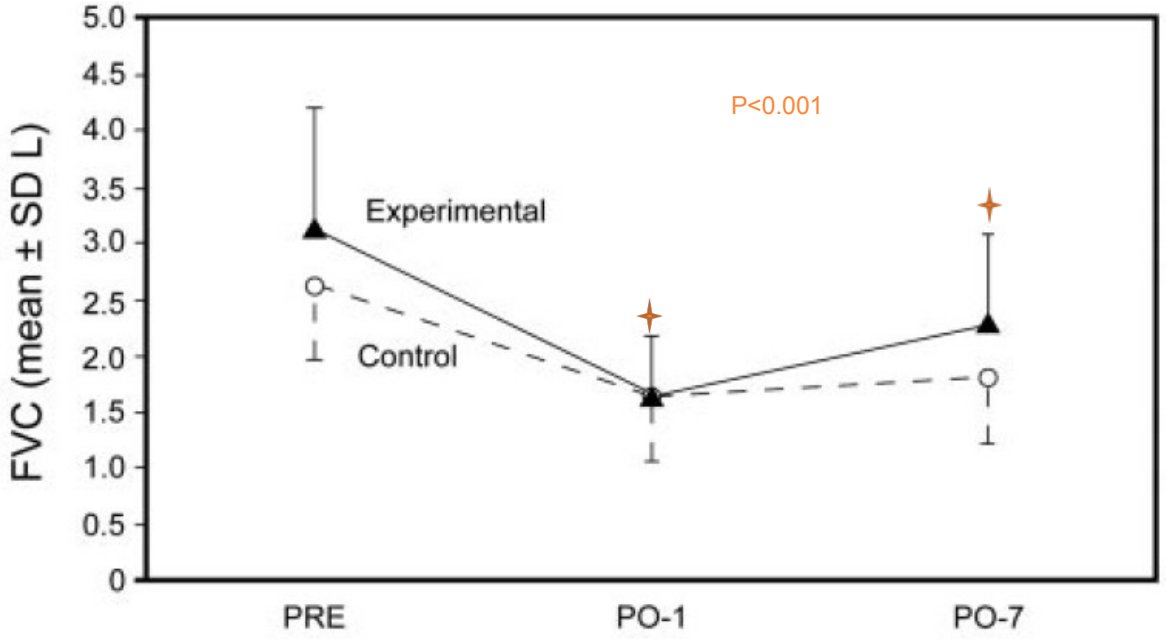
Flávio POS Nery CPT MSc, Agnaldo J Lopes MD PhD, Denise N Domingos CPT, Renato F Cunha CPT, Márcia G Peixoto CPT, Cláudio Higa MD MSc, Rodolfo A Nunes MD PhD, and Eduardo H Saito MD PhD

N=30

Contrôle: exercices respi

Expérimental: CPAP

10 cmH_2O pdt 30' 2x/24h



RESPIRATORY CARE • MARCH 2012 VOL 57 NO 3

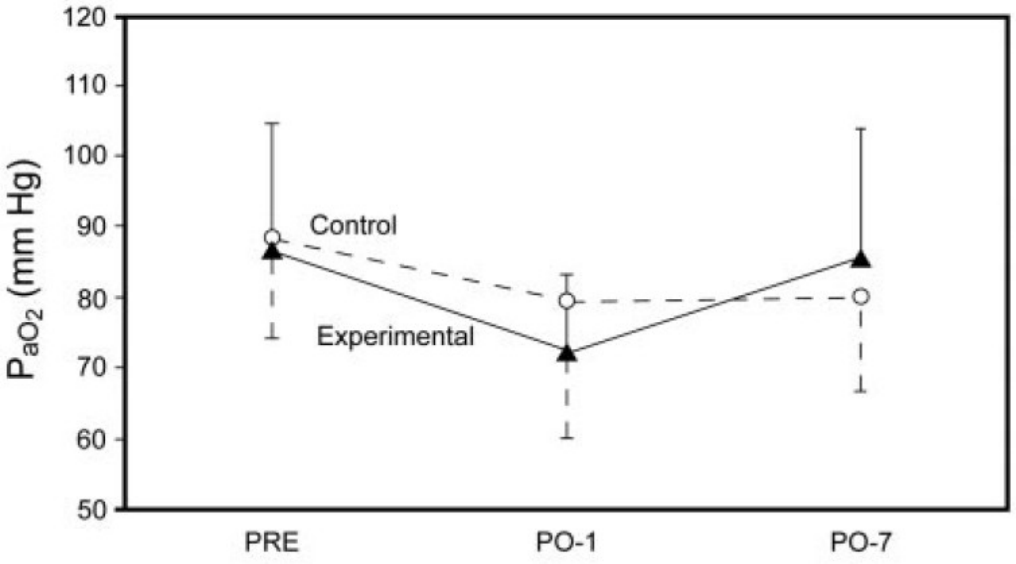
CPAP Increases 6-Minute Walk Distance After Lung Resection Surgery

Flávio POS Nery CPT MSc, Agnaldo J Lopes MD PhD, Denise N Domingos CPT, Renato F Cunha CPT, Márcia G Peixoto CPT, Cláudio Higa MD MSc, Rodolfo A Nunes MD PhD, and Eduardo H Saito MD PhD

