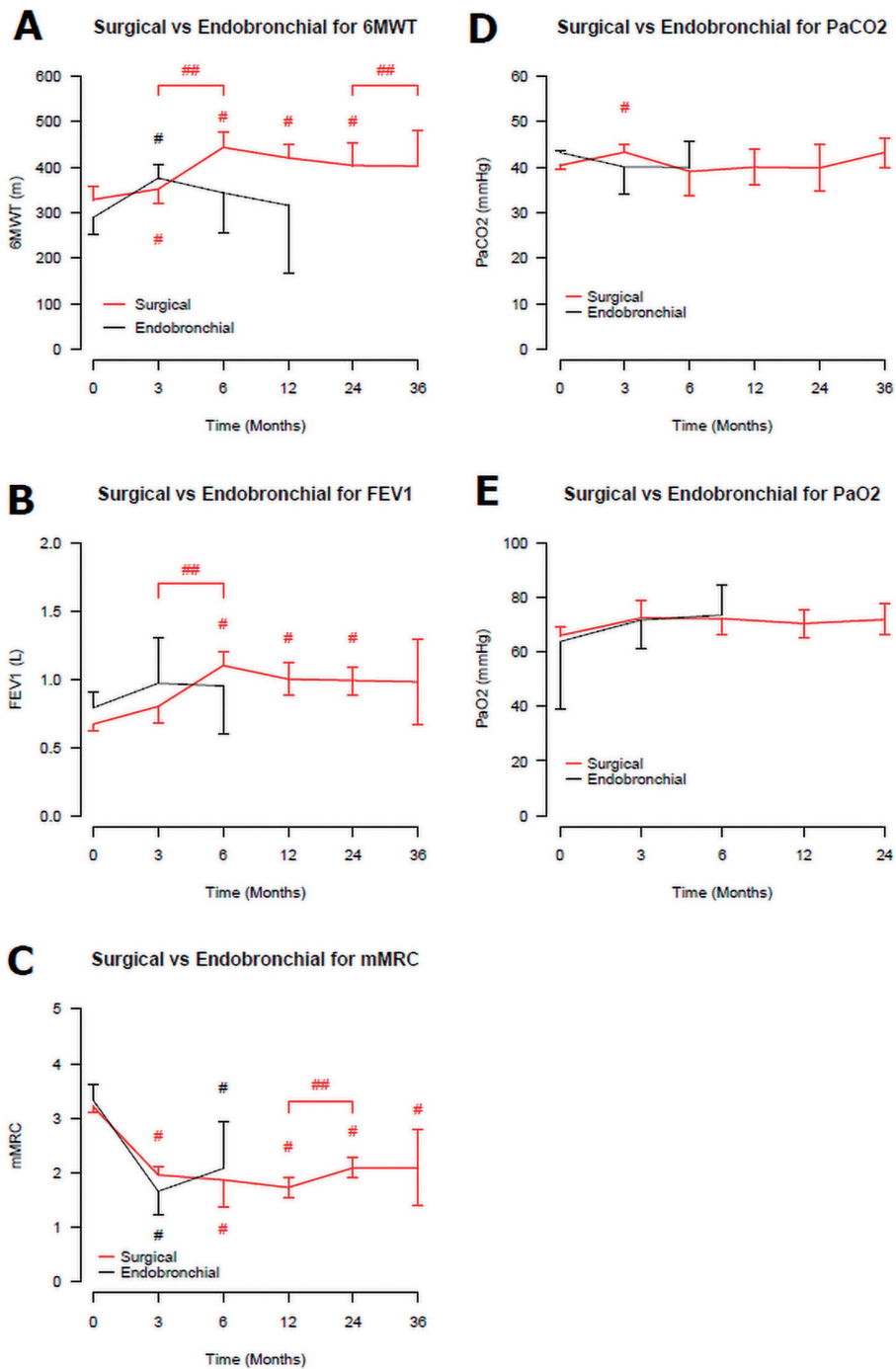


Figure S1 PRISMA flow diagram showing the process of study selection.



**Figure S2** Comparison of trends in functional lung parameters after surgical *vs.* endobronchial lung volume reduction: (A) 6MWT, (B) FEV1 (% pred), (C) mMRC, (D) PaCO<sub>2</sub> (mmHg), (E) PaO<sub>2</sub> (mmHg). #, P<0.05 when compared to baseline; ##, P<0.05 for compared timepoints. 6MWT, 6-minute walk test; FEV, forced expiratory volume; mMRC, modified medical research council dyspnea scale; PaCO<sub>2</sub>, partial pressure of carbon dioxide; PaO<sub>2</sub>, partial pressure of oxygen.

