

Table S1: Database-specific search strings.

Database	Search items
Pubmed	("thoracic surgery, video assisted"[MeSH Terms] OR ("thoracic"[All Fields] AND "surgery"[All Fields] AND "video assisted"[All Fields]) OR "video-assisted thoracic surgery"[All Fields] OR ("video"[All Fields] AND "assisted"[All Fields] AND "thoracoscopic"[All Fields] AND "surgery"[All Fields]) OR "video assisted thoracoscopic surgery"[All Fields] OR ("thoracic surgery, video assisted"[MeSH Terms] OR ("thoracic"[All Fields] AND "surgery"[All Fields] AND "video assisted"[All Fields]) OR "video-assisted thoracic surgery"[All Fields] OR "vats"[All Fields]) OR ("thoracoscopy"[MeSH Terms] OR "thoracoscopy"[All Fields] OR ("thoracoscopic"[All Fields] AND "surgery"[All Fields]) OR "thoracoscopic surgery"[All Fields])) AND ("uniportal"[All Fields] OR "single-port"[All Fields] OR ("single person"[MeSH Terms] OR ("single"[All Fields] AND "person"[All Fields]) OR "single person"[All Fields] OR "single"[All Fields] OR "singles"[All Fields]) AND ("incise"[All Fields] OR "incised"[All Fields] OR "incises"[All Fields] OR "incising"[All Fields] OR "incision s"[All Fields] OR "incisions"[All Fields] OR "surgical wound"[MeSH Terms] OR ("surgical"[All Fields] AND "wound"[All Fields]) OR "surgical wound"[All Fields] OR "incision"[All Fields])) OR "single-incision"[All Fields]) AND ("nonintubated"[All Fields] OR "non-intubated"[All Fields] OR ("awake"[All Fields] OR "awakeness"[All Fields] OR "awakes"[All Fields] OR "awaking"[All Fields]) AND ("anaesthesia"[All Fields] OR "anesthesia"[MeSH Terms] OR "anesthesia"[All Fields] OR "anaesthesias"[All Fields] OR "anesthesias"[All Fields])) OR ("tubeless"[All Fields] AND ("anaesthesia"[All Fields] OR "anesthesia"[MeSH Terms] OR "anesthesia"[All Fields] OR "anaesthesias"[All Fields] OR "anesthesias"[All Fields])) OR ("spontaneous"[All Fields] OR "spontaneously"[All Fields]) AND ("ventilated"[All Fields] OR "ventilates"[All Fields] OR "ventilating"[All Fields] OR "ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "ventilate"[All Fields] OR "ventilations"[All Fields] OR "ventilation s"[All Fields] OR "ventilator s"[All Fields] OR "ventilators, mechanical"[MeSH Terms] OR ("ventilators"[All Fields] AND "mechanical"[All Fields]) OR "mechanical ventilators"[All Fields] OR "ventilator"[All Fields] OR "ventilators"[All Fields] OR "ventillation"[All Fields]))))
Ovid	((video-assisted thoracoscopic surgery or VATS or thoracoscop* or minimally invasive thoracic surgery or minimally invasive lung surgery or thoracoscopic procedure* or thoracoscopic operation* or video-assisted lung surgery or thoracic endoscopic surgery or minimally invasive thoracoscopy) and (uniportal or uni-port or single port or single incision or single-incision or single access or single access or single-port VATS or single-entry or single-entry port or single-trocar or one-port or one-incision or one-access or single-skin incision) and (nonintubated or non-intubated or awake anesthesia or awake surgery or tubeless anesthesia or tubeless VATS or spontaneous ventilation or spontaneous breathing or regional anesthesia or epidural anesthesia or local anesthesia or spinal anesthesia or thoracic epidural or paravertebral block or intercostal block or nerve block or awake thoracic surgery or sedation anesthesia or conscious sedation)).tw.

