

Réduction du volume pulmonaire, approche endoscopique



Plan de la présentation :

- **BPCO et hyperinflation(distention)**
- **La réduction de volume pulmonaire chirurgicale (LVRS)**
- **La réduction de volume pulmonaire par valve**
 - la ventilation collatérale
 - l'obstruction lobaire
- **La réduction de volume pulmonaire par coils**
- **Cas traités au CHUV 2012-2013**
- **conclusion**



The Global BURDEN of COPD :

Prevalence : Switzerland : ~5%population= 350.000 people

Leuenberger P et al. Schweiz Med Wochenschr 1998; 128: 150-161

Mortality : previsted to be the third leading cause of death in 2020

Major morbidity

Economic and social burden

Inflammation

Small Airway disease

Airway inflammation

Airway remodeling

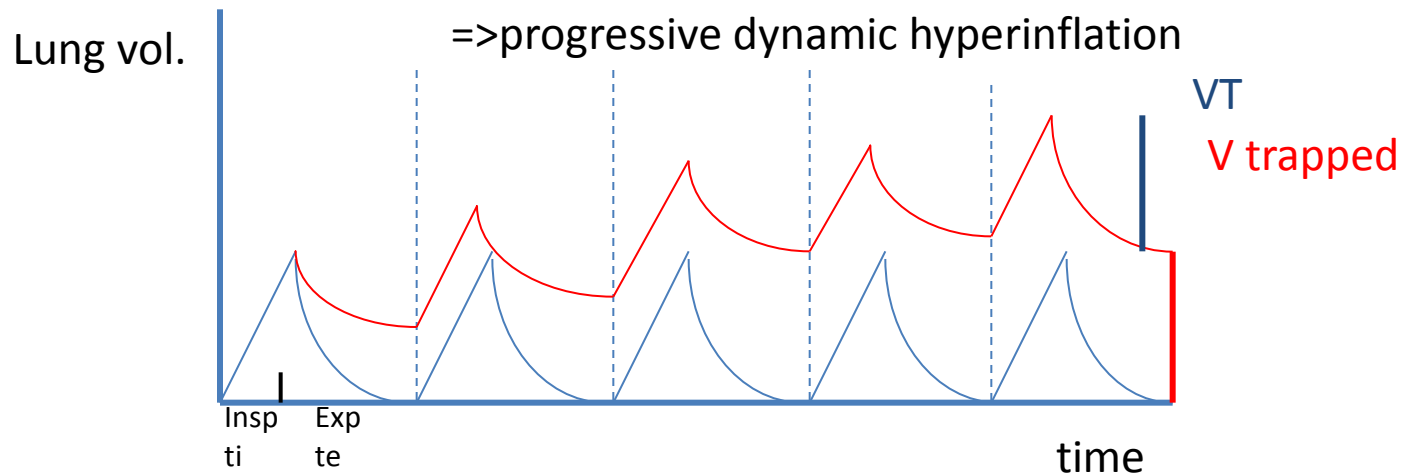
Parenchymal Destruction

Loss of alveolar attachments

Decrease of elastic recoil

Airflow limitation

hyperinflation



LVRS, Lung Volume Reduction Surgery

Brantigan O, M. A surgical approach to pulmonary emphysema. *Am Rev Respir Dis.* **1959**;80:194-202.

Cooper JD, Patterson GA, et al.
Bilateral pneumonectomy (volume reduction) for chronic obstructive pulmonary disease. *J Thorac Cardiovasc Surg.*1995;109:106-19.



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

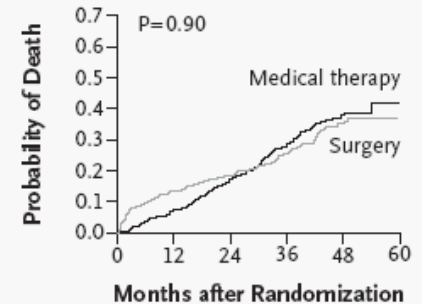
MAY 22, 2003

VOL. 348 NO. 21

A Randomized Trial Comparing Lung-Volume–Reduction Surgery with Medical Therapy for Severe Emphysema

National Emphysema Treatment Trial Research Group*

A All Patients (N=1218)



No. at Risk

Surgery	608	491	376	233	74
Medical therapy	610	527	384	224	70

Objectif : compare the safety and efficacy of LVRS versus standard medical care

Design multicenter randomized 1:1 controlled trial n=1218

Pulmonary rehabilitation $\begin{cases} \rightarrow \text{Control : 610} \\ \rightarrow \text{LVRS : 608 bilat. wedge resection} \end{cases}$

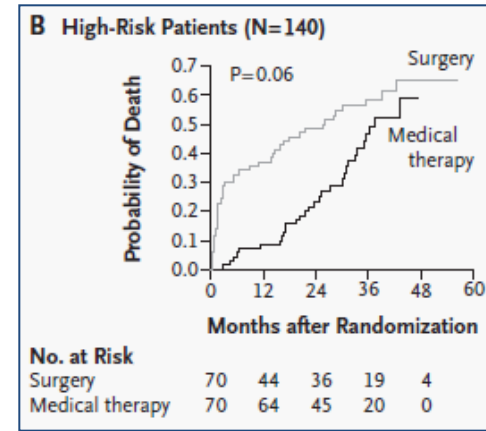
Participants : heterogeneous emphysema+hyperinflation

Primary outcomes : mortality and maximal exercise capacity
two years after randomization

NETT trial, subgroup analysis

1) High risk patients

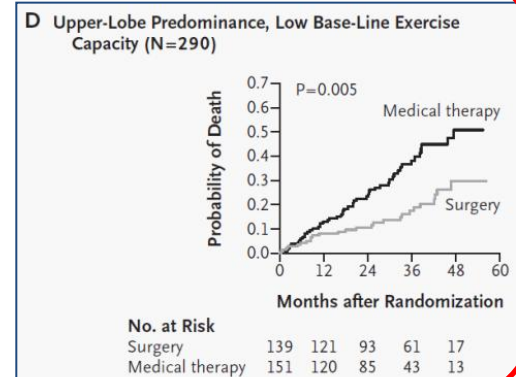
FEV1 < 20% v.p. + -DLCO < 20% v.p. or
-homogeneous emphysema



2) Non High risk patients

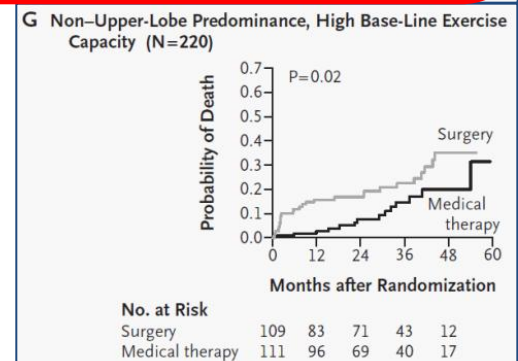
2.1) Responder patients

Upper-Lobe predominance
Low Exercise Capacity



2.2) Non responder patients

Non-Upper-Lobe Predominance
High exercise capacity



Predictors of operative mortality and cardiopulmonary morbidity in the National Emphysema Treatment Trial

Keith S. Naunheim, MD,^a Douglas E. Wood, MD,^b Mark J. Krasna, MD,^c Malcolm M. DeCamp, Jr, MD,^d Mark E. Ginsburg, MD,^e Robert J. McKenna, Jr, MD,^f Gerard J. Criner, MD,^g Eric A. Hoffman, PhD,^h Alice L. Sternberg, ScM,ⁱ and Claude Deschamps, MD,^j for the National Emphysema Treatment Trial Research Group

MORTALITY

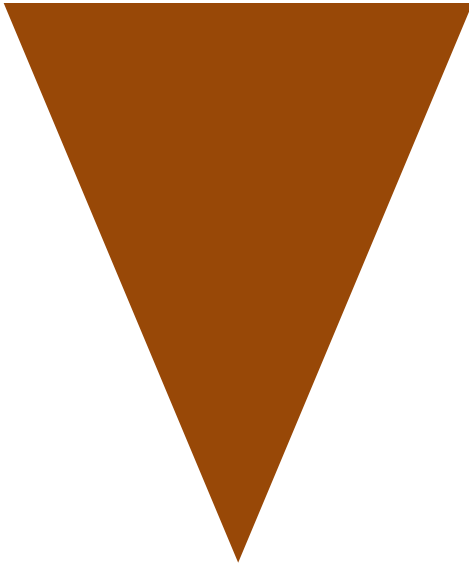
	Mortality 90 d.(%)		Mortality 2 y.(nb deaths/pers/year)	
	Surgery	medical	Surgery	medical
All patients	7.9	1.3	0.11	0.11
High risk	28.6	0	0.33	0.18
Non high risk	5.2	1.5	0.09	0.10

MORBIDITY

•Among the 511 « non-high risk patient » :

- major pulmonary morbidity : 29.8%
- major cardiac morbidity : 20%

} **50% major morbidity**



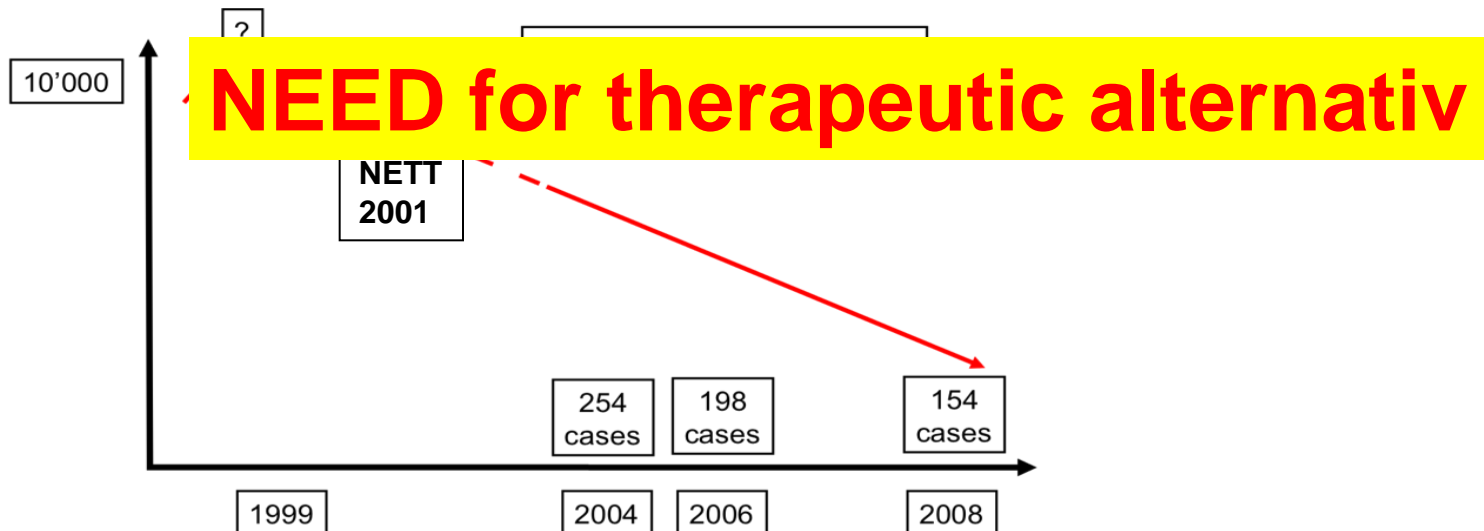
5% BPCO in Switzerland

↳ 10% with Heterogeneous emphysema +hyperinflation

↳ 44% Upper-lobe predominance+ low exercise capacity

4.4% of BPCO eligible for LVRS...

