PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only



Figure S1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIMSA) flowchart.

			F	Risk of bia	as domair	IS		
	D1	D2	D3	D4	D5	D6	D7	Overall
Argenziano et al., 2006	+	•	+	-	+	+	•	+
Balkhy et al., 2020			•	•		•	•	•
Balkhy et al., 2017			•	-		•		
Balkhy et al., 2018	•	-	+	•	•	+	•	•
Balkhy et al., 2022	•	-	•	•	•	+	•	•
Balkhy et al., 2011	+	-	-	-	•	•	-	
Bolton & Connally, 2004		+	+	+	•	+	+	+
Bonaros et al., 2013	+	-	+	-	-	+	+	-
Bonaros et al., 2009	+	-	+	+	+	+	-	-
Bonatti et al., 2012	+	+	+	+	+	+	+	+
Bonatti et al., 2009	+	+	+	+	+	+	+	+
Casula et al., 2014	•	-	+	-	+	+	+	+
Currie et al., 2012	+	-	+	-	+	+	-	-
Damiano et al., 2001	-	+	+	-	-	+	+	-
Dhawan et al., 2012	+	-	+	-	+	+	+	+
Folliguet et al., 2010	+	+	+	-	+	+	-	+
Halkos et al., 2014	+	+	+	-	+	+	+	+
Jonsson et al., 2023	+	+	+	+	+	+	+	+
Kitahara et al., 2018a	+	-	+	+	+	+	+	+
Kitahara et al., 2019	+	-	+	-	+	+	+	+
Kitahara et al., 2018b	+	-	+	-	+	+	+	+
Leyvi et al., 2014	+	+	+	-	+	+	+	+
Nisivaco et al., 2023a	-	-	+	-	+	+	+	-
Nisivaco et al., 2023b	+	-	+	-	-	+	+	-
Pasrija et al., 2018	+	+	+	-	+	+	+	+
Patel et al., 2022	-	+	+	+	+	+	+	+
Peev et al., 2022	-	-	+	+	+	+	-	-
Raad et al., 2016	+	+	+	-	+	+	+	+
Spanjersberg et al., 202	2 +	-	+	+	+	+	+	+
Srivastava et al., 2012	-	+	+	+	+	+	-	+
Srivastava et al., 2008	-	-	+	+	+	+	-	-
Srivastava et al., 2006	-	-	+	+	+	+	-	•
Torregrossa et al., 2022	+	+	+	+	-	+	+	+
Varrone et al., 2022	-	-	+	+	-	+	+	-
Zaouter et al., 2015	-	-	+	+	<u> </u>	+	+	-
	Domains: D1: Bias	due to conf	ounding	-		-	Ju	dgement
	D2: Bias D3: Bias D4: Bias D5: Bias D6: Bias D7: Bias	due to sele in classifica due to devi due to miss in measure in selection	ction of par tion of inte ations from ing data. ment of out of the repo	ticipants. rventions. intended ir tcomes. orted result.	ntervention:	5.		Moderate



Bias due to deviations from intended interventions

Figure S2 Risk of bias assessment (ROBINS-I Tool).