N=30

Contrôle: exercices respiratoires

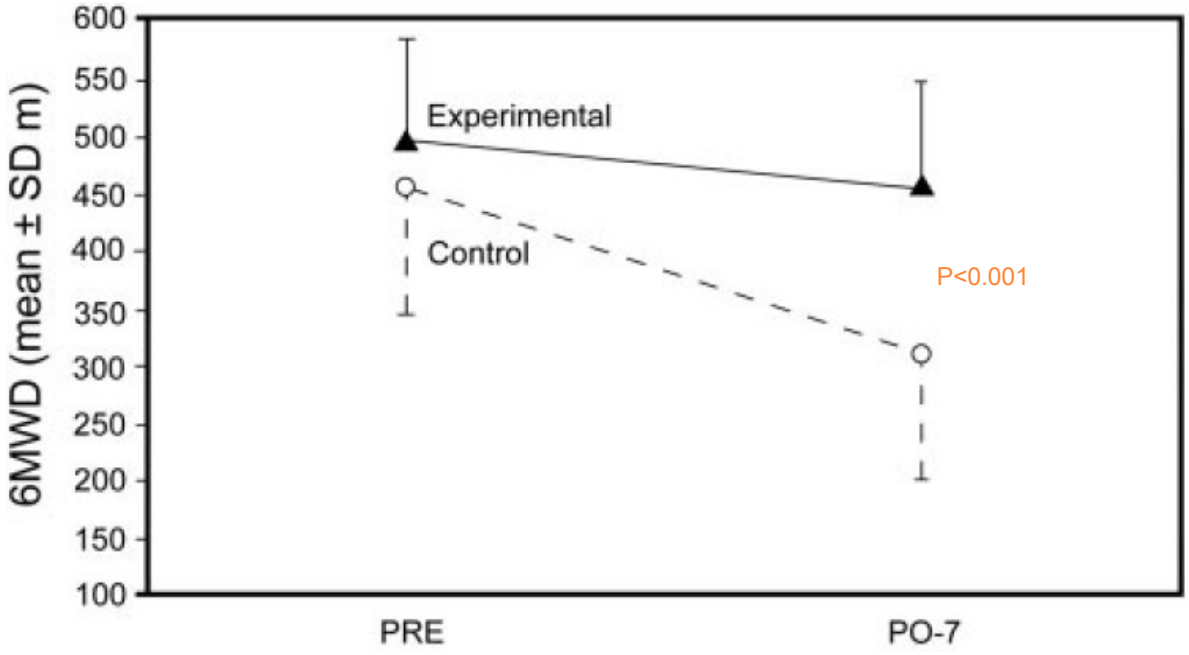
Expérimental: CPAP



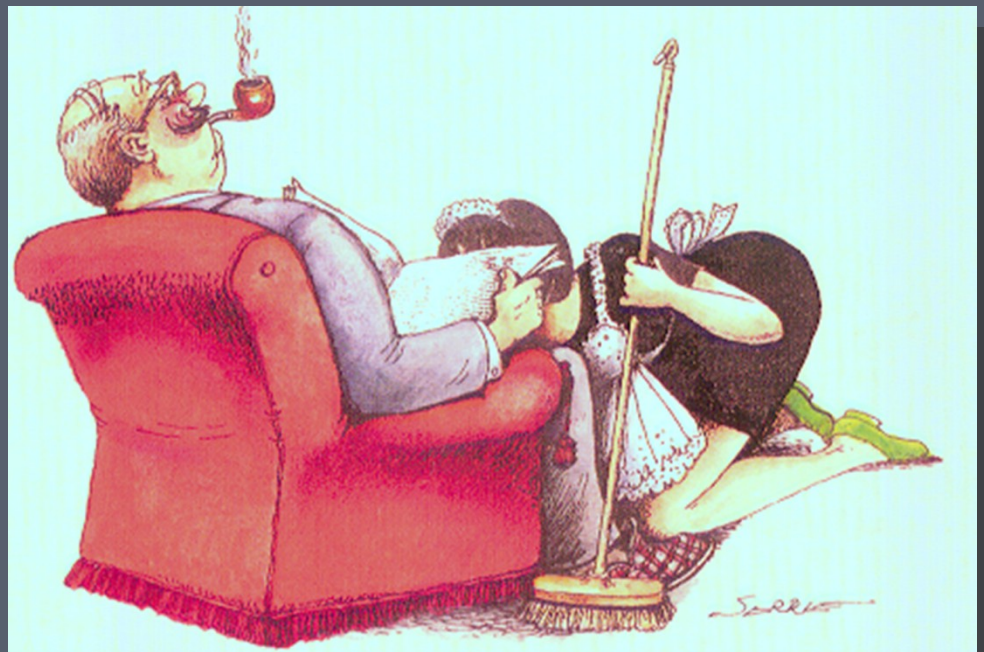
RESPIRATORY CARE • MARCH 2012 VOL 57 NO 3

CPAP Increases 6-Minute Walk Distance After Lung Resection Surgery

Flávio POS Nery CPT MSc, Agnaldo J Lopes MD PhD, Denise N Domingos CPT, Renato F Cunha CPT, Márcia G Peixoto CPT, Cláudio Higa MD MSc, Rodolfo A Nunes MD PhD, and Eduardo H Saito MD PhD