+
Morbi/mortality associated





Conservative treatment

1) Smoking cessation

2) Pharmacological therapy+rehabilitation/Nutrition

3) Oxygene/VNI for selected cases

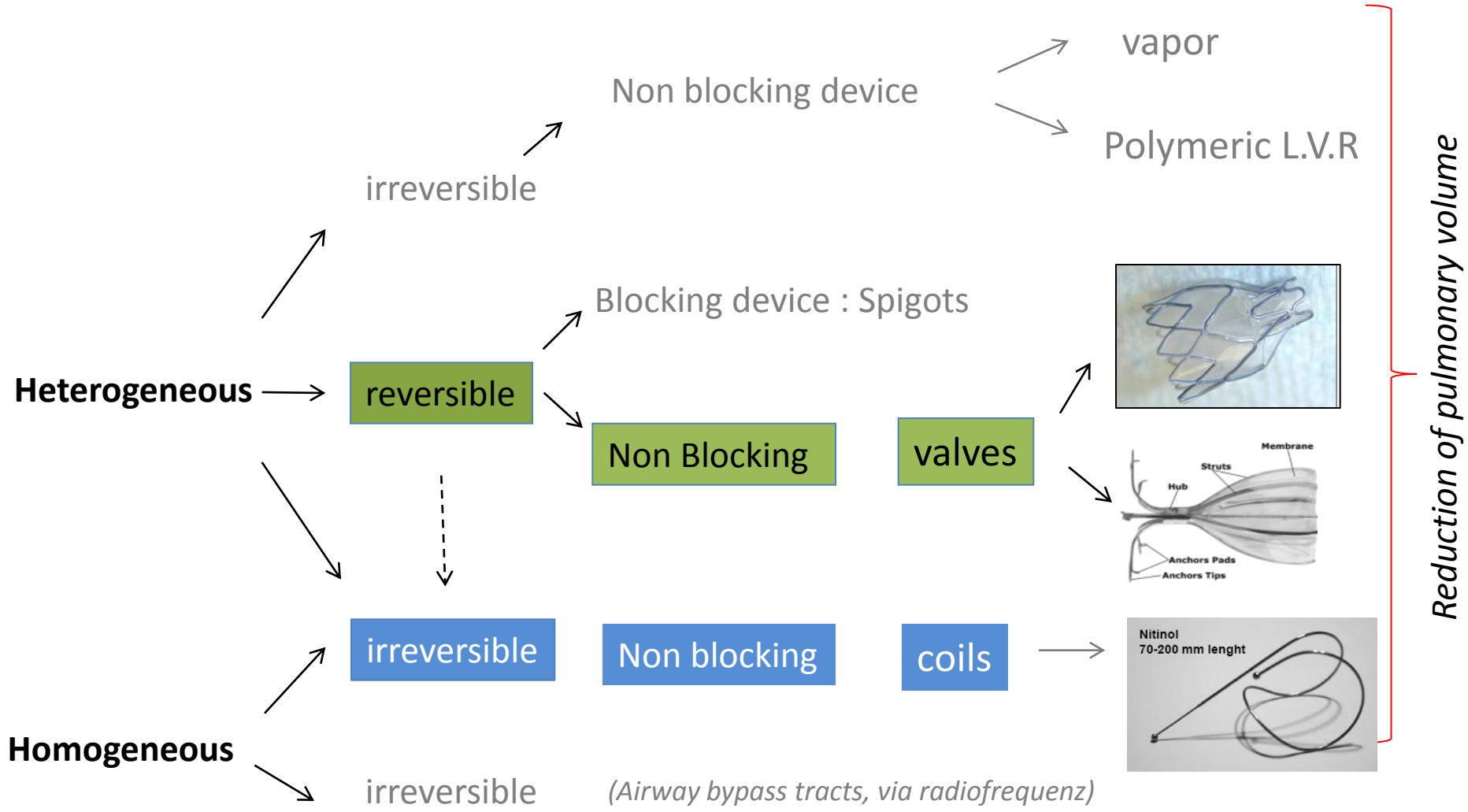
Invasive treatment

4) Surgery for selected cases

minimal-invasive treatment

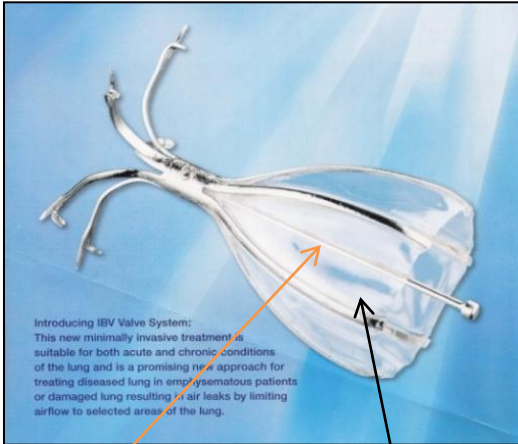
5) Endoscopic for selected cases

Endoscopic therapy for emphysema, a new approach with less morbidity/mortality?



Endoscopic Lung Volume Reduction with valves

IBV
Olympus



Silicone membrane

Nitinol structure,
Self-expandible

ZEPHYR
pulmonX



A Randomized Study of Endobronchial Valves for Advanced Emphysema

Frank C. Sciurba, M.D., Armin Ernst, M.D., Felix J.F. Herth, M.D.,
Charlie Strange, M.D., Gerard J. Criner, M.D., Charles H. Marquette, M.D., Ph.D.,
Kevin L. Kovitz, M.D., M.B.A., Richard P. Chiacchierini, Ph.D.,
Jonathan Goldin, M.D., Ph.D., and Geoffrey McLennan, M.D., Ph.D.,
for the VENT Study Research Group*

Endobronchial Valve for Emphysema Palliation Trial (VENT)

N ENGL J MED 363;13 NEJM.ORG SEPTEMBER 23, 2010

Objectif : compare the safety and efficacy of endobronchial-valve therapy versus standard medical care

Design : multicenter randomized 2:1 controlled trial n=321

Pulmonary rehabilitation  Control : 101
ELVR : 220 unilat. Valve placement+
lobar occlusion

Participants : heterogeneous emphysema(FEV15-45%)+hyperinflation(RV>150%)

Efficacy end points : % Δ FEV1 and % Δ 6-minute walk test @ 6Mo.

ORIGINAL ARTICLE

A Randomized Study of Endobronchial Valves for Advanced Emphysema

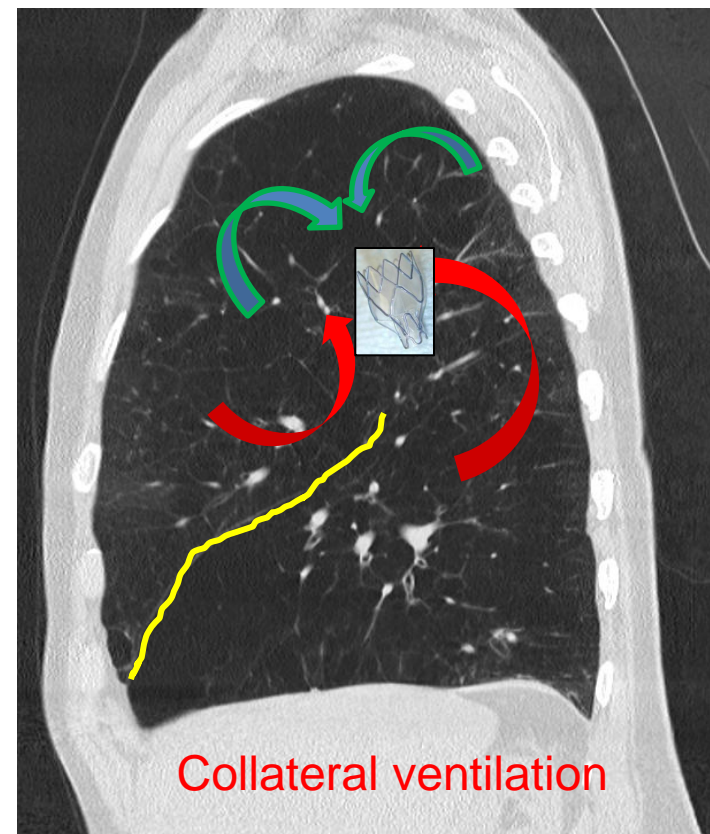
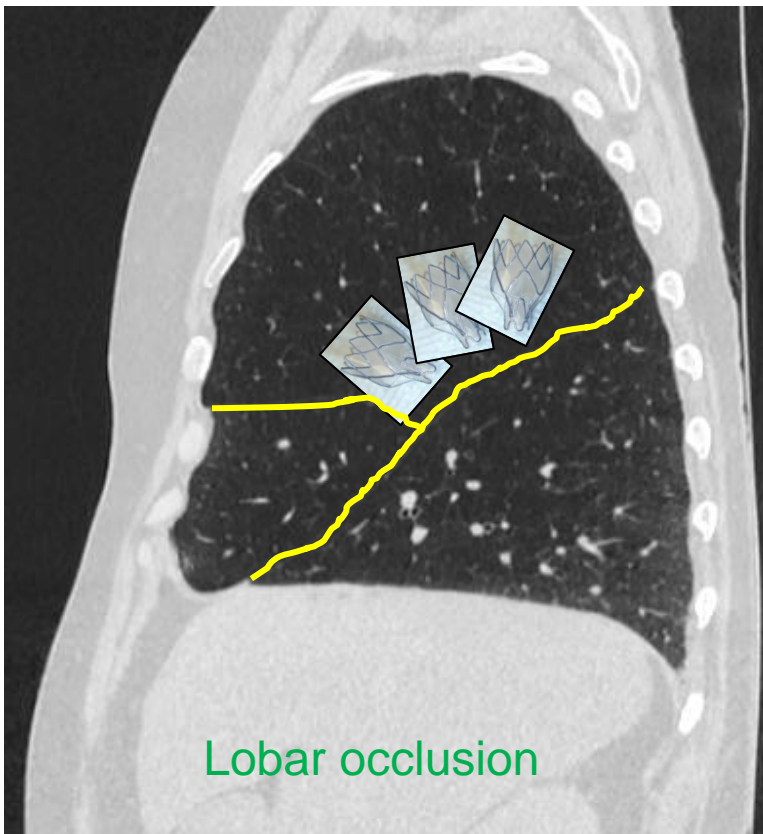
Frank C. Sciurba, M.D., Armin Ernst, M.D., Felix J.F. Herth, M.D.,
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for the VENT Study Research Group*