Web of Science (Core Collection)	TS=("video-assisted thoracoscopic surgery" OR VATS OR thoracoscop* OR "minimally invasive thoracic surgery" OR "thoroscopic procedure*" OR "thoroscopic operation*" OR "video-assisted lung surgery" OR "thoracic endoscopic surgery" OR "minimally invasive thoracoscopy") AND TS=(uniportal OR "uni-port" OR "single-port" OR "single incision" OR "singleincision" OR "single access" OR "single-access" OR "single-port VATS" OR "singleentry" OR "single-entry port" OR "single-trocar" OR "one-port" OR "one-incision" OR "one-access" OR "single-skin incision") AND TS=(nonintubated OR "non-intubated" OR "awake anesthesia" OR "awake surgery" OR "tubeless anesthesia" OR "tubeless VATS" OR "spontaneous ventilation" OR "spontaneous breathing" OR "regional anesthesia" OR "epidural anesthesia" OR "local anesthesia" OR "spinal anesthesia" OR "thoracic epidural" OR "paravertebral block" OR "intercostal block" OR "nerve block" OR "awake thoracic surgery" OR "sedation anesthesia" OR "conscious sedation")
Scopus	TITLE-ABS-KEY("video-assisted thoracoscopic surgery" OR VATS OR thoracoscop* OR "minimally invasive thoracic surgery" OR "thoroscopic procedure*" OR "thoroscopic operation*" OR "video-assisted lung surgery" OR "thoracic endoscopic surgery" OR "minimally invasive thoracoscopy") AND TITLE-ABS-KEY(uniportal OR "uni-port" OR "single-port" OR "single incision" OR "single-incision" OR "single access" OR "single-access" OR "singleport VATS" OR "single-entry" OR "single-entry port" OR "single-trocar" OR "oneport" OR "one-incision" OR "one-access" OR "single-skin incision") AND TITLE-ABS-KEY(nonintubated OR "non-intubated" OR "awake anesthesia" OR "awake surgery" OR "tubeless anesthesia" OR "tubeless VATS" OR "spontaneous ventilation" OR "spontaneous breathing" OR "regional anesthesia" OR "epidural anesthesia" OR "local anesthesia" OR "spinal anesthesia" OR "thoracic epidural" OR "paravertebral block" OR "intercostal block" OR "nerve block" OR "awake thoracic surgery" OR "sedation anesthesia" OR "conscious sedation")
Cochrane	(video-assisted thoracoscopic surgery OR VATS OR thoracoscop* OR uniportal OR single-port OR single port) AND (nonintubat* OR non-intubat* OR tubeless OR awake OR spontaneous ventilation OR epidural OR paravertebral OR erector spinae OR serratus OR intercostal nerve block OR laryngeal mask OR supraglottic airway)

Table S2: A verification table confirming that each included study is strictly uniportal in both arms and truly comparative.

Authors	Uniportal VATS in Non-Intubated Arm	Uniportal VATS in Intubated Arm	Truly Comparative (Two Arms)
Pompeo & Dauri, 2013	Yes (Single flexible trocar)	Yes (Single flexible trocar)	Yes
Ambrogi et al., 2017	Yes (Single 30-40mm uniport)	Yes (Single 30-40mm uniport - implied same technique)	Yes
Hwang et al., 2018	Yes (Single 1.7cm port)	Yes (Single 1.7cm port)	Yes
Mineo & Ambrogi, 2018	Yes (Uniportal VATS)	Yes (Uniportal VATS)	Yes
Kocaturk et al., 2019	Yes (Single ~2cm incision)	Yes (Single ~2cm incision)	Yes
Liu et al., 2020	Yes (Explicitly stated: "nonintubated uniportal video-assisted thoracoscopic thymectomy" and "single incision of ~3 cm")	Yes (Explicitly stated: "intubated uniportal video-assisted thoracoscopic thymectomy" and "single incision of ~3 cm")	Yes
Gokce et al., 2021	Yes (Explicitly stated: "uniportal AVATS" and "a single skin incision of approximately 20 mm")	Yes (Explicitly stated: "uniportal VATS" and "a single skin incision of approximately 20 mm")	Yes
Liu et al., 2021	Yes (Explicitly stated: "nonintubated uniportal VATS segmentectomy" and "a single skin incision (3-4 cm)")	Yes (Explicitly stated: "intubated uniportal VATS segmentectomy")	Yes
Hsu et al., 2021	Yes (Explicitly stated: "nonintubated group" and "uniportal VATS" with "a single 3- to 4-cm skin incision")	Yes (Explicitly stated: "intubated group" and "uniportal VATS")	Yes
Rabeea et al., 2022	Yes (Explicitly stated: "awake uniportal video-assisted thoracoscopic pleural decortication" and "uniportal" is in the	Yes (Explicitly stated: "VATS decortication under general anesthesia" and "uniportal" is in the title/methods)	Yes