**Table S1** Studies included in the meta-analysis

First author	Title	Year published	Journal	Study date	Type of study	Number of patients	Total NOS score or ROB
Lederer 1	<i>Obesity and primary graft dysfunction after lung transplantation: the Lung Transplant Outcomes Group Obesity Study</i>	2011	<i>Am J Respir Crit Care Med</i>	2002–2009	Prospective cohort	261	8
Davis	<i>Pepsin concentrations are elevated in the bronchoalveolar lavage fluid of patients with idiopathic pulmonary fibrosis after lung transplantation</i>	2013	<i>Journal of Surgical Research</i>	2009–2011	Prospective cohort	45	7
Bossenbroek	<i>Cross-sectional Assessment of Daily Physical Activity in Chronic Obstructive Pulmonary Disease Lung Transplant Patients</i>	2009	<i>J Heart Lung Transplant</i>	1990–2005	Prospective cohort	47	7
Langenbach	<i>Airway vascular changes after lung transplant: potential contribution to the pathophysiology of bronchiolitis obliterans syndrome</i>	2005	<i>J Heart Lung Transplant</i>	1997–1998	Prospective cohort	11	6
Ekstrom	<i>Lung transplantation and survival outcomes in patients with oxygen-dependent COPD with regard to their alpha-1 antitrypsin deficiency status</i>	2017	<i>International Journal of COPD</i>	1987–2015	Prospective cohort	171	9
Aharinejad	<i>Prediction of lung-transplant rejection by hepatocyte growth factor</i>	2004	<i>The Lancet</i>	–	Prospective cohort	65	6
Habedank	<i>Reversibility of cachexia after bilateral lung transplantation</i>	2007	<i>International Journal of Cardiology</i>	–	Prospective cohort	17	7
Rodrigue	<i>Are there sex differences in health-related quality of life after lung transplantation for chronic obstructive pulmonary disease?</i>	2006	<i>J Heart Lung Transplant</i>	1994–2002	Prospective cohort	37	6
Ringbaek	<i>Prognosis of patients with alpha1-antitrypsine deficiency on long-term oxygen therapy</i>	2014	<i>Respiratory Medicine</i>	1994–2010	Prospective cohort	262	7
Ratnovsky	<i>Mechanics of Respiratory Muscles in Single-Lung Transplant Recipients</i>	2006	<i>Respiration</i>	–	Prospective cohort	5	5
Van Muylem	<i>Monitoring the lung periphery of transplanted lungs</i>	2005	<i>Respiratory Physiology and Neurobiology</i>	–	Prospective cohort	3	5
Titman	<i>Disease-Specific Survival Benefit of Lung Transplantation in Adults: A National Cohort Study</i>	2009	<i>American Journal of Transplantation</i>	1995–2006	Prospective cohort	483	8
Gerbase	<i>Health-Related Quality of Life Following Single or Bilateral Lung Transplantation</i>	2005	<i>CHEST</i>	1993–2004	Prospective cohort	24	6
Wilkens H	<i>Breathing pattern and chest wall volumes during exercise in patients with cystic fibrosis, pulmonary fibrosis and COPD before and after lung transplantation</i>	2010	<i>Thorax</i>	–	Prospective cohort	5	6
Ley	<i>Functional Evaluation of Emphysema Using Diffusion-Weighted Helium-Magnetic Resonance Imaging, High-Resolution Computed Tomography, and Lung Function Tests</i>	2004	<i>Investigative radiology</i>	–	Prospective cohort	9	4
Tutic	<i>Lung-volume reduction surgery as an alternative or bridging procedure to lung transplantation</i>	2006	<i>The Annals of Thoracic Surgery</i>	1994–2005	Prospective cohort	31	8
Haniuda	<i>Effects of pulmonary artery remodeling on pulmonary circulation after lung volume reduction surgery</i>	2003	<i>Thorac Cardiovasc Surgery</i>	–	Prospective cohort	12	5
Criner	<i>Biologic lung volume reduction in advanced upper lobe emphysema phase 2 results</i>	2009	<i>Am J Respir Crit Care Med</i>	2007–2008	NR clinical trial	50	8
McKeough	<i>Reduction in resting energy expenditure following lung volume reduction surgery in subjects with chronic obstructive pulmonary disease</i>	2004	<i>Chronic Respiratory Disease</i>	–	Prospective cohort	10	5
Herth	<i>Characterization of outcomes 1 year after endoscopic thermal vapor ablation for patients with heterogeneous emphysema</i>	2005	<i>International Journal of COPD</i>	2009–2011	NR clinical trial	44	8
Fujimoto	<i>Long-term results of lung volume reduction surgery</i>	2002	<i>European Journal of Cardio-thoracic Surgery</i>	1994–1998	Registry study	88	7
Sievi	<i>Lung volume reduction surgery does not increase daily physical activity in patients with severe chronic obstructive pulmonary disease</i>	2018	<i>Journal of Thoracic Disease</i>	2010–2016	Prospective case-control	19	7