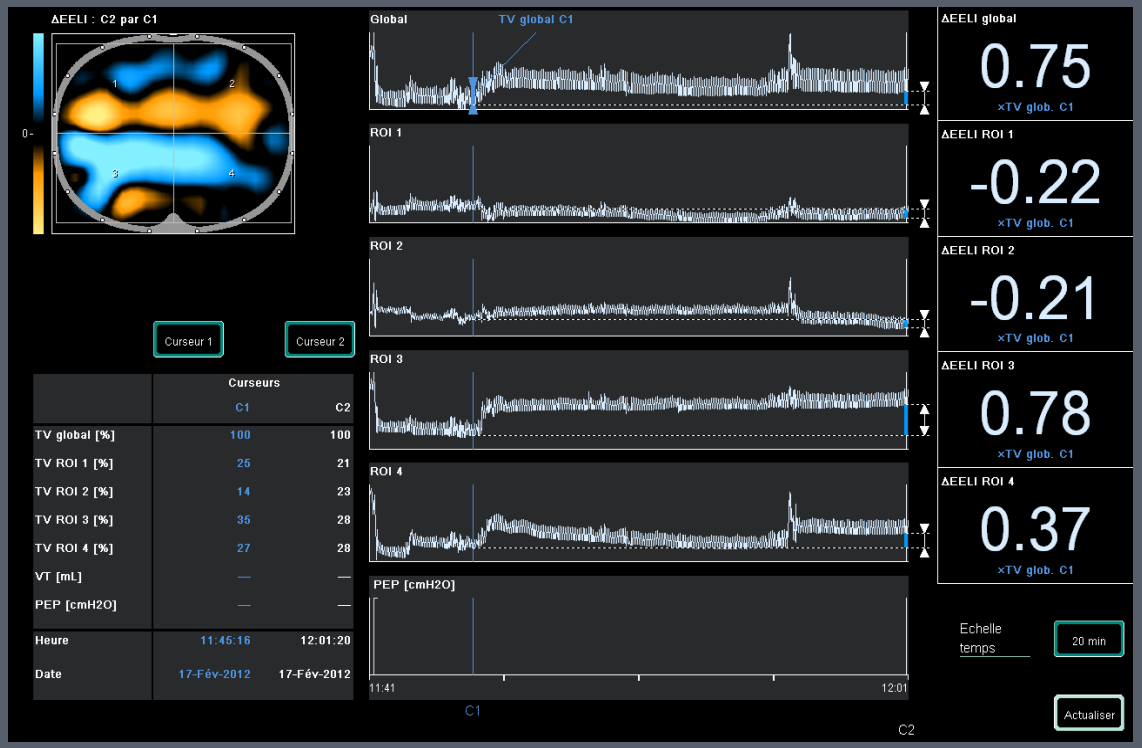
RESPIRATORY CARE • MARCH 2012 VOL 57 NO 3



