Pneumopathies et Insuffisance respiratoire post opératoire en chirurgie thoracique

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sous la direction du Dr Antoine RABBAT

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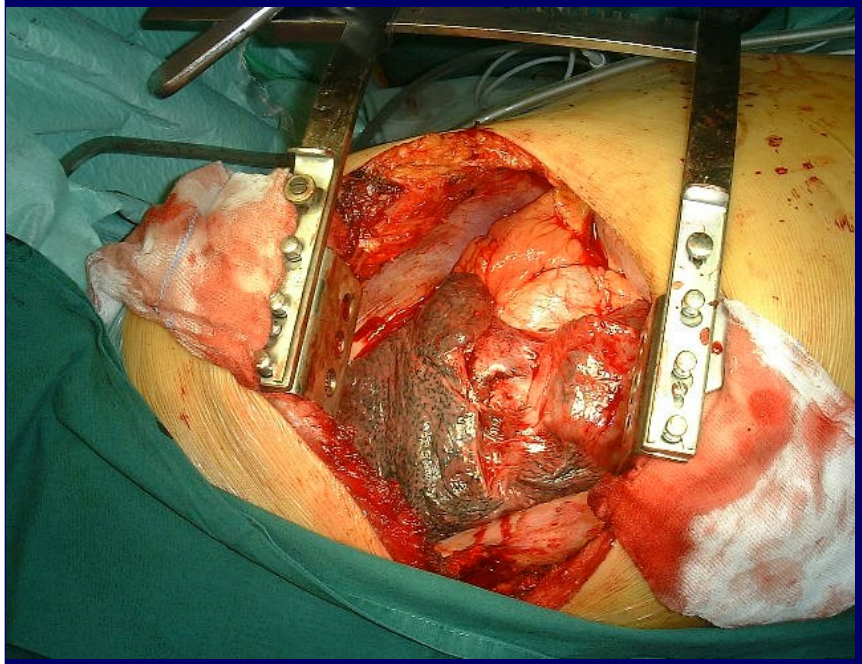
ASSISTANCE PUBLIQUE HÔPITAUX DE PARIS

DES pneumo

Thoracotomie
pour exérèse pulmonaire



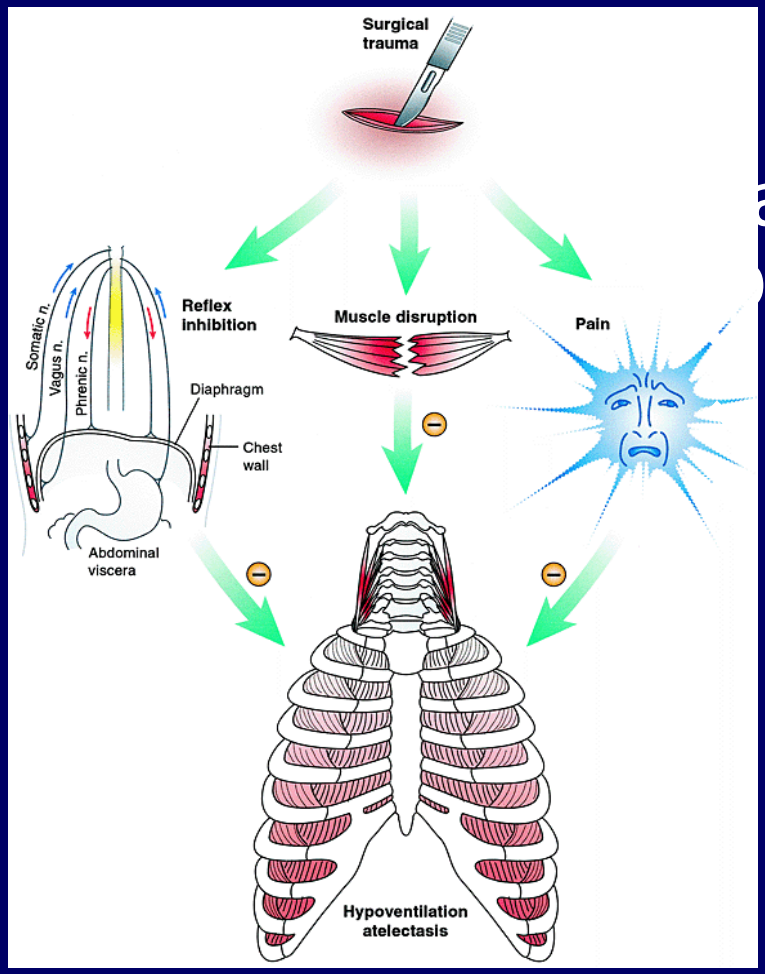
Altérations précoces de la fonction respiratoire post opératoires

Anesthésie
Chirurgie

Altération de la commande centrale
Diminution des volumes pulmonaires
Altération de la fonction diaphragmatique

Risque de complication +++ si facteurs de risques

Période post-opératoire = modifications de la fonction respiratoire



Warner. Anesthesiology 2000

Atélectasies

aisse des volumes ulmonaires
- CV
- CRF
- VT

Dysfonction diaphragmatique

Immédiate et précoce (<24 h)

Dureuil. JAP 86

Transitoire et réversible (J3 à J7)

Dureuil. BJA 87; Simonneau ARRD 83

COMPLICATIONS RESPIRATOIRES POST OP

Am J Med. 2002 Feb 15;112(3):219-25.Predicting pulmonary complications after nonthoracic surgery: a systematic review of blinded studies.Fisher BW, Majumdar SR, McAlister FA

J Thorac Cardiovasc Surg. 2015 Jan;149(1):73-82. Pneumonectomy for lung cancer: contemporary national early morbidity and mortality outcomes.Thomas PA Loundou A EPITHOR group.

Data from The Society of Thoracic Surgeons General Thoracic Surgery database: The surgical management of primary lung tumors

Daniel J. Boffa, MD,[a] Mark S. Allen, MD,[b] Joshua D. Grab,[c] Henning A. Gaissert, MD,[d] David H. Harpole, MD,[e] and Cameron D. Wright, MD[d]

Earn CME credits at http://cme.ctsnetjournals.org

Objective: Our objective was to investigate the surgical management of primary

TABLE 5. Complications

Complication	Affected patients (%)*
Atrial arrhythmia requiring treatment	964 (10.7%)
Air leak > 5 d	722 (8%)
Pneumonia	351 (3.9%)
Atelectasis requiring bronchoscopy	325 (3.6%)
Reintubation	306 (3.4%)
Other pulmonary event	319 (3.5%)
Urinary tract infection	129 (1.4%)
New renal failure requiring treatment or doubling creatinine	125 (1.4%)
Adult respiratory distress syndrome	99 (1.1%)
Myocardial infarction	37 (0.4%)
Deep venous thrombosis requiring treatment	41 (0.5%)
Empyema	29 (0.3%)
Wound infection	26 (0.3%)
Central neurologic event	47 (0.5%)
Recurrent laryngeal nerve paresis	20 (0.2%)
Chylothorax	50 (0.6%)
Delerium tremens	25 (0.3%)
Other	736 (8.1%)

*Prevalence within total resection population (n = 9033).

Complications respiratoires fréquentes (20% des patients) et sévères

European Journal of Cardio-thoracic Surgery 33 (2008) 496–500

www.els

Changes in patient presentation and outcomes for major lung resection over three decades☆

Mark K. Ferguson*, Wickii T. Vigneswaran

Department of Surgery, The University of Chicago, 5841 South Maryland Avenue, MC 5035, Chicago, IL 60637, USA

- **Baisse de la mortalité péri-op avec la baisse des pneumonectomies**
- **Moins de complications cardio-vasculaires**
- **Taux de complications respiratoires: idem !!!**

Table 2
Operative outcomes

	All patients (n = 1046)	1980–1989 (n = 320)	1990–1999 (n = 351)	2000–2006 (n = 373)	p-Value
Lobectomy or bilobectomy	868 (83.0%)	229 (71.6%)	296 (84.3%)	342 (91.4%)	<0.001
Lung cancer	862 (82.8%)	264 (82.5%)	276 (78.6%)	322 (87.3%)	0.008
Surgical stage III or IV	220 (25.6%)	88 (33.3%)	64 (23.2%)	68 (21.4%)	0.003
Pulmonary complications	151 (14.6%)	55 (17.5%)	51 (14.6%)	45 (12.2%)	0.148
Cardiovascular complications	156 (15.1%)	67 (21.3%)	48 (13.8%)	40 (10.8%)	0.001
Cardiopulmonary complications	223 (21.7%)	92 (29.3%)	73 (21.0%)	57 (15.6%)	<0.001
Other complications	150 (14.5%)	50 (15.9%)	49 (14.0%)	50 (13.4%)	0.65
Nonfatal complications	320 (31.2%)	125 (39.8%)	100 (28.8%)	94 (25.8%)	<0.001
Operative mortality	65 (6.2%)	28 (8.8%)	25 (7.1%)	12 (3.2%)	0.005
Postoperative hospital days	9.3 ± 8.9	13.2 ± 10.7	8.4 ± 8.3	6.8 ± 6.3	<0.001

BASE DE DONNÉES EPITHOR

Société Française de Chirurgie Thoracique

54 913 patients résection pulmonaire 01/2005-12/2012

Tableau 2. Les taux de mortalité hospitalière selon le type de résections pulmonaires

Résections pulmonaires	Mortalité	Taux (%)
Wedge (n=18 241)	248	1.4
Segmentectomie (n=2 672)	44	1.6
Lobectomie (n=27 335)	717	2.6
Bilobectomie (n= 1 812)	97	5.35
Pneumonectomie (n= 4 853)	382	7.9
Total (n= 54 913)	1 488	2.7

BASE DE DONNÉES EPITHOR
Société Française de Chirurgie Thoracique

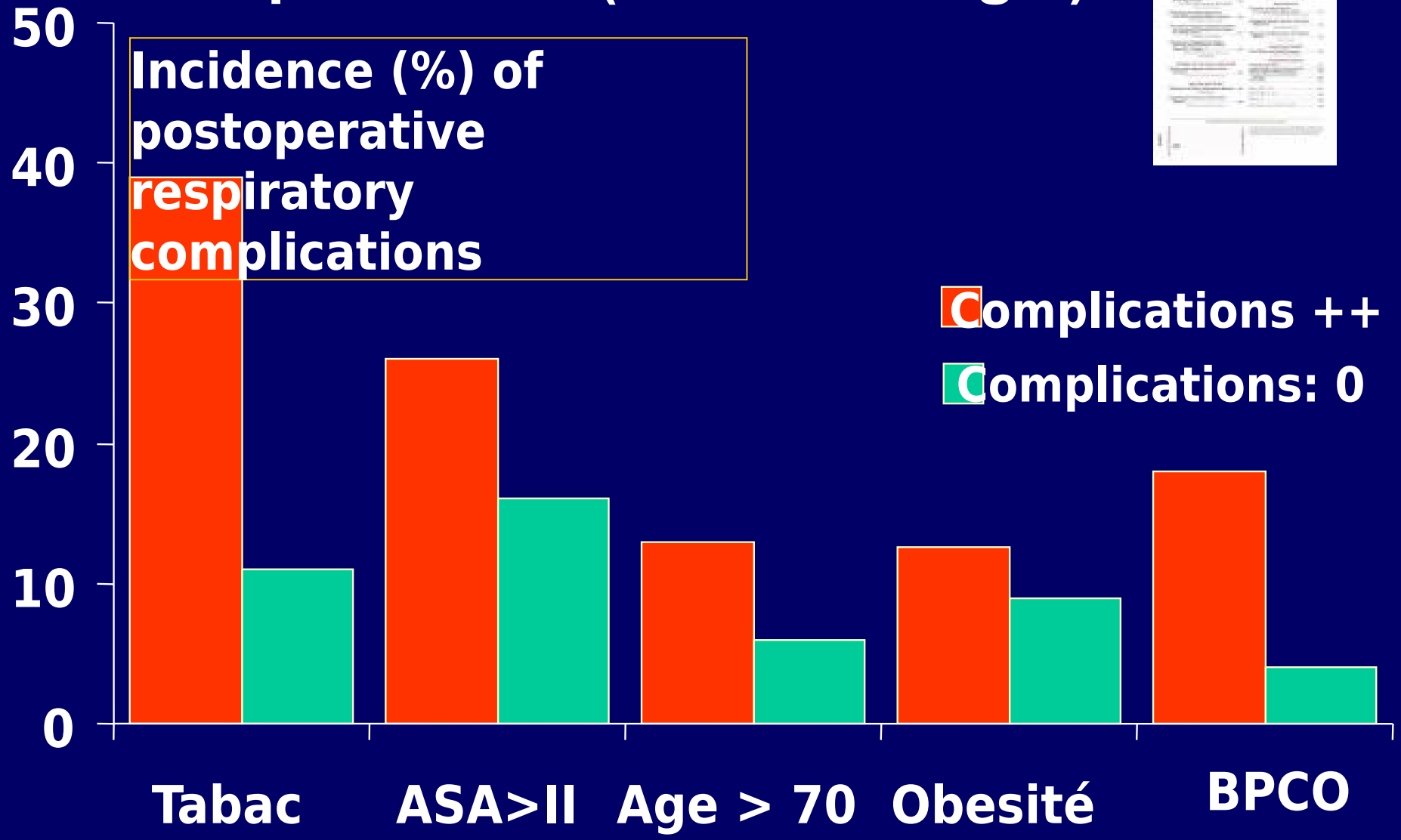
Résections pulmonaires	CRM	Taux (%)
Wedge (n=18 221)	640	3.5
Segmentectomie (n=2 668)	241	9
Lobectomie (n=27 292)	3 821	14
Bilobectomie (n= 1 805)	371	20.5
Pneumonectomie (n= 4 845)	567	12
Total (n=54 831)	5 640	10.3

cations respiratoires majeures (CRM) atélectasie, pneumopathie, ation > 2jours, sepsis, choc, défaillance multiviscérale.

COMPLICATIONS RESPIRATOIRES POST OP

COMPLICATIONS RESPIRATOIRES POST OP

Facteurs de complications respiratoires Post-opératoires (toute chirurgie)



Smetana. NEJM 99

ELSEVIER

European Journal of Cardio-thoracic Surgery 27 (2005) 1099-1105

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

www.elsevier.com/locate/ejcts

Early and long-term results of lung resection for non-small-cell lung cancer in patients with severe ventilatory impairment

Pierre Magdeleinat*, Agathe Seguin, Marco Alifano, Souheil Boubia, Jean-François Regnard

Hôpital Hôtel-Dieu, Unité de Chirurgie Thoracique, 1 Place du Parvis Notre-Dame, 75004 Paris, France

Predictive post-operative functional loss and predictive post-operative FEV1 according to the type of exeresis

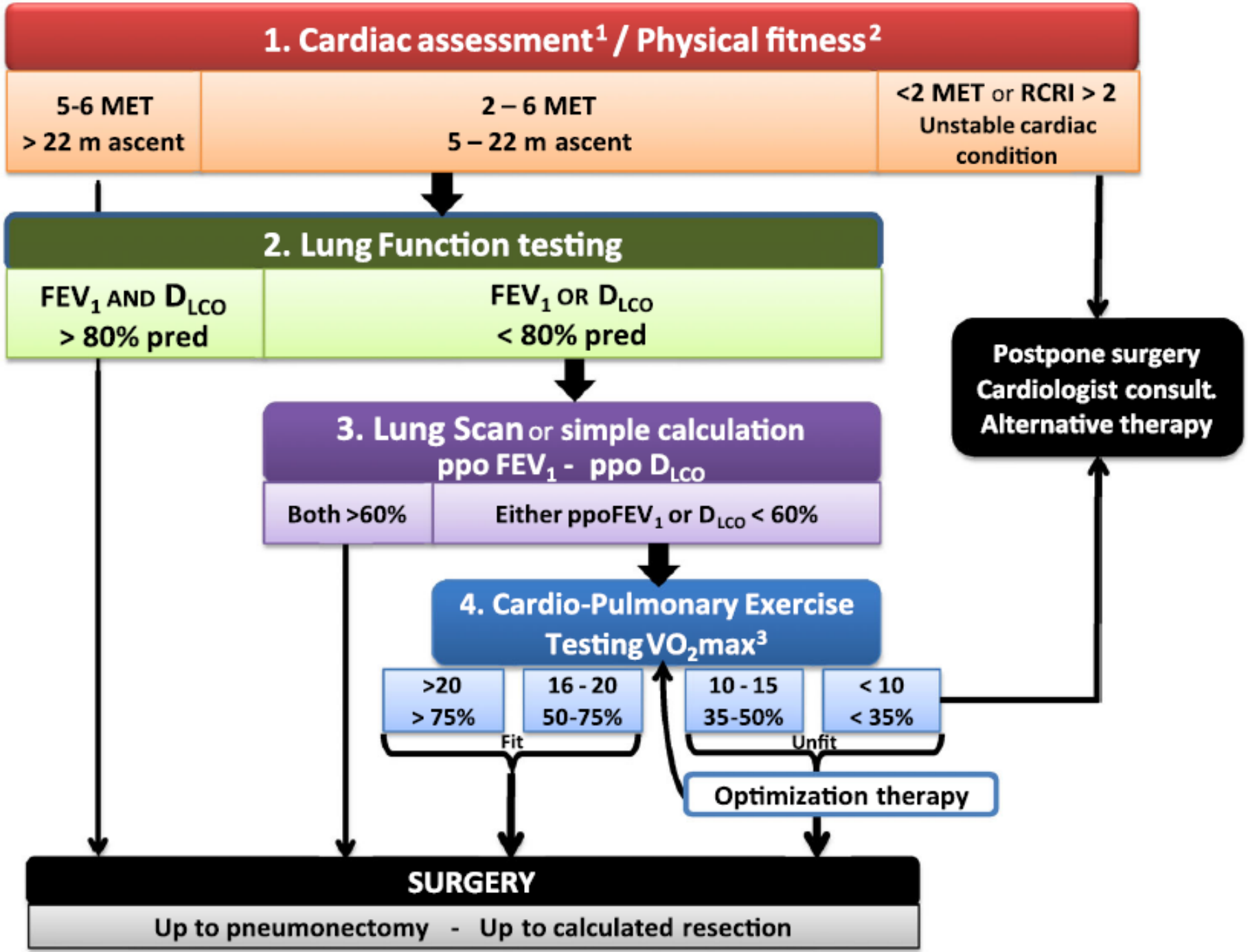
	Lobectomy ($n=73$)	Pneumonectomy ($n=16$)	Sub-lobar resections ($n=17$)
Predictive post-operative functional loss (%)	9.9 (0-27)	8.7 (0-34)	4.9 (1-15)
Predictive post-operative FEV1 (L)	1.19 (0.75-1.89)	1.09 (0.75-1.71)	1.13 (0.84-1.45)
Predictive post-operative FEV1 (% of predicted)	39.8 (23-55)	38.9 (27-50)	38.3 (27-53)

Values are expressed as mean and ranges (in parentheses).