Yusen	<i>A prospective evaluation of lung volume reduction surgery in 200 consecutive patients</i>	2003	<i>Chest</i>	1993–1998	Prospective cohort	200	9
Wood	<i>A multicenter trial of an intrabronchial valve for treatment of severe emphysema</i>	2007	<i>The Journal of Thoracic and Cardiovascular Surgery</i>	2004	Prospective cohort	30	7
Goldstein	<i>Influence of lung volume reduction surgery (LVRS) on health related quality of life in patients with chronic obstructive pulmonary disease</i>	2003	<i>Thorax</i>	1997–2001	RCT	28	Low risk
Davey	<i>Bronchoscopic lung volume reduction with endobronchial valves for patients with heterogeneous emphysema and intact interlobar fissures (the BeLieVeR-HIFI study): a randomised controlled trial</i>	2015	<i>The Lancet</i>	2012–2013	RCT	25	Low risk
Hopkinson	<i>Atelectasis and survival after bronchoscopic lung volume reduction for COPD</i>	2011	<i>European Respiratory Journal</i>	2002–2004	Prospective cohort	19	7
Goto	<i>Improved activities of daily living, psychological state and health-related quality of life for 12 months following lung volume reduction surgery in patients with severe emphysema</i>	2004	<i>Respirology</i>	1996–1999	Prospective cohort	18	7
Ingenito	<i>Physiological characterization of variability in response to lung volume reduction surgery</i>	2003	<i>Journal of Applied Physiology</i>	1994–2000	Prospective cohort	25	8
Mineo	<i>Resting energy expenditure and metabolic changes after lung volume reduction surgery for emphysema</i>	2006	<i>Annals of Thoracic Surgery</i>	2000–2003	Prospective cohort	30	9
Pompeo	<i>Comparative results of non-resectional lung volume reduction performed by awake or non-awake anesthesia</i>	2011	<i>European Journal of Cardio-thoracic Surgery</i>	2007–2010	Prospective cohort	60	7
Deslee 1	<i>Lung volume reduction coil treatment for patients with severe emphysema: a European multicentre trial</i>	2014	<i>Thorax</i>	2009–2011	NR clinical trial	60	8
Gelb	<i>Lung function 5 yr after lung volume reduction surgery for emphysema</i>	2001	<i>Am Journal Respir Crit Care Med</i>	1995	Prospective cohort	26	9
Liu J	<i>Mid-term effects of lung volume reduction surgery on pulmonary function in patients with chronic obstructive pulmonary disease</i>	2007	<i>Chinese Medical Journal</i>	–	Prospective cohort	10	5
Venuta	<i>Long-term follow-up after bronchoscopic lung volume reduction in patients with emphysema</i>	2012	<i>European Respiratory Journal</i>	–	Prospective cohort	40	7
Bakeer	<i>Low cost biological lung volume reduction therapy for advanced emphysema</i>	2016	<i>International Journal of COPD</i>	2013–2015	NR clinical trial	15	6
Flaherty	<i>Short-term and long-term outcomes after bilateral lung volume reduction surgery: Prediction by quantitative CT</i>	2001	<i>Chest</i>	1994–1998	Prospective cohort	89	8
De Oliveira	<i>Combined bone marrow-derived mesenchymal stromal cell therapy and one-way endobronchial valve placement in patients with pulmonary emphysema: A phase I clinical trial</i>	2017	<i>Stem Cells Translational Medicine</i>	2013–2014	RCT	10	High risk
Homan	<i>Increased effective lung volume following lung volume reduction surgery in emphysema</i>	2001	<i>Chest</i>	1996–1998	Prospective cohort	36	8
Lederer 2	<i>Lung-volume reduction surgery for pulmonary emphysema: Improvement in body mass index, airflow obstruction, dyspnea, and exercise capacity index after 1 year</i>	2007	<i>The Journal of Thoracic and Cardiovascular Surgery</i>	2004–2005	Prospective cohort	23	8
Tan A	<i>Lung volume reduction surgery for the treatment of severe emphysema: a study in a single Canadian institution</i>	2000	<i>Canadian journal of surgery</i>	1995–1997	Prospective case series	10	6
Cremona	<i>Mechanisms of gas exchange response to lung volume reduction surgery in severe emphysema</i>	2011	<i>Journal of Applied Physiology</i>	–	Prospective cohort	23	5
Ohno	<i>Oxygen-enhanced MRI, thin-section MDCT, and perfusion SPECT/CT: comparison of clinical implications to patient care for lung volume reduction surgery</i>	2012	<i>American Journal of Roentgenology</i>	2007–2011	Prospective cohort	25	6