Subset	group	FEV1@6M.	6MWT@6M.
Total population	control	-1.9%	1.5%
	treatment	5.3%	4.3%
	p	0.005	0.04

US-VENT Study :

38% of patients did not have **complete fissures** in treated lobe

44% of patients did not achieve **lobar occlusion**

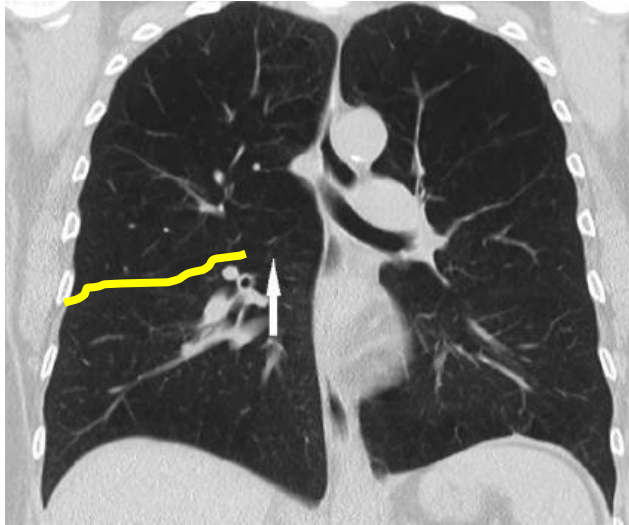


US-VENT Study, subgroup analysis

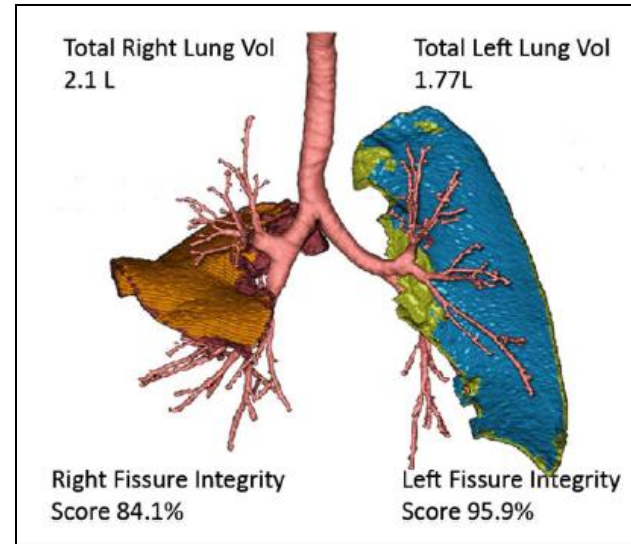
Subset	group	Vol Red	FEV1	6MWT	SGRQ
Total population	control	-1.7%	-1.9%	1.5%	0.74
	treatment	-20.6%	5.3%	4.3%	-2.66
>10% heterogenous	Control	-0.8%	-2.8%	-4.3%	0.95
	treatment	-23.3%	7.7%	4.5%	-2.33
+lobar occlusion	treatment	-30.3%	12.4%	6.3%	-3.34
+complete fissure	Treatment	-56.9%	22.8%	5.3%	-5.01

⇒ Responder patients : **lobar occlusion**
complete fissure ⇒ no CV **~20% of patients included**

Complete fissure and Collateral ventilation



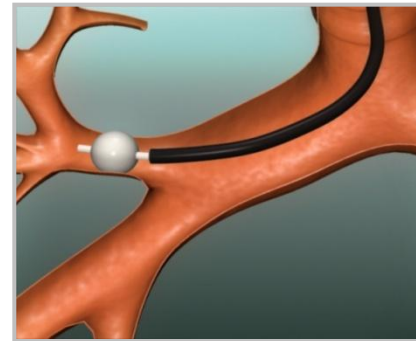
Estimated



Analysed (VIDA software)

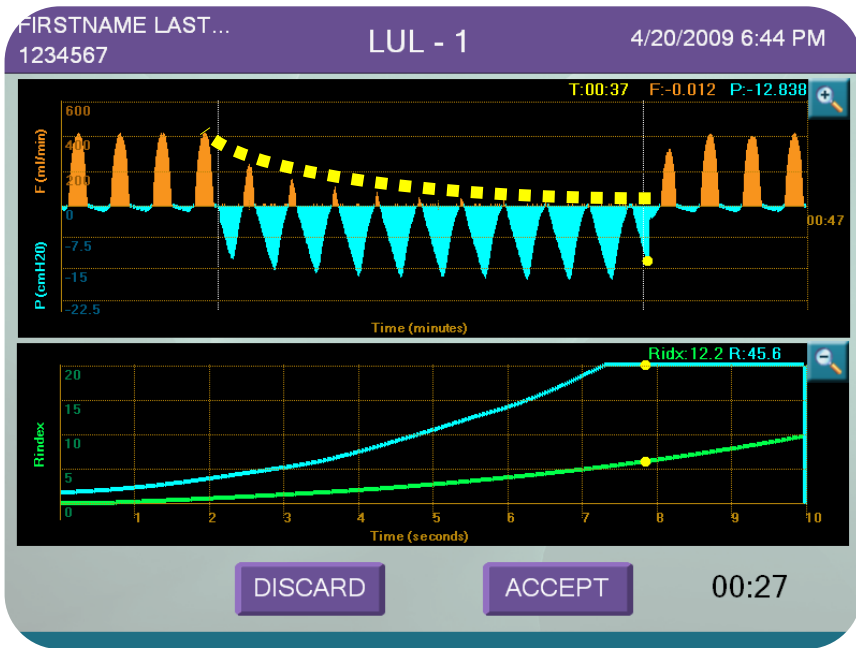
Measured : CHARTIS system

1) Console displays

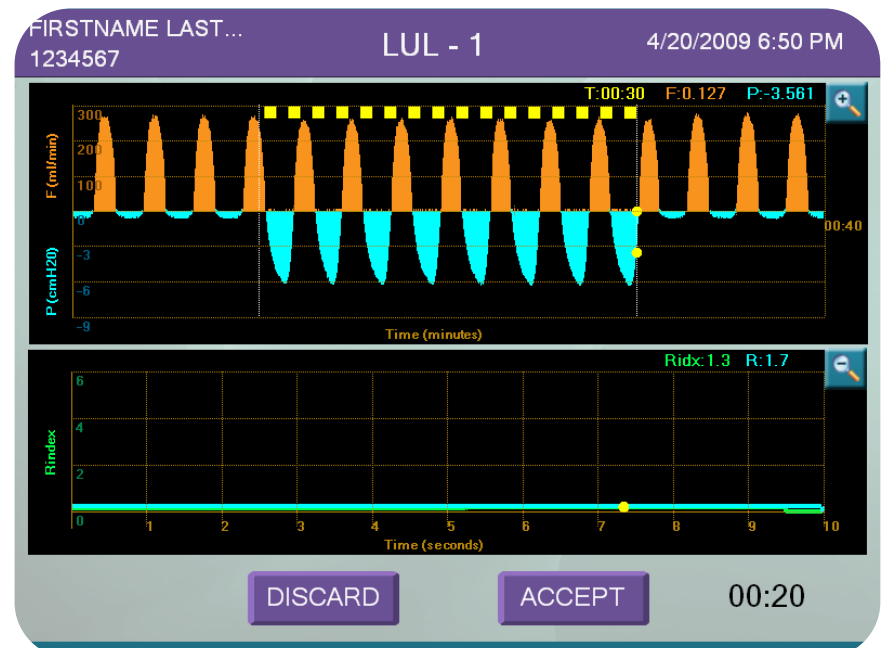


2) Balloon catheter,

measurement of collateral ventilation



No Collateral Ventilation
(CV-)



Collateral Ventilation
(CV+)

Radiological and clinical outcomes of using chartis to plan endobronchial valve treatment.

Herth FJ, Eberhardt R, Gompelmann D, Ficker JH, Wagner M, Ek L, Schmidt B, Slebos DJ.

Thoraxklinik, Heidelberg, Germany, Member of the German Center for Lung Research.

	Median Target Lobe Volume Reduction	
	CV-	CV+
Target Lobe VR (ml)	-1031.7	-82.0
Target Lobe VR (%)	-61.6%	-3.9%

Secondary outcome	CV -	CV +
FEV ₁ Change (%)	19.2 ± 23.9 N=37	0.9 ± 13.3 N=20
SGRQ Change (pts)	-11.1 ± 13.0 N=27	-4.6 ± 18.0 N=13
6MWT Change (%)	15.6 ± 47.3 N=3 4	9.8 ± 14.8 N=18

accuracy level of 75%

Adverse Events :

Table 1 Percentage of patients experiencing adverse events at 90 days in the randomised clinical trials

	Treatment	Control
Death	0.8	0.6
COPD exacerbation with hospitalisation	9.2	4.8
COPD exacerbation without hospitalisation	10.5	15.7
Infection	1.2	0
Respiratory failure	2.2	0.7
Pneumonia distal to valve	1.9	–
Pneumonia other lobe	2.8	2.0
Haemoptysis: massive	0.6	0
Pneumothorax: >7 days	2.2	0
Emphysema	0	0

Data derived from Scirba *et al*²⁴ Herth *et al*²⁵ and Ninane *et al*.²⁶

COPD, chronic obstructive pulmonary disease.

Zephyr Valves, long term Follow-Up

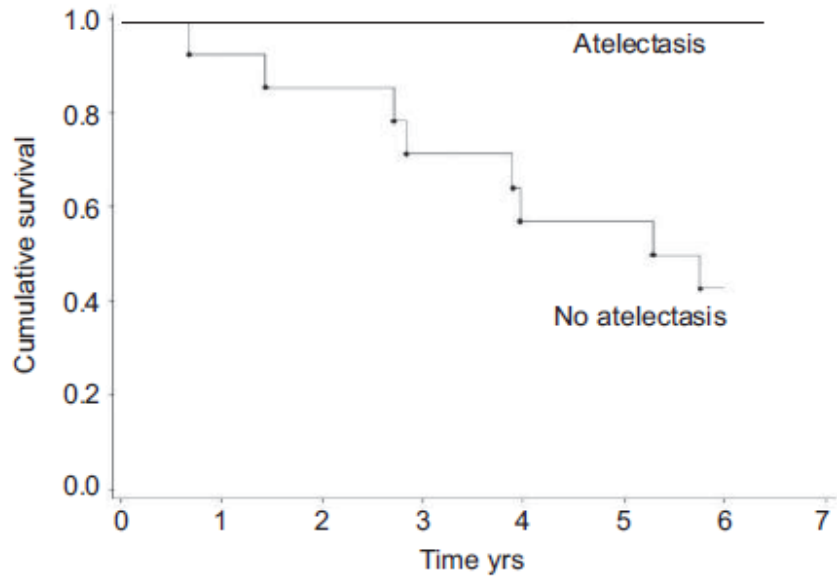


FIGURE 1. Atelectasis following bronchoscopic lung volume reduction was associated with improved survival ($p=0.026$).