Ceci n’est pas une PEEP

from Th. Sottiaux

Je vous remercie pour votre attention

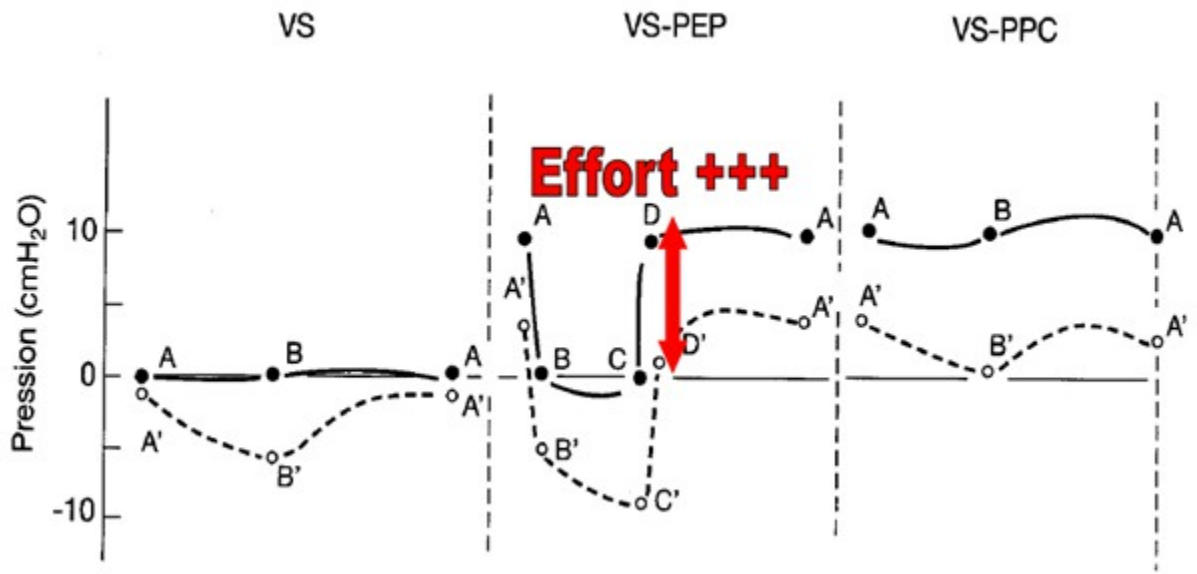


= EELI x 1;75

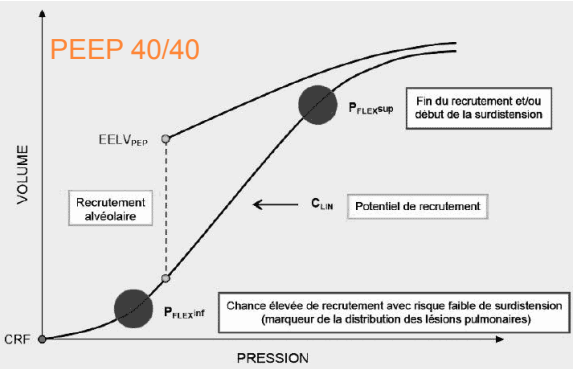
CPAP 8 cmH_2O **>15'**

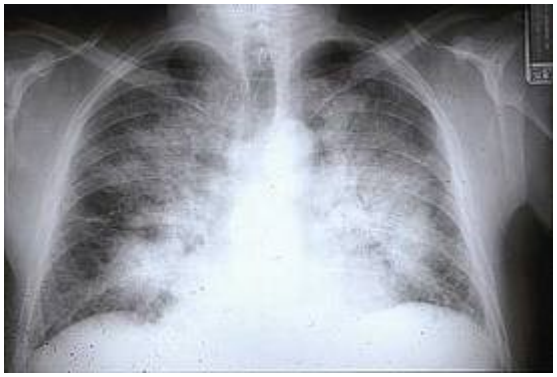
C. Buyse, N. Guiraut, JL Vincent. Electrical Impedance Tomography (EIT) to assess effectiveness of CPT in spontaneously breathing hypoxemic patients, SKR 2012

La CPAP n'est pas une VS-PEP à proprement parler…



J.Roeseler – Clin. Univ. Saint-Luc, Bruxelles





NCBI Resources How To Sign in to NCBI

PubMed.gov
US National Library of Medicine
National Institutes of Health

PubMed | alveolar recruitment continuous positive airway pressure | Search

RSS Save search Advanced Help

Show additional filters

Display Settings: Summary, 20 per page, Sorted by Recently Added

Send to: Filters: Manage Filters

Article types
Clinical Trial

Results: 20 of 46

<< First < Prev Page 1 of 3 Next > Last >>

New feature

Conséquences hémodynamiques de la CPAP

Ssi cardiopathie congestive

- Réduction des pressions trans-murales ventriculaires et Aortiques …Réduction bénéfique de la charge systolique à l'éjection du VG
- Sans réduction significative de la pré charge ventriculaire
- Baisse des résistances pulmonaires
- Délétère au-delà de 10 cmH2O?

Naughton MT et col. Circulation 1995
Lin M et col. Chest 1995
Lenique et al. Am J Respir Crit Care Med 1997
Gérard JL et col. Conf actu SFAR 1999
Chadda K et al CCM 2002

Hémodynamique

CPAP

Augmentation Oxygénation

Augmentation Performances myocardiques

Amélioration :

Précharge
Postcharge
Pression transmurale
+ diminue P remplissage VD

Lenique et al. Am J Respir Crit Care Med 1997 ; Baratz et al. Chest 1992
Bradley et al. Am Rev Respir Dis 1992Chadda et al. CCM 2002

Ssi cardiopathie congestive

Complications respiratoires post-opératoires: physiopathologie et prise en charge

Antoine Roch
Réanimation Médicale
Marseille

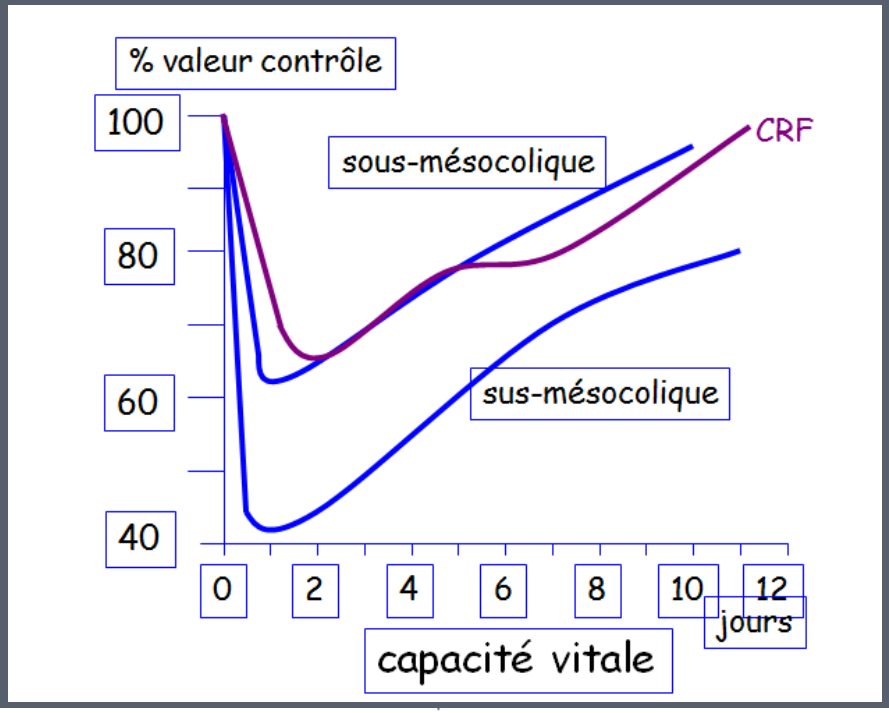
Continuous Positive Airway Pressure Versus Noninvasive Pressure Support Ventilation to Treat Atelectasis After Cardiac Surgery