**Table S1** (continued)

Table S1 (continued)

First author	Title	Year published	Journal	Study date	Type of study	Number of patients	Total NOS score or ROB
Liu Z	<i>Video-Assisted Thoracoscopic Surgery for Treatment of Chronic Obstructive Pulmonary Disease</i>	2016	<i>Indian Journal of Surgery</i>	2002–2012	Prospective cohort	90	6
Koizumi	<i>Comparison of changes in hemodynamics between unilateral and bilateral lung volume reduction for pulmonary emphysema</i>	2001	<i>Annals of Thoracic and Cardiovascular Surgery</i>	1994–1997	Prospective	16	4
Gorman	<i>Diaphragm length and neural drive after lung volume reduction surgery</i>	2005	<i>American Journal of Respiratory and Critical Care Medicine</i>	–	Prospective cohort	12	6
Malthener	<i>Lung volume reduction surgery: Results of a Canadian pilot study</i>	2000	<i>Canadian Journal of Surgery</i>	1995–1997	Prospective case series	24	8
Wilkens H	<i>Lung volume reduction surgery versus conservative treatment in severe emphysema</i>	2000	<i>European Respiratory Journal</i>	1995–1997	Prospective cohort	29	8
Mineo	<i>Impact of lung volume reduction surgery versus rehabilitation on quality of life</i>	2004	<i>European Respiratory Journal</i>	1996–1999	RCT	30	High risk
Hillerdal	<i>Comparison of lung volume reduction surgery and physical training on health status and physiologic outcomes: a randomized controlled clinical trial</i>	2005	<i>Chest</i>	1997–2000	RCT	49	Some concern
Weder	<i>Persistent benefit from lung volume reduction surgery in patients with homogeneous emphysema</i>	2009	<i>The Annals of Thoracic Surgery</i>	1994–2008	Prospective cohort	250	8
Geiser	<i>Outcome after unilateral lung volume reduction surgery in patients with severe emphysema</i>	2001	<i>European Journal of Cardio-thoracic Surgery</i>	1996–1999	Prospective cohort	28	7
Soon	<i>Sequential VATS lung volume reduction surgery: prolongation of benefits derived after the initial operation</i>	2003	<i>European Journal of Cardio-thoracic Surgery</i>	1994–2001	Prospective cohort	29	7
Sharafkhaneh	<i>Altered thoracic gas compression contributes to improvement in spirometry with lung volume reduction surgery</i>	2005	<i>Thorax</i>	–	Prospective cohort	27	7
Butler	<i>Underestimation of mortality following lung volume reduction surgery resulting from incomplete follow-up</i>	2001	<i>Chest</i>	1995–1997	Prospective longitudinal	85	7
Laghi	<i>Effect of lung volume reduction surgery on diaphragmatic neuromechanical coupling at 2 years</i>	2004	<i>Chest</i>	–	Prospective cohort	15	5
Klooster 1	<i>Endobronchial Valves for Emphysema without Interlobar Collateral Ventilation</i>	2015	<i>The New England Journal of Medicine</i>	2011–2014	RCT	34	Low risk
Herth	<i>Treatment of Advanced Emphysema With Emphysematous Lung Sealant (AeriSeal®)</i>	2011	<i>Respiration</i>	–	NR clinical trial	25	7
Deslee 2	<i>Lung Volume Reduction Coil Treatment vs Usual Care in Patients With Severe Emphysema: The REVOLENS Randomized Clinical Trial</i>	2016	<i>JAMA</i>	2013	RCT	50	Low risk
Klooster 2	<i>Lung Volume Reduction Coil Treatment in Chronic Obstructive Pulmonary Disease Patients with Homogeneous Emphysema: A Prospective Feasibility Trial</i>	2014	<i>Respiration</i>	2011–2012	Prospective cohort	10	8
Bostanci	<i>Endobronchial coils in treatment of advanced emphysema: A single center experience [İleri amfizem tedavisinde endobronşiyal sarmallar: Tek merkez deneyimi]</i>	2019	<i>Turkish Journal of Thoracic and Cardiothoracic Surgery</i>	2012–2014	Prospective cohort	46	8
Zoumot	<i>Endobronchial Coils for Severe Emphysema Are Effective Up to 12 Months following Treatment: Medium Term and Cross-Over Results from a Randomised Controlled Trial</i>	2015	<i>PLOS ONE</i>	2010–2011	RCT	45	Low risk
Herth	<i>Segmental Volume Reduction Using Thermal Vapour Ablation in Patients With Severe Emphysema: 6-month Results of the Multicentre, Parallel-Group, Open-Label, Randomised Controlled STEP-UP Trial</i>	2016	<i>The Lancet: Respiratory medicine</i>	2013–2014	RCT	45	Low risk
Song	<i>Bronchoscopic Lung Volume Reduction For Pulmonary Emphysema: Preliminary Experience With Endobronchial Occluder</i>	2013	<i>Respiratory Care</i>	2006	Prospective cohort	23	7
Shah	<i>Bronchoscopic lung-volume reduction with Exhale airway stents for emphysema (EASE trial): randomised, sham-controlled, multicentre trial</i>	2011	<i>Lancet</i>	2006–2009	RCT	208	Low risk

NOS, Newcastle-Ottawa scale; ROB, Risk of Bias; NR, non-randomized; RCT, randomized clinical trial.