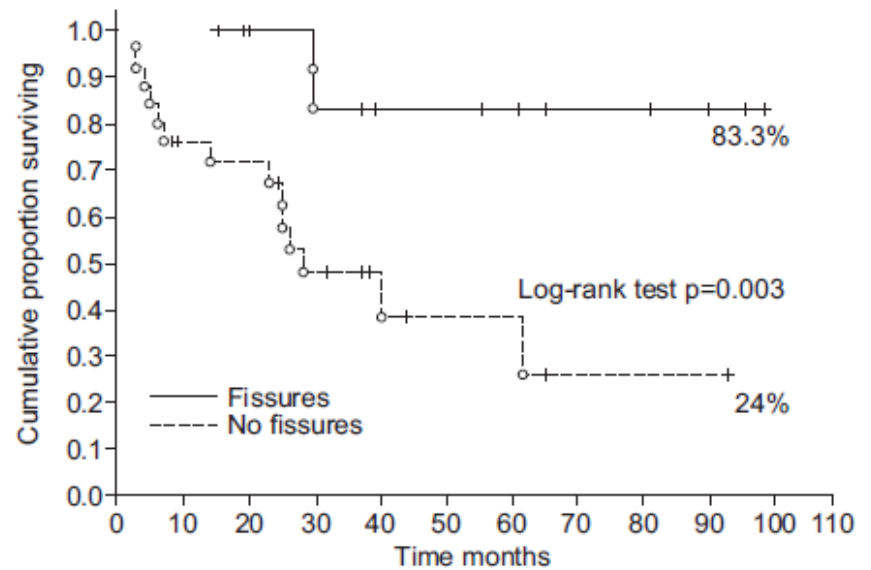


FIGURE 2. Survival comparison between patients with and without visible fissures. O: censored patients; |: alive patients. Log-rank test $p=0.003$.

Hopkinson et al, Eur Respir. J, 2011

Venuta et al, Eur Respir J, 2012

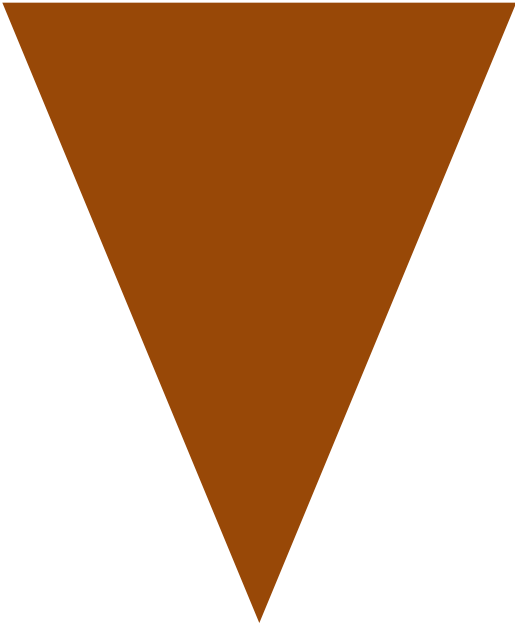
Zephyr Valves, long term Follow-Up

TABLE 3 Functional variables of the patients at the different time-points

Variables	Baseline	Follow-up							p-value
		24-72 h	1 month	3 months	6 months	1 yr	3 yrs	5 yrs	
Supplementary O ₂ L·min ⁻¹	1.87±1.2	0.5±0.2	0.5±0.20	0.5±0.20	0.6±0.2	0.8±0.8	0.8±0.8	1.0±1.0	<0.0001
O ₂ saturation %	94.9±3.1	95.2±2.9	94.8±2.9	95.1±1.8	94.9±1.9	94.7±1.9	94.4±1.9	95.7±2.4	0.2
Pa _a O ₂ mmHg	72.7±11.3	74.1±8.9	73.4±7.2	74.2±8.1	74.3±6.9	74.6±6.7	71.9±6.3	72.9±10.3	0.7
Pa _a CO ₂ mmHg	41.2±4.5	39.4±4.4	39.1±4.7	39.1±3.7	39.4±3.2	39.5±3.4	39.3±2.6	39.7±2.9	0.2
FEV ₁ L·min ⁻¹	0.88±0.3	0.9±0.3	1.1±0.2	1.1±0.3	1.1±0.3	1.09±0.4	1.08±0.4	1.2±0.5	0.004
FVC L	2.0±0.6	2.1±0.5	2.3±0.6	2.3±0.8	2.3±0.5	2.4±0.6	2.4±0.5	2.5±0.6	0.06
RV L	5.2±0.9	4.5±0.8	4.7±1.0	4.7±0.9	4.4±1.1	4.4±1.2	4.4±1.2	3.98±1.3	0.03
TLC L	7.45±1.1	7.39±1.3	7.49±1.1	7.41±0.9	7.3±1.1	7.28±1.0	7.29±1.1	7.3±1.3	0.7
ITGV L	6.0±1.1	5.1±0.9	5.4±1.0	5.4±1.1	5.3±1.0	5.3±1.1	5.2±1.3	5.3±1.2	0.1
DL _{CO} /VA mL·min ⁻¹ · mmHg ⁻¹ ·L ⁻¹	2.95±1.9	3.03±1.9	2.99±1.8	2.81±1.5	2.84±1.2	2.88±1.5	3.35±1.3	3.86±1.2	0.2
6MWT m	286±97	312±72	371±88	408±91	388±87	349±105	355±90	402±113	0.003
MRC score	3.9±0.8	3.4±0.9	2±0.6	2±0.7	2.2±0.7	2.4±0.6	2.6±0.5	2.6±0.7	<0.0001

Data are presented as mean ± SD, unless otherwise stated. Pa_aO₂: arterial oxygen tension; Pa_aCO₂: arterial carbon dioxide tension; FEV₁: forced expiratory volume in 1 s; FVC: forced vital capacity; RV: residual volume; TLC: total lung capacity; ITGV: intrathoracic gas volume; DL_{CO}/VA: diffusing capacity of the lung for carbon monoxide corrected for alveolar ventilation; 6MWT: 6-min walking test; MRC: Medical Research Council.

ELVR with Valves :



5% BPCO in Switzerland



**10% with Heterogeneous emphysema
+ severe hyperinflation**



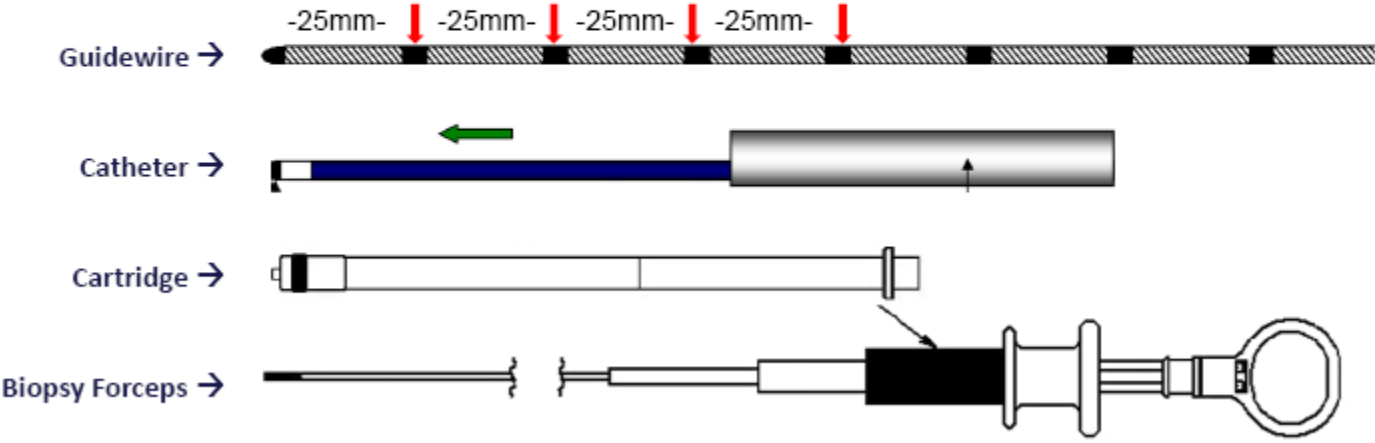
**20-40% no collateral ventilation+
lobar occlusion**

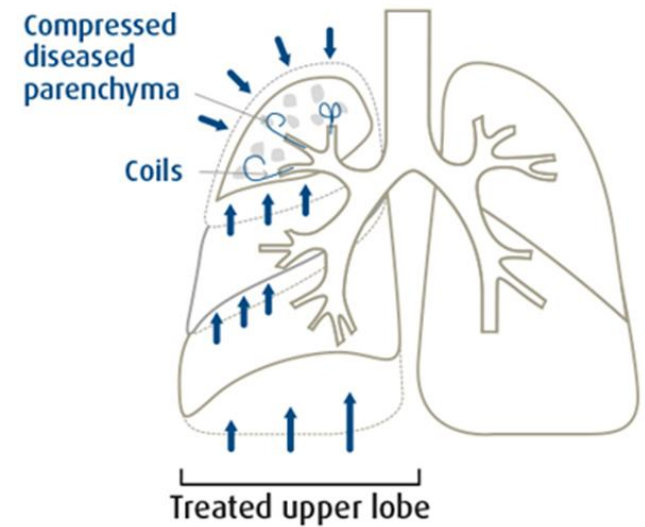
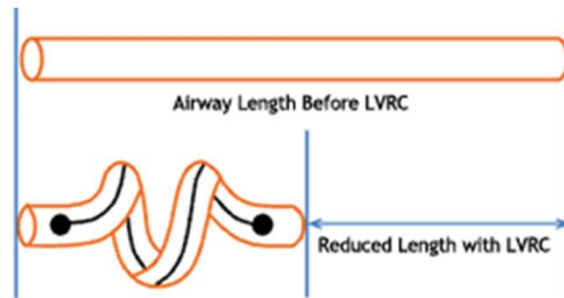
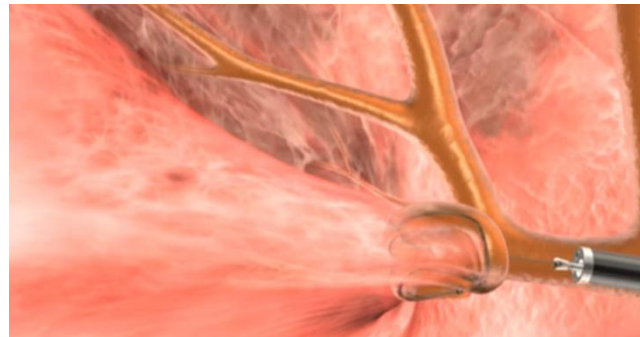
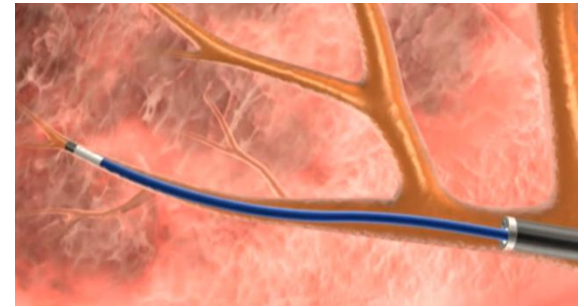
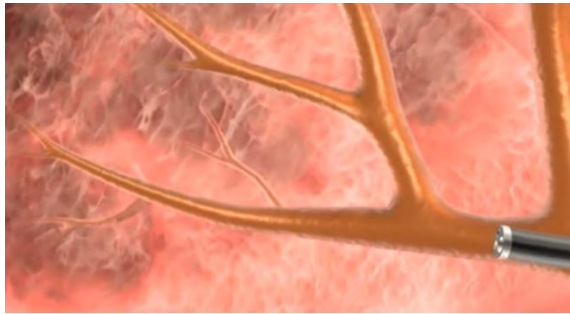
NEED for therapeutic alternativ