Official	F	T - 4 - 1			05% 01	Weight	Weight
Study	Events	Total	Pr	oportion	95%-CI	(common)	(random)
Assess = MIDCAD			1				
Access = MIDCAB	6	1000	4	0.01	10 00: 0 011	12 50/	12 50/
A. Jonsson, J. Binongo, F. Faler, T. Wang, V. Gamer, D. Mitchell-Cooks, et al.	5	1000		0.01	[0.00, 0.01]	19.0%	19.0%
M. Varione, I. C. Sarmento, L. Firem, D. R. Dinster, V. F. Singh, M. C. Kim, et al.	5	1000		0.00	[0.00, 0.01]	1 7%	1 70/
M E Halkos H A Liberman C Devireddy P Walker A V Einn W Jahor et al	4	207		0.00	[0.00, 0.04]	1.7 %	1.7 %
G Lever S I Forget V S Srinivas M Greenberg N Wang A Mais et al.	4	150	-	0.01	[0.00, 0.03]	3 7%	3 7%
S. Leyvi, S. J. Folest, V. S. Shirivas, M. Gleenberg, N. Wang, A. Mais, et al.	0	150		0.00	[0.00, 0.02]	3.7 /0	3.7%
S. Shivasiava, S. Sauasani, IVI. Agusala, K. Konuru, J. Naluu, IVI. Shiron, et al.	0	2797	7	0.00	[0.00, 0.02]	13 /0/	3.1 %
Random effects model		2101	X	0.00	[0.00, 0.01]	40.470	13 10/
Heterogeneity: $l^2 = 0\%, \tau^2 = < 0.0001, p = 0.50$				0.00	[0.00, 0.01]		43.470
Access = total / pure endoscopic			1				
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy	3	525	*	0.01	[0.00; 0.02]	7.5%	7.5%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy	3	133	<u> </u>	0.02	[0.00; 0.06]	0.5%	0.5%
S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy	6	720	Ť	0.01	[0.00; 0.02]	7.0%	7.0%
H. H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al.	5	544	<b>†</b>	0.01	[0.00; 0.02]	4.8%	4.8%
M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy	0	100		0.00	[0.00; 0.04]	1.7%	1.7%
A. Spanjersberg, L. Hoek, J. P. Ottervanger, T. Y. Nguyen, E. Kaplan, R. Laurens, et al.	0	107	a	0.00	[0.00; 0.03]	1.9%	1.9%
G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al.	8	600	-	0.01	[0.01; 0.03]	3.7%	3.7%
H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco	0	16	h	0.00	[0.00; 0.21]	0.0%	0.0%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	5	308	-	0.02	[0.01; 0.04]	1.6%	1.6%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	0	50	·	0.00	[0.00; 0.07]	0.4%	0.4%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	4	220	[+	0.02	[0.00; 0.05]	1.0%	1.0%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	4	263		0.02	[0.00; 0.04]	1.4%	1.4%
H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy	4	234	+	0.02	[0.00; 0.04]	1.1%	1.1%
C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al.	0	50	+	0.00	[0.00; 0.07]	0.4%	0.4%
H. H. Balkhy, S. Nathan, S. E. Arnsdorf and D. J. Krienbring	1	140	+	0.01	[0.00; 0.04]	1.6%	1.6%
C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Coiffic, G. Colonna, et al.	0	38	·	0.00	[0.00; 0.09]	0.2%	0.2%
N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al.	5	500	*	0.01	[0.00; 0.02]	4.1%	4.1%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	1	334	÷	0.00	[0.00; 0.02]	9.0%	9.0%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	3	150	<b>↓</b>	0.02	[0.00; 0.06]	0.6%	0.6%
R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chanev	4	106	<b>└─</b> →───	0.04	[0.01: 0.09]	0.2%	0.2%
S. Srivastava, R. Barrera and S. Quismundo	1	164	+-	0.01	[0.00; 0.03]	2.2%	2.2%
H. H. Balkhy, L. S. Wann, D. Krienbring and S. E. Arnsdorf	1	120	<u> </u>	0.01	[0.00; 0.05]	1.2%	1.2%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al.	. 0	55	·	0.00	[0.00; 0.06]	0.5%	0.5%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	0	25	·	0.00	[0.00: 0.14]	0.1%	0.1%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	0	25	, <b></b>	0.00	[0.00: 0.14]	0.1%	0.1%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	0	25	, <u> </u>	0.00	[0.00: 0.14]	0.1%	0.1%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	0	25	, <u> </u>	0.00	[0.00: 0.14]	0.1%	0.1%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, R. Barrera, S. Quismundo, et al.	0	93		0.00	[0.00: 0.04]	1.4%	1.4%
M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al.	Ő	85	•	0.00	[0.00: 0.04]	1.2%	1.2%
J. W. Bolton and J. F. Connally	0	10	, <u> </u>	0.00	[0.00: 0.31]	0.0%	0.0%
Common effect model		5765		0.01	[0.01: 0.01]	55.8%	0.070
Random effects model		0100	8	0.01	[0.01: 0.01]	001070	55.8%
Heterogeneity: $I^2 = 0\%, \tau^2 = 0, p = 0.86$				0.01	[0.01, 0.01]		00.070
Accors = Mix							
T. A. Folliquet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde	1	56	<u> </u>	0.02	[0.00; 0.10]	0.3%	0.3%
······································							
Access = open / sternotomy							
N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al	. 0	56	+	0.00	[0.00; 0.06]	0.5%	0.5%
Common effect model		8664		0.01	[0.00; 0.01]	100.0%	
Random effects model			¢	0.01	[0.00; 0.01]		100.0%
Heterogeneity: $I^2 = 0\%$ , $\tau^2 = 0$ , $\rho = 0.84$			0 0.05 0.1 0.15 0.2 0.25 0.3				
Test for subgroup differences (common effect); $\gamma_{2}^{2} = 3.30$ , df = 3 (p = 0.35)							
Test for subgroup differences (random effects): $\chi_3^2 = 3.17$ , df = 3 ( $p = 0.37$ )							