Table S2 NOS for included studies

First author	Title	Type of study	Representative of the exposed cohort	Selection of the non-exposed cohort	Ascertainment of exposure	Outcome of interest was not present at start of study	Comparability of cohorts on the bases of the design or analysis	Assessment of outcome	Was follow-up long enough for outcome to occur	Adequacy of follow-up	Total
Lederer 1	<i>Obesity and primary graft dysfunction after lung transplantation: the Lung Transplant Outcomes Group Obesity Study</i>	Prospective cohort	1	1	1	0	2	1	1	1	8
Davis	<i>Pepsin concentrations are elevated in the bronchoalveolar lavage fluid of patients with idiopathic pulmonary fibrosis after lung transplantation</i>	Prospective cohort	1	1	1	0	1	1	1	1	7
Bossenbroek	<i>Cross-sectional Assessment of Daily Physical Activity in Chronic Obstructive Pulmonary Disease Lung Transplant Patients</i>	Prospective cohort	1	1	1	1	0	1	1	1	7
Langenbach	<i>Airway vascular changes after lung transplant: potential contribution to the pathophysiology of bronchiolitis obliterans syndrome</i>	Prospective cohort	0	0	1	1	1	1	1	1	6
Ekstrom	<i>Lung transplantation and survival outcomes in patients with oxygen-dependent COPD with regard to their alpha-1 antitrypsin deficiency status (swedish registry)</i>	Prospective cohort	1	1	1	1	2	1	1	1	9
Aharinejad	<i>Prediction of lung-transplant rejection by hepatocyte growth factor</i>	Prospective cohort	1	0	1	1	0	1	1	1	6
Habedank	<i>Reversibility of cachexia after bilateral lung transplantation</i>	Prospective cohort	1	1	1	1	1	1	1	0	7
Rodrigue	<i>Are there sex differences in health-related quality of life after lung transplantation for chronic obstructive pulmonary disease?</i>	Prospective cohort	1	0	1	0	1	1	1	1	6

Table S2 (continued)

Table S2 (continued)