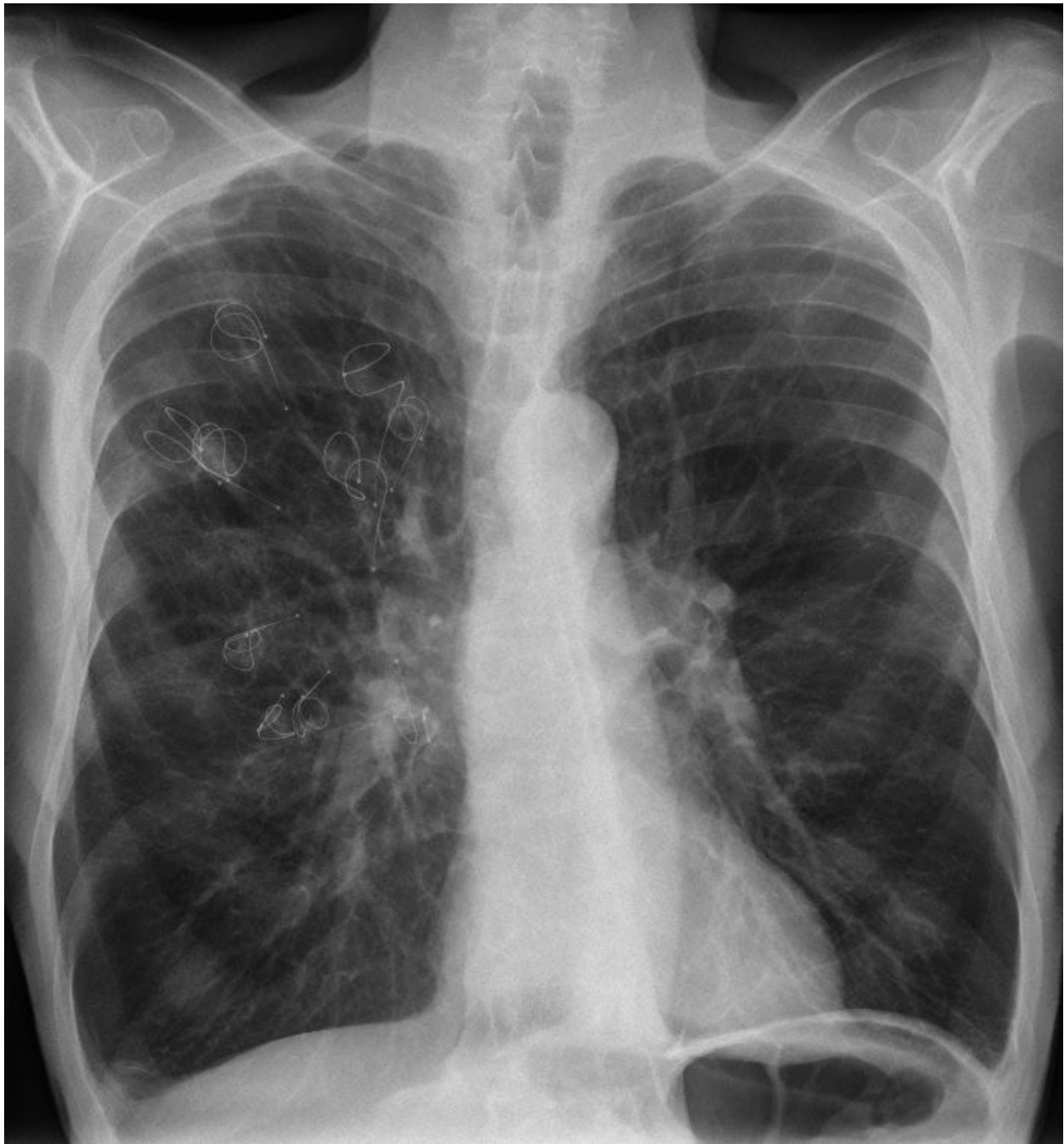


Coil treatment

LVRC delivery system & coils





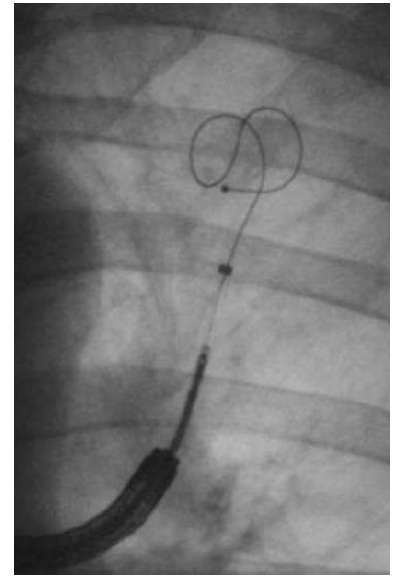


Ther Adv Respir Dis. 2010 Aug;4(4):225-31. doi: 10.1177/1753465810368553. Epub 2010 Jun 10.

Bronchoscopic lung volume reduction with a dedicated coil: a clinical pilot study.

Herth FJ, Eberhard R, Gompelmann D, Slebos DJ, Ernst A.

Department of Pulmonology, Thoraxklinik Heidelberg, Germany.



Chest. 2012 Sep;142(3):574-82.

Bronchoscopic lung volume reduction coil treatment of patients with severe heterogeneous emphysema.

Slebos DJ, Klooster K, Ernst A, Herth FJ, Kersters HA.

Department of Pulmonary Diseases, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands. d.j.slebos@long.umcg.nl

Endobronchial coils for the treatment of severe emphysema with hyperinflation (RESET): a randomised controlled trial



Lancet Respir Med 2013;
1: 233-40



Endobronchial coils for the treatment of severe emphysema with hyperinflation (RESET): a randomised controlled trial



Lancet Respir Med 2013;
1: 233-40

Panel 1: Enrolment criteria

Inclusion criteria

- Aged ≥ 35 years
- High resolution CT scan indicates unilateral or bilateral emphysema
- High resolution CT scan indicates homogeneous or heterogeneous emphysema
- A post-bronchodilator $FEV_1 \leq 45\%$ predicted
- Total lung capacity $> 100\%$ predicted
- Patient has marked dyspnoea score ≥ 2 on modified Medical Research Council scale of 0-4
- Patient has stopped smoking for a minimum of 8 weeks before enrolment
- Patient (or legal guardian if applicable) read, understood, and signed the informed consent form

Endobronchial coils for the treatment of severe emphysema with hyperinflation (RESET): a randomised controlled trial



Exclusion criteria

- A change in FEV₁ greater than 20% post-bronchodilator
- A single-breath diffusing capacity for carbon monoxide <20% predicted
- A history of recurrent clinically significant respiratory infection
- An uncontrolled pulmonary hypertension defined by right ventricular pressure >50 mm Hg or evidenced by echocardiogram
- An inability to walk >140 m in 6 min
- Evidence of other diseases that can compromise survival—eg, lung cancer or renal failure
- Pregnant or lactating
- An inability to tolerate bronchoscopy under heavy sedation or anaesthesia
- Clinically significant bronchiectasis
- Giant bullae greater than a third of lung volume
- Previous lung volume reduction surgery, lung transplant, or lobectomy
- Participation in other pulmonary drug studies within 30 days of enrolment
- Taking greater than 20 mg prednisone (or similar steroid) daily
- On clopidogrel or unable to stop treatment for 1 week before the procedure
- Other disease that would interfere with completion of study or follow-up assessments, or that would adversely affect outcomes

Visual scale of parenchymal density



#1 score

#2 score

#3 score

#4 score

#5 score

coils



Tissue is the issue

Efficacy of Coils

	Treatment (n= 23)	Usual care (n= 23)	Between-group difference in change from baseline*	p value
Primary outcome				
St George's Respiratory Questionnaire	-8.11 (-13.83 to -2.39)	0.25 (-5.58 to 6.07)	-8.36 (-16.24 to -0.47)	0.04
Secondary outcome				
Total lung capacity (L)	-0.24 (-0.38 to -0.10)	-0.13 (-0.27 to 0.01)	-0.11 (-0.29 to 0.07)	0.22
Residual volume (L)	-0.51 (-0.73 to -0.30)	-0.20 (-0.42 to 0.02)	-0.31 (-0.59 to -0.04)	0.03
6-min walk test (m)	51.15 (27.65 to 74.66)	-12.39 (-36.61 to 11.83)	63.55 (32.57 to 94.53)	<0.001
% change in FEV ₁	14.19 (6.84 to 21.55)	3.57 (-4.02 to 11.17)	10.62 (1.12 to 20.12)	0.03
mMRC dyspnoea score	-0.24 (-0.57 to 0.09)	-0.09 (-0.44 to 0.26)	-0.15 (-0.60 to 0.30)	0.5

Data are mean change from baseline (95% CI). FEV₁=forced expiratory volume in 1 s. *Corrected for difference between groups at baseline.