Study	Total	Mean	SD	Mean	MRAW	95%-CI	Weight (common)	Weight (random)
Access = MIDCAB A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al. M. Varrone, I. C. Sarmiento, L. Pirelli, D. R. Brinster, V. P. Singh, M. C. Kim, et al. R. Casula, E. Khoshbin and T. Athanasiou M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al. Common effect model Random effects model Heterogeneity: $l^2 = 93\%, \tau^2 = 3.0692, p < 0.01$	1000 1080 100 307 2487	64.00 66.30 62.00 62.70	11.0000 10.9000 11.0000 11.6000		64.00 66.30 62.00 62.70 64.80 63.90	[63.32; 64.68] [65.65; 66.95] [59.84; 64.16] [61.40; 64.00] [64.36; 65.23] [60.89; 66.91]	16.7% 18.4% 1.7% 4.6% 41.4%	4.5% 4.5% 4.0% 4.3% 17.3%
Access = total / pure endoscopic H. H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al. H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy H. Balkhy, S. Nathan, S. E. Arnsdorf and D. J. Krienbring N. Bonaros, T. Schachner, E. Lehr, M. Koffer, D. Wiedemann, P. Hong, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. M. E. Currle, J. Romsa, S. A. Fox, W. C. Vezina, C. Akincioglu, J. C. Warrington, et al. R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney H. H. Balkhy, L. S. Wann, D. Krienbring and S. E. Arnsdorf N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. W. Bolton and J. E. Connally Common effect model Random effects model	544 16 50 263 314 150 334 150 82 106 120 55 255 255 255 255 85 10 2775	66.00 60.60 72.80 63.80 65.40 63.40 62.00 60.00 55.50 63.60 66.30 59.00 54.00 58.00 58.00 68.00 61.00	10.5000 13.5000 10.2000 10.6000 11.2000 9.0000 14.7500 11.5000 11.5000 0.4000 6.0000 7.2500 9.5000 0.0000 10.0000 11.4000	↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	66.00 60.60 63.80 63.80 63.40 63.40 63.40 63.40 63.40 61.00 59.00 59.00 59.00 58.00 58.00 58.00 58.00 61.00 61.00	[65.12; 66.88] [53.99; 67.21] [69.97; 75.63] [62.48; 65.12] [64.12; 66.68] [59.20; 62.80] [53.38; 57.62] [61.41; 65.79] [56.42; 61.58] [59.20; 62.80] [53.38; 57.62] [61.41; 65.79] [56.65; 61.35] [56.65; 61.35] [54.67; 61.33] [55.87; 60.13] [53.93; 68.07] [62.36; 63.11] [59.52; 63.74]	$\begin{array}{c} 10.0\%\\ 0.2\%\\ 1.0\%\\ 4.7\%\\ 2.3\%\\ 12.5\%\\ 3.1\%\\ 2.4\%\\ 1.7\%\\ 1.6\%\\ 3.1\%\\ 0.6\%\\ 0.7\%\\ 0.2\%\\ 54.7\%\\ \end{array}$	$\begin{array}{c} 4.5\%\\ 1.9\%\\ 3.6\%\\ 4.3\%\\ 4.3\%\\ 4.1\%\\ 4.5\%\\ 4.2\%\\ 4.1\%\\ 4.0\%\\ 4.1\%\\ 4.2\%\\ 3.9\%\\ 3.6\%\\ 3.4\%\\ 4.0\%\\ 1.7\%\\ 71.5\%\\ \end{array}$
${\sf Access}$ = ${\sf Mix}$ T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde	56	66.00	11.0000		66.00	[63.12; 68.88]	0.9%	3.6%
Access = open / sternotomy N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. Common effect model Random effects model Heterogeneity: $l^2 = 0\%$ , $\tau^2 = 0$ , $p = 0.52$	56 32 88	64.20 63.00	7.3000 9.0000		64.20 63.00 63.87 63.87	[62.29; 66.11] [59.88; 66.12] [62.24; 65.50] [57.08; 70.67]	2.1% 0.8% 2.9%	4.1% 3.5% 7.6%
Common effect model Random effects model Heterogeneity: $l^2 = 93\%, \tau^2 = 8.0391, \rho < 0.01$ Test for subgroup differences (common effect): $\chi_a^2 = 52, 10, df = 3 (\rho < 0.01)$	5406			55 60 65 70 75	63.65 62.34	[63.37; 63.93] [60.77; 63.92]	100.0%	100.0%