Authors	Uniportal VATS in Non-Intubated Arm	Uniportal VATS in Intubated Arm	Truly Comparative (Two Arms)
	title/methods)		
Yang et al., 2022	Yes (NI-SP-VALS)	Yes (I-SP-VALS)	Yes
Farkas et al., 2023	Yes (NITS uniportal VATS lobectomy)	Yes (iVATS uniportal lobectomy)	Yes
Kong et al., 2024	Yes (NI-SV with LMA)	Yes (I-MV with DLT)	Yes
Wang et al., 2024	Yes (NIVATS)	Yes (IVATS)	Yes

Table S3: A summary of the risk of bias assessments.

S3-A: Cochrane Risk of Bias 2 (RoB 2) tool for randomized controlled trials

Authors	Bias from the randomization process	Bias due to deviations from intended intervention	Bias due to missing outcome data	Bias in measurement of the outcome	Bias in selection of the reported result	Overall Risk of Bias
Rabeea et al., 2022	Low risk	Some concerns	Some concerns	Some concerns	Low risk	Some concerns
Kong et al., 2024	Low risk	Some concerns	Low risk	Low risk	Some concerns	Some concerns
Pompeo & Dauri, 2013	Some concerns	Some concerns	Low risk	Some concerns	Low risk	Some concerns
Kocatürk et al., 2019	Some concerns	Some concerns	Low risk	Some concerns	Some concerns	Some concerns
Hwang et al., 2018	Some concerns	Some concerns	Low risk	Low risk	Some concerns	Some concerns
Wang et al., 2024	Low risk	Low risk	Low risk	Low risk	Some concerns	Some concerns

S3-B: Newcastle-Ottawa Scale (NOS) for observational studies

Authors	Selection (0–4)	Comparability (0–2)	Outcome/Exposure (0–3)	Total Score (0–9)	Overall Methodological Quality
Gokce et al., 2021	3	1	3	7	High
Ambrogi et al., 2017	3	1	2	6	Moderate
Mineo & Ambrogi, 2018	3	1	2	6	Moderate
Liu et al., 2020	3	1	2	6	Moderate
Hsu et al., 2021	4	1	3	8	High
Liu et al., 2021	3	1	2	6	Moderate
Farkas et al., 2023	3	2	3	7	High
Yang et al., 2022	4	2	3	9	High

Table S4: Characteristics of observational studies using propensity score matching (PSM) including the propensity score model, matching algorithm, calipers, balance diagnostics (SMDs), and treatment effect estimands.