Table 2: Primary and secondary efficacy outcomes* in the intention-to-treat population (change from baseline at 90 days after final treatment)

Adverse Events :

	Treatment (23 patients, 44 procedures)			Usual care (23 patients)			p value‡
	Events (n)*	Patients (n)	Incidence (%)†	Events (n)	Patients (n)	Incidence (%)†	
Treatment recovery periods§							
Device removal	0	0	0%	0	0	0%	NA
Exacerbation	2	2	5%	1	1	4%	>0.99
Haemoptysis	0	0	0%	0	0	0%	NA
Lower respiratory tract infection¶	2	2	5%	0	0	0%	0.49
Pneumothorax	2	2	5%	0	0	0%	0.49
Respiratory failure	0	0	0%	0	0	0%	NA
Total	6	6	15%	1	1	4%	0.02
Post-treatment periods 							
Device removal	0	0	0%	0	0	0%	NA
Exacerbation	3	2	7%	2	2	9%	>0.99
Haemoptysis	0	0	0%	0	0	0%	NA
Lower respiratory tract infection¶	0	0	0%	1	1	4%	>0.99
Pneumothorax	0	0	0%	0	0	0%	NA
Respiratory failure	0	0	0%	0	0	0%	NA
Total	3	2	7%	3	3	13%	>0.99

NA=not applicable. *Some patients had more than one occurrence of the same type of event. †Event incidence for patients in the treatment group calculated by number of events/total number of procedures, and for those in the usual care group by number of events/total number of procedure-equivalents. ‡Calculated using Fisher's exact test. §Includes days 0-29 after each treatment (first and second treatment) or usual care-treatment (first and second) visit. ¶||Includes pneumonia. ||Includes day 30 after first treatment or usual care treatment up to day of second treatment or second usual care visit and day 30 after second treatment through to day 90 after second treatment or second usual care treatment visit.

Table 4: Investigator-reported serious adverse events in the intent-to-treat population

*Lung volume reduction coil treatment of
severe emphysema+hyperinflation :*



- An effective and safe ELVR treatment
- Seems to expand the indications for homogeneous emphysema and CV+patients

ELVR Lausanne 2012-2013

38 patients bilantés :

- ❑ 2 LVRSurgery : 1 nodule LSG, 1 bullous disease
- ❑ 10 sans critères d inclusion ($VR < 150$, pas d emphysème, pas hétérogène, pas de limitation respiratoires, limites autre)
- ❑ 14 avec contre indication ($HTPsyst > 50-60mmHg$, bronchiectasies productives, trouble coag.)
- ❑ 12(31%) patients avec critères inclusion et sans CI=> endoscopés

7 (7/12=**58%**) **CV-**(sans ventilation collatérale) => valves

- 1 co. majeure=> retrait valves
- 2 sans bénéfice=> valves ds LM, sans effet=> retiré et **coils**
- 4 avec effet (4/7=**57%** répondeur)

4 **CV+**

- 2 traité par coils
- 1 attente de coils ou de LVRS en fonction du projet TX
- 1 avec sécrétions purulentes++++=>ttt médicamenteux

1 avec emphysème homogène=> coils

14 procédures

Evolution fonctionnelle post valves CV-(chartis)

	VEMS / VR DLCO /6MWT/ avant	VEMS/VR/DLCO/6MWT 1 mois	VEMS/VR/DLCO/6MWT 3 mois	VEMS/VR/DLCO 12 mois	Ate :	PTX	coils 1 mois
patient 1 F.E.	0.78L / 3.78L / 41% / 370m	1.15L / 3.21L / 51%/	1.03L / - / 48% / 422m	1.20L/3.59L/50%	no		
patient 2 SP	0.61L / 4.11L / 24% / 400m.	0.75/- / - /	0.65L / 2.73L / - / 435m		no		
patient 3 RD	0.79L / 5.89L / 38% / -	1.27L / 4.32L / 35%	0.91L / 6.00 / 37%		oui	oui	
patient 4 TL	0.93L / 4.61L / 58% / 414m	1.12L / - / - /	1.07L /4.50L / 58% / 435m.		no		
patient 5 FB	0.78L / 4.69L / 41% / -	0.84L / - / - /	0.80L / 6.18L / 45%=> retrait		no		1.21L/6.0L/40%
patient 6 VKW	0.67L / 6.95L / 26% / 200m	0.61 / 8L / 30% /	0.62L /8.42L / 33%=> retrait		no		0.62L / - / -/255m.
patient 7 MJF	0.77L / 6.24L / 27% / 400m	co majeure=> retrait valves			oui	oui	

* Patients avec valves retirées à >5 mois pour manque de bénéfice, puis traité par coils

Evolution fonctionnelle post valves CV-(chartis)

	Δ VEMS(%) 1M	Δ VEMS(%) 3M	Δ VEMS(%) 12M	Δ 6MWT(%) 3M	Δ dyspnee (NYHA) 3M
patient 1 F.E.	+47.4	+32	+53.8	+14	3=>2
patient 2 SP	+22.9	+6.55		+8.75	4=>3
patient 3 RD	+60.75	+15.18			3=>2
patient 4 TL	+20.43	+15		+5	3=>2
patient 5 FB*	+7.7	+2.5	-		3=>3
patient 6 VKW*	-8.9	-7.4	-		4=>4
moyenne	+25.04	+10.63	+53.84	+9.25	

* Patients avec valves retirées à >5 mois pour manque de bénéfice puis traité par coils

Evolution fonctionnelle post coils

	VEMS / VR DLCO /6MWT/ avant	VEMS/VR/DLCO/6MWT 1 mois	ΔVEMS(%) 1M
patient 1 FB*	0.80L / 6.18L / 45%	1.21L / 6.0L / 40%	+51.25
patient 2 VKW*	0.62L / 8.42L / 33%/200	0.62L / - / - / 255m.	+0
patient 3 VJJ#	0.65L / 7.36L / 26% / 500m	0.99L / - / 24% / -	+52.3
patient 4 RMJ#	0.47L / 5.75L / 39%	0.63L / - / -	+34.04
patient 5 NB	0.69L / 4.21L / 44% / 120m.		
moyenne			+21.713%

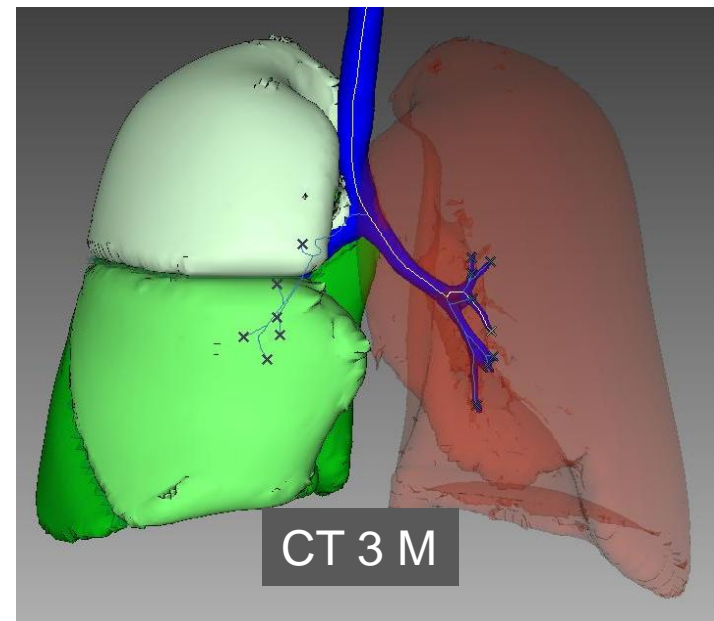
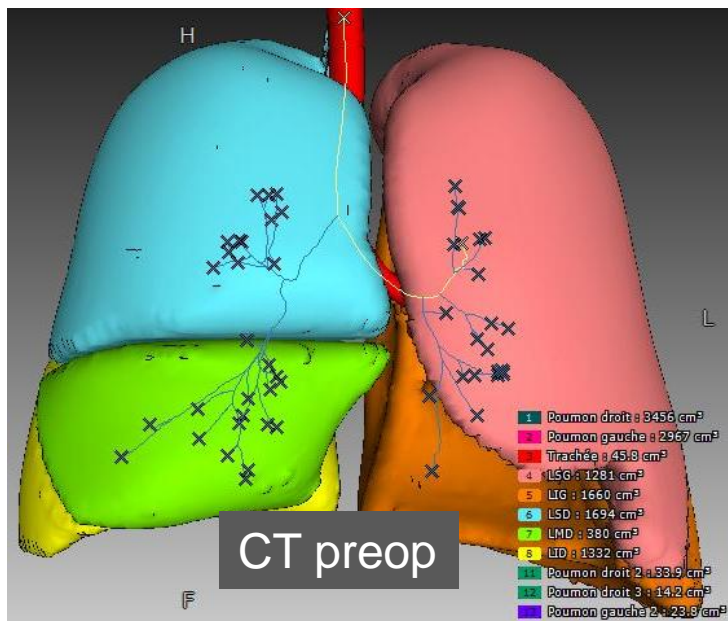
*Patients avec valves retirées pour manque de bénéfice