Test for subgroup differences (common effect):  $\chi_3^2 = 52.10$ , df = 3 ( $\rho < 0.01$ ) Test for subgroup differences (random effects):  $\chi_3^2 = 6.85$ , df = 3 ( $\rho = 0.08$ )

Figure S4 Forest plot for age stratified data via access approach.

Study	Total	Mean	SD		Mea	n		MRAW	9	95%-CI (	Weight common) (	Weight random)
$ \begin{array}{l} \label{eq:access} A: MIDCAB \\ A: Jonsson, J: Binongo, P: atel, Y: Wang, V: Garner, D: Mitchell-Cooks, et al. \\ N: C: Patel, J: M: Hemli, K: Seetharam, V: P: Singh, S: J: Scheinerman, L: Pirellii, et al. \\ W: N: Raad, S: Forest, M: Follis, P: Friedmann \text{ and } J: J: DeRose \\ M: E: Halkos, H: A: Liberman, C: Devireddy, P: Walker, A: V: Finn, W: Jaber, et al. \\ G: Leyv, S: J: Sorrist, S: Sorrivas, N: Greenberg, N: Wang, A: Mais, et al. \\ S: Srivastava, S: Gadasalli, M: Agusala, R: Kolluru, J: Naidu, M: Shroff, et al. \\ Common effect model \\ Random effects model \\ Heterogeneity: \mathit{I}^{2} = 87\%, r^{2} = 2.3806, \mathit{p} < 0.01 \\ \end{array} $	1000 158 142 307 150 150 1907	55.20 53.20 54.00 55.50 54.20 50.70	9.2000 10.4000 10.0000 8.7000 10.5800 9.0000					55.20 53.20 54.00 55.50 54.20 50.70 54.60 53.87	[54.63; [51.58; [52.36; [54.53; [52.51; [49.26; [54.19; [52.04;	55.77] 54.82] 55.64] 56.47] 55.89] 52.14] 55.02] 55.71]	27.0% 3.3% 3.2% 9.3% 3.1% 4.2% 50.1%	3.6% 3.6% 3.6% 3.6% 3.6% 21.5%
Access = total / pure endoscopic M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al. H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al. C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmournen, A. Colfic, G. Colonna, et al. N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, F. Hong, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. S. Srivastava, R. Barrera and S. Quismundo N. Bonaros, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. S. Srivastava, R. Barrera and S. Quismundo N. Bonaros, T. Schachner, D. Wiedemann, A. Weidinger, B. Wehman, et al. J. Bonatti, T. Schachner, D. Wiedemann, A. Oehlinger, C. Wiedmann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D	100 600 308 50 220 38 500 334 150 106 45 255 255 255 85 10 3133	31.00 60.00 50.30 39.50 55.00 55.00 55.00 60.00 60.00 60.00 60.00 65.00 64.00 64.00 65.00 55.50	8.5000 11.1900 13.7000 14.2500 18.2500 14.9300 10.4500 12.0000 17.0000 17.0000 13.7500 13.0000 9.0000 10.0000 10.0000 10.2500 10.0000 8.2500 10.2000 7.5000		• + + + + • • • + • • • + • • • • • • •			31.00 60.00 50.30 55.00 55.00 60.00 60.00 60.00 53.90 55.00 59.00 60.00 65.00 65.00 65.00 65.00 65.00 55.50 55.33 55.36	[29.33; [59.10; [48.77; [35.55; [49.89; [53.20; [52.10; [52.10; [58.51; [58.51; [58.18; [57.80; [51.43; [56.36; [51.43; [56.36; [56.36; [56.36; [56.36; [56.08; [60.98; [60.98; [56.77; [54.08; [54.88; [51.65;	32.67] 60.90] 51.83] 43.45] 54.71] 56.80] 57.90] 59.82] 61.42] 61.82] 61.82] 63.23] 56.33] 63.02] 69.02] 67.92] 63.23] 58.37] 60.15] 55.77] 59.07]	$\begin{array}{c} 3.2\%\\ 10.9\%\\ 3.7\%\\ 0.6\%\\ 1.5\%\\ 2.7\%\\ 4.0\%\\ 1.6\%\\ 1.6\%\\ 1.6\%\\ 1.6\%\\ 1.4\%\\ 4.6\%\\ 1.3\%\\ 0.6\%\\ 0.6\%\\ 0.6\%\\ 0.4\%\\ 4.8\%\\ \end{array}$	3.6% 3.6% 3.5% 3.5% 3.5% 3.6% 3.5% 3.5% 3.5% 3.2% 3.2% 3.2% 3.4% 3.2% 3.4% 3.2% 3.4% 3.2% 3.4%
Access = Mix T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde	56	49.00	6.0000		-			49.00	[47.43;	50.57]	3.6%	3.6%
Access = open / sternotomy N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. Common effects model Random effects model Heterogeneity: $l^2 = 93\%, \tau^2 = 46.6200, p < 0.01$	56 32 88	64.00 54.00	11.2500 12.0000		*	-		64.00 54.00 60.66 59.11	[61.05; [49.84; [58.25; [-4.40; 1	66.95] 58.16] 63.06] 122.63]	1.0% 0.5% 1.5%	3.4% 3.2% 6.6%
Common effect model Random effects model Heterogeneity: $l^2 = 98\%$ , $r^2 = 32.9482$ , $p < 0.01$ Test for subroup differences (common effect): $r^2 = 81.37$ . df = 3 ( $p < 0.01$ )	5184			0 20	40 60	80	100 120	54.82 55.03	[54.52; [52.41;	55.12] 57.66]	100.0%	100.0%
Test for subgroup differences (random effects); $\chi_2^2 = 26.44$ , df = 3 ( $p < 0.01$ )												