Study	Model	Matching algorithm	Calipers	Balance diagnostics (SMDs)	Treatment effect (ATE/ATT)
Liu et al 2021 [16]	Multivariable logistic regression model. Covariates: Sex + body mass index (BMI)	1:1 nearest neighbor matching	Not stated	Absolute standardized mean difference (SMD), SMD threshold for balance ≤ 0.2	Not stated
Yang et al 2022 [21]	Multivariable logistic regression. Covariates: Age, sex, BMI, smoking history, medical history, pulmonary function tests (FVC%, FEV1%, DLCO%), preoperative blood routine (WBC, NEUT%, LYM%, HGB, PLT, ALB), ASA class, nodule location, histologic types, pTNM stage, operating methods, inpatient ward	1:1 propensity score matching. Exact method not specified (nearest neighbor implied)	Not stated	Standardized differences (via χ^2 , t-test, Mann-Whitney U, or Z-test) reported as P values. SMD threshold for balance not stated. Balance inferred from $P > 0.05$ for all covariates after matching	Not stated
Farkas et al 2023 [22]	Multivariable logistic regression. Covariates: Age, sex, BMI, Charlson Comorbidity Index, histology, type of lobectomy, FEV1	Propensity score matching (1:1 ratio implied; exact algorithm not specified)	Not stated	Mann-Whitney U test (reported as p-values). SMD threshold for balance not reported. Balance inferred from $p > 0.05$ for all covariates (except FEV ₁ , which showed $p = 0.014$)	Not stated (implied ATT by matching)

Table S5: Sensitivity analysis for robustness of primary and secondary outcomes (Random versus Fixed effects and Leave-one-out analysis).

S5-A:

Outcome	Primary (Random effects)	Fixed effects	Leave-One-Out, Omitted studies	Leave-One-Out, Results	Conclusion
Primary outcomes:					
Total postoperative complications/morbidity (RR)	0.47 [0.32, 0.69], P=0.0001	0.45 [0.31, 0.66], P < 0.0001	Ambrogi et al. 2017	0.49 [0.33, 0.73], P=0.0004	Robust – Consistent across models and leave-one-out
			Farkas et al. 2023	0.50 [0.34, 0.74], P=0.0004	
			Gokce et al. 2021	0.44 [0.29, 0.67], P=0.0001	
			Hsu et al. 2021	0.48 [0.32, 0.70], P=0.0002	
			Kocatürk et al. 2019	0.47 [0.32, 0.69], P=0.0001	
			Mineo & Ambrogi 2018	0.42 [0.22, 0.79], P=0.008	
			Yang et al. 2022	0.49 [0.33, 0.73], P=0.0001	
Postoperative pulmonary complications (RR)	0.49 [0.34, 0.69], P < 0.0001	0.47 [0.33, 0.68], P < 0.0001	Ambrogi et al. 2017	0.51 [0.35, 0.73], P=0.0003	Robust – Consistent across models and leave-one-out
			Farkas et al. 2023	0.50 [0.35, 0.72], P=0.0002	
			Gokce et al. 2021	0.46 [0.31, 0.67], P < 0.0001	
			Kocatürk et al. 2019	0.48 [0.34, 0.69], P < 0.0001	
			Kong et al. 2024	0.43 [0.26, 0.69], P=0.0005	
			Mineo & Ambrogi 2018	0.53 [0.34, 0.81], P=0.004	
			Wang et al. 2024	0.49 [0.34, 0.70], P < 0.0001	
Mortality (RR)	0.21 [0.07, 0.66], P=0.007	0.22 [0.07, 0.68], P = 0.009	Mineo & Ambrogi 2018	0.33 [0.01, 7.72], P=0.49	Not robust – Driven by single study (Mineo & Ambrogi 2018)
			Pompeo & Dauri 2013	0.20 [0.06, 0.66], P=0.009	
Secondary outcomes:					
VAS pain score (MD)	-0.46 [-1.04, 0.13], P=0.13	-0.71 [-0.87, -0.56], P < 0.00001	Hwang et al. 2018	-0.37 [-1.02, 0.28], P=0.27	Not robust – Discordant between random- and fixed-effects
			Kocatürk et al. 2019	-0.53 [-1.25, 0.19], P=0.15	
			Liu et al. 2020	-0.21 [-0.62, 0.19], P=0.31	