Patrick Pasquina, RN*, Paolo Merlani, MD†, Jean Max Granier, RN*, and Bara Ricou, MD†

Table 2. Pulmonary Variables and Outcome

Variable	CPAP (n = 75)	NIPSV (n = 75)
pH (mean ± SD)		
T0	7.40 ± 0.04	7.40 ± 0.04
TD	7.47 ± 0.03	7.46 ± 0.03
$Paco_2$, mm Hg (mean ± SD)		
T0	37 ± 5	36 ± 5
TD	36 ± 5	35 ± 4
Pao_2/Fio_2, mm Hg (mean ± SD)		
T0	283 ± 59	289 ± 70
TD	280 ± 38	301 ± 40
VC, mL (mean ± SD) [% preoperative value]		
T0	1010 ± 370 [27]	1020 ± 370 [28]
TD	1080 ± 380 [29]	1110 ± 350 [31]
FEV_1, mL (mean ± SD) [% preoperative value]		
T0	820 ± 300 [31]	820 ± 280 [30]
TD	880 ± 300 [33]	900 ± 280 [33]
SICU stay, h, median (25th–75th percentiles)	65 (47–74)	60 (47–74)
Hospital stay, d, median (25th–75th percentiles)	14 (12–16)	13 (12–17)
SICU mortality, n (%)	0	0
Hospital mortality, n (%)	1 (1)[a]	0

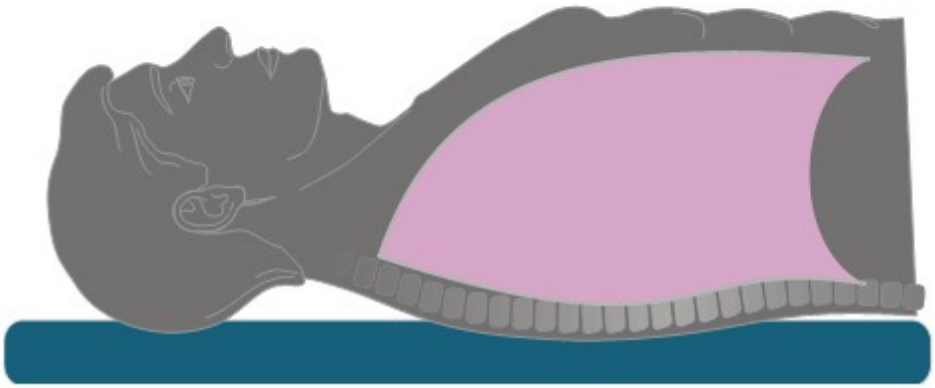
(Anesth Analg 2004;99:1001–8)