77% de complications dont 50% respiratoires

Post-operative complications ($n=74$)

Respiratory ($n=45$)	Cardio-vascular ($n=23$)	Miscellaneous ($n=37$)
Pneumonia, 27	Arrhythmias, 17	Prolonged air-leak, 18
Atelectasis, 16	Pulmonary embolism, 3	Empyema, 5
Bronchitis, 1	Patent foramen ovale, 1	Wound infection, 2
Non-infectious respiratory failure, 1	Left cardiac failure, 2	Pneumothorax, 1
		Digestive-tract complications, 8
		Deep venous thrombosis, 1
		Heparine-related throbocytopenia, 1
		Bleeding from tracheotomy orifice, 1


1. Cardiac assessment[1] / Physical fitness[2]
5-6 MET
> 22 m ascent
2 – 6 MET
5 – 22 m ascent
<2 MET or RCRI > 2
Unstable cardiac condition
2. Lung Function testing
FEV1 AND DLCO
> 80% pred
FEV1 OR DLCO
< 80% pred
Postpone surgery
Cardiologist consult.
Alternative therapy
3. Lung Scan or simple calculation
ppo FEV1 - ppo DLCO
Both >60%
Either ppoFEV1 or DLCO < 60%
4. Cardio-Pulmonary Exercise Testing VO2max[3]
>20
> 75%
16 - 20
50-75%
10 - 15
35-50%
< 10
< 35%
Fit
Unfit
Optimization therapy
SURGERY
Up to pneumonectomy - Up to calculated resection

European Journal of Cardio-Thoracic Surgery 45 (2014) 652–659
doi:10.1093/ejcts/ezt452 Advance Access publication 23 September 2013

ORIGINAL ARTICLE

National perioperative outcomes of pulmonary lobectomy for cancer: the influence of nutritional status†

Pascal Alexandre Thomas[a,*], Julie Berbis[b], Pierre-Emmanuel Falcoz[c], Françoise Le Pimpec-Barthes[d], Alain Bernard[e], Jacques Jougon[f], Henri Porte[g], Marco Alifano[h] and Marcel Dahan[i] on behalf of the EPITHOR Group

Table 2: Observed and adjusted operative mortality

	Operative death		P*	OR a	95% CI	P**
	Yes (N = 490)	No (N = 19 145)				
BMI, N (%)						
Normal	249 (2.7)	9142 (97.3)	**0.002**	1		
Underweight	35 (4.1)	822 (95.9)		1.89	[1.30–2.75]	**0.001**
Overweight	156 (2.3)	6565 (97.7)		0.72	[0.59–0.89]	**0.002**
Obesity	50 (1.9)	2616 (98.1)		0.54	[0.40–0.74]	**<0.001**

Underweight Hi mortality ++

* Adjusted analysis. Co-variables: male gender, age, performance stat ues, active smokers, right side, extended lobectomy, early-stage disease, histology non adenocarcinoma, operative time.
Bold values: $P < 0.05$ was significant.
BMI: body mass index; OR a: adjusted odd ratio; CI: confidence interval.

- **Underweight**
  - **More respiratory complications ++**
  - **More surgical complications**
- **Overweight and Obesity**
  - **More cardio-vascular complications**
  - **Better long term survival?**

Complications	Normal N = 9391	Underweight N = 857	Overweight N = 6721	Obesity N = 2666	P
Prolonged air leaks, *n* (%)	913 (9.7)	151 (17.6)[a]	389 (5.8)[a]	103 (3.9)[a]	<0.001
Atelectasis, *n* (%)	692 (7.4)	99 (11.6)[a]	480 (7.1)	231 (8.7)	<0.001
Pneumonia, *n* (%)	647 (6.9)	76 (8.9)	409 (6.1)	149 (5.6)	0.001
Arrhythmia, *n* (%)	401 (4.3)	20 (2.3)[a]	339 (5.0)	150 (5.6)[a]	<0.001
Ventilatory support, *n* (%)	356 (3.8)	57 (6.7)[a]	203 (3.0)[a]	94 (3.5)	<0.001
ARDS, *n* (%)	192 (2.0)	33 (3.9)[a]	103 (1.5)	34 (1.3)[a]	<0.001
Haemothorax, *n* (%)	185 (2.0)	19 (2.2)	102 (1.5)	26 (1.0)[a]	0.002
Recurrent nerve palsy, *n* (%)	126 (1.3)	16 (1.9)	80 (1.2)	34 (1.3)	0.404
Pulmonary embolism and DVT, *n* (%)	76 (0.8)	5 (0.6)	77 (1.1)	40 (1.5)[a]	0.005
Bronchial fistula, *n* (%)	51 (0.5)	12 (1.5)[a]	25 (0.4)	11 (0.4)	0.001
Coronary events, *n* (%)	23 (0.2)	5 (0.6)	24 (0.4)	8 (0.3)	0.262

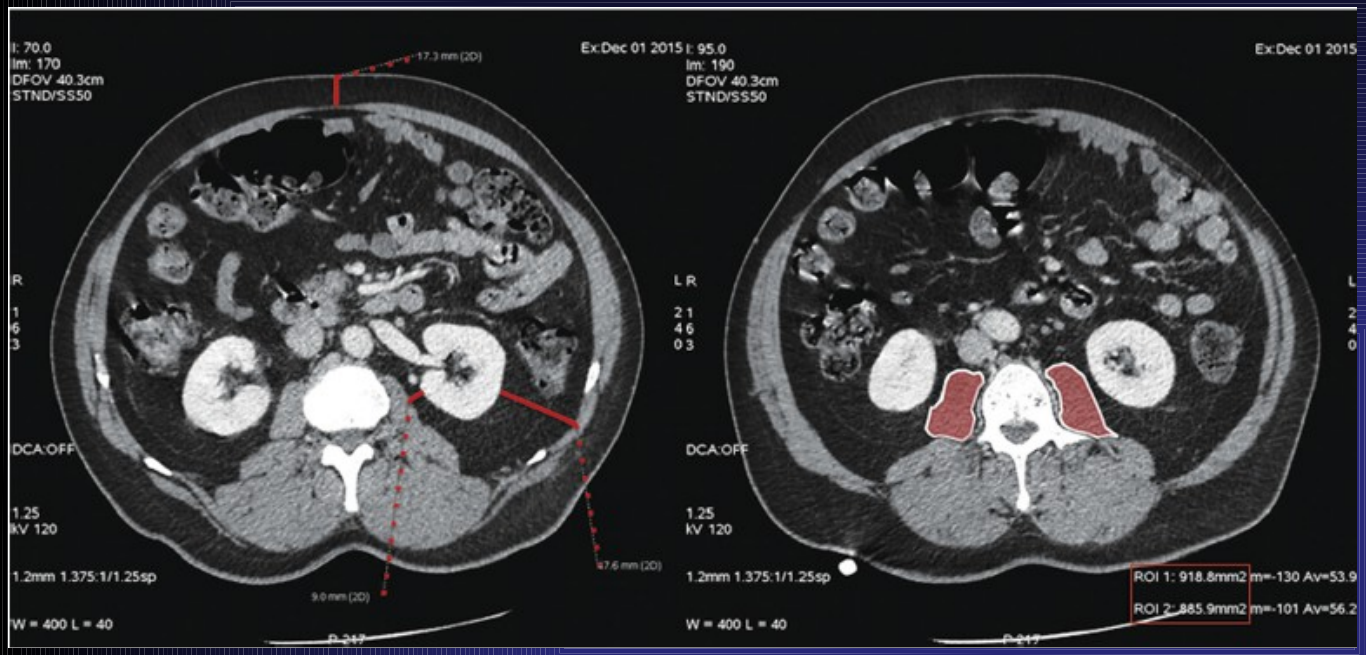
Body Mass Index and Total Psoas Area Affect Outcomes in Patients Undergoing Pneumonectomy for Cancer

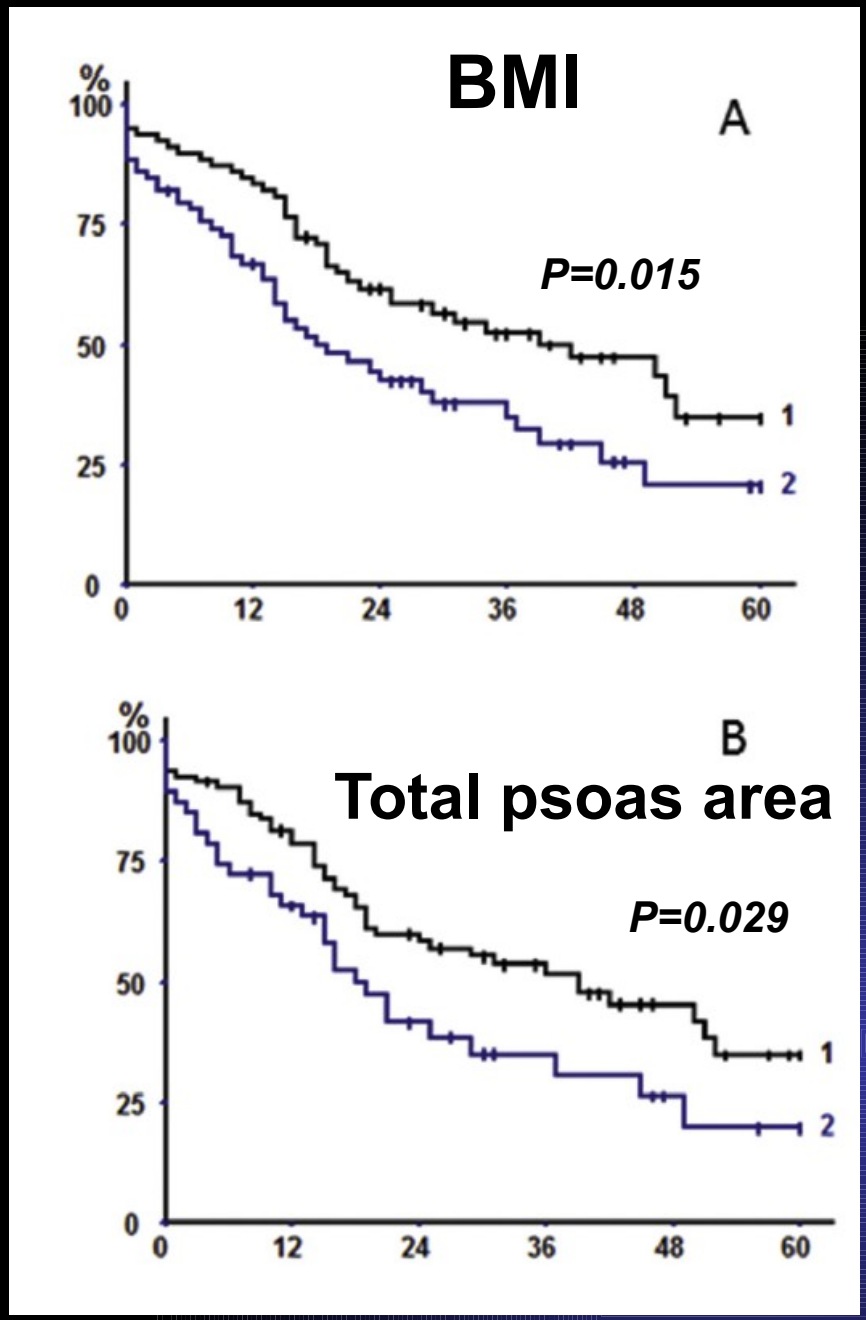
(Ann Thorac Surg 2017;103:287–95)

Remi Hervochon, MD, Antonio Bobbio, MD, PhD, Claude Guinet, MD, PhD, Audrey Mansuet-Lupo, MD, PhD, Antoine Rabbat, MD, Jean-François Régnard, MD, Nicolas Roche, MD, PhD, Diane Damotte, MD, PhD, Antonio Iannelli, MD, PhD, and Marco Alifano, MD, PhD

Departments of Thoracic Surgery, Radiology, Pathology, and Chest Disease and Intensive Care, Paris Centre University Hospitals, Paris; University Paris Descartes, Paris; and Department of Surgery, Nice University Hospital, Nice, France

1 pts avec pneumonectomies pour KBP non PC





BMI > 25 kg/m2
vs
BMI ≤ 25 Kg/m2

Total psoas area > 33ème percentile
vs
Total psoas area ≤ 33ème percentile

(Ann Thorac Surg 2017;103:287–95)

ORIGINAL ARTICLE

Long-term impact of developing a postoperative pulmonary complication after lung surgery

Lugg ST, *et al. Thorax* 2016;**71**:171–176. doi:10.1136/thoraxjnl-2015-207697

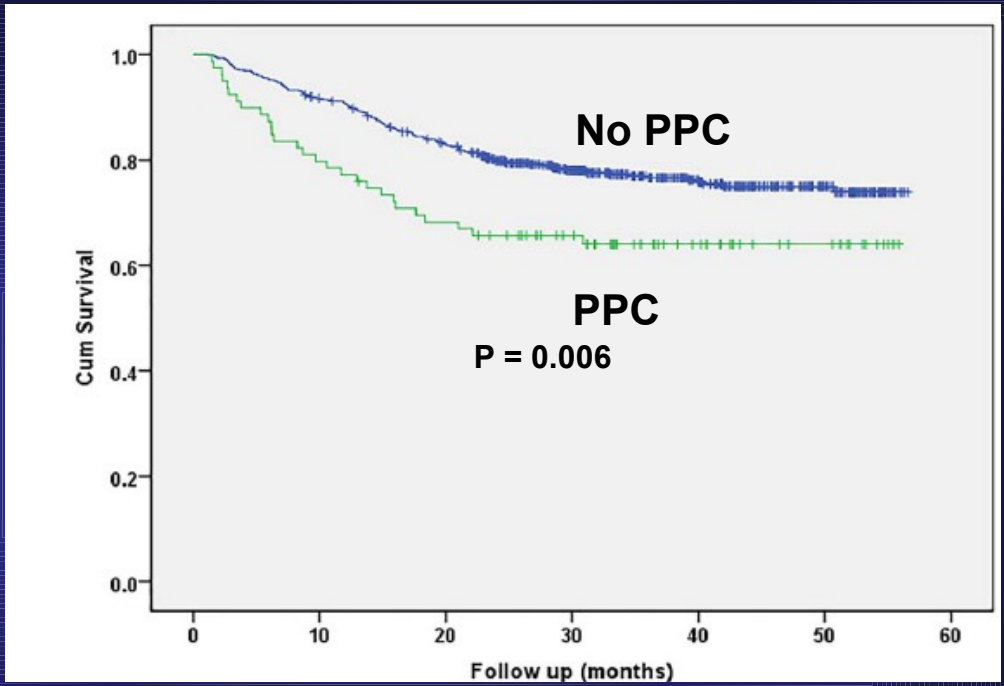
- [illegible]
- 370 pts présentant une complication pulmonaire post op (PPC)

ssociés à la survenue d'une PPC

able 2 Preoperative risk factors associated with PPC on nultivariate analysis

ariables	Estimate	SE	p Value	OR	95% CI
onstant	−3.18	0.45	<0.001	–	–
OPD	0.59	0.25	0.017	1.81	1.11 to 2.95
urrent smoker (vs never)	1.69	0.51	<0.001	5.42	1.99 to 14.76
x smoker (vs never)	1.03	0.49	0.035	2.80	1.08 to 7.28

- Impact sur la survie



ORIGINAL ARTICLE

Long-term impact of developing a postoperative pulmonary complication after lung surgery

Lugg ST, *et al. Thorax* 2016;**71**:171–176. doi:10.1136/thoraxjnl-2015-207697

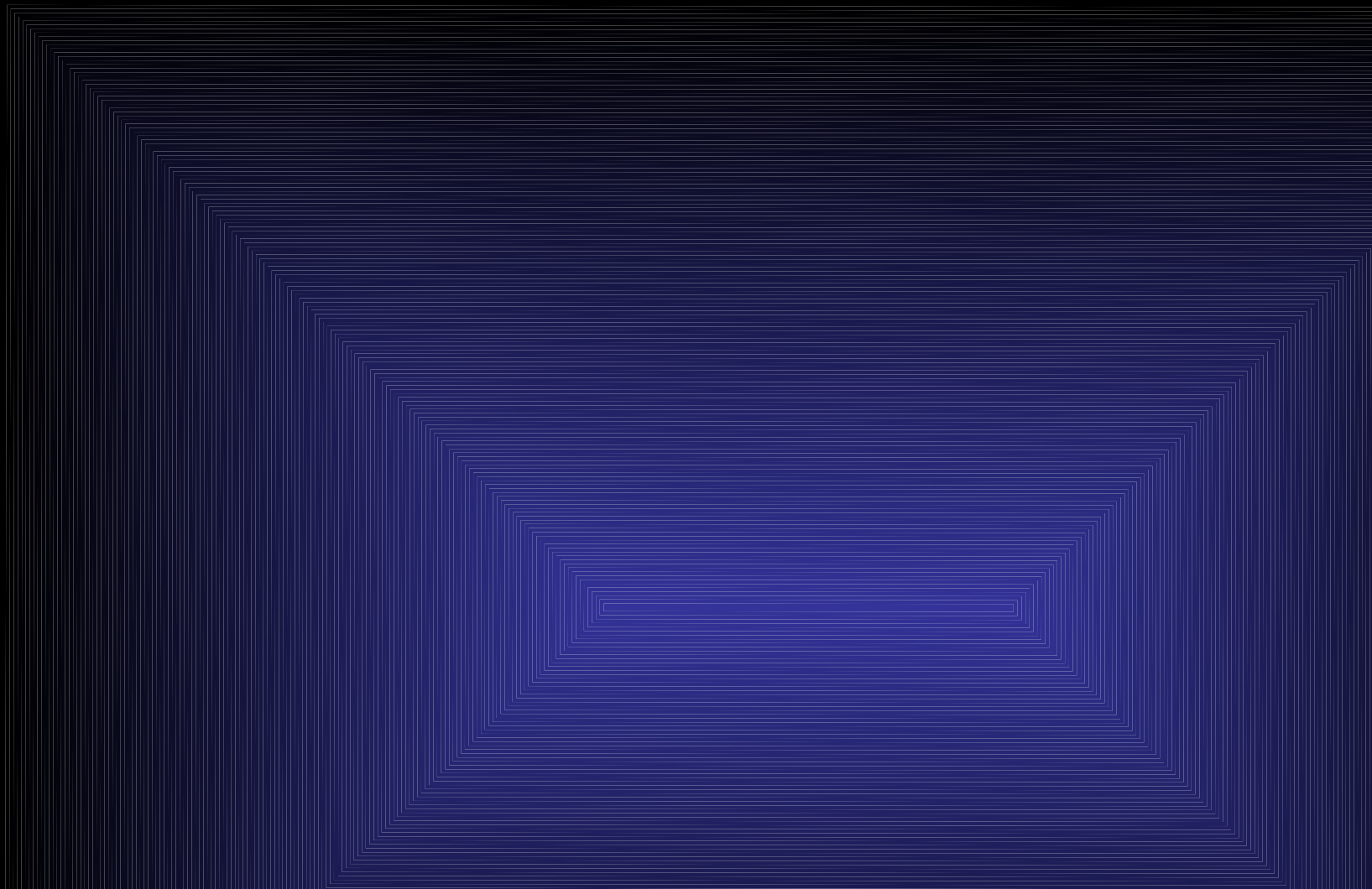
- [illegible]
- 370 pts présentant une complication pulmonaire post op (PPC)
- Frs associés à la mortalité tardive