First author	Title	Type of study	Representative of the exposed cohort	Selection of the non-exposed cohort	Ascertainment of exposure	Outcome of interest was not present at start of study	Comparability of cohorts on the bases of the design or analysis	Assessment of outcome	Was follow-up long enough for outcome to occur	Adequacy of follow-up	Total
Ringbaek	<i>Prognosis of patients with alpha1-antitrypsine deficiency on long-term oxygen therapy (danish oxygen register)</i>	Prospective cohort	1	1	1	0	1	1	1	1	7
Ratnovsky	<i>Mechanics of Respiratory Muscles in Single-Lung Transplant Recipients</i>	Prospective cohort	0	0	1	0	1	1	1	1	5
Van Muylem	<i>Monitoring the lung periphery of transplanted lungs</i>	Prospective cohort	1	0	1	1	0	1	1	0	5
Titman	<i>Disease-Specific Survival Benefit of Lung Transplantation in Adults: A National Cohort Study (UK database)</i>	Prospective cohort	1	0	1	1	2	1	1	1	8
Gerbase	<i>Health-Related Quality of Life Following Single or Bilateral Lung Transplantation</i>	Prospective cohort	1	0	1	1	0	1	1	1	6
Wilkens H	<i>Breathing pattern and chest wall volumes during exercise in patients with cystic fibrosis, pulmonary fibrosis and COPD before and after lung transplantation</i>	Prospective cohort	1	0	1	0	1	1	1	1	6
Ley	<i>Functional Evaluation of Emphysema Using Diffusion-Weighted Helium-Magnetic Resonance Imaging, High-Resolution Computed Tomography, and Lung Function Tests</i>	Prospective cohort	0	1	1	0	0	1	0	1	4
Tutic	<i>Lung-volume reduction surgery as an alternative or bridging procedure to lung transplantation</i>	Prospective cohort	1	1	1	1	1	1	1	1	8
Haniuda	<i>Effects of pulmonary artery remodeling on pulmonary circulation after lung volume reduction surgery</i>	Prospective cohort	0	0	1	1	0	1	1	1	5
McKeough	<i>Reduction in resting energy expenditure following lung volume reduction surgery in subjects with chronic obstructive pulmonary disease</i>	Prospective cohort	0	0	1	1	0	1	1	1	5
Fujimoto	<i>Long-term results of lung volume reduction surgery</i>	Registry study	1	0	1	1	1	1	1	1	7
Sievi	<i>Lung volume reduction surgery does not increase daily physical activity in patients with severe chronic obstructive pulmonary disease (registry switzerland)</i>	Prospective case-control	1	0	1	1	2	1	1	0	7
Yusen	<i>A prospective evaluation of lung volume reduction surgery in 200 consecutive patients</i>	Prospective cohort	1	1	1	1	2	1	1	1	9
Goto	<i>Improved activities of daily living, psychological state and health-related quality of life for 12 months following lung volume reduction surgery in patients with severe emphysema</i>	Prospective cohort	1	1	1	1	1	1	1	0	7
Ingenito	<i>Physiological characterization of variability in response to lung volume reduction surgery</i>	Prospective cohort	1	1	1	1	2	1	1	0	8
Mineo	<i>Resting energy expenditure and metabolic changes after lung volume reduction surgery for emphysema</i>	Prospective cohort	1	1	1	1	2	1	1	1	9
Pompeo	<i>Comparative results of non-resectional lung volume reduction performed by awake or non-awake anesthesia</i>	Prospective cohort	1	1	1	1	0	1	1	1	7
Gelb	<i>Lung function 5 yr after lung volume reduction surgery for emphysema</i>	Prospective cohort	1	1	1	1	2	1	1	1	9
Liu J	<i>Mid-term effects of lung volume reduction surgery on pulmonary function in patients with chronic obstructive pulmonary disease</i>	Prospective cohort	0	1	1	1	0	1	1	0	5
Venuta	<i>Long-term follow-up after bronchoscopic lung volume reduction in patients with emphysema</i>	Prospective cohort	1	1	1	1	1	1	1	0	7
Flaherty	<i>Short-term and long-term outcomes after bilateral lung volume reduction surgery: Prediction by quantitative CT</i>	Prospective cohort	1	1	1	1	1	1	1	1	8
Homan	<i>Increased effective lung volume following lung volume reduction surgery in emphysema</i>	Prospective cohort	1	1	1	1	1	1	1	1	8
Lederer 2	<i>Lung-volume reduction surgery for pulmonary emphysema: Improvement in body mass index, airflow obstruction, dyspnea, and exercise capacity index after 1 year</i>	Prospective cohort	1	1	1	1	1	1	1	1	8
Tan A	<i>Lung volume reduction surgery for the treatment of severe emphysema: a study in a single Canadian institution</i>	Prospective case series	0	0	1	1	1	1	1	1	6

Table S2 (continued)

Table S2 (continued)