			Liu et al. 2021	-0.65 [-1.19, -0.11], P=0.02	
			Pompeo & Dauri 2013	-0.48 [-1.23, 0.28], P=0.21	
Operative duration (min), (MD)	-3.64 [-30.36, 23.07], P=0.79	-17.25 [-18.93, -15.58], P < 0.00001	Wang et al. 2024	-9.78 [-37.82, 18.26], P=0.49	Not robust – Discordant between random- and fixed-effects.
			Rabeea et al. 2022	0.77 [-28.11, 29.65], P=0.96	
			Pompeo & Dauri 2013	-4.35 [-38.44, 29.74], P=0.80	
			Mineo & Ambrogi 2018	-8.96 [-35.59, 17.68], P=0.51	
			Liu et al. 2021	-12.69 [-39.10, 13.72], P=.35	
			Kocatürk et al. 2019	0.32 [-32.99, 33.62], P=0.99	
			Hwang et al. 2018	-1.10 [-29.87, 27.67], P=0.94	
			Gokce et al. 2021	6.60 [-20.39, 33.59], P=0.63	
Anesthetic duration (min), (MD)	-15.87 [-28.67, -3.06], P = 0.02	-20.62 [-24.17, -17.08], P < 0.00001	Hwang et al. 2018	-15.81 [-33.87, 2.25], P=0.09	Not robust – Consistent across models but significance lost when some studies omitted
			Kocatürk et al. 2019	-12.84 [-33.77, 8.09], P=0.23	
			Mineo & Ambrogi 2018	-9.96 [-24.42, 4.49], P=0.18	
			Wang et al. 2024	-23.13 [-32.64, -13.61], P<0.00001	
Awakening time (min), (MD)	-5.44 [-7.77, -3.11], P<0.00001	-5.56 [-7.02, -4.10], P < 0.00001	Hwang et al. 2018	-6.55 [-8.46, -4.64], P<0.00001	Robust – Consistent across models and leave-one-out
			Wang et al. 2024	-4.17 [-6.44, -1.90], P=0.0003	
Chest tube/drainage duration (days), (MD)	-0.41 [-0.59, -0.23], P<0.0001	-0.41 [-0.59, -0.23], P < 0.0001	Liu et al. 2021	-0.41 [-0.62, -0.21], P<0.0001	Robust – Consistent across models and leave-one-out
			Mineo & Ambrogi 2018	-0.37 [-0.57, -0.18], P=0.0002	
			Rabeea et al. 2022	-0.43 [-0.63, -0.23], P<0.0001	
			Wang et al. 2024	-0.45 [-0.69, -0.20], P<0.0001	
Hospital stay duration (days), (MD)	-0.62 [-1.05, -0.19], P=0.005	-0.53 [-0.71, -0.35], P < 0.00001	Gokce et al. 2021	-0.68 [-1.23, -0.13], P=0.02	Robust – Consistent across models and leave-one-out
			Liu et al. 2021	-0.70 [-1.23, -0.17], P=0.01	