Table 4 Significant Independent risk factors for late deaths in patients with non-small cell lung cancer

Variables	Estimate	SE	p Value	HR	95% CI
PPC	0.69	0.25	0.006	2.00	1.19 to 3.20
Staging IIA/B	1.07	0.22	<0.001	2.92	1.89 to 4.56
Staging IIIA	1.28	0.25	<0.001	3.60	2.20 to 5.85
Staging IIIB	1.91	0.61	0.002	6.72	1.61 to 18.90
Age	0.03	0.01	0.003	1.04	1.01 to 1.06
Readmission (30 days)	0.62	0.23	0.008	1.86	1.15 to 2.89

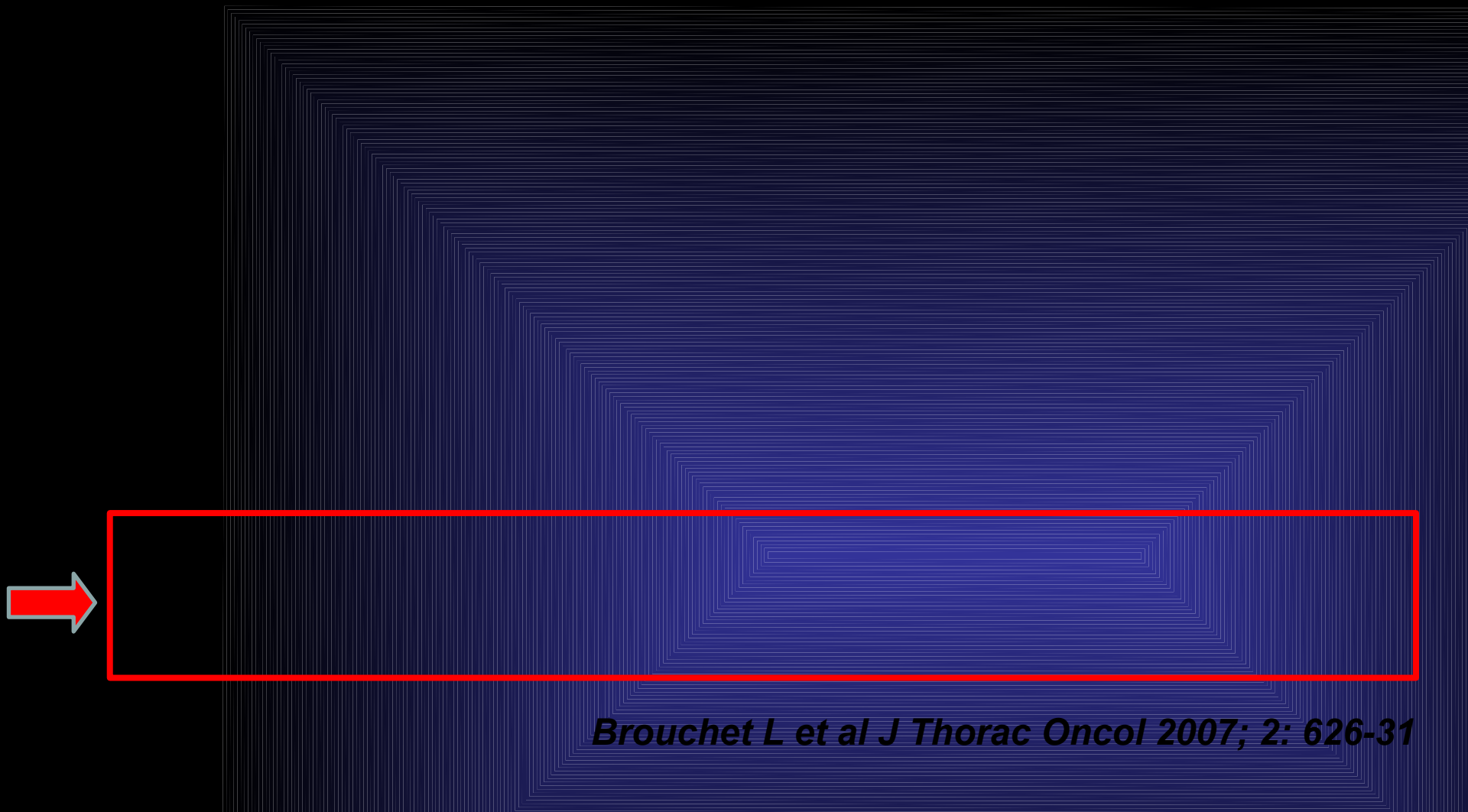
PPC, postoperative pulmonary complication.

- PPC, plus de décès non liés au cancer et de cause respiratoire



COMPLICATIONS RESPIRATOIRES POST OP

COMPLICATIONS RESPIRATOIRES POST OP



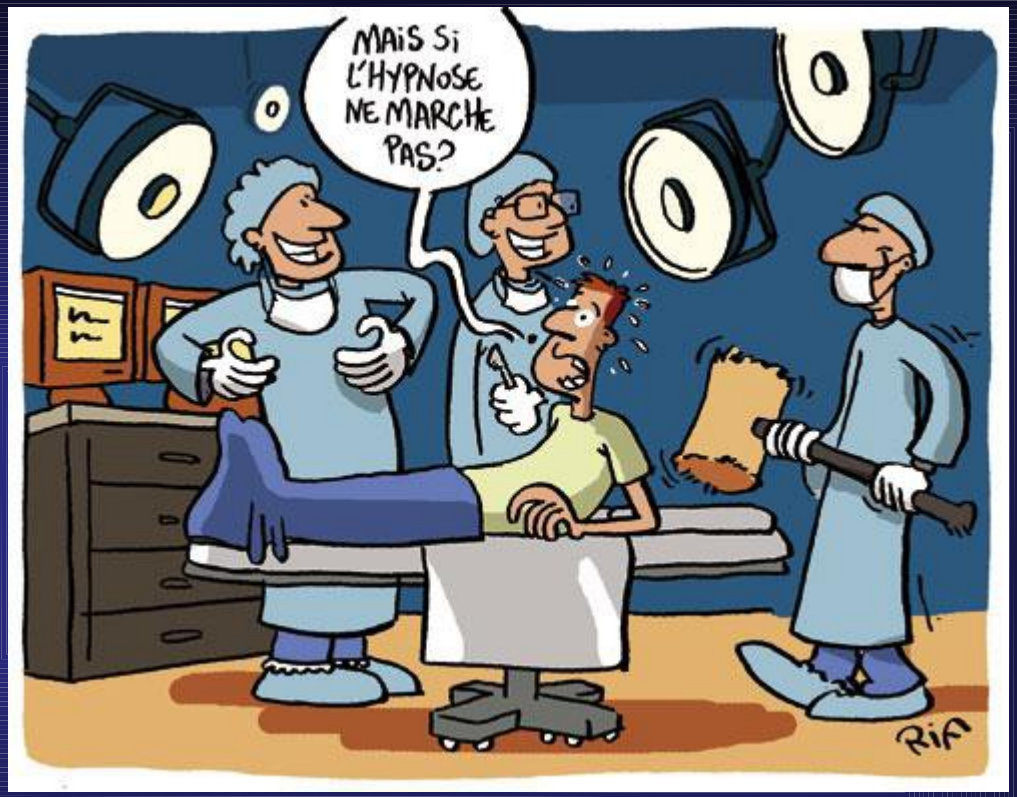
Brouchet L et al J Thorac Oncol 2007; 2: 626-31

COMPLICATIONS RESPIRATOIRES POST OP

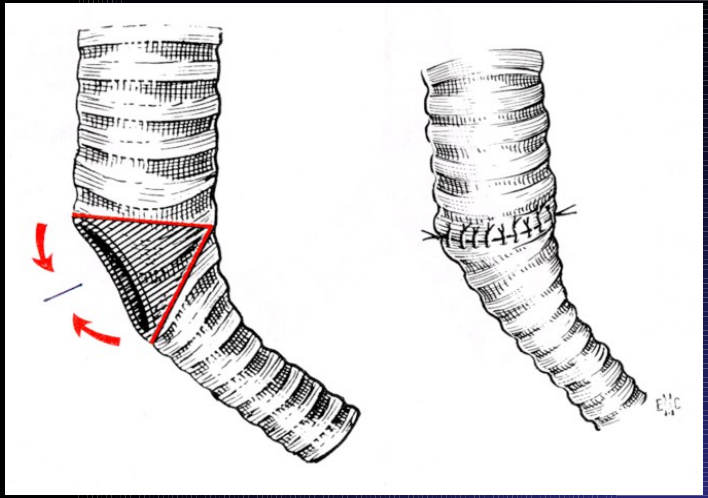
COMPLICATIONS RESPIRATOIRES POST OP

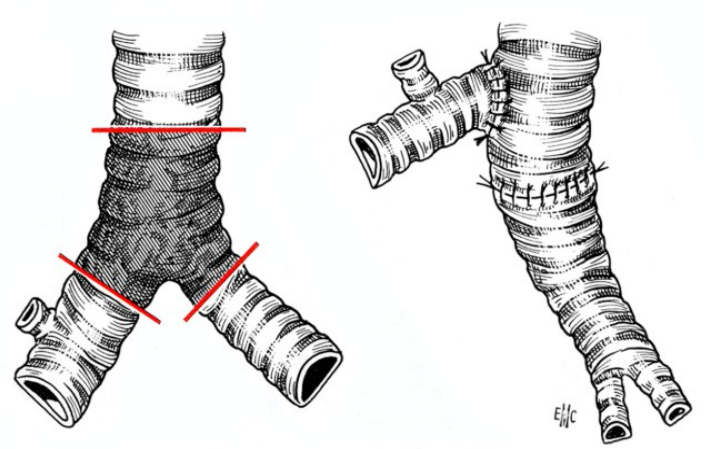
sthésique

- ps opératoire
- age
- g lionnaire
- umonectomie
- te >gauche



Thorac Surg. 2015 Jan;149(1):73-82. Pneumonectomy for lung cancer: contemporary national early mortality outcomes.Thomas PA Loundou A EPITHOR group.
Thorac Surg. 2016 Feb;49(2):e38-43 Bilobectomy for lung cancer: contemporary national early morbidity outcomes. Thomas PA Loundou A EPITHOR group.



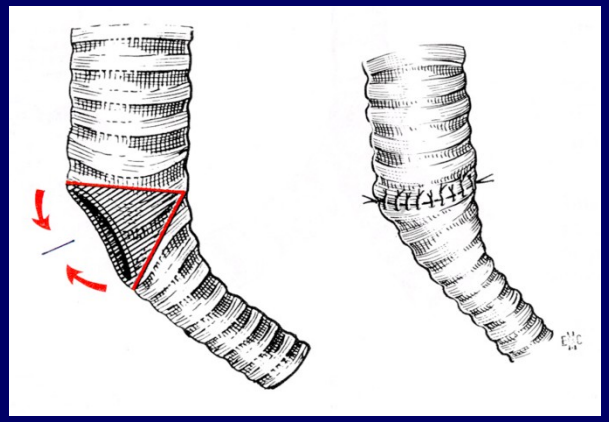


Barclay "inversée" avec bronche droite longue.

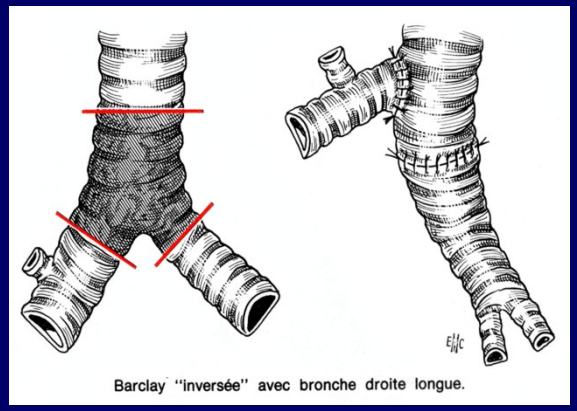
RESECTIONS DE CARENE

- 82 patients
- 67 hommes/14 femmes
- Age moyen :57 ans

- 60 cancers épidermoïdes
- 12 adénocarcinomes
- 2 carcinomes peu diff. à grandes cellules
- 5 carcinomes adénoïdes kystiques
- 2 tumeurs carcinoïdes
- 1 tumeur muco-épidermoïde



- Complications postopératoires :
  - Td Rythme supra-ventriculaire 22
  - pneumopathie 8
  - ARDS 6
  - empyème, fistule 7
- Mortalité postopératoire : 5 (6%)
  - ARDS 2
  - pneumopathie 2
  - fistule 1



Barclay "inversée" avec bronche droite longue.

LIMITES FONCTIONNELLES RESPIRATOIRES DES EXERESES

Fonction de l'exérèse envisagée (Lobe / poumon)
de la valeur fonctionnelle du poumon opéré
de la taille du patient

Schématiquement

- **Résection segmentaire** : pratiquement pas de contre-indication

- **Lobectomie** : VEMS POPP > 30% des valeurs théoriques
  CI op. : - $PaCO_2$ > 55 mmHg
  - I. respiratoire + autres tares associées

- **Pneumonectomie** : VEMS POPP > 1/3 des valeurs théoriques
  intervention « lourde » importance
  des facteurs de risque associés

décision toujours difficile → services spécialisés

COMPLICATIONS RESPIRATOIRES POST OP

COMPLICATIONS RESPIRATOIRES POST OP

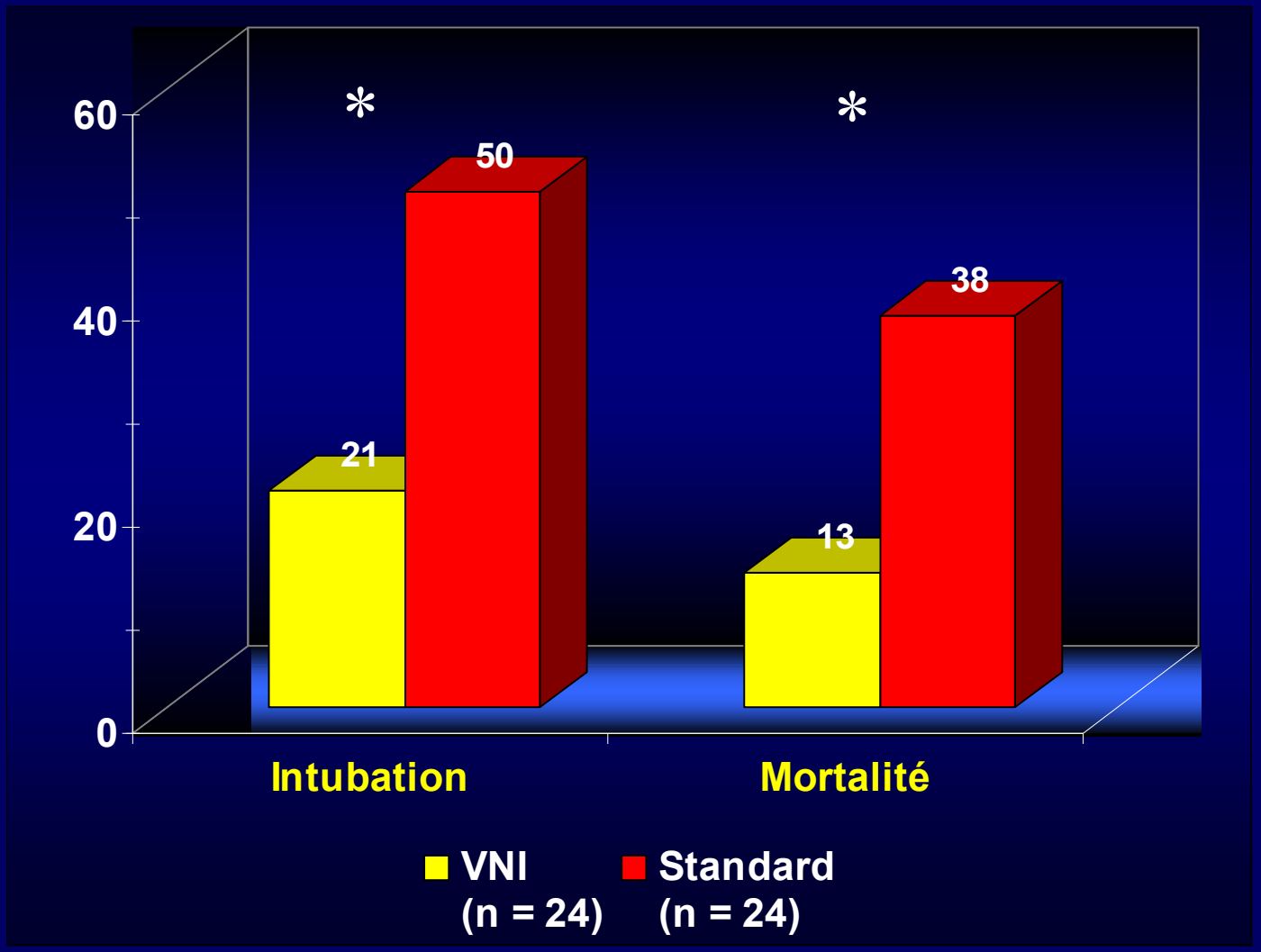
COMPLICATIONS RESPIRATOIRES POST OP

Insuffisance respiratoire aigue

Complications respiratoires post-opératoire:

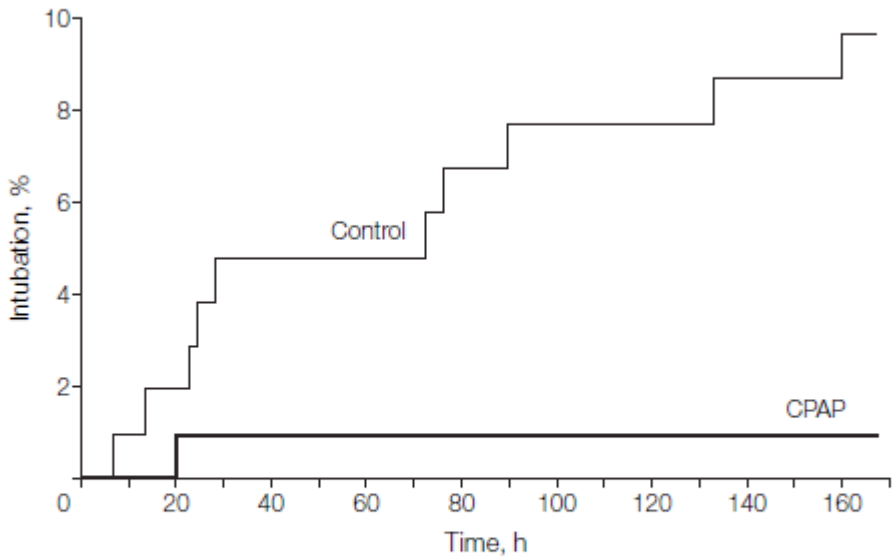
- **IRA**
- **Atélectasies, encombrement**
- **Embolies**
- **Pneumonies**
- **SDRA**
- Autres

Noninvasive Ventilation Reduces Mortality in Acute Respiratory Failure following Lung Resection.