First author	Title	Type of study	Representative of the exposed cohort	Selection of the non-exposed cohort	Ascertainment of exposure	Outcome of interest was not present at start of study	Comparability of cohorts on the bases of the design or analysis	Assessment of outcome	Was follow-up long enough for outcome to occur	Adequacy of follow-up	Total
Cremona	<i>Mechanisms of gas exchange response to lung volume reduction surgery in severe emphysema</i>	Prospective cohort	0	0	1	1	1	1	1	0	5
Ohno	<i>Oxygen-enhanced MRI, thin-section MDCT, and perfusion SPECT/CT: comparison of clinical implications to patient care for lung volume reduction surgery</i>	Prospective cohort	0	0	1	1	1	1	1	1	6
Liu Z	<i>Video-Assisted Thoracoscopic Surgery for Treatment of Chronic Obstructive Pulmonary Disease</i>	Prospective cohort	1	1	1	1	1	1	0	0	6
Koizumi	<i>Comparison of changes in hemodynamics between unilateral and bilateral lung volume reduction for pulmonary emphysema</i>	Prospective cohort	0	0	1	1	1	1	0	0	4
Gorman	<i>Diaphragm length and neural drive after lung volume reduction surgery</i>	Prospective cohort	0	0	1	1	1	1	1	1	6
Malthener	<i>Lung volume reduction surgery: Results of a Canadian pilot study</i>	Prospective case series	1	1	1	1	1	1	1	1	8
Wilkens H	<i>Lung volume reduction surgery versus conservative treatment in severe emphysema</i>	Prospective cohort	1	1	1	1	1	1	1	0	8
Weder	<i>Persistent benefit from lung volume reduction surgery in patients with homogeneous emphysema</i>	Prospective cohort	1	1	1	1	1	1	1	1	8
Geiser	<i>Outcome after unilateral lung volume reduction surgery in patients with severe emphysema</i>	Prospective cohort	0	1	1	1	1	1	1	1	7
Soon	<i>Sequential VATS lung volume reduction surgery: prolongation of benefits derived after the initial operation</i>	Prospective cohort	1	1	1	1	1	1	1	0	7
Butler	<i>Underestimation of mortality following lung volume reduction surgery resulting from incomplete follow-up</i>	Prospective longitudinal	1	1	1	1	1	1	1	1	7
Laghi	<i>Effect of lung volume reduction surgery on diaphragmatic neuromechanical coupling at 2 years</i>	Prospective cohort	0	0	1	1	1	1	1	0	5
Bostanci	<i>Endobronchial coils in treatment of advanced emphysema: A single center experience [İleri amfizem tedavisinde endobronşiyal sarmallar: Tek merkez deneyimi]</i>	Prospective cohort	1	1	1	1	1	1	1	0	8
Song	<i>Bronchoscopic Lung Volume Reduction For Pulmonary Emphysema: Preliminary Experience With Endobronchial Occluder</i>	Prospective cohort	0	1	1	1	1	1	1	1	7
Criner	<i>Biologic lung volume reduction in advanced upper lobe emphysema phase 2 results</i>	NR clinical trial	1	1	1	1	1	1	1	1	8
Herth	<i>Characterization of outcomes 1 year after endoscopic thermal vapor ablation for patients with heterogeneous emphysema</i>	NR clinical trial	1	1	1	1	1	1	1	1	8
Wood	<i>A multicenter trial of an intrabronchial valve for treatment of severe emphysema</i>	Prospective cohort	1	1	1	1	1	1	1	0	7
Hopkinson	<i>Atelectasis and survival after bronchoscopic lung volume reduction for COPD</i>	Prospective cohort	0	1	1	1	1	1	1	1	7
Deslee 1	<i>Lung volume reduction coil treatment for patients with severe emphysema: a European multicentre trial</i>	NR clinical trial	1	1	1	1	2	1	1	0	8
Bakeer	<i>Low cost biological lung volume reduction therapy for advanced emphysema</i>	NR clinical trial	0	1	1	1	1	1	1	0	6
Herth	<i>Treatment of Advanced Emphysema With Emphysematous Lung Sealant (AeriSeal®)</i>	NR clinical trial	0	1	1	1	1	1	1	1	7
Klooster	<i>Lung Volume Reduction Coil Treatment in Chronic Obstructive Pulmonary Disease Patients with Homogeneous Emphysema: A Prospective Feasibility Trial</i>	NR clinical trial	0	1	1	1	1	1	1	1	8
Sharafkhaneh	<i>Altered thoracic gas compression contributes to improvement in spirometry with lung volume reduction surgery</i>	Prospective cohort	1	1	1	1	1	1	1	0	7

NOS, Newcastle-Ottawa scale; NR, non-randomized.

**Table S3** Cochrane ROB assessment of included studies

First author	Title	Type of study	Randomization process	Deviation from intended intervention	Missing outcome data	Measurement of outcome	Selection of reported result	Overall risk of bias
Goldstein	<i>Influence of lung volume reduction surgery (LVRS) on health related quality of life in patients with chronic obstructive pulmonary disease</i>	RCT	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Davey	<i>Bronchoscopic lung volume reduction with endobronchial valves for patients with heterogeneous emphysema and intact interlobar fissures (the BeLieVeR-HiFi study): a randomised controlled trial</i>	RCT	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Mineo	<i>Impact of lung volume reduction surgery versus rehabilitation on quality of life</i>	RCT	Some concern	Low risk	Some concern	Some concern	Low risk	High risk
Hillerdal	<i>Comparison of lung volume reduction surgery and physical training on health status and physiologic outcomes: a randomized controlled clinical trial</i>	RCT	Low risk	Low risk	Some concern	Low risk	Low risk	Some concern
Klooster	<i>Endobronchial Valves for Emphysema without Interlobar Collateral Ventilation</i>	RCT	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Zoumot	<i>Endobronchial Coils for Severe Emphysema Are Effective Up to 12 Months following Treatment: Medium Term and Cross-Over Results from a Randomised Controlled Trial</i>	RCT	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Herth	<i>Segmental Volume Reduction Using Thermal Vapour Ablation in Patients With Severe Emphysema: 6-month Results of the Multicentre, Parallel-Group, Open-Label, Randomised Controlled STEP-UP Trial</i>	RCT	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Shah	<i>Bronchoscopic lung-volume reduction with Exhale airway stents for emphysema (EASE trial): randomised, sham-controlled, multicentre trial</i>	RCT	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
De Oliveira	<i>Combined Bone Marrow-Derived Mesenchymal Stromal Cell Therapy and One-Way Endobronchial Valve Placement in Patients with Pulmonary Emphysema: A Phase I Clinical Trial</i>	RCT	High risk	Low risk	High risk	Low risk	Low risk	High risk
Deslee 2	<i>Lung Volume Reduction Coil Treatment vs Usual Care in Patients With Severe Emphysema: The REVOLENS Randomized Clinical Trial</i>	RCT	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk

ROB, Risk of Bias; RCT, randomized clinical trial.