Volumes pulmonaires après chirurgie abdominale

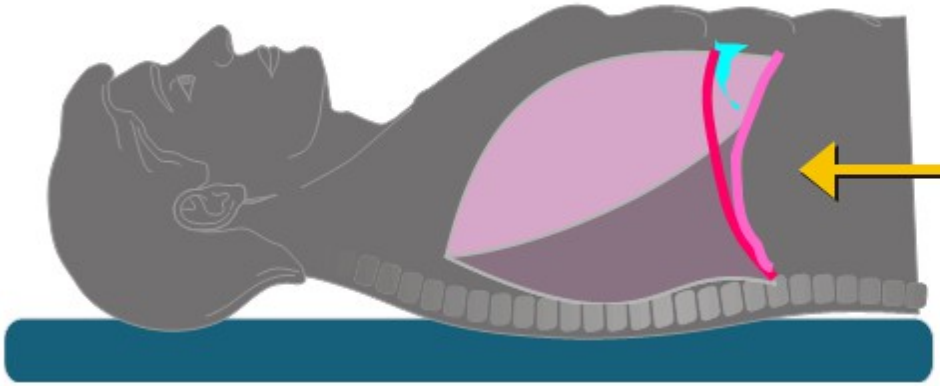
Ford *et al.* ARRD 1983

En chirurgie abdominale



Réduction du volume pulmonaire ventilable

Compliance réduite



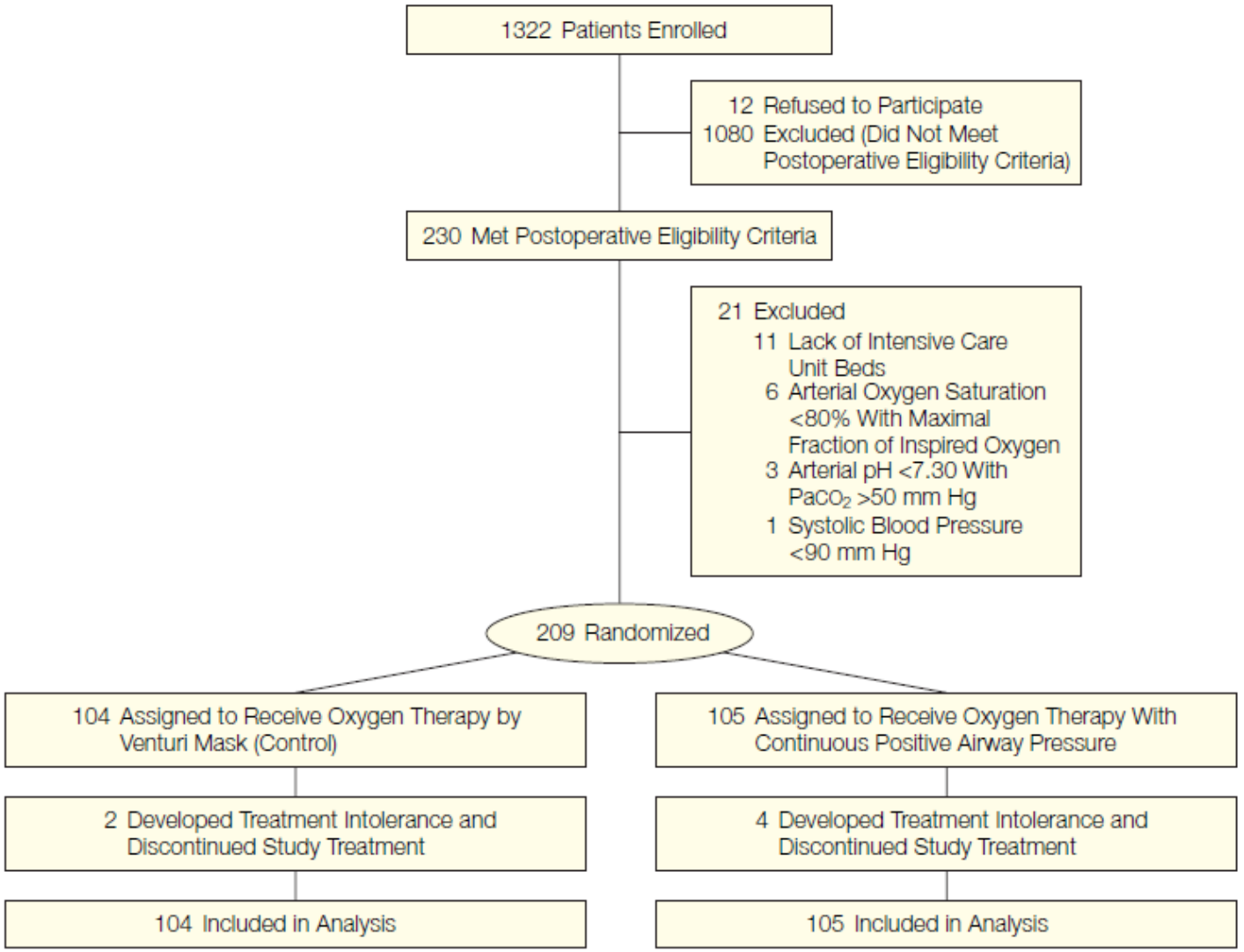
JAMA The Journal of the American Medical Association

Continuous Positive Airway Pressure for Treatment of Postoperative Hypoxemia

A Randomized Controlled Trial

Squadrone et al, JAMA 2005, 293(5):589-595

Figure 1. Patient Flow Chart



Squadrone et al, JAMA 2005, 293(5):589-595

Table 1. Baseline Characteristics of the Patients at Study Inclusion Before Randomization

	Control (n = 104)	CPAP (n = 105)
Sex, No. (%)		
Men	64 (62)	71 (68)
Women	40 (38)	34 (32)
Age, mean (SD), y	65 (10)	66 (9)
Body mass index, mean (SD)*	26.3 (4.5)	26.5 (4.7)
Current smoker, No. (%)†	21 (20)	19 (18)
SAPS II, mean (SD)‡	28 (8)	27 (7)
Type of surgery, No. (%)		
Colectomy	38 (36)	39 (36)
Gastrectomy	7 (6)	6 (6)
Pancreatico-duodenectomy	18 (17)	19 (18)
Retroperitoneal mass	4 (3)	3 (4)
Liver resection	24 (22)	22 (21)
Liver transplant	13 (12)	16 (15)
Pathology, No. (%)		
Cancer	64 (62)	67 (64)
Noncancer	40 (38)	38 (36)
Comorbidities, No. (%)		
Diabetes	11 (11)	16 (15)
Hypertension	42 (40)	37 (35)
Postoperative gases, mean (SD)		
Pa_{O_2}/Fi_{O_2}	255 (31)	247 (33)
Arterial, pH	7.39 (0.05)	7.38 (0.04)
Pa_{CO_2}, mm Hg	39 (5)	39 (7)
Mean arterial blood pressure, mean (SD), mm Hg	86 (10)	85 (11)
Time of surgical procedure, mean (SD), h§	226 (95)	227 (91)

Abbreviations: CPAP, continuous positive airway pressure; Pa_{O_2}/Fi_{O_2}, arterial oxygen to inspiratory oxygen fraction ratio; Pa_{CO_2}, arterial carbon dioxide.
*Body mass index is the weight in kilograms divided by the square of the height in meters.
†Patients who had smoked within 8 weeks of surgery were defined as current smokers.
‡Simplified Acute Physiology Score (SAPS II) (range, 0-63) is an index of the severity of illness; higher values indicate greater severity.
§Time of surgical procedure is the time encompassed between the skin incision and the first suture placed to close skin incision.