AURIANT et coll. AJRCCM

Figure 2. Kaplan-Meier Estimates of Intubation Rate



No. at Risk									
Control	104	102	99	99	97	96	96	95	95
CPAP	105	104	104	104	104	104	104	104	104

Estimates of intubation rates are according to whether or not patients received oxygen alone (control) or oxygen plus continuous positive airway pressure (CPAP). The cumulative probability of remaining without intubation was higher in patients treated with CPAP (P=.005; log-rank test).

10%; p=.005; RR 0.099 [0.01-0.76]

JAMA. 2005 Feb 2;293(5):589-95 . Squadrone Piedmont Intensive Care Units Network (PICUN).

Intensive Care Med
DOI 10.1007/s00134-008-1317-z

ORIGINAL

Aurélie Lefebvre
Christine Lorut
Marco Alifano
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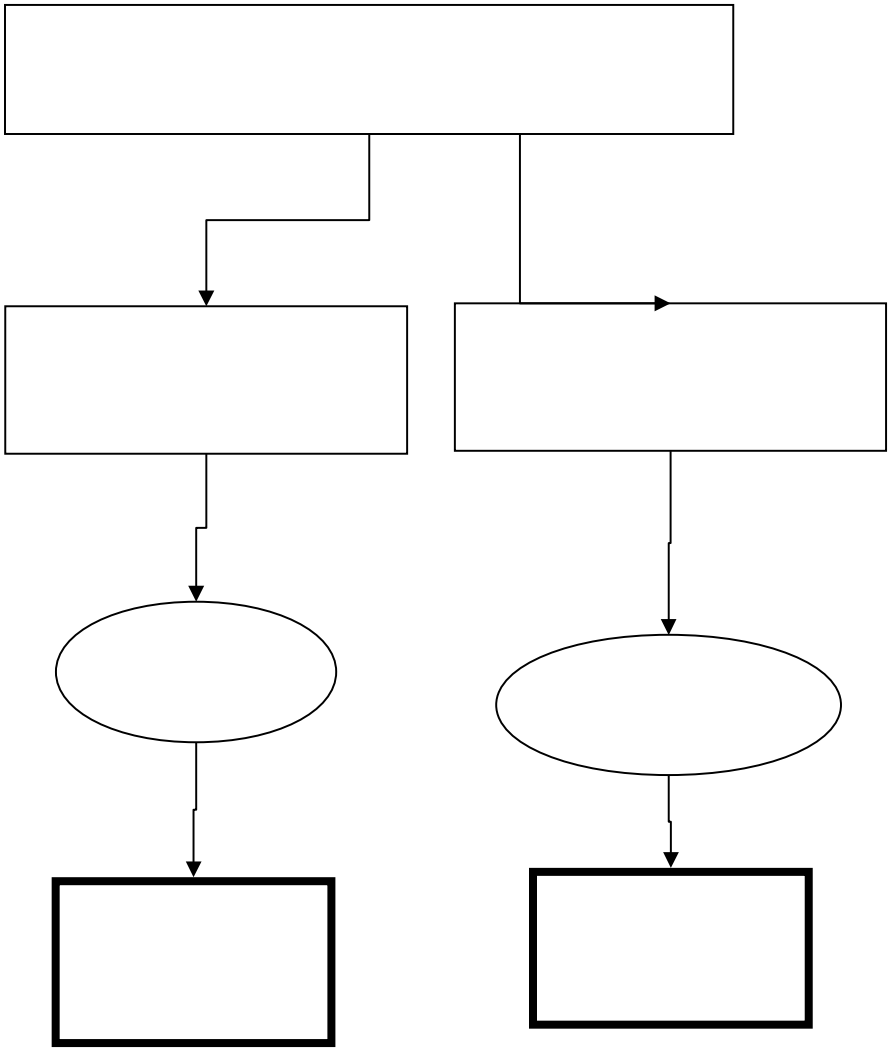
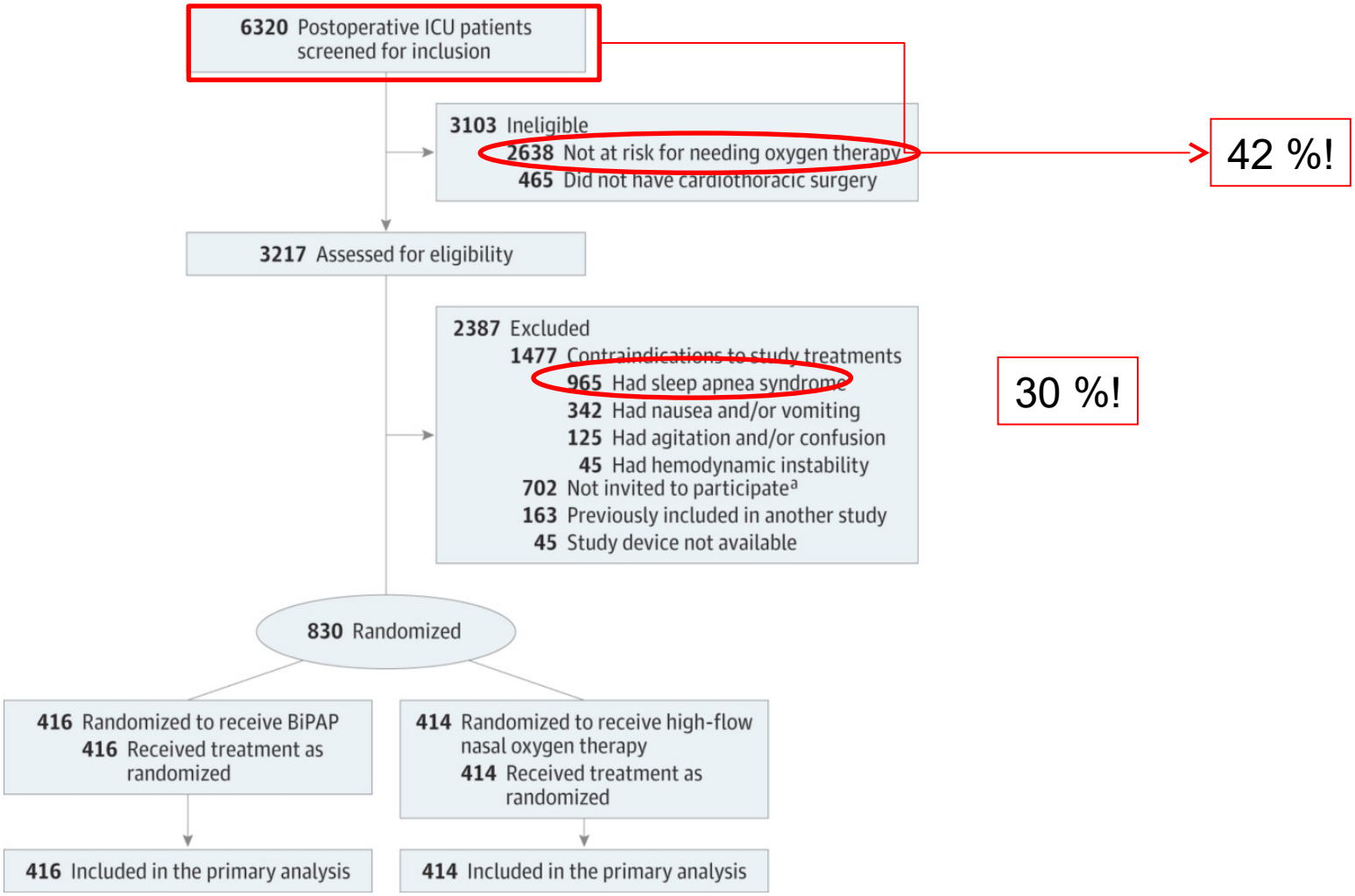
Jean-François Regnard
Gérard Huchon
Antoine Rabbat

Noninvasive ventilation for acute respiratory failure after lung resection: an observational study

Etiologies, n (%)	Total n=137	IRA hypoxémique n=59	IRA hypercapnique n=30
Pneumonies	56 (40.8)	38	4
Atélectasies	32 (23.7)	10	4
Encombrement bronchique	7 (5.1)	5	2
OAP	3 (2.1)	3	0
Hypoventilation alvéolaire	20 (14.6)	0	20
Autres	19 (13.8)	3	0

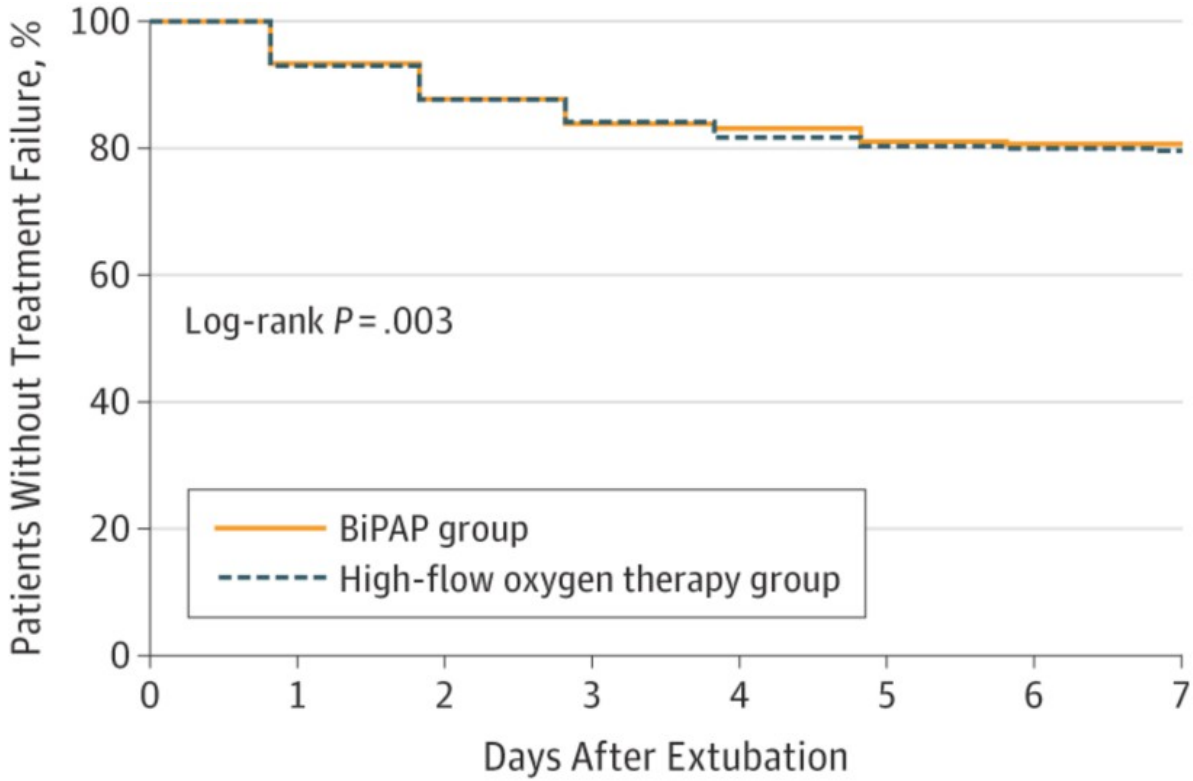


High-Flow Nasal Oxygen vs Noninvasive Positive Airway Pressure in Hypoxemic Patients After Cardiothoracic Surgery: A Randomized Clinical Trial



Stephan et al JAMA 2015
Published online May 17, 2015. doi:10.1001/jama.2015.5213

High-Flow Nasal Oxygen vs Noninvasive BiPAP in Hypoxemic Patients After Cardiothoracic Surgery:



No. at risk								
BiPAP	416	385	363	348	339	333	331	329
High-flow oxygen therapy	414	385	361	346	342	334	333	331

Stephan et al JAMA 2015

Published online May 17, 2015. doi:10.1001/jama.2015.5213

High-Flow Nasal Oxygen vs Noninvasive Positive Airway Pressure in Hypoxemic Patients After Cardiothoracic Surgery:

Table 2. Physiologic Variables and Subjective Effect on Dyspnea at Baseline (Before Any Study Intervention), After 1 Hour, and After 6-12 Hours

	Mean (95% CI)							
	Baseline		1 Hour			6-12 Hours		
Parameters	BiPAP Group	HFNO Group	BiPAP Group	HFNO Group	*P* Value	BiPAP Group	HFNO Group	*P* Value
PaO_2:FIO_2	203 (195-21[illegible])	196 (187-204)	221 (213-230)[a]	184 (177-192)[b]	<.001	261 (248-27[illegible])[c]	198 (187-208)[c]	<.001
$PaCO_2$, mm Hg	39.1 (38.4-39.8)	38.7 (38.1-39.4)	39.0 (38.4-39.7)	37.9 (37.2-38.5)[d]	.09	39.3 (38.6-40.0)	38.2 (37.6-38.9)	.19
pH	7.39 (7.39-7.40)	7.39 (7.39-7.40)	7.39 (7.39-7.40)	7.40 (7.39-7.40)	.75	7.40 (7.40-7.41)[e]	7.41 (7.40-7.42)[f]	.99
Respiratory rate, breaths/min	23.3 (22.6-24.0)	22.8 (22.1-23.5)	23.0 (22.3-23.7)	21.0 (20.4-21.7)[a]	<.001	22.5 (21.9-23.1)	21.6 (20.9-22.2)	.16
Actual or calculated FIO_2	0.47 (0.45-0.49)	0.49 (0.47-0.51)	0.55 (0.53-0.57)	0.60 (0.59-0.62)	<.001	0.53 (0.51-0.56)	0.58 (0.57-0.60)	<.001
Dyspnea score, No./total (%) [95% CI]								
Improvement			266/404	236/403		229/379	217/373 (58.2) [52.9-63.2]	
No improve[illegible]			[illegible] (29.7) [25.3-34.4]	[illegible] (37.5) [32.7-42.4]	.39	[illegible] (35.1) [30.3-40.1]	139/373 (37.3) [32.4-43.4]	.99
Deterioration			18/404 (4.5) [2.7-7.0]	16/403 (4.0) [2.3-6.4]		17/379 (4.5) [2.6-6.1]	17/373 (4.6) [2.7-7.2]	
Comfort score, No. (%) [95% CI]								
Poor			51/397 (13.0) [9.7-16.5]	67/402 (16.7) [13.2-20.7]		67/376 (17.8) [14.1-22.1]	66/372 (17.7) [14.0-22.0]	
Acceptable			128/397 (32.2) [27.7-37.1]	101/402 (25.1) [21.0-29.7]	.32	110/376 (29.3) [24.7-34.1]	115/372 (31.0) [26.3-36.9]	.99
Good			218/397 (55.0) [49.9]	234/402 (58.2) [53.2-63.1]		199/376 (53.0) [47.7-58.1]	101/372 (51.0) [46.1-56.5]	

Amélioration P/F avec VNI

Stephan et al JAMA 2015

Published online May 17, 2015. doi:10.1001/jama.2015.5213

High-Flow Nasal Oxygen vs Noninvasive Positive Airway Pressure in Hypoxemic Patients After Cardiothoracic Surgery: A Randomized Clinical Trial

Table 1. Patient Characteristics

Characteristics	BiPAP (n = 416)	High-Flow Nasal Oxygen Therapy (n = 414)
Age, mean (95% CI), y	63.9 (62.6-65.2)	63.8 (62.5-65.2)
Men, No. (%)	278 (66.8)	273 (65.9)
Body mass index[a]		
Mean (95% CI)	28.2 (27.6-28.7)	28.3 (27.8-28.8)
>30, No. (%)	136 (32.7)	135 (32.6)
Smoking, No. (%)[b]		
Former	217 (52.2)	226 (54.6)
Current	69 (16.6)	83 (20.0)
SAPS II score at admission, mean (95% CI)	28.8 (27.7-30.0)	29.0 (27.8-30.1)
Surgical procedures, No. (%)		
Coronary artery bypass grafting	111 (26.7)	122 (29.5)
Valvular surgery	83 (20.0)	88 (21.3)
Combined cardiac surgery with coronary artery bypass grafting	27 (6.5)	26 (6.3)
Thoracic aorta	28 (6.7)	23 (5.6)
Pulmonary thromboendarterectomy	90 (21.6)	68 (16.4)
Lung resection	30 (7.2)	34 (8.2)
Heart, lung, and heart-lung transplantations	9 (2.2)	18 (4.3)
Others	38 (9.1)	35 (8.5)
Cardiopulmonary bypass, No. (%)	340 (81.7)	320 (77.2)
Duration of cardiopulmonary bypass, mean (95% CI), min	137 (129-146)	137 (128-146)
Time from surgery to randomization, median (IQR), d	1.0 (1.0-3.0)	1.0 (1.0-3.0)
Duration of mechanical ventilation at randomization, median (IQR), h	13.0 (6.0-27.5)	11.5 (5.0-25.4)