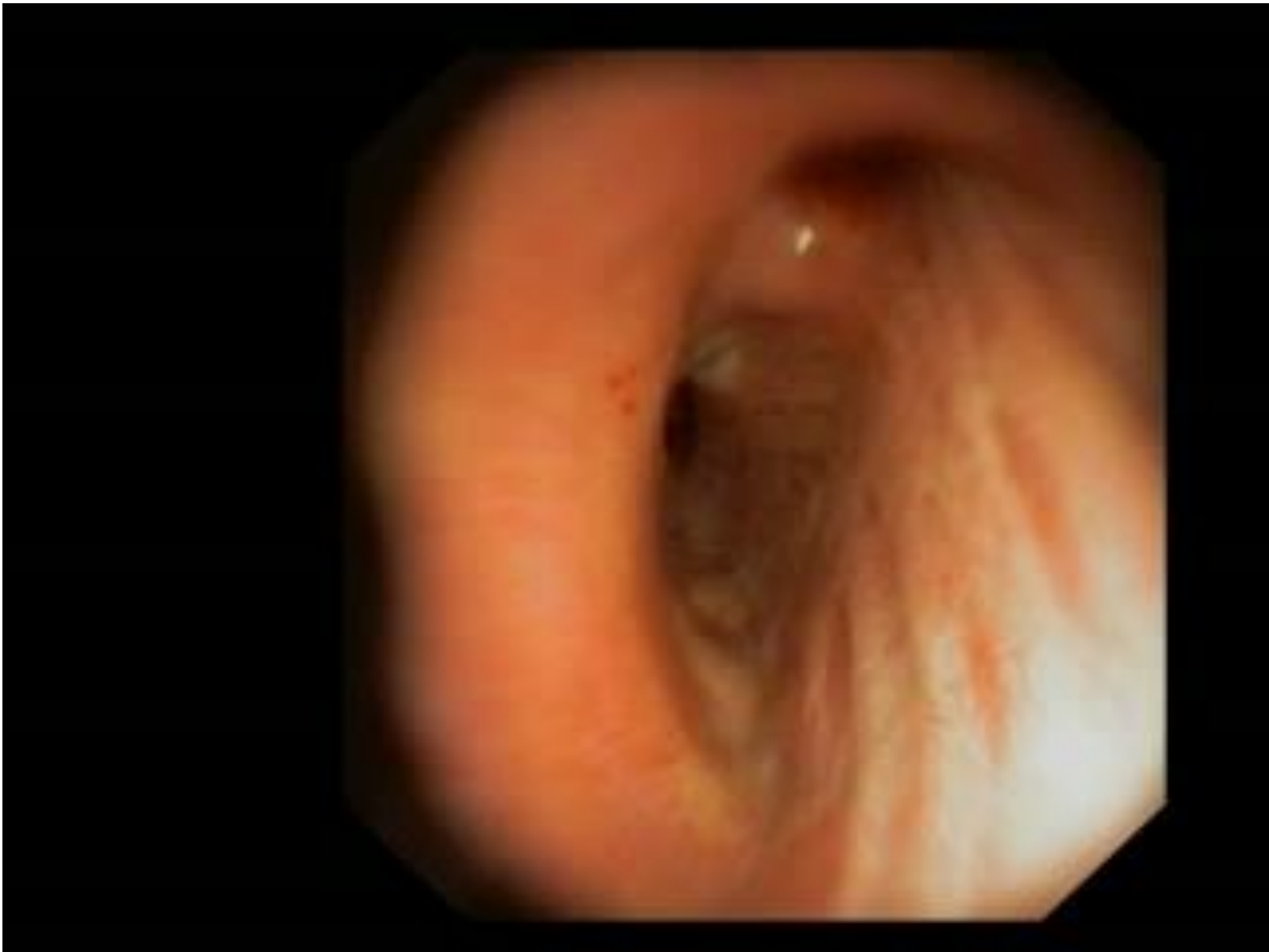
#Patients avec CV+, non valvé

patiente 1

	VEMS(L)	VEMS%v.p.	DLCO corr(v.p.)
avant	0.82	36%	40%
insertion des 3 valves dans le LSD			
1W	1.15	49%	52%
1M	1.03	44%	48%
3M	1.14	48%	52%
12M	1.20	51%	50%

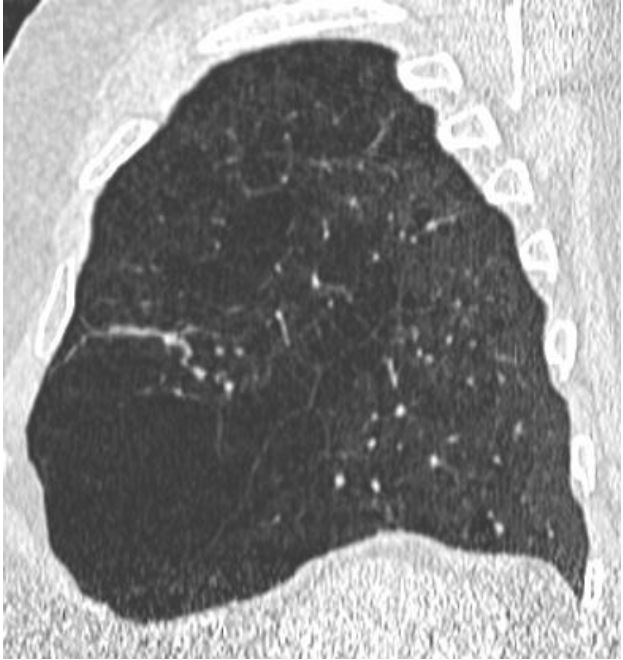
analyse CT	poumonD(cm3)	poumon G(cm3)	D+G(cm3)	LSD(cm3)	LM(cm3)	LID(cm3)
05.03 (preop)	3456	2967	6423	1665	401	1335
25.09 (3M)	2868	2855	5723	741	501	1587
			-700	-924	+100	+252





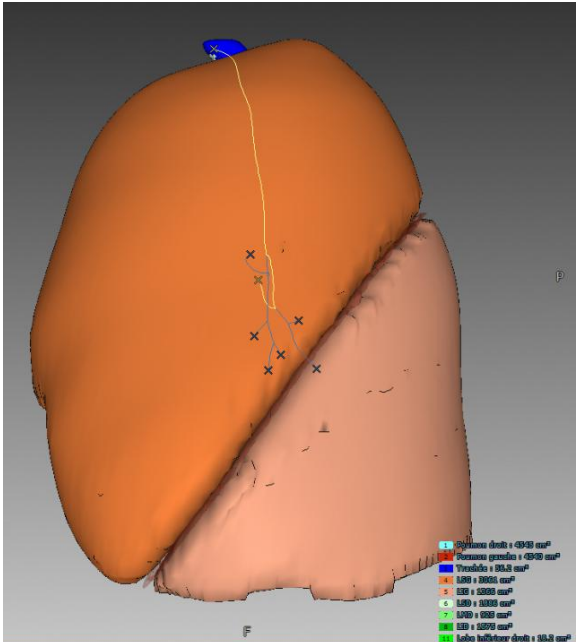
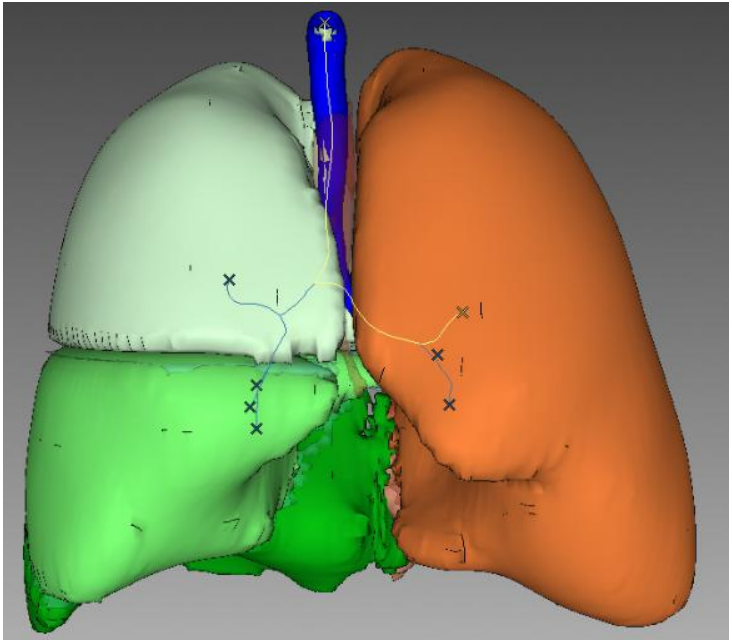
Patient 3

- 65 y.old
- α 1 anti-try. Deficiency
- Former smoker 10py
- Right Bullectomy D. 2008
- asthma



- BPCO IV
- FEV1 22%v.p.
- RV 247%v.p
- TLC 117%
- DLCO 38%

- Heterogeneous emphysema
- RUL>LUL
- Incomplete fissure



Bronchoscopy :

1) CHARTIS : no CV



2) 2 valves LUL



Respiratory distress immediately at the end of the procedure

Pulm Fct	VEMS(%p.v.)	RV(%p.v.)	TLC(%p.v.)	DLCO(% p.v.)
preop	0.79L(22%)	5.89L(247%)	8.51L(117%)	38%
1.5Mo	1.27L(37%)	4.53L(193%)	8.65L(122%)	35%
	+ 480ml(+60%)	1.33L(-22%)		

Control 1,5 Mo
Major subjective improvement



	pré	1.5 mois	3-6 mois
patient 3	0.79L / 5.89L	1.27L / 4.32L	0.91L / 6.00

Aerosol of NACL 0.9%=> strong cough and expectoration of a valve 7M post insertion