**Table S4** Pre to post-operative comparison within lung volume reduction and lung transplant groups

Variable	Lung transplant			Lung volume reduction		
	Pre-operative	Post-operative	P value	Pre-operative	Post-operative	P value
BMI (kg/m <sup>2</sup> )	20.6 [17.7, 23.5]	24.1 [19.7, 28.5]	0.19	22.9 [22.0, 23.8]	24.7 [23.6, 25.8]	0.01
6MWT (m)	212.9 [119.0, 306.9]	454.4 [334.7, 574.2]	<0.01	286.0 [270.2, 301.9]	409.1 [392.1, 426.0]	<0.01
FEV1 (% pred)	21.8 [16.8, 26.7]	54.9 [41.4, 68.4]	<0.01	27.6 [25.7, 29.5]	32.5 [30.1, 34.8]	0.01

Data presented as mean [95% CI]. BMI, body mass index; 6MWT, 6-minute walk test; FEV, forced expiratory volume; CI, confidence interval.

**Table S5** Baseline characteristics of surgical vs. endobronchial lung volume reduction groups

Variable	Surgical				Endobronchial				Overall				P value
	Pooled value, mean [95% CI]	No. of patients (N or n/N)	No. of studies	I <sup>2</sup> (%)	Pooled value, mean [95% CI]	No. of patients (N or n/N)	No. of studies	I <sup>2</sup> (%)	Pooled value, mean [95% CI]	No. of patients (N or n/N)	No. of studies	I <sup>2</sup> (%)	
Age (years)	64 [62, 67]	1,034	26	0	62 [59, 65]	724	16	0	63 [62, 65]	1,758	42	0	0.18
BMI (kg/m <sup>2</sup> )	22.7 [21.7, 23.8]	227	7	0	23.3 [21.6, 25.0]	590	11	0	22.9 [22.0, 23.8]	817	18	0	0.58
Female (%)	25 [17, 35]	343/968	23	67*	32 [22, 45]	300/779	18	70*	28 [21, 36]	643/1,748	41	68	0.34
Heterogeneous A1AT (%)	96 [94, 98]	816/831	20	32	95 [92, 97]	348/352	11	0	96 [94, 97]	1,164/1,183	31	13	0.58
Home oxygen requirement (%)	50 [28, 72]	231/519	12	93*	68 [36, 89]	198/358	9	96*	59 [40, 75]	429/877	21	95	0.37
Smoking (pack years)	49 [31, 66]	245	3	0	48 [37, 60]	616	12	0	48 [39, 58]	861	15	0	1

\*, significant heterogeneity present (P<0.05). CI, confidence interval; BMI, body mass index; A1AT, alpha-1 antitrypsin.

**Table S6** Surgical vs. endobronchial lung volume reduction perioperative variables (takes the latest follow-up value per variable)

Variable	Surgical				Endobronchial				Overall				P value
	Pooled value, mean [95% CI]	No. of patients (N or n/N)	No. of studies	I <sup>2</sup> (%)	Pooled value, mean [95% CI]	No. of patients (N or n/N)	No. of studies	I <sup>2</sup> (%)	Pooled value, mean [95% CI]	No. of patients (N or n/N)	No. of studies	I <sup>2</sup> (%)	
Operation time (min)	116 [58, 173]	166	3	91*	47 [28, 67]	458	7	51	74 [47, 101]	624	10	85*	0.03
Significant bleeding (%)	2 [1, 4]	8/373	6	0	1 [0, 3]	1/208	1	-	2 [1, 3]	9/581	7	0	0.16
Infection (%)	15 [10, 21]	27/180	5	0	11 [8, 16]	45/387	14	24	13 [10, 16]	72/567	19	8	0.25
Pneumothorax (%)	3 [1, 9]	3/98	2	0	4 [2, 10]	26/536	12	74*	4 [2, 9]	29/634	14	69	0.62
Respiratory failure (%)	10 [3, 27]	27/238	5	82*	8 [2, 21]	3/40	3	0	9 [4, 21]	30/278	8	75	0.68
Arrhythmia (%)	14 [9, 22]	28/194	6	9	5 [0, 61]	6/55	2	72	12 [7, 20]	34/249	8	37	0.51
Hospital stay (days)	9 [7, 12]	438	8	14	2 [1, 4]	190	3	0	6 [4, 9]	628	11	56*	<0.01

\*, significant heterogeneity present (P<0.05). CI, confidence interval.