64/830
=
7,7%
des inclusions

Stephan et al JAMA 2015
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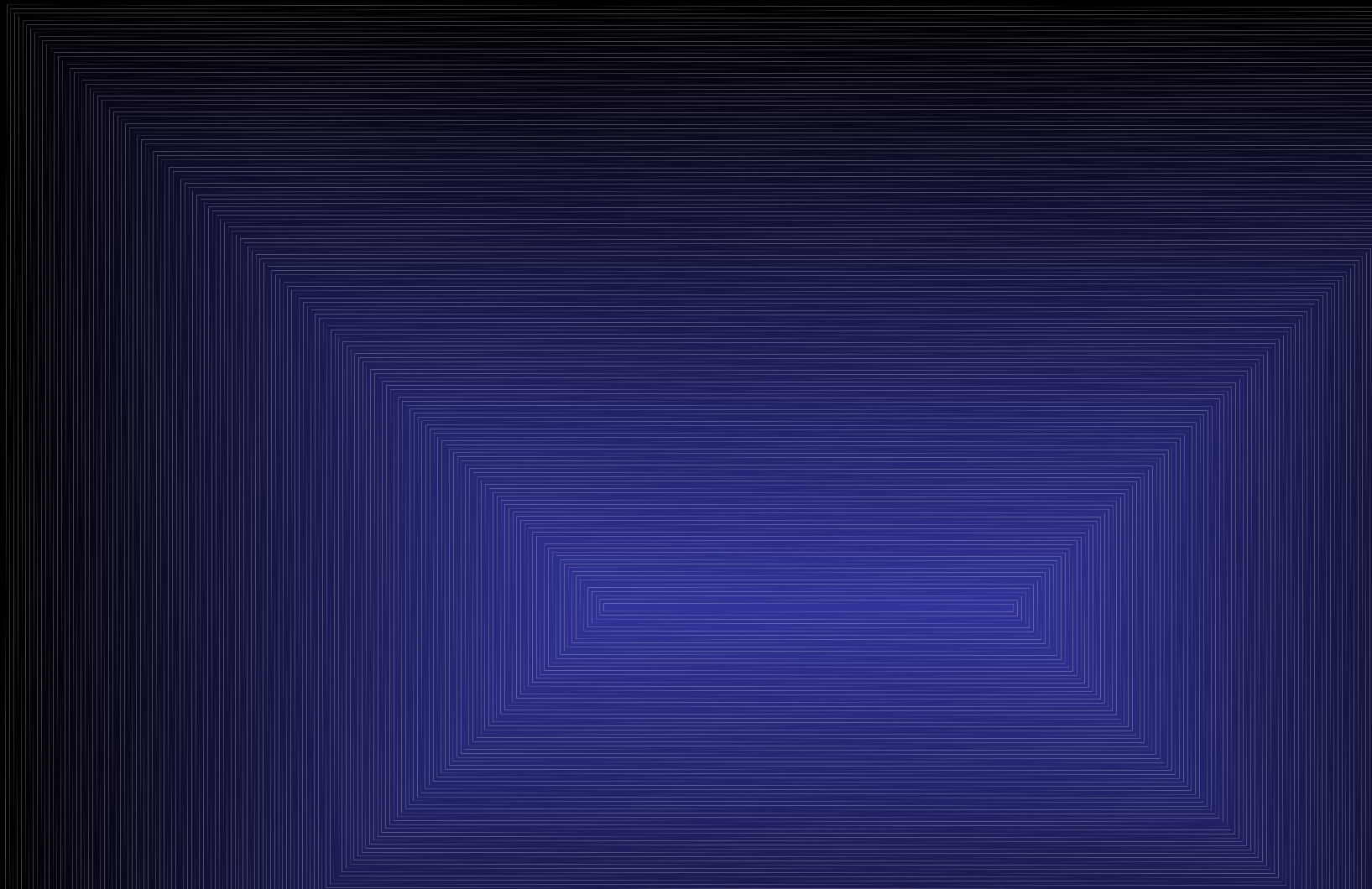


COMPLICATIONS RESPIRATOIRES POST OP

COMPLICATIONS RESPIRATOIRES POST OP

Atélectasie

Atélectasies

J2-J5 post op

JAMA. 2005 Feb 2;293(5):589-95 Squadrone Piedmont Intensive Care Units Network (PICUN).

COMPLICATIONS RESPIRATOIRES POST OP

COMPLICATIONS RESPIRATOIRES POST OP

Pneumonie

Pneumonie post opératoire PPO

TABLE 2. PROSPECTIVE STUDIES ON POSTOPERATIVE PNEUMONIA AFTER LUNG SURGERY

Ref.	Targeted Study?	Particularity of Study	Patient No.	Type of Resection	Antibioprophylaxis	Follow-up Duration (*d*)	Definition of POP	Microbiology of POP	Need for Antibiotherapy	Incidence of Pneumonia
2	Yes	Lung cancer	60/60	L or P	Sulbactam–ampicillin s.shot/cefazolin s.shot	3	Yes	No	NS	3.3%/16.6%
7	Yes	—	194	LR	Cefuroxime 24 h	3	Yes	Yes*	20.7%	17%
10	Yes	—	54	L or P	Cefuroxime 48 h	10	No	No	NS	13%
11	Yes	—	60/60	LR	Cefuroxime 24 h/doxycycline 5 d	NS	Yes	No	27%/30%	10%/18%
31	Yes	—	50/52	LR	Cefuroxime 48 h/cefepime 24 h	NS	Yes	Yes†	NS	12%/15.3%
32	No	Lung cancer	306	LR	Cefuroxime 24 h	NS	Yes	No	NS	8.6%
33	No	Lung cancer	52	L or P	Fluoxacillin 48 h	30	Yes	No	NS	24.5%
34	Yes	—	62	L or P	NS	NS	No	No	NS	8%
35	No	—	500	LR	Cefamandol 48 h	NS	Yes	No	NS	22%
36	Y									
37	N									
38	Y									
39	N									
40	N									
41	N									
42	N									
43	Y									
44	Y									
45	Y									
46	Y									
47	Y									
48	Y									
49	Y									
50	Yes	—	45/47	LR	Penicillin 36 h/No	NS	Yes	No	94%/80%	40%/33%
64	Yes	Major lung resection in 50% of cases	295	LR	Cefotaxime 48 h or amoxicillin–clavulanate (3 g) 48 h	30	Yes	Yes§	NS	2.7% (but 16% lower respiratory tract infection)
65	Yes	Lung cancer	78	LR	Cefazolin 24 h	NS	Yes	Yes‖	NS	12% (and 24% of bronchitis)

Definition of abbreviations: L = lobectomy; LR = lung resection; Lung cancer = lung cancer only; No = no antibioprophylaxis was administered; No infection = infected patients or patients undergoing major lung resection for infectious disease were excluded; NS = not stated; P = pneumonectomy; POP = postoperative pneumonia; s.shot = single shot of prophylaxis.

- 27 études prospectives
- Nbre de patients variable: 30 à 600
- Pas de définition de la PPO: 7 / 26
- Pas de critère microbiologique de PPO: 20 / 27
- Incidence variable de PPO: 2,7% à 40%

Post Operative Pneumonia after major lung resection

TABLE 5. POSTOPERATIVE INFECTIONS

Infection Type and Treatment	No. (%) of Patients*
Type of infection	
Total POP, no. (%)	42 (25)
Documented POP, no. (%)	24 (14.3)
Nondocumented POP, no. (%)	18 (10.7)
Acute bronchitis, no. (%)	9 (5.3)
Wound infections, no. (%)	5 (2.9)†
Empyemas without fistula, no. (%)	8 (4.7)
Treatment	
Antibiotics, no. (%)	70 (41.6)
Antibiotherapy for thoracic infections, no. (%)	63 (37.5)
Antibiotherapy for other causes, no. (%)	7 (4.2)

Definition of abbreviation: POP = postoperative pneumonia.
* Total number of patients surveyed: 168.
† Only four of five wound infections necessitated antibiotherapy.

Schussler et al Am J Respir Crit Care Med. 2006; 173:1161-9.

Post Operative Pneumonia after major lung resection

TABLE 6. MAIN OUTCOME PARAMETERS FOR PATIENTS WITH OR WITHOUT POSTOPERATIVE PNEUMONIA

	Overall (*n* = 168)	With POP (*n* = 42)	Without POP (*n* = 126)	p Value
Noninvasive ventilation, no. (%)	26 (15.5)	19 (45.2)	7 (5.6)	< 0.0000001
Reintubation,* no. (%)	15 (9.0)	10 (23.8)	5 (4.0)	0.00075
Median ICU stay (d), mean (range)	4 (2–7)	7 (5–13)	3 (2–5)	< 0.0000001
OMEGA score,† mean ± SD	172 ± 246	350 ± 387	109 ± 116	< 0.0000001
Median hospital stay (d), mean (range)	10 (8–14)	16 (11–22)	9 (7–12)	0.0000005
30-d mortality, no. (%)	11 (6.5)	8 (19.0)	3 (2.4)	0.00123

Definition of abbreviations: ICU = intensive care unit; POP = postoperative pneumonia.

* Reintubation means late postoperative mechanical ventilation. After surgery, all the patients had been successfully extubated in the recovery room within 6 h of the end of surgery.

† OMEGA = therapeutic intensity score for patients in an intensive care unit (57, 58).

Schussler et al Am J Respir Crit Care Med. 2006; 173:1161-9.

TABLE 4. BACTERIA RECOVERED FROM INTRAOPERATIVE SAMPLES AND INVOLVED IN VARIOUS CASES OF DOCUMENTED POSTOPERATIVE PNEUMONIA

	Intraoperative Bacterial Colonization‡	Pathogenic Bacteria of POP§	p Value
No. patients with QEBA-positive samples (*column 2*) or with POP (*column 3*)	n = 31/136 (22.8%)	n = 24/168 (14.3%)	
No. bacterial species isolated from QEBA samples (*column 2*) or from PSB or PTC (*column 3*)	n = 39	n = 29	
Haemophilus	19/31 (61.3%)	10/24 (41.7%)	NS
β-Lactamase positive	5/19 (26.3%)	4/10 (40%)	NS
Streptococcus pneumoniae	9/31 (29.0%)	6/24 (25%)	NS
MIC peni G ≥ 0.125	2/9 (22.2%)	6/6 (100%)	NS
Other *Streptococcus*	3/31 (9.7%)	3/24 (12.5%)	NS
Staphylococcus aureus	2/31 (12.5%)	1/24 (4.2%)	NS
Gram-negative bacteria*	6/31 (193%)	9/24 (37.5%)	NS
Pseudomonas species	1/31 (3.2%)	6/24 (25%)	NS (p = 0.06)
Enterobacter species	3/31 (9.7%)	2/24 (8.7%)	NS
Serratia species	1/31 (3.2%)	3/24 (12.5%)	NS
Morganella species	1/31 (3.2%)	0/24 (0.0%)	NS
Resistant gram negative†	5/6 (83.3%)	7/10 (70%)	NS
Polymicrobial POP	9/31 (29.0%)	8/24 (33.3%)	NS

Schussler et al Am J Respir Crit Care Med. 2006; 173:1161-9.

Table 7. Outcome of patients according to initial diagnosis expressed as number and percentage of patients

	Group I (n = 261)	Group II (n = 392)	Group III (n = 184)
Favorable outcome	187 (72)	273 (70)	135 (75)
Complications	13 (5)	20 (5)	5 (3)
Death	51 (20)	86 (22)	43 (23)
Interval between diagnosis and death	17 ± 14	14 ± 17	20 ± 20
Interval between hospitalization and death	31 ± 20	24 ± 19	30 ± 23
Estimated cause of death			
Complication of pulmonary infection	12 (5)	26 (7)	15 (8)
Infection of other origin	19 (7)	29 (7)	19 (10)
Noninfectious cause	23 (9)	37 (9)	20 (11)
Undetermined	10 (20)	16 (19)	2 (5)

ars Med 2002 30: 368-75 Diagnostic and therapeutic management of nosocomial pneumonia
gical patients: Results of the Eole study Montravers P, Pourriat JL

Table 4. Microorganisms isolated from pulmonary specimens and blood cultures in 328 of 837 patients studied at time of diagnosis

Organisms	Total No. n = 328	Monomicrobial Isolates n = 234	Bacteremia n = 82
Gram-negative bacteria	237 (72)	126 (54)	26 (32)
Enterobacteriaceae	107 (33)	53 (23)	20 (24)
Escherichia coli	43 (13)	22 (9)	12 (15)
Enterobacter species	13 (4)	8 (3)	3 (4)
Serratia species	12 (4)	5 (2)	0
Klebsiella species	12 (4)	5 (2)	1 (1)
Other Enterobacteriac eae	27 (8)	13 (6)	4 (5)
Haemophilus species	63 (19)	27 (12)	1 (1)
Pseudomonas species	57 (17)	41 (18)	5 (6)
Acinetobacter species	6 (2)	4 (2)	0
Miscellaneous	1 (0.3)	0	0
Gram-positive bacteria	175 (53)	93 (40)	62 (75)
Staphylococcus aureus	87 (27)	54 (23)	27 (33)
Other staphylococci	23 (7)	11 (5)	26 (32)
Streptococcus pneumoniae	32 (10)	19 (8)	3 (4)
Other streptococci	33 (10)	9 (4)	6 (7)
Undetermined organisms	22 (7)	6 (3)	1 (1)
Fungi	14 (4)	7 (3)	2 (2)

ars Med 2002 30: 368-75 Diagnostic and therapeutic management of nosocomial pneumonia
gical patients: Results of the Eole study Montravers P, Pourriat JL

ers Med 2002 30: 368-75 Diagnostic and therapeutic management of nosocomial pneumonia
gical patients: Results of the Eole study Montravers P, Pourriat JL

Impact of an antimicrobial stewardship program on management of severe post-operative pneumonia after major lung resection Kerneis et al Soumis

Incidence

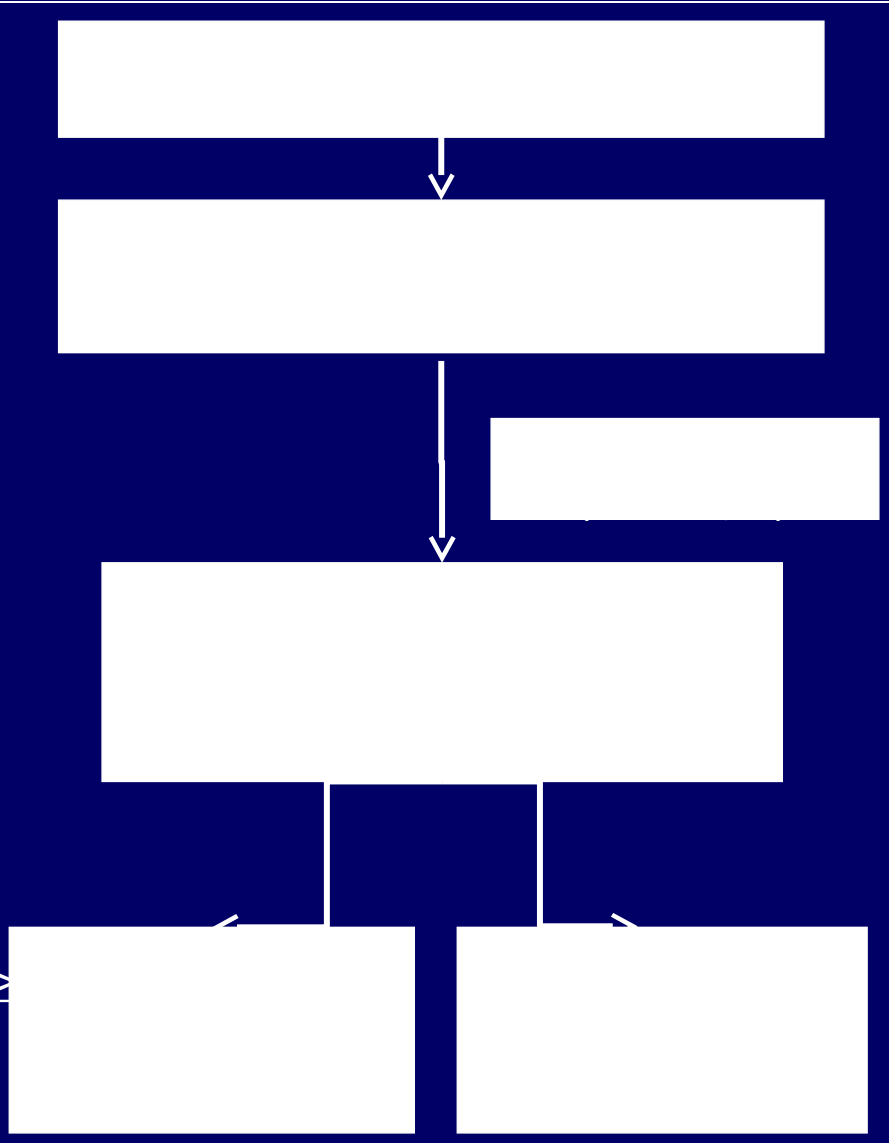
2001 (N=168)	2002 (n=277)	2013-2015 (N=1555)
Céfamandole	Amoxi-clav	ASP+Amoxi-clav
42 (25%)	38 (14%)	152 (10%)

Microbiologie

Pneumonies documentées	2001 (N=24)	2013-2015 (N=66)
BGN hors *Haemophilus*	7 (29%)	50 (76%)
Enterobacteriacae	-	41 (62%)
Pseudomonas sp	-	9 (14%)
Haemophilus influenzae	10 (42%)	13 (20%)
Streptococcus sp.	10 (42%)	8 (12%)
Staphylococcus aureus	1 (4%)	10 (15%)

- **Incidence des POP sévères après résection pulmonaire reste basse 15 ans après le changement d'antibioprophylaxie**
- **Emergence des entérobactéries**

- **3 years prospective study (01.13-12.15)**
- **POP within 30 days after LRS**
- **Antibiotic prophylaxis Amox-Clav.**
  - at induction (2 g) and after 4 hours (1 g)
- **POP suspicion:**
  - New or changing pulmonary infiltrates on chest X-Ray that persisted despite physiotherapy or broncho-aspiration, fever > 38°C, new rise in CRP or PCTvalues or WBC count over the 24 hours > 12 G/l or increase and modification of sputum with purulent aspect.
- **Documented POP:**
  - positive blood culture or positive urinary antigen or positive sputum culture ≥ 106 CFU /ml or distal bronchial aspirate ≥ 106 CFU/ml or protected catheter distal sampling ≥ 103 CFU /ml or BAL culture ≥ 104 CFU /ml



Pneumonies post opératoire

- Complications sévère
- Diagnostic: urgent
  - Prélèvements (protégés) dirigés per fibroscopique
  - ECBC
- Antibiothérapie urgente
  - Spectre initial large (Strepto, SDMS, Entérobact et pyo) = Piperacilline-Tazobactam
- Reévaluation +++

COMPLICATIONS RESPIRATOIRES POST OP

COMPLICATIONS RESPIRATOIRES POST OP

Hémothorax

Hémothorax

Stephan et al CHEST 2000;118:1263-70
Massard et al Ann Thorac Surg 1996;62:1033-7.