Squadrone et al, JAMA 2005, 293(5):589-595

Table 2. Secondary Outcomes

	Control (n = 104)	CPAP (n = 105)	Difference of Means (95% CI)	*P* Value*
ICU length of stay, mean, d	2.6	1.4	–1.2 (–2.0 to –0.3)	.09
Median (95% CI), d	1 (1-11)	1 (1-4)		
Hospital length of stay, mean (SD), d	17 (15)	15 (13)	–2 (–6 to 2)	.10
Median (95% CI)	12 (7-47)	11 (6-35)		
			Relative Risk (95% CI)	
Pneumonia, No. (%)†	10 (10)	2 (2)	0.19 (0.04 to 0.88)	.02
Infection, No. (%)‡	11 (10)	3 (3)	0.27 (0.07 to 0.94)	.03
Sepsis, No. (%)§	9 (9)	2 (2)	0.22 (0.04 to 0.99)	.03
Anastomotic leakage, No.	6	1		
Pneumonia, No.	3	1		
Deaths, No. (%)	3 (3)	0 (0)		.12

Abbreviations: CI, confidence interval; CPAP, continuous positive end-expiratory pressure; ICU, intensive care unit.

Squadrone et al, JAMA 2005, 293(5):589-595

Annals of Surgery • Volume 247, Number 4, April 2008

Continuous Positive Airway Pressure for Treatment of Respiratory Complications After Abdominal Surgery

A Systematic Review and Meta-Analysis

Gabriela P. Ferreyra, RT, Iacopo Baussano, MD, PhD,†‡ Vincenzo Squadrone, MD,* Lorenzo Richiardi, MD, PhD,§ Giovana Marchiaro, MD,* Lorenzo Del Sorbo, MD,* Luciana Mascia, MD, PhD,* Franco Merletti, MD, PhD,§ and V. Marco Ranieri, MD**

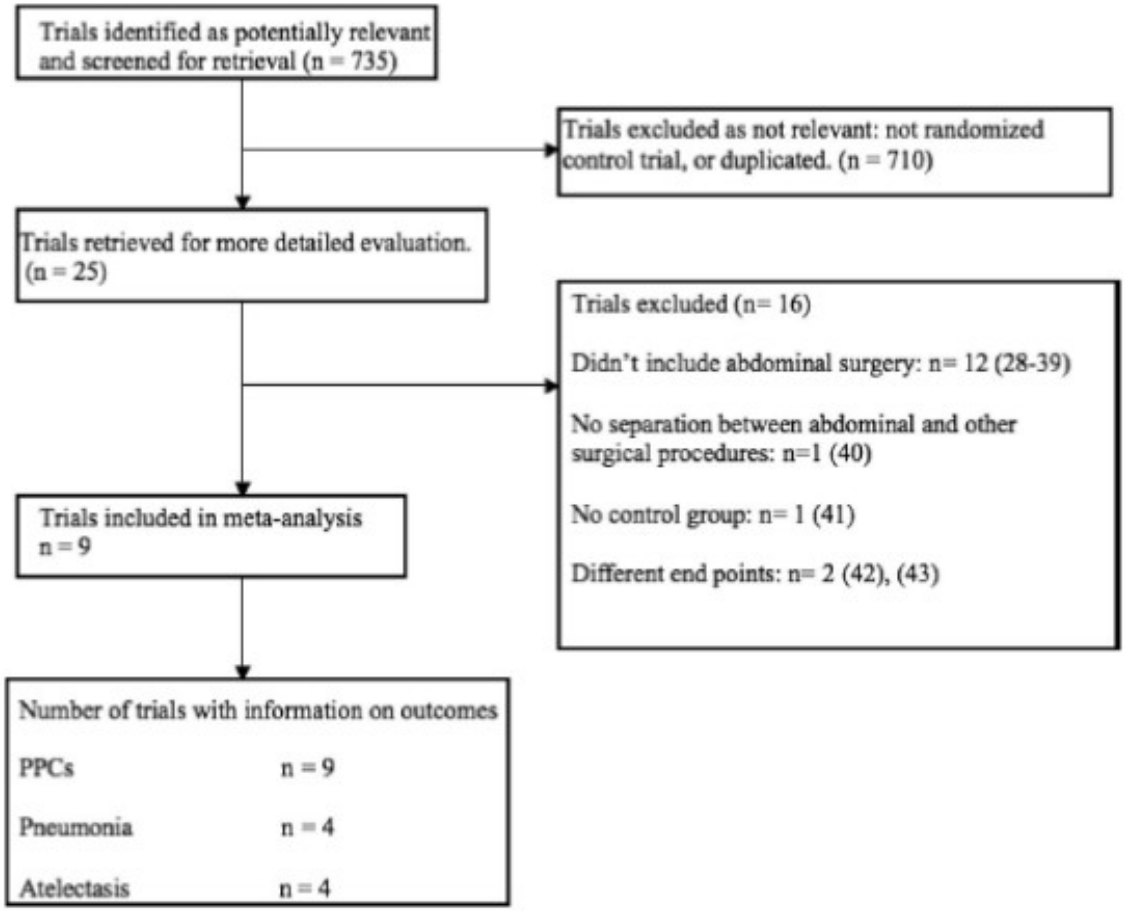
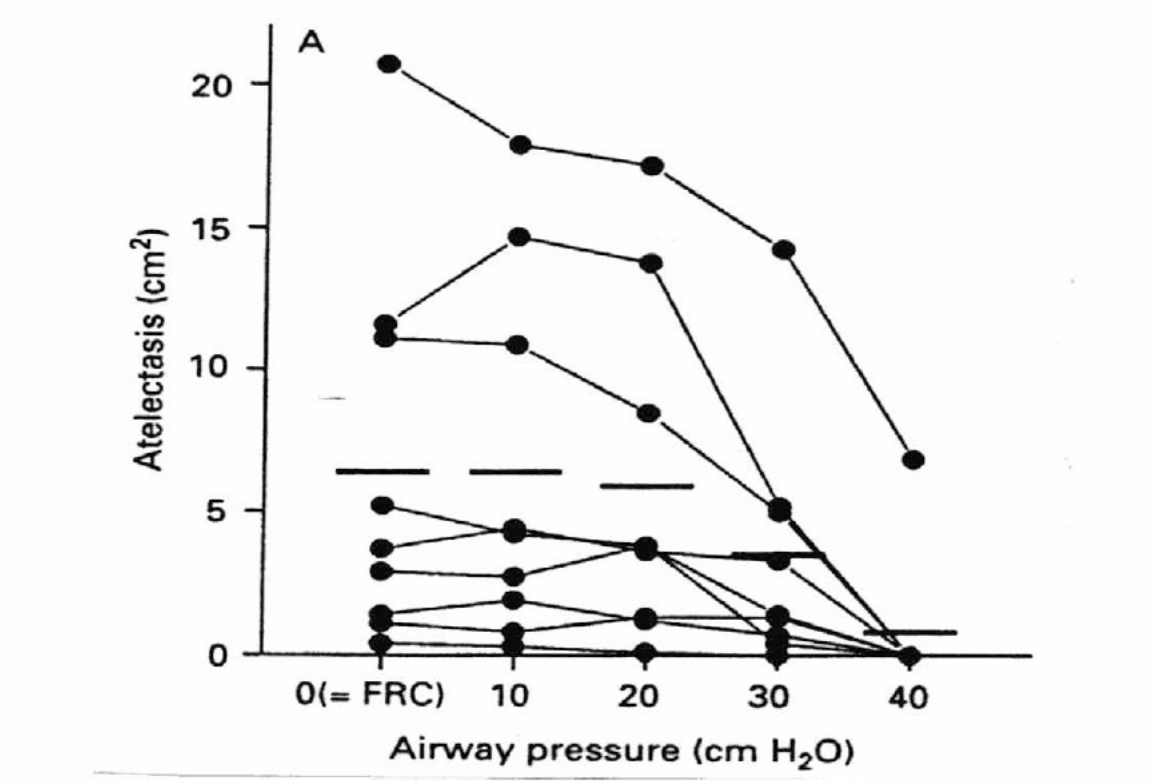


