

Risk factors and prognosis of airway complications after lung transplantation : A pooled analysis of 39 observational studies

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Background:

Airway complications (AC) are leading causes of significant morbidity and mortality after lung transplantation (LTx), but its predictors and outcomes remain controversial. This study aimed to identify potential risk factors and prognosis of AC after lung transplantation.

Methods:

A systematic review was performed by searching PubMed, Embase and Cochrane Library. All observational studies reporting outcome and potential factors of AC after lung transplantation were included. The incidence, mortality and estimated effect of each factors for AC were pooled by using random-effects model.

Results:

Thirty-nine eligible studies with 52401 patients undergoing lung transplantation were included for meta-analysis. The pooled incidence of AC was 12.4% (95% confidence interval [CI]: 9.4-15.7) and the most frequent AC is bronchial stenosis (78.3%, 1405/1853). AC-related mortality rates at 30-days, 90-days, 6 months, 1 year and 5 year were 7%, 8.5%, 20.7%, 23.5% and 44.1%, respectively. We also found that AC were associated with worse overall survival in lung transplant recipients (hazard ratio [HR] 1.66, 95%CI 1.05-2.62). Significant predictors of increased risk of AC after lung transplantation included male recipient (odds ratio [OR] 1.59), bilateral lung transplantation (OR 2.08), mechanical ventilation (OR 1.46), cytomegalovirus infection (OR 1.16), acute rejection (OR 1.36), post-operative ICU admission (OR 1.62) and smoking history of donor (OR 1.19). Moreover, diagnosis of cystic fibrosis (OR 0.625, compared to emphysema) and perioperative usage of extracorporeal membrane oxygenation (OR 0.63) were protective factors for AC in lung transplant.

Table 1. Characteristics of included studies.

First author	Year	No. of LTx patients	Study type	retro/pro	single/multi	Country
Castleberry	2013	9335	cohort	retro	single	America
Colquhoun	1994	67	case-control	retro	single	UK
Date	1995	226	case-control	retro	single	America
Fallis	2019	70	cohort	retro	single	America
Fitzsullivan	2011	230	cohort	retro	single	America
Hasegawa	2000	246	case-control	retro	single	America
Hayanga	2016	16156	cohort	retro	multi	America
Herrera	2001	123	case-control	retro	single	UK
kshetry	1997	127	case-control	retro	single	America
Levy	2021	421	case-control	retro	single	America
Malas	2019	18122	case-control	retro	multi	America
Mazzetta	2022	740	cohort	retro	multi	America
Mazzetta	2019	191	case-control	retro	multi	France
Mendogni	2019	147	case-control	retro	single	Italy
Moreno	2008	214	case-control	retro	single	Spain
Murthy	2007	276	cohort	retro	single	America
Necki	2020	91	cohort	retro	single	Poland
Nunley	2002	61	cohort	retro	single	America
Olland	2016	270	cohort	retro	multi	France
Ruttman	2005	81	case-control	retro	multi	Australia
Schröder	2003	145	cohort	retro	single	America
Schweiger	2020	1555	cohort	retro	single	Australia
Shofer	2012	467	cohort	retro	single	America
Snell	2000	76	cohort	retro	single	Australia
Thistlethwaite	2008	240	cohort	retro	single	America
Vanberkel	2011	279	cohort	retro	single	America
Vandewauwer	2007	232	cohort	retro	single	Belgium
Yserbyt	2015	490	cohort	retro	single	Belgium
Alvarez	2001	101	cohort	retro	single	Spain
Chhajed	2001	312	cohort	retro	single	Australia
Cho	2015	75	case-control	retro	single	Korea
Gammie	1999	352	case-control	retro	single	America
Lonchyna	1999	107	case-control	retro	single	America
Necki	2020	165	case-control	retro	single	Poland
Patior	2020	121	case-control	retro	single	France
Samano	2009	71	case-control	retro	single	Brazil
Saad	2003	253	case-control	retro	single	America
Suh	2020	173	case-control	retro	single	Korea
Weder	2009	235	case-control	retro	single	Switzerland

LTx, lung transplantation; retro, retrospective study; pro, prospective study; single, single center study; multi, multicenter study

Discussion:

Our study indicated that AC after lung transplantation remain common and significantly increased short- and long-term mortality. Several risk factors for AC and have been identified, providing comprehensive evidence for appropriate donor-recipient selection and optimal risk mitigation strategies.