			Mineo & Ambrogi 2018	-0.37 [-0.56, -0.19], P<0.0001	
			Pompeo & Dauri 2013	-0.64 [-1.11, -0.17], P=0.008	
			Rabeea et al. 2022	-0.69 [-1.22, -0.16], P=0.01	
			Wang et al. 2024	-0.68 [-1.23, -0.13], P=0.02	
Surgery/Procedure cost (\$), (MD)	-404.04 [-1438.22, 630.13], P=0.44	-20.09 [-30.88, -9.29], P = 0.0003	Kocatürk et al. 2019	-1129.00 [-2334.19, 76.19], P=0.07	Not robust – Discordant between random- and fixed-effects. Significant only under fixed-effects.
			Pompeo & Dauri 2013	-20.00 [-30.80, -9.20], P=0.0003	
Perioperative hypoxemia, (RR)	1.92 [0.99, 3.76], P=0.05	1.94 [1.12, 3.36], P = 0.02	Kong et al. 2024	1.44 [0.76, 2.73], P=0.26	Not robust – Significant only under fixed-effects. Result driven by specific studies
			Wang et al. 2024	3.18 [1.22, 8.30], P=0.02	
			Yang et al. 2022	2.10 [0.74, 5.97], P=0.16	
Sore throat/throat discomfort, (RR)	0.31 [0.11, 0.87], P=0.03	0.30 [0.19, 0.46], P < 0.00001	Hwang et al. 2018	0.40 [0.14, 1.14], P=0.09	Not robust – Result driven by specific studies
			Kong et al. 2024	0.25 [0.06, 1.08], P=0.06	
			Liu et al. 2020	0.45 [0.17, 1.15], P=0.09	
			Wang et al. 2024	0.28 [0.06, 1.22], P=0.09	
			Yang et al. 2022	0.21 [0.08, 0.57], P=0.002	
Patient satisfaction, (RR)	0.85 [0.36, 2.01], P=0.71	0.92 [0.86, 0.99], P = 0.02	Rabeea et al. 2022	1.00 [0.97, 1.03], P=1	Not robust – Significant only under fixed-effects. Result driven by specific studies
			Yang et al. 2022	0.71 [0.54, 0.94], P=0.01	
Re-operation, (RR)	0.58 [0.13, 2.57], P=0.48	0.57 [0.13, 2.49], P = 0.45	Farkas et al. 2023	0.67 [0.12, 3.57], P=0.64	Robust – Consistently non-significant
			Pompeo & Dauri 2013	0.36 [0.02, 8.62], P=0.53	

Effects are presented as MD[95%CI] for continuous data or RR[95%CI] for dichotomous data.

S5-B:

The sensitivity analysis incorporating imputed means and SDs from studies reporting median/IQR or median/range

Outcome	Primary Analysis (Mean±SD only)	Sensitivity Analysis (with all imputed data)	Leave-one-out sensitivity analysis
Operative Duration	-3.64 [-30.36, 23.07], P=0.79	-1.35 [-16.55, 13.85], P=0.86	Yang et al, 2022: -1.12 [-18.92, 16.67], P=0.90
			Liu et al, 2020: -1.99 [-18.81, 14.83], P=0.82
			Hsu et al, 2021: -1.47 [-17.74, 14.80], P=0.86
			Farkas et al, 2023: -1.54 [-17.43, 14.35], P=0.85
			Ambrogi et al, 2017: MD,95%CI(-2.15 [-18.34, 14.04], P=0.80
Chest Tube Duration	-0.41 [-0.59, -0.23], P<0.0001	-0.40 [-0.64, -0.16], P=0.0009	Yang et al, 2022: -0.40 [-0.64, -0.16], P=0.0009
			Liu et al, 2020: -0.47 [-0.75, -0.20], P=0.0007
			Hsu et al, 2021: -0.47 [-0.78, -0.15], P=0.004
			Farkas et al, 2023: -0.34 [-0.54, -0.14], P=0.0009
			Ambrogi et al, 2017: -0.45 [-0.70, -0.19], P=0.0005
			Hwang et al, 2018: -0.34 [-0.52, -0.15], P=0.0005
Hospital stay duration	-0.62 [-1.05, -0.19], P=0.005	-0.55 [-0.78, -0.33], P<0.00001	Yang et al, 2022: -0.58 [-0.89, -0.28], P=0.0002
			Liu et al, 2020: -0.59 [-0.87, -0.31], P=0.0001
			Ambrogi et al, 2017: -0.55 [-0.78, -0.31], P=0.00001
Procedure/surgical cost (\$)	-404.04 [-1438.22, 630.13], P=0.44	-19.42 [-58.80, 19.97], P=0.33	Yang et al, 2022: -552.86 [-1347.41, 241.70], P=0.17
			Ambrogi et al, 2017: -17.26 [-41.15, 6.62], v=0.16

Data are presented as mean difference (MD) and 95%Confidence interval (CI).