TABLE 1. Randomized Control Trials of CPAP in Patients who Developed Severe Hypoxemia After Abdominal Surgery

Source	Sample Size	Intervention	Interface	Time Delivered	Pneumonia	Atelectasis	No. Patients CPAP	No. Patients Ctr
Anderes et al[46]	30	CPAP 3 vs. O_2	ET	3 h during first day	NE	Radiography confirmed	15	15
Carlsson et al[18]	24	CPAP 5–10 vs. O_2	FM	4 h during first day	NE	Radiography confirmed	13	11
Lotz et al[47]	32	CPAP 3–6 vs. O_2	MP	2 h during first day	NE*	NE*	16	16
Stock et al[48]	43	CPAP 7.5 vs. PT	FM	15 min/2 h for 3 d	2 of the following 3 criteria: change in color or quantity of sputum, T >38°C for at least 2 d, infiltrate in radiography; sputum was cultured for isolation	Radiography confirmed	23	20
Ricksten et al[49]	28	CPAP 10–15 vs. PT	FM	30 breaths/h/d for 3 d	NE	Radiography confirmed	13	15
Lindner et al[50]	34	CPAP 12 vs. O_2 and PT	MP	3 h/d for 5 d	NE*	NE*	17	17
Denehy et al[17]	50	CPAP 10 vs. PT	NM	15 min 4 times a day for 3 d	T >38.5°C for 24 h, radiography score ≥2 and one of the following: increased white cell count, altered sputum or microbiological isolation pathogen from sputum or use of additional antibiotic treatment	Radiography confirmed	32	18
Bohner et al[19]	204	CPAP 10 vs. O_2	NM	First day until the next morning, at least 12 h	Defined according to Centers for Disease Control Criteria	NE	99	105
Squadrone et al[51]	209	CPAP 7.5 and PT vs. O_2 and PT	H	CPAP applied until PaO_2/FiO_2 > 300	Infiltrate in radiography and one of the following: purulent endotracheal aspirate; known pathogen cultured, T >38.5°C or <36°C; white blood cell count[20,21]	NE	105	104
Sum	654						333	321

Pression dans les voies aériennes et manœuvre de recrutement



Après recrutement maintenir le volume pulmonaire : appliquer une PEEP