Hémothorax post-opératoire

- Indications de reprise
  - Choc hémorragique
  - Pertes ≥200 ml/h pendant plus de 4 heures
  - Hémothorax non drainé sur le cliché thoracique
  - Troubles de la coagulation non contrôlés (CIVD)

- Fréquence de re-thoracotomie:
  - 2.9 % de re-thoracotomie pour hémostase dans une série de 173 patients avec réserve respîratoire limitée “
    Knott-Craig et al. Ann Thorac Surg 1997;63:1405-10
  - 0.6% dans une cohorte de 621 cas.
    Licker et al. Eur J Cardiothorac Surg 1999;15:314-9

Drainage hématique >300mL/3h en post-opératoire

Estimer la perte sanguine

- **Avis chirurgical d'urgence**
- **Déclampage du drain sauf avis contraire**
- **Demander radio thoracique de face**
- **Demander hémocue sang+liquide pleural**
- **Prélever hémostase+RAI.**
- **Mettre en réserve/commander CG/PFC (ratio [1-1,5])**

Objectifs de réanimation :
A jeun
Oxygénothérapie qsp SpO2**≥94%**
VVPx2 .
Objectifs:
- PAS 80-90mmHg
- PAM 60-65mmHg
- Plaq ≥50G/mm3
- Fibrinogène ≥1,5g/L

Instabilité hémodynamique

1L de cristalloïdes max
NAD si PAS<80mmHg
Reprise chirurgicale
en urgence

Stabilité hémodynamique

1L de cristalloïdes maximum

Pas de caillotage à la RP

Surveillance

Caillotage à la RP

Exacyl 1g bolus sur 10'
puis 1g sur 8h IVSE

Vérification perméabilité du drain
Avis chirurgical pour reprise chirurgicale

Pas de caillotage

Surveillance clinique+bio

Caillotage

Reprise chirurgicale
en urgence

COMPLICATIONS RESPIRATOIRES POST OP

COMPLICATIONS RESPIRATOIRES POST OP

Fistule/Pyothorax

Fuites aériques persistantes

- Fuites alvéolaires persistantes > 7 jours
- Fréquence:

5% (n=33) dans une série de 669 patients

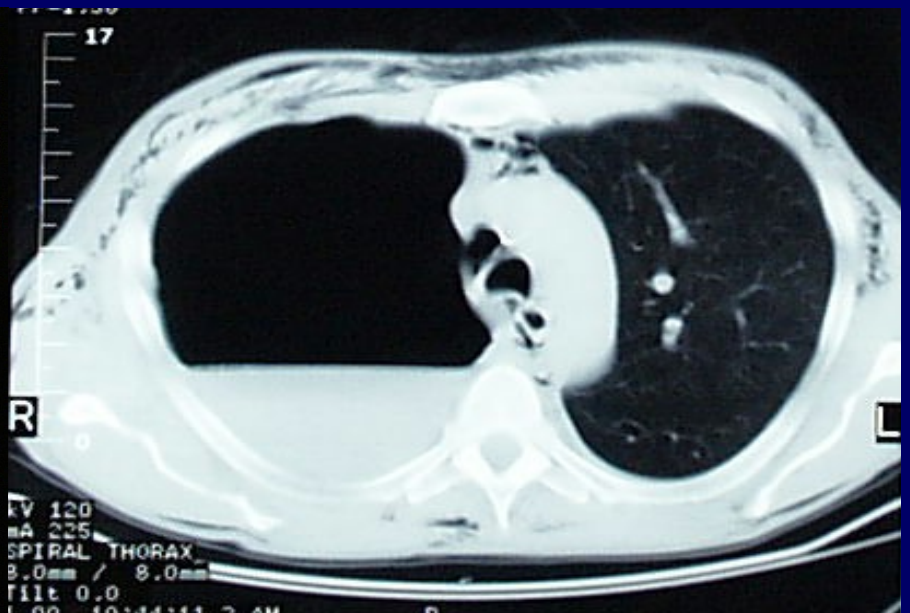
Cerfolio et al Ann Thorac Surg 2002;73:1727-30

- **Facteurs de risque:**
  - VEMS <80% th
  - Corticothérapie
  - Sexe masculin
- **Traitement**
  - Mobiliser les drains
  - Mettre au boccal puis retirer les drains
  - Valve de Heimlich?
  - Vidéothoracoscopie et symphyse

Rice. Chest Surg Clin N Am. 2002;12(3):529-39

Fistule broncho-pleurale

- Fréquence:
  - 0-3% des lobectomies
  - 0-10% des pneumonectomies
- Signes:
  - Sepsis
  - Insuffisance respiratoire aiguë
  - Emphysème sous cutané
- Diagnostic:
  - Fibroscopie
  - TDM thorax
  - Scintigraphie au Xenon
  - NO

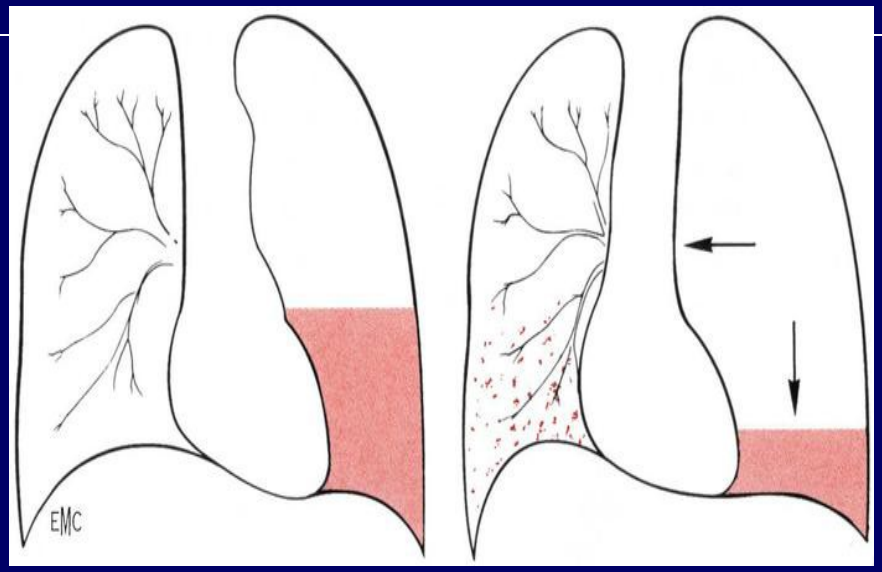


Empyème

- 2.8% (n=109) dans une série de résections pulmonaires
- Fistule broncho-pleurale dans 97/109 cas (89%)
- Diagnostic;
  - Ponction de la cavité: pus ou germes

Regnard et al JTCVS 2000;120:270-5.

Traitement Empyème sur Pneumonectomie



En Urgence

- Position demi assis

Mise en place d'un drainage protecteur et antibiothérapie systémique à large spectre.

- Recherche d'une fistule broncho-pleurale

- Pyothorax avec fistule

Mise à plat par thoracostomie
Technique de la gueule de four
Chirurgie de comblement secondaire.
A réaliser avec un patient autonome sur le plan respiratoire en l'absence de sepsis pulmonaire.

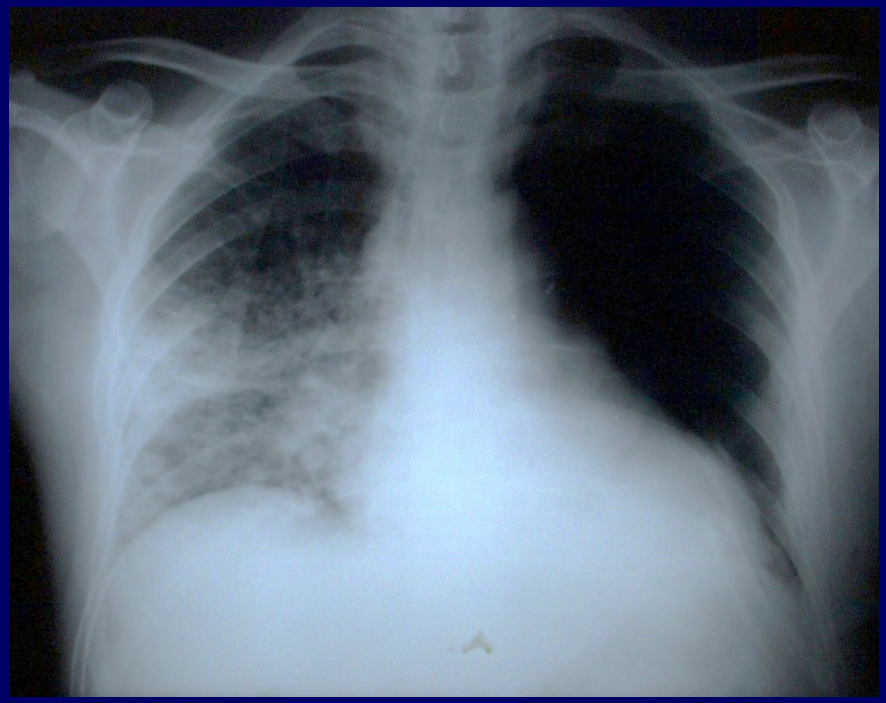
Pyothorax sans fistule

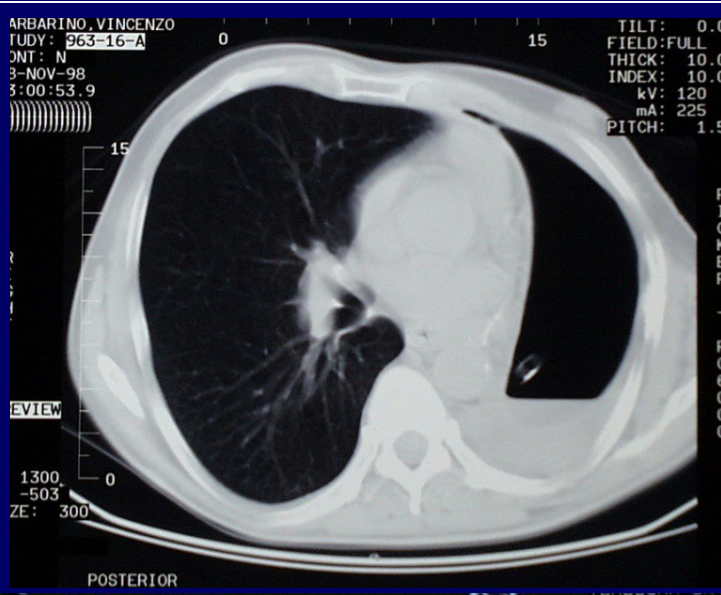
Vidéo-thoracoscopie et mise en place d'une irrigation lavage.

Thoracostomie secondaire si la cavité ne peut être stérilisée.

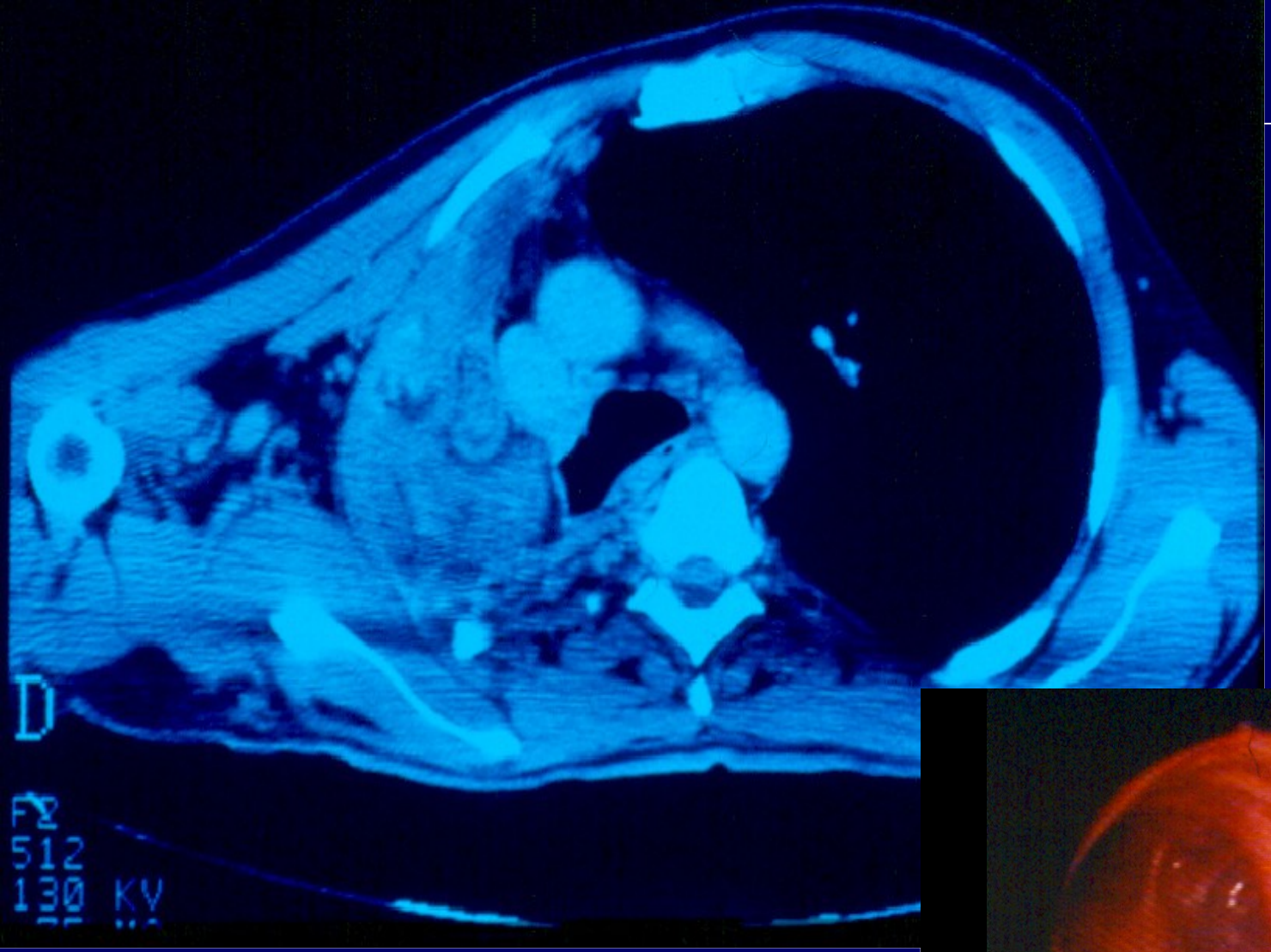
Pyothorax avec fistule

sur le moignon de pneumonectomie gauche compliquée de pneumonie contro-latérale





Thoracostomie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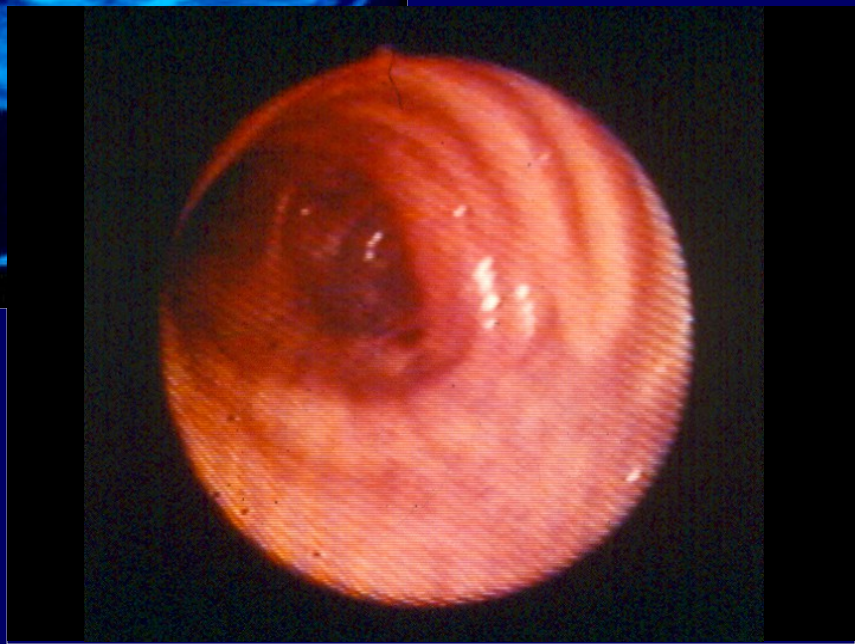


COMPLICATIONS RESPIRATOIRES POST OP

COMPLICATIONS RESPIRATOIRES POST OP

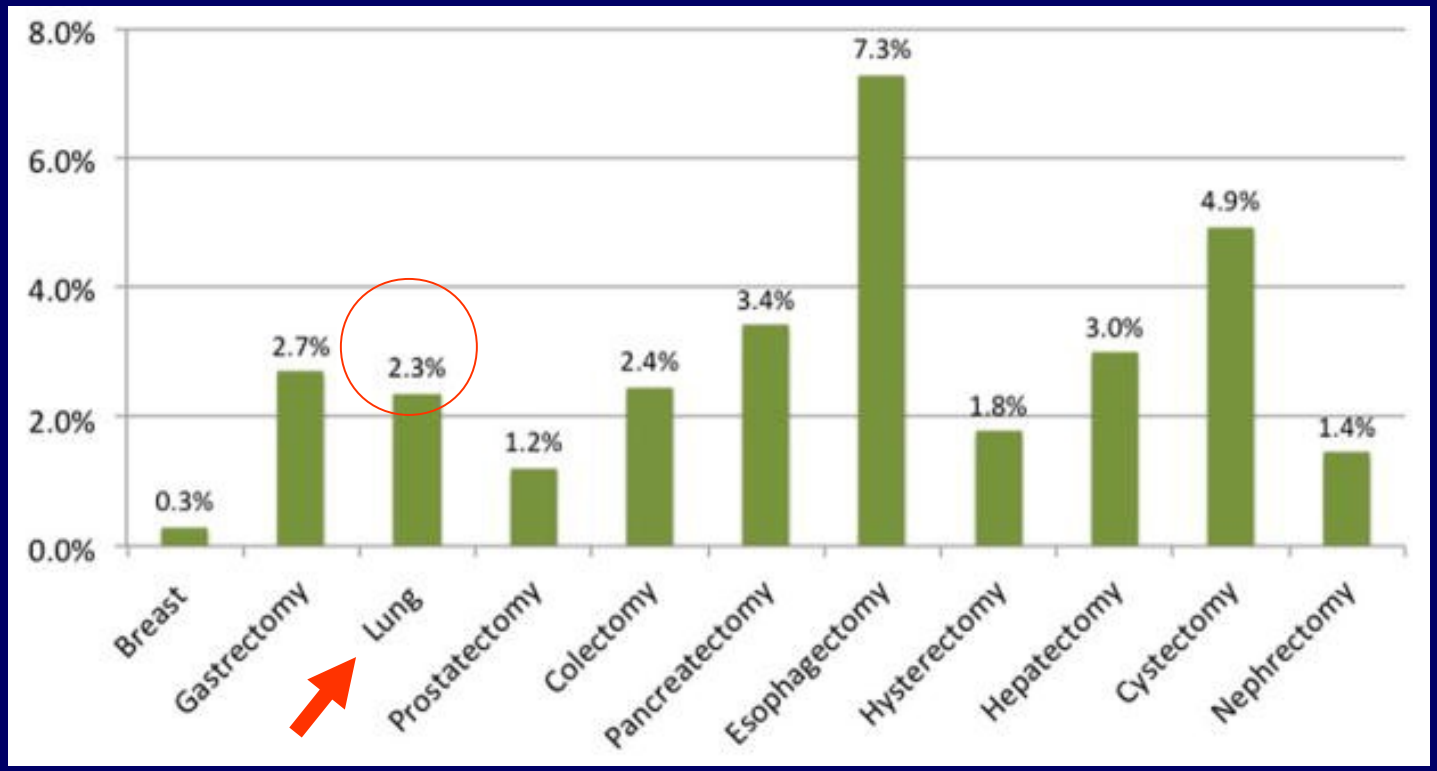
Bronchospasme

COMPLICATIONS RESPIRATOIRES POST OP

Autres

CHIRURIGIE CARCINOLOGIQUE

INCIDENCE D'EMBOLIE PULMONAIRE POST OPERATOIRES J+30



National Surgical Quality Improvement Program (NSQIP) (2007–2009).