05/11/2013

09:52:34

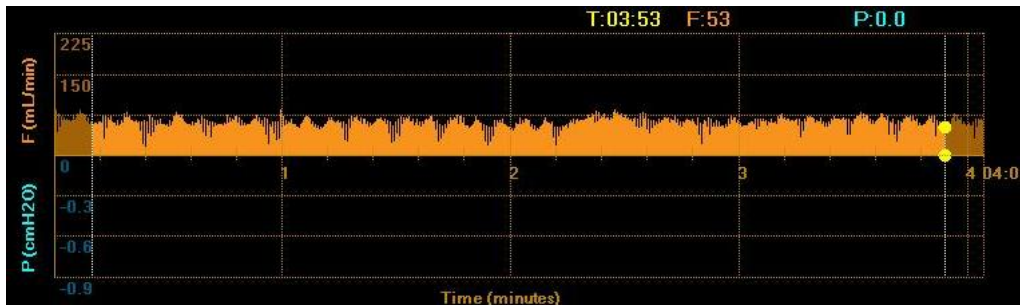
CVP:1

Gr:N

Em:A3



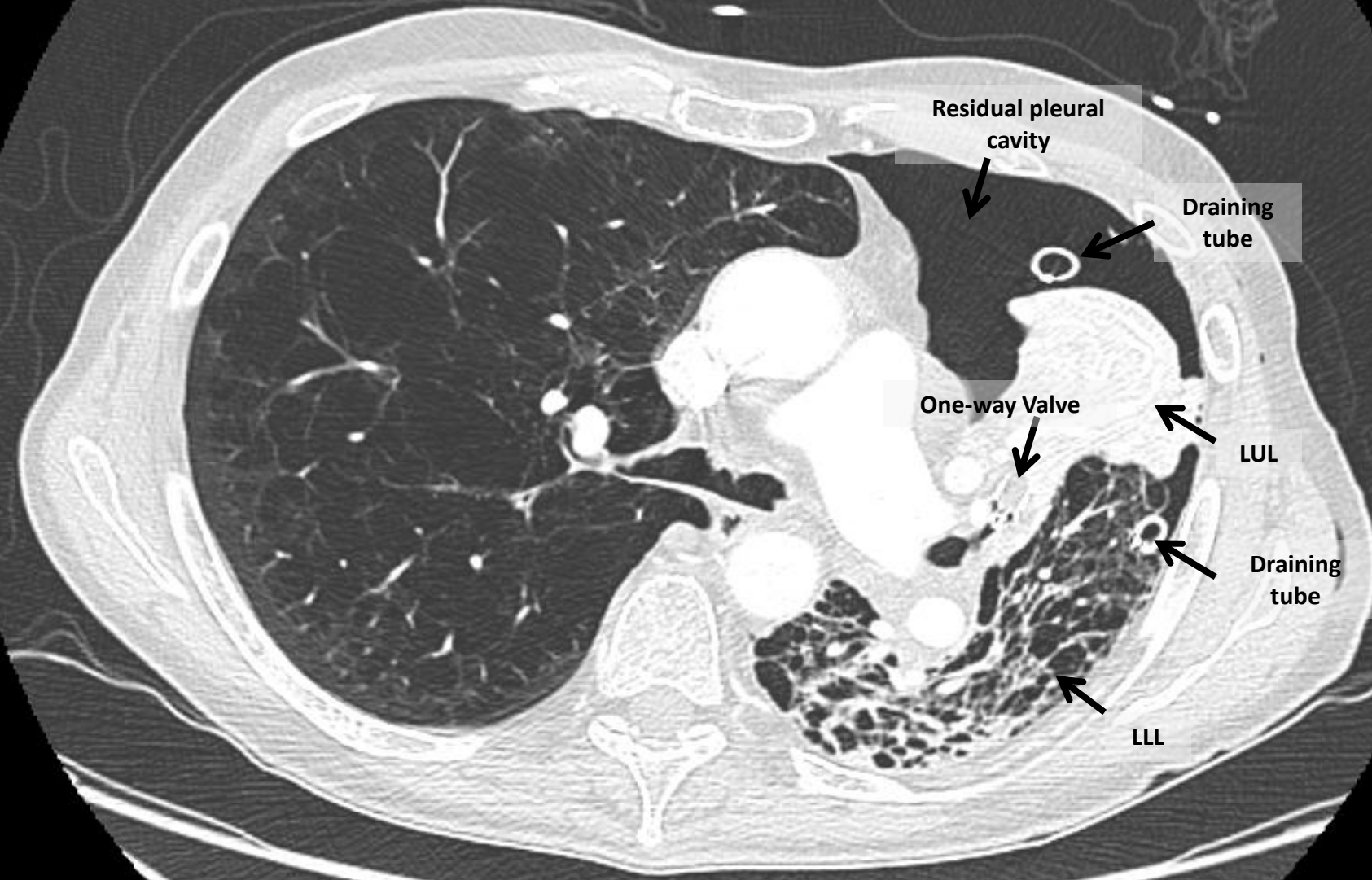
Case 5



CV +

=> no valves.

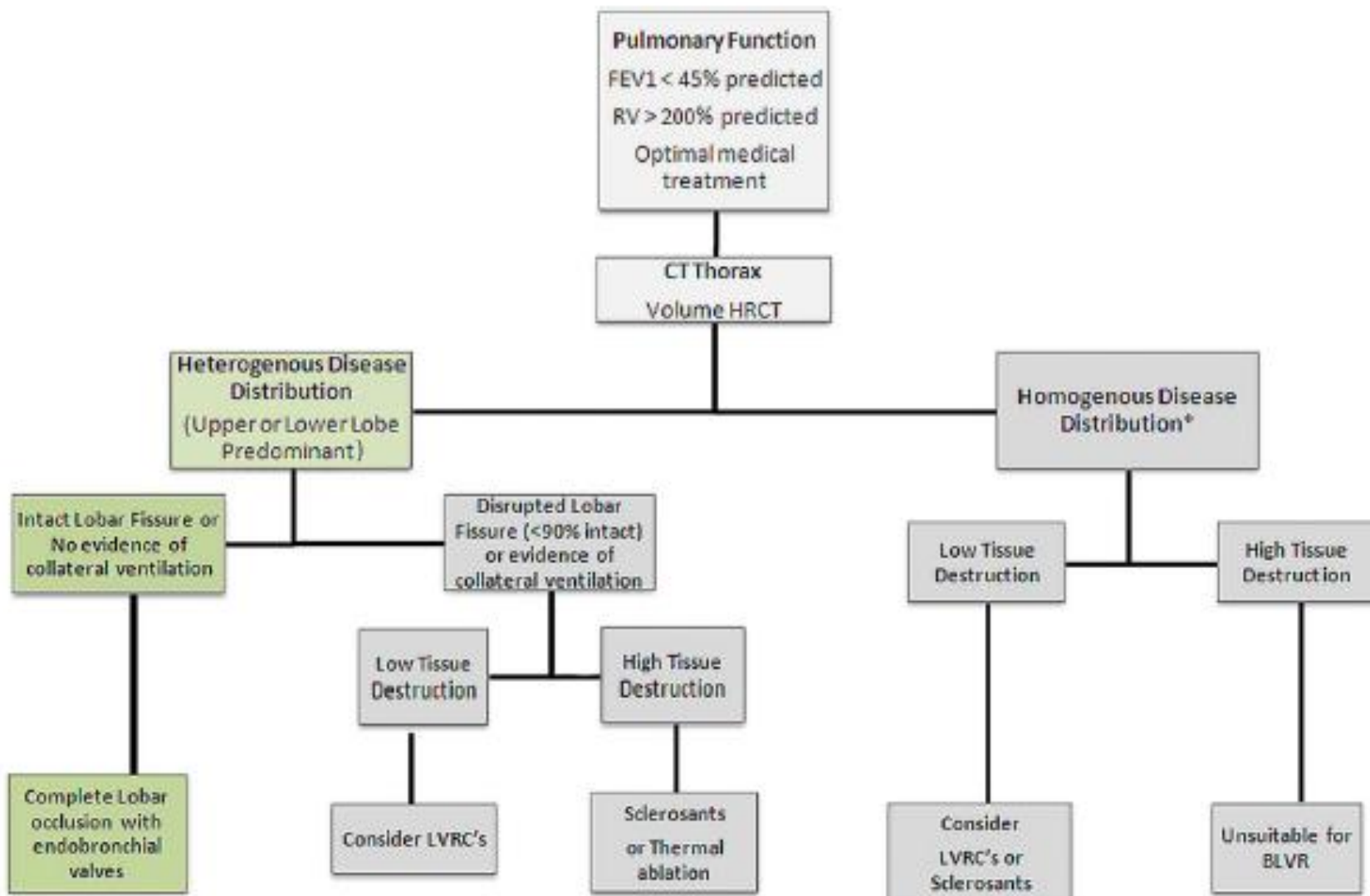
Patient 7, MJF, retrait valves pr co.



We would also recommend restricting treatment to selected regional or national centres to concentrate expertise, maximise knowledge on patient selection and procedural expertise. This will facilitate further research and development.

Shah PL, *et al. Thorax* 2013;**0**:1–7. doi:10.1136/thoraxjnl-2013-203743

Algorithm for ELVR



Valves

Coils

Vapeur/glu

coils

∅

LVRs?



Conclusion :

- ❑ Endoscopic Lung Volume Reduction is a safe procedure
- ❑ The efficacy of valves dependent on: **Lobar exclusion**
Low collateral ventilation (CV)
- ❑ Assessment and quantification of collateral ventilation (CV) is critical to predict optimal response to ELVR-valve treatment
- ❑ Coils seems to expand the indications / homogeneous emphysema, CV+

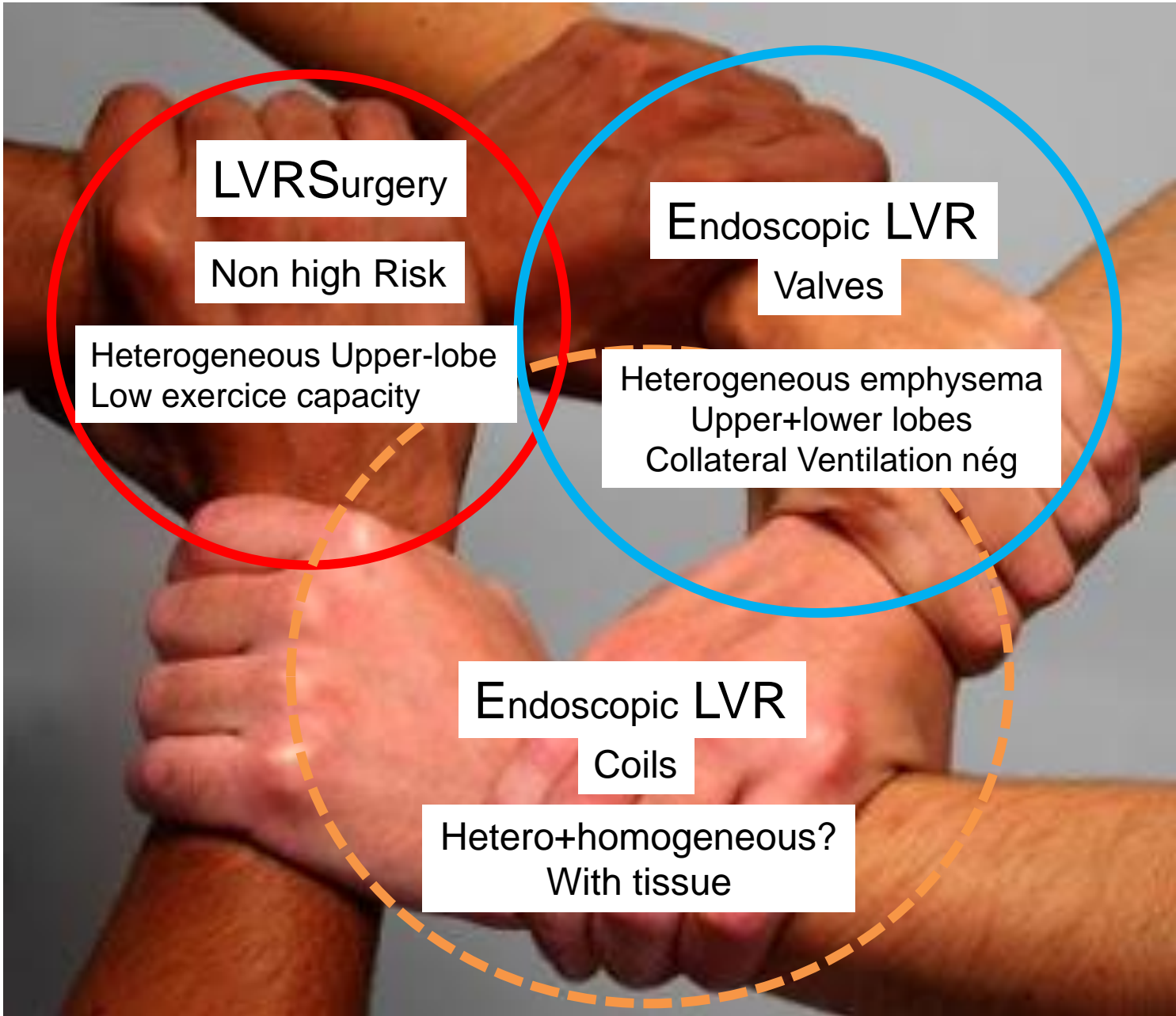
BPCO III-IV
+VR>150%(200%)
+SPT



Hetero/homogeneous emphysema ?

Complete fissure/collateral ventilation ?

Tissue density ?



LVRSurgery

Non high Risk

Heterogeneous Upper-lobe
Low exercise capacity

Endoscopic LVR
Valves

Heterogeneous emphysema
Upper+lower lobes
Collateral Ventilation nég

Endoscopic LVR
Coils

Hetero+homogeneous?
With tissue