**Table S6: Subgroup analyses according to study design and procedure type
S6-A:**

Subgroup analysis: Study design, Postoperative pulmonary complications					
Subgroup	Non-intubated		Intubated		RR, 95%CI
	Events	Total	Events	Total	
Subgroup: RCT					
Kocatürk et al. 2019	1	145	1	148	1.02 [0.06, 16.16]
Kong et al. 2024	12	35	21	35	0.57 [0.34, 0.97]
Wang et al. 2024	1	60	2	60	0.50 [0.05, 5.37]
Subtotal (95% CI)		240		243	0.58 [0.35, 0.97]
Total events	14		24		
Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 0.18$, $\text{df} = 2$ ($P = 0.91$); $I^2 = 0\%$					
Test for overall effect: $Z = 2.10$ ($P = 0.04$)					
1.18.2 Subgroup: Non-RCT					
Ambrogi et al. 2017	2	45	3	13	0.19 [0.04, 1.03]
Farkas et al. 2023	1	32	7	35	0.16 [0.02, 1.20]
Gokce et al. 2021	4	41	15	113	0.73 [0.26, 2.09]
Mineo & Ambrogi 2018	27	542	13	106	0.41 [0.22, 0.76]
Subtotal (95% CI)		660		267	0.41 [0.25, 0.68]
Total events	34		38		
Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 2.84$, $\text{df} = 3$ ($P = 0.42$); $I^2 = 0\%$					
Test for overall effect: $Z = 3.50$ ($P = 0.0005$)					
Total (95% CI)		900		510	0.49 [0.34, 0.69]
Total events	48		62		
Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 3.93$, $\text{df} = 6$ ($P = 0.69$); $I^2 = 0\%$					
Test for overall effect: $Z = 3.97$ ($P < 0.0001$)					
Test for subgroup differences: $\text{Chi}^2 = 0.89$, $\text{df} = 1$ ($P = 0.35$), $I^2 = 0\%$					

S6-B:

Subgroup analysis: Procedure, Total Postoperative complications					
Subgroup	Non-intubated		Intubated		RR, 95%CI
	Events	Total	Events	Total	
Subgroup: Lung resection					
Ambrogi et al. 2017	3	45	3	13	0.29 [0.07, 1.26]
Farkas et al. 2023	1	32	9	35	0.12 [0.02, 0.91]
Hsu et al. 2021	1	21	3	25	0.40 [0.04, 3.54]
Yang et al. 2022	2	73	7	73	0.29 [0.06, 1.33]
Subtotal (95% CI)		171		146	0.26 [0.11, 0.61]
Total events	7		22		
Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 0.76$, $\text{df} = 3$ ($P = 0.86$); $I^2 = 0\%$					
Test for overall effect: $Z = 3.07$ ($P = 0.002$)					
1.17.2 Subgroup: Non Lung resection					
Gokce et al. 2021	4	41	15	113	0.73 [0.26, 2.09]
Kocatürk et al. 2019	1	145	1	148	1.02 [0.06, 16.16]
Mineo & Ambrogi 2018	52	542	20	106	0.51 [0.32, 0.82]
Subtotal (95% CI)		728		367	0.55 [0.36, 0.84]
Total events	57		36		
Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 0.61$, $\text{df} = 2$ ($P = 0.74$); $I^2 = 0\%$					
Test for overall effect: $Z = 2.76$ ($P = 0.006$)					
Total (95% CI)		899		513	0.47 [0.32, 0.69]
Total events	64		58		
Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 3.78$, $\text{df} = 6$ ($P = 0.71$); $I^2 = 0\%$					
Test for overall effect: $Z = 3.84$ ($P = 0.0001$)					
Test for subgroup differences: $\text{Chi}^2 = 2.37$, $\text{df} = 1$ ($P = 0.12$), $I^2 = 57.9\%$					

S6-C:

Subgroup analysis: Procedure, Postoperative pulmonary complications					
Subgroup	Non-intubated		Intubated		RR, 95%CI
	Events	Total	Events	Total	
Subgroup: Lung resection					
Ambrogi et al. 2017	2	45	3	13	0.19 [0.04, 1.03]
Farkas et al. 2023	1	32	9	35	0.12 [0.02, 0.91]
Kong et al. 2024	12	35	21	35	0.57 [0.34, 0.97]
Wang et al. 2024	1	60	2	60	0.50 [0.05, 5.37]
Subtotal (95% CI)		172		143	0.40 [0.20, 0.82]
Total events	16		35		
Heterogeneity: $\text{Tau}^2 = 0.13$; $\text{Chi}^2 = 3.68$, $\text{df} = 3$ ($P = 0.30$); $I^2 = 18\%$					
Test for overall effect: $Z = 2.50$ ($P = 0.01$)					
1.19.2 Non Lung resection					
Gokce et al. 2021	4	41	15	113	0.73 [0.26, 2.09]
Kocatürk et al. 2019	1	145	1	148	1.02 [0.06, 16.16]
Mineo & Ambrogi 2018	27	542	13	106	0.41 [0.22, 0.76]
Subtotal (95% CI)		728		367	0.49 [0.29, 0.83]
Total events	32		29		
Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 1.22$, $\text{df} = 2$ ($P = 0.54$); $I^2 = 0\%$					
Test for overall effect: $Z = 2.65$ ($P = 0.008$)					
Total (95% CI)		900		510	0.48 [0.34, 0.69]
Total events	48		64		
Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 4.62$, $\text{df} = 6$ ($P = 0.59$); $I^2 = 0\%$					
Test for overall effect: $Z = 4.02$ ($P < 0.0001$)					
Test for subgroup differences: $\text{Chi}^2 = 0.19$, $\text{df} = 1$ ($P = 0.67$), $I^2 = 0\%$					

Table S7: Final GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) certainty ratings and rationale for any downgrading or upgrading of certainty for evaluated primary and secondary outcomes.

Outcome	Final GRADE Certainty	Reasons
Primary outcomes:		
Total postoperative complications	Moderate	Downgrade 1 level for risk of bias (“some concerns”); no inconsistency, indirectness, imprecision, or publication bias; effect size not large enough to upgrade
Postoperative pulmonary complications	Moderate	Downgrade 1 for risk of bias; I^2 low (5%); CI does not cross 1; RR <0.5 but not enough to upgrade.
Mortality	Low	Downgrade for risk of bias and imprecision.
Secondary outcomes:		
VAS pain score	Low	Downgrade 1 for risk of bias and 1 for very high inconsistency (93%); effect significant but heterogeneity limits confidence.
Operative duration (min)	Very Low	Downgrade for risk of bias, very high inconsistency (99%), and imprecision.
Anesthetic duration (min)	Low	Downgrade for risk of bias and very high inconsistency (91%); CI does not cross 0.
Awakening time (min)	Low	Downgrade 1 for risk of bias; I^2 moderate (60%); CI significant. Downgrade 1 due to optimal information size.
Chest tube/drainage duration (days)	Moderate	Downgrade 1 for risk of bias; no inconsistency; precise and significant effect.
Hospital stay duration	Low	Downgrade for risk of bias and high inconsistency (82%); CI significant.
Procedure/surgical cost (\$)	Low	Downgrade for risk of bias and inconsistency (69%); CI crosses 0 → further downgrade for imprecision.
Intraoperative hypoxemia	Low	Downgrade for risk of bias; CI crosses 1; inconsistency not serious (19%).
Sore throat/throat discomfort	Low	Downgrade for risk of bias and inconsistency (78%); CI does not cross 1.
Patient satisfaction	Very Low	Downgrade for risk of bias, very high inconsistency (98%), and imprecision (CI crosses 1).
Re-operation	Very Low	Downgrade for risk of bias and imprecision (CI crosses 1); only two small studies.