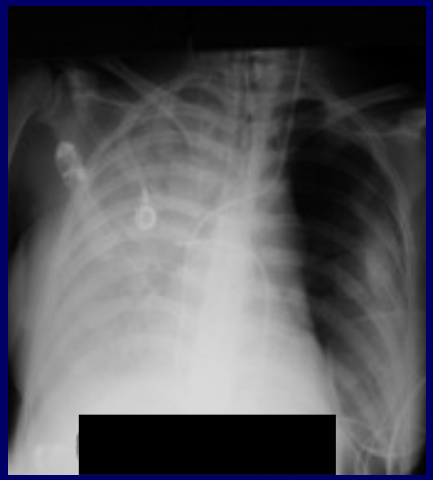
Embolies pulmonaires

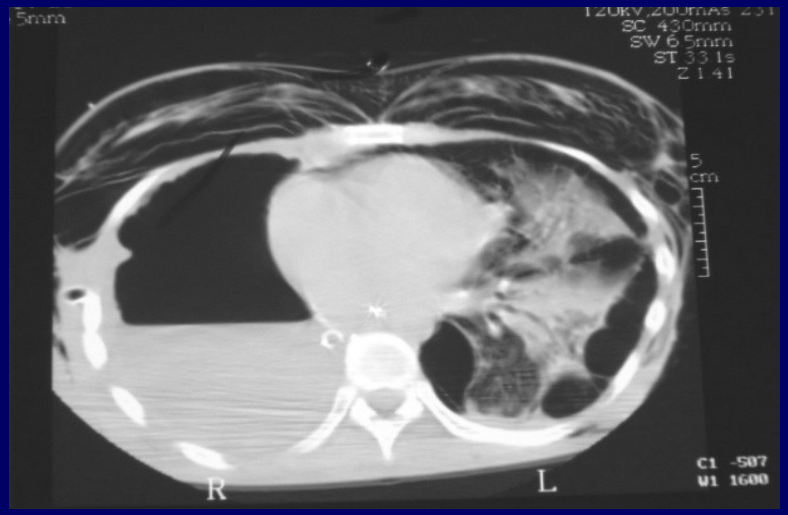
- Diagnostic: = Angioscanner spiralé
- Traitement = HNF curative si possible (avis chirurgien)

  Risque de saignement surtout précoce (< J5)
- Fibrinolyse seulement si état de choc (avis chirurgien)
- Interruption de VCI
  - si CI aux anticoagulants (Fitres cave temporaires)
  - Si récidive documentée sous traitement anticoagulant bien conduit

Oedèmes pulmonaires

- OAP de surcharge
- Oedème pulmonaire post pneumonectomie
- TRALI (transfusions)
- SDRA post inhalation
- SDRA sur pneumonie infectieuse
- Oedème pulmonaire de réexpansion





ALI / SDRA

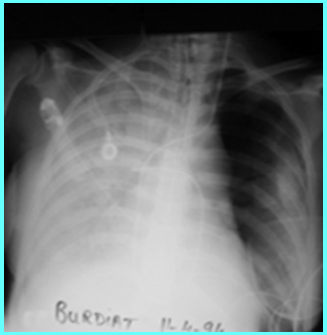
- Incidence:
  - 1,6% à 3,7% Lobectomie
  - 3,2% à 12% Pneumonectomie
- Etiologie primitive si précoce et plutôt secondaire à une infection si tardif.
- Mortalité élevée 22% à 67% en cas de pneumonectomie.
- Facteurs de risque
  - Etendue de la résection (Pie droite)
  - Ventilation à hauts volumes
  - Apports hydriques permissifs
  - Alcoolisme, Score ASA,

SS Tang, Eur J Cardiothorac Surg. 2008 Oct;(34):892-902.
M Licker, Anesth Analg 2003;97:1558-1565.
A Dulu, Chest 2006 Jul;130(1):73-8.
J K Yoon, Anaesth Intensive Care 2009;37(1):14-9.

SDRA Post opératoire : traitement

- Phase initiale
  - Optimiser l'hémodynamique
  - Sédation adaptée
  - Curares à la phase initiale
  - Nutrition entérale
  - DV et DL
  - NO inhalé
  - Epuration CO2?
  - ECLS
- Phase secondaire (
  - **Corticostéroïdes?**

VM protectrice
↓VT (4-5 mL/kg)
Pplat (P< 30 cmH2O)
PEP optimale



Patients undergoing pneumonectomy
n = 579

Invasive mechanical ventilation
n = 89 (15.4%)
Day 30 of MV Deaths n = 34 (38.2%)

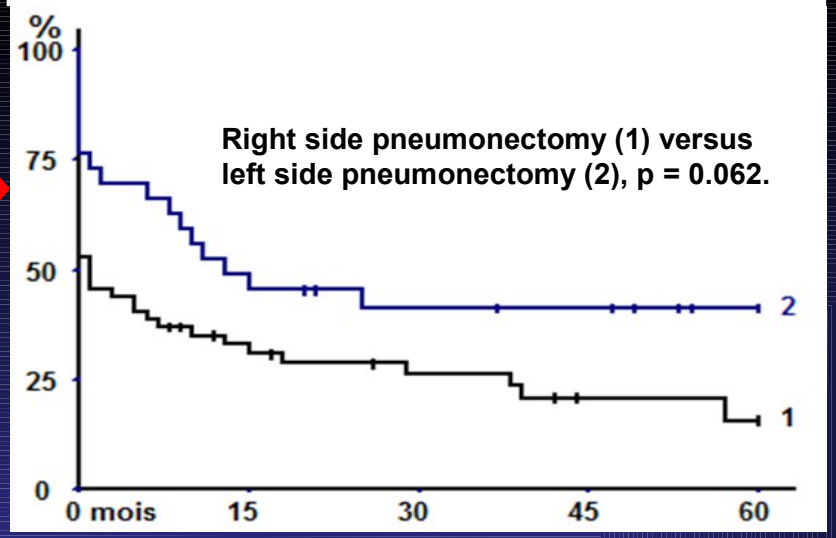
	OR	95 % CI	*p* value
ARDS	7.33	(1.47 - 36.67)	0.015
SAPS 2 > 25	4.57	(1.19 - 17.52)	0.027
Right side pneumonectomy	4.95	(1.19 - 20.54)	0.028

ARDS
n = 60 (67.4%)
Deaths n=29 (48.3%)

Mild / Moderate ARDS
n = 24 (40%)
Deaths n=6 (25%)

Severe ARDS
n (60%) %)
Deaths n=23 (64%)

Overall survival rate of n= 89 patients with early IMV after pneumonectomy.



Right side pneumonectomy (1) versus left side pneumonectomy (2), p = 0.062.

10% des pneumonectomies

Blanc K et al 2016 soumis

COMPLICATIONS RESPIRATOIRES POST OP

Prévention des complications

PREVENTION DES COMPLICATIONS RESPIRATOIRES POST OPERATOIRES

- Evaluation pré-opératoire +++
  - Co-morbidités
  - fonction respiratoire

- Préparation préopératoire (BPCO, obèses)
  - Sevrage tabac
  - Optimisation des traitements de fond
  - Nutrition
  - Réhabilitation, VNI?, CPAP si SASO

- Anesthésie et per op

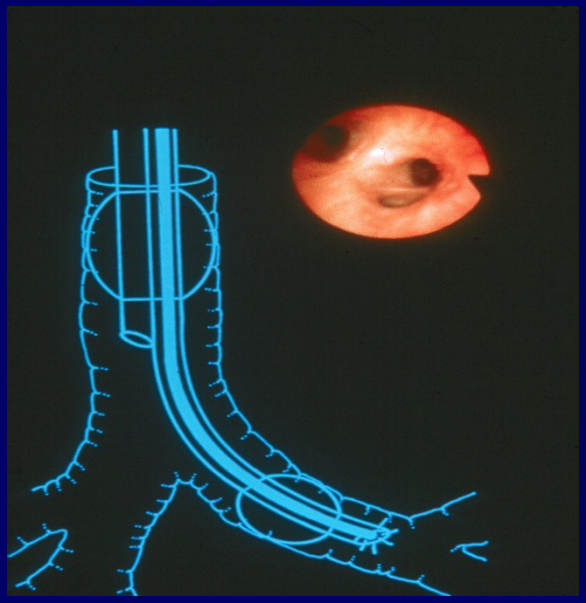
- Post-opératoire:
  - Le bon patient au bon endroit selon ses FDR de complication post op et le type d'exérèse

Optimisation ventilatoire peropératoire

Prévention:

- **Vérifier la position de la sonde par fibro +++**
- **Limitation des Pplat**
- **Diminution du VT < 6 ml/kg**

- **Appliquer une PEP**
- **Limiter remplissage**
- **Eviter les transfusions**



E Beddow, P Goldstraw Thorax 2003;58:820–822

TRAITEMENT DES COMPLICATIONS RESPIRATOIRES POST OPERATOIRES

- Prise en charge précoce
  - Adapter les modalités et lieu de prise en charge en fonction de l'évaluation du risque préopératoire
    - SSPI
    - Réa, USCI, USC
- Traitement symptomatique
  - O2
  - VNI
    - VS AI PEP +++ si hypoventilation alvéolaire (hypercapnie)
  - Ventilation invasive
    - SDRA
    - Pneumonie sévère
    - Défaillance extra respiratoire
    - Reprise chirurgicale
    - Absence d'amélioration précoce sous VNI si IRA hypoxémique
- Traitement étiologique+++
  - Complication chirurgicale +++
  - Complication pulmonaire
  - Autre

POPVNI trial

Intensive Care Med
DOI 10.1007/s00134-013-3150-2

ORIGINAL ARTICLE

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Benjamin Planquette
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Hervé Clavier
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Halim Abou Hanna
François Bellenot
Jean-François Regnard
Marc Riquet
Pierre Magdeleinat
Guy Meyer
Nicolas Roche
Gérard Huchon
Joel Coste
Antoine Rabbat

Early postoperative prophylactic noninvasive ventilation after major lung resection in COPD patients: a randomized controlled trial

- Objectif: Déterminer si la mise en route d 'une VNI mode VS AI PEP en postopératoire immédiat permet de diminuer l 'incidence des évènements aigus respiratoires chez les patients avec BPCO

2 groupes parallèles de 180 patients:

Groupe 1: VNI en systématique en post-opératoire

Groupe 2: groupe contrôle

POPVNI

BPCO (VEMS<80% et tiff <70%)
résection pulmonaire

↓

Patient éligible
(inclusion +; exclusion -)

↓

Information et consentement

↓

Randomisation la veille de l'intervention

↓

Résection pulmonaire
J0 post-opératoire

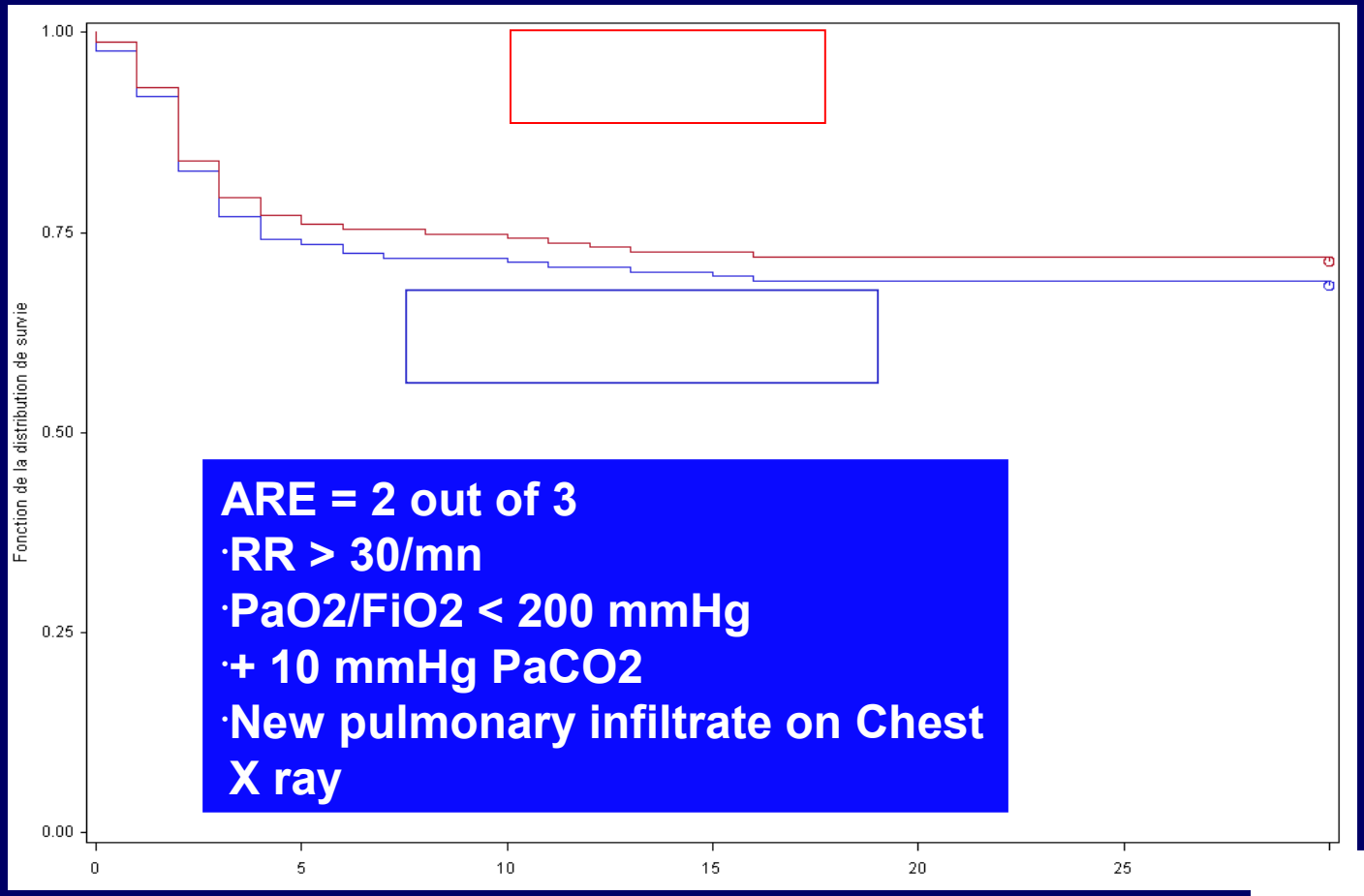
↙ ↘

Groupe VNI

Groupe contrôle

Int Care Med 2014;40:220-7

Survival free of ARE (Kaplan Meier)



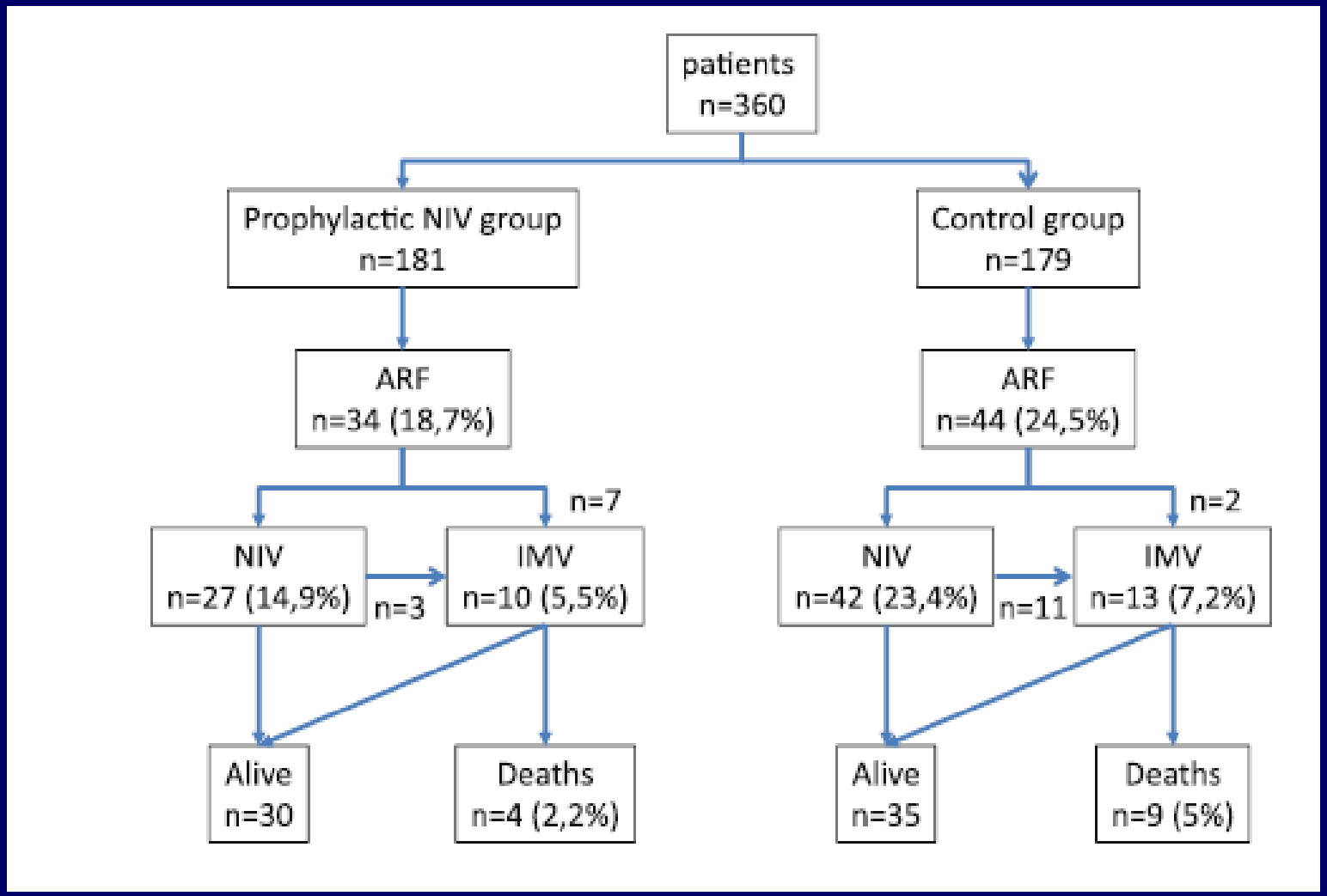
ARE = 2 out of 3
- RR > 30/mn
- PaO2/FiO2 < 200 mmHg
- + 10 mmHg PaCO2
- New pulmonary infiltrate on Chest X ray

Lorut C et al. Int Care Med 2014;40:220-7

POPVNI trial

Parameters	Population N = 349	NIV group N = 175	Control group n = 174	p
ARE (%)	**105 (30.1)**	**50 (28.6)**	**55 (31.6)**	**0.54**
ARF, n (%)	**71 (20.3)**	**27 (15.4)**	**44 (25.3)**	**0.03**
requiring NIV, n (%)	69 (19.7)	27 (15.4)	42 (24.1)	0.04
requiring IMV , n (%)	23 (6.6)	10 (5.7)	13 (7.4)	0.53
Infection	14 (4.0)	8 (4.6)	6 (3.4)	0.79
Length of stay (j)	17.3 (35.9)	18.6 (40.7)	16.0 (30.3)	0.27
Mortality (%)	13 (3.7)	4 (2.3)	9 (5.2)	0.17

POPVNI trial



Lorut C et al. Int Care Med 2014;40:220-7

POPVNI trial

Table 3 Outcomes

Variable	Population ($n = 360$)	NIV group ($n = 181$)	Control group ($n = 179$)	p value
ARE, n (%)	112 (31.1)	57 (31.5)	55 (30.7)	0.93
Acute respiratory failure, n (%)	78 (21.7)	34 (18.8)	44 (24.5)	0.20
IMV, n (%)	9 (2.5)	7 (3.9)	2 (1.1)	0.17
Pneumonia, n (%)	57 (15.8)	29 (16.0)	28 (15.6)	1
Operative site infection, n (%)	14 (3.5)	8 (4.4)	6 (3.4)	0.59
Length of hospital stay (day), mean ± SD	17.3 (35.9)	18.6 (40.7)	16.0 (30.3)	0.27
Mortality, n (%)	13 (3.6)	4 (2.2)	9 (5)	0.16

ARE acute respiratory event defined by at least two of the following criteria: respiratory rate >30/min, PaO_2/FiO_2 <200 mmHg, $PaCO_2$ increase of more than 10 mmHg above baseline postoperative value or a new pulmonary infiltrate on chest X-ray; *IMV* invasive mechanical ventilation; *NIV* non-invasive ventilation

Lorut C et al. Int Care Med 2014;40:220-7

Merci de votre attention

Réhabilitation pré-opératoire

- Complications repiratoires (1, 2) ↘
- VO2 peak (1) ↗
- Coûts pos-opératoires (DMS) (3) ↘

1. *Bobbio A et al Eur j of cardio-thoracic Surgery 2008; 33:95-98.*
2. *Reeve J et al : J Cardiothorac Surg 2008; 3:48.*
3. *Valera Get al Eur J Cardio-Thor Surg 2006; 29:216-220*

PREVENTION DES COMPLICATIONS RESPIRATOIRES POST OPERATOIRES

- Evaluation pré-opératoire+++
  - Co-morbidités
  - fonction respiratoire
- Préparation préopératoire (BPCO, obèses)
  - Sevrage tabac
  - Optimisation des traitements de fond
  - Nutrition
  - Réhabilitation, VNI?, CPAP si SASO
  - Modalités de Chimiothérapie , radiothérapie

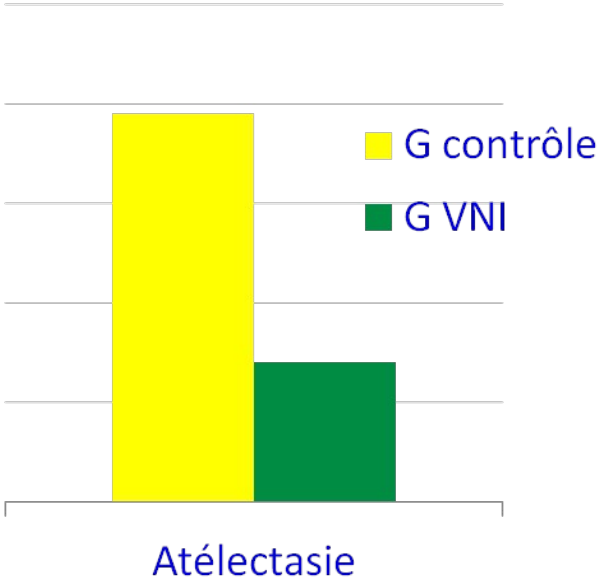
Avant

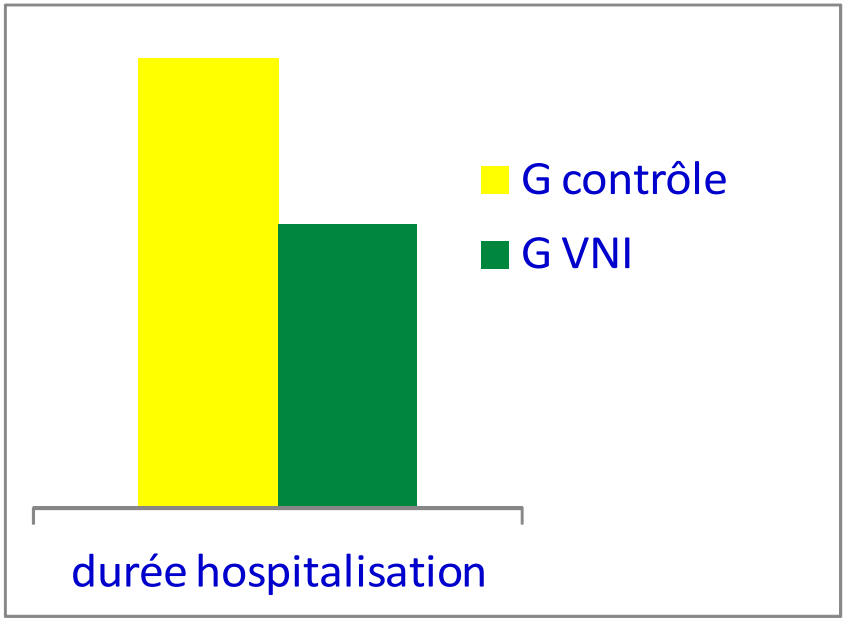
- Anesthésie et per op
  - Choix des drogues
  - intubation, VM perop, remplissage
  - Antibioprophylaxie

Pendant

- Post-opératoire
  - Surveillance
  - Douleur
  - Kinésithérapie et mobilisation
  - CPAP si SASO
  - VNI préventive si BPCO sévère ou FDR ++?
  - Optiflow?

Après


G contrôle
G VNI
Atélectasie


G contrôle
G VNI
durée hospitalisation

High-Flow Nasal Oxygen vs Noninvasive Positive Airway Pressure in Hypoxemic Patients After Cardiothoracic Surgery:

NS

Table 3. Subjective Effect on Dyspnea, Comfort Score, Nurse Interventions, and Markers of Illness Severity During the First 3 Study Treatment Days[a]

Parameters	Day 1			Day 2			Day 3		
	BiPAP (n = 412)	High-Flow Nasal Oxygen Therapy (n = 408)	*P* Value	BiPAP (n = 272)	High-Flow Nasal Oxygen Therapy (n = 257)	*P* Value	BiPAP (n = 153)	High-Flow Nasal Oxygen Therapy (n = 151)	*P* Value
Duration of respiratory assistance per day, mean (95% CI), h	6.6 (6.3-6.9)	17.9 (17.3-18.6)		6.5 (6.0-6.9)	20.7 (19.9-21.4)		6.0 (5.4-6.6)	20.5 (19.4-21.6)	
Dyspnea score, No./total (%) [95% CI]									
Improvement	227/402 (56.5) [51.5-61.4]	224/396 (56.6) [51.5-61.5]		174/261 (66.7) [60.6-72.3]	163/252 (64.7) [58.4-72.6]		98/142 (69.0) [60.7-76.5]	87/148 (58.8) [50.4-66.8]	
No improvement	146/402 (36.3) [31.6-41.2]	134/396 (33.8) [29.2-38.7]	>.99	76/261 (29.1) [23.7-35.0]	76/252 (30.2) [24.6-36.2]	>.99	34/142 (23.9) [17.2-31.8]	50/148 (34.0) [26.2-42.0]	.48
Deterioration	29/402 (7.2) [4.9-10.2]	38/396 (9.6) [6.9-12.9]		11/261 (4.2) [2.1-7.4]	13/252 (5.2) [2.8-8.7]		10/142 (7.0) [3.4-12.6]	11/148 (7.4) [3.8-12.9]	
Comfort score, No./total (%) [95% CI]									
Poor	86/399 (21.6) [17.6-25.9]	81/395 (20.5) [16.6-26.9]		56/261 (21.5) [16.6-26.9]	52/249 (21.0) [16.0-26.5]		30/143 (21.0) [14.6-28.6]	31/148 (21.0) [14.7-28.4]	
Acceptable	118/399 (29.6) [25.1-34.3]	116/395 (29.4) [24.9-34.1]	>.99	76/261 (29.1) [23.7-35.0]	80/249 (32.1) [26.4-38.3]	>.99	44/143 (31.0) [23.3-39.0]	48/148 (32.4) [24.9-40.6]	>.99
Good	195/399 (49.0) [43.9-53.9]	198/395 (50.1) [45.1-55.3]		129/261 (49.4) [43.2-55.7]	117/249 (47.0) [40.7-53.4]		69/143 (48.3) [39.8-56.7]	69/148 (47.0) [38.4-55.0]	
Skin breakdown, No./total (%) [95% CI]									
None	363/403 (90.1) [86.6-92.7]	392/405 (96.8) [94.4-98.2]		229/267 (86.0) [80.9-89.6]	232/252 (92.1) [87.8-94.9]		119/145 (82.1) [74.6-87.8]	129/147 (87.8) [81.0-92.4]	
Focal erythema	38/403 (9.4) [6.8-12.8]	10/405 (2.5) [1.3-4.6]	<.001	38/267 (14.2) [10.4-19.1]	19/252 (7.5) [4.7-11.7]	.05	25/145 (17.2) [11.7-24.6]	18/147 (12.2) [7.6-19.8]	>.99
Moderate skin breakdown	1/403 (0.2)	2/405 (0.5)		0	0		1/145 (0.7)	0	
Skin ulcer	0	1/405 (0.2)		0	1/252 (0.4)		0	0	
Skin necrosis	1/403 (0.2)	0		0	0		0	0	
Nurse interventions per patient, mean (95% CI)	0.30 (0.22-0.38)	0.49 (0.34-0.63)	.35	0.24 (0.15-0.32)	0.39 (0.26-0.52)	.09	0.29 (0.14-0.45)	0.32 (0.20-0.43)	.24
Patients with ≥1 fiberoptic bronchoscopy, No. (%) [95% CI]	31 (7.5) [5.4-10.9]	40 (9.8) [7.4-13.6]	.79	28 (10.3) [7.3-15.2]	27 (10.5) [7.4-15.6]	>.99	12 (7.8) [4.3-13.8]	22 (14.6) [10.2-22.9]	.20
Score, mean (95% CI)									
Radiologic[b]	4.0 (3.8-4.2)	4.3 (4.1-4.5)	.04	4.2 (3.9-4.4)	4.5 (4.2-4.7)	.29	4.5 (4.2-4.8)	4.7 (4.4-5.0)	>.99
SOFA[c]	4.7 (4.5-4.9)	4.9 (4.6-5.1)		4.4 (4.2-4.7)	4.7 (4.4-4.9)		4.2 (3.9-4.5)	4.8 (4.4-5.2)	.03

Stephan et al JAMA 2015
Published online May 17, 2015. doi:10.1001/jama.2015.5213

High-Flow Nasal Oxygen vs Noninvasive Positive Airway Pressure in Hypoxemic Patients After Cardiothoracic Surgery:

Table 4. Clinical Outcomes and Adverse Events During the Intensive Care Unit Stay

Events	Group		*P* Value
	BiPAP (n = 416)	HFNO (n = 414)	
Nosocomial pneumonia, No. (%) [95% CI]	90 (21.6) [17.8-25.9]	83 (20.0) [16.4-24.3]	.57
Pneumothorax, No. (%) [95% CI]	7 (1.7) [0.7-3.6]	8 (1.9) [0.9-3.9]	.86
Acute colonic pseudo-obstruction, No. (%) [95% CI]	8 (1.9) [0.9-3.9]	9 (2.2) [1.0-4.2]	.86
No. of days with respiratory support, median (IQR)	2 (1-3)	2 (1-3)	.59
Stay length, median (IQR), d			
ICU	6 (4-10)	6 (4-10)	.77
Hospital	14 (9-20)	13 (9-22)	.59

Stephan et al JAMA 2015
Published online May 17, 2015. doi:10.1001/jama.2015.5213

High-Flow Nasal Oxygen vs Noninvasive Positive Airway Pressure in Hypoxemic Patients After Cardiothoracic Surgery:

Non car le résultat de cette étude = OHDH = BiPAP

Non car étude discutable

Etude en soins courant!!! pas de consentement signé
Population incluse
Biais de sélection++
Soins courants mais indications de BiPAP non reconnues car
non bénéfique en prophylaxie d'IRA après exérèse pulmonaire
On évalue 2 techniques
mais l'on administre une en continue et l'autre en séquentielle

POPVNI trial

Table 1 Preoperative characteristics of the patients, disease and treatment before surgery

Parameters	Overall population (n = 360)	Prophylactic NIV group (n = 181)	Control group (n = 179)
Age, year, mean ± SD	63.6 ± 9.7	63.6 ± 10.6	63.7 ± 8.8
Male gender, n (%)	276 (76.6)	135 (74.5)	141 (78.7)
BMI (kg/m^2), mean ± SD	24.7 ± 4.8	24.7 ± 4.8	24.7 ± 4.9
Smokers, n (%)	96 (26.6)	48 (26.5)	48 (26.8)
ASA III + IV, n (%)	147 (40.8)	67 (37)	80 (44.6)
Charlson score, n (%)			
0–1	292 (81.8)	150 (82.8)	141 (79.2)
≥2	57 (15.8)	25 (13.8)	32 (17.8)
Thoracoscore, mean ± SD	9.8 (13.5)	9.4 (12.8)	10.3 (14.2)
Heart disease, n (%)	110 (30.5)	54 (29.8)	56 (31.2)
Ischemic Heart disease, n (%)	47 (13)	23 (12.7)	24 (13.4)
Peripheral vascular disease, n (%)	56 (15.5)	29 (16)	27 (15)
Chronic renal failure, n (%)	28 (7.7)	8 (4.4)	20 (11.1)
Diabetes mellitus, n (%)	31 (8.6)	12 (6.6)	19 (10.6)
Alcohol use, n (%)	40 (11.1)	19 (10.4)	21 (11.7)
FEV1/FVC (%), mean ± SD	55.2 ± 9.9	55.8 ± 9.7	57 ± 10
FEV1 (%), mean ± SD	61.9 ± 11.4	63.5 ± 10.8	60.4 ± 11.9
FEV1 <60 % pred, n (%)	129 (37.0)	59 (33.7)	70 (40.2)
Lung cancer, n (%)	283 (78.6)	143 (79)	140 (78.5)
Chemotherapy, n (%)	44 (12.2)	23 (12.7)	21 (11.7)
Radiotherapy, n (%)	14 (3.8)	8 (4.4)	6 (3.3)
Secondary lung cancer, n (%)	22 (6.1)	9 (4.9)	13 (7.2)
Non-malignant, n (%)	44 (12.2)	23 (12.7)	21 (11.7)

BMI body mass index, *ASA* American Society of Anesthesiologists, *FEV1* forced expiratory volume, *FVC* forced vital capacity, *pred.* predicted value, *CPAP* continuous positive airway pressure

Lorut C et al. Int Care Med 2014;40:220-7

ELSEVIER

European Journal of Cardio-thoracic Surgery 27 (2005) 1099-1105

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

www.elsevier.com/locate/ejcts

Early and long-term results of lung resection for non-small-cell lung cancer in patients with severe ventilatory impairment

Pierre Magdeleinat*, Agathe Seguin, Marco Alifano, Souheil Boubia, Jean-François Regnard

Hôpital Hôtel-Dieu, Unité de Chirurgie Thoracique, 1 Place du Parvis Notre-Dame, 75004 Paris, France

Table 2
Pre-operative functional assessment ($n=106$)

FEV1 (L)	1.17 (0.62-1.77)
FEV1 (% of predicted)	40 (23-50)
	< 30, $n=11$
	30-39, $n=39$
	40-50, $n=56$
FVC (L)	2.67 (1.20-4.19)
FVC (% of predicted)	69 (17-117)
FEV1/FVC %	44 (23-77)
TLC (L)	6.3 (3.07-14.3)
TLC (% of predicted)	101 (54-202)
PaO2 (mmHg)	72 (54-93)
	< 65, $n=18$
PaCO2 (mmHg)	37 (22-49)
	> 42, $n=9$

Values are expressed as mean and ranges (in parentheses).

Table 1
Extra-respiratory co-morbidities ($n=66$)

Cardiac ($n=25$)	Vascular ($n=36$)	Miscellaneous ($n=14$)
Coronary artery disease, 17	Arterial hypertension, 25	Previous head and neck cancer, 5
Arrhythmia, 4	Arterial occlusive disease, 14	Previous lymphomas, 4
Previous valvular replacement, 2	Cerebrovascular accident, 2	Previous NSCLC, 3
Right heart failure, 1		Previous colonic cancer, 1
Left heart failure, 1		Diabetes, 4
		Other neurologic disorders, 4
		Hepatic cirrhosis, 1

Reduction of postoperative pulmonary complications after lung surgery using a fast track clinical pathway

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Table 4
Postoperative complications and mortality in the postoperative course in the conservative and the fast track group

	Conservative treatment ($n = 28$)	Fast track treatment ($n = 30$)	p-Value
Pulmonary complications			
Atelectasis	2	0	
Pneumonia	3	0	
Prolonged air leak >7days	3	1	
Pleural effusion	2	1	
Empyema	0	0	
Summary	10/28 (36%)	2/30 (7%)	0.009
Cardiovascular complications			
Arrhythmia	1	3	
Myocardial infarction/decompensation	1	1	
Technical complications			
Reoperation	1	1	
Wound infection	0	0	
Others			
Urinary tract infection	0	2	
Renal insufficiency	1	0	
Overall morbidity	13/28 (46%)	8/30 (26%)	0.172
Death	1 (4%)	1 (3%)	

Different numbers result from patients with more than one complication.