Figure S5 Forest plot for access approach stratified for preoperative ejection fraction.

Study	Total	Mean	SD	Mean	MRAW	95%-CI	Weight (common)	Weight (random)
Access = MIDCAB A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al. M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al. Common effect model Random effects model Heterogeneity: $l^2 = 76\%$ , $\tau^2 = 0.1241$ , $p = 0.04$	1000 307 1307	1.57 1.00	1.7874 4.7500		1.57 1.00 1.55 - 1.35	[ 1.46; 1.68] [ 0.47; 1.53] [ 1.44; 1.65] [-2.19; 4.88]	4.6% 0.2% 4.8%	5.9% 1.8% 7.8%
Access = total / pure endoscopic S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al. M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy G. Torregrossa, S. M. P. Sai, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al. H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. Kitahara, M. McCrorey, S. Patel, S. Nisivaco and H. H. Balkhy H. Kitahara, M. McCrorey, S. Patel, S. Nisivaco and H. H. Balkhy H. Kitahara, M. McCrorey, S. Patel, S. Nisivaco and H. H. Balkhy H. Kitahara, M. McCrorey, S. Patel, S. Nisivaco and H. H. Balkhy H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al. N. Bonaros, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Hweidinger, B. Wehman, et al. R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney N. Bonaros, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, F. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J.	525 133 720 544 100 600 16 308 500 220 263 234 500 334 150 106 555 25 25 25 25 85 5093	$\begin{array}{c} 1.27\\ 1.23\\ 1.25\\ 1.30\\ 1.59\\ 1.69\\ 1.20\\ 1.70\\ 1.70\\ 1.71\\ 1.73\\ 1.81\\ 2.30\\ 1.28\\ 0.96\\ 0.83\\ 0.79\\ 1.46\end{array}$	0.6500 0.6000 0.6900 0.8900 1.3900 0.4000 0.9600 0.4900 2.6700 2.8200 1.2440 10.8000 4.8800 4.8800 0.8100 0.8100 2.8200 3.8600 1.9600 8.8800 1.5400	···	$\begin{array}{c} 1.27\\ 1.23\\ 1.25\\ 1.30\\ 1.54\\ 1.69\\ 1.20\\ 1.70\\ 1.76\\ 1.21\\ 1.73\\ 1.81\\ 1.79\\ 0.96\\ 0.88\\ 1.63\\ 2.30\\ 1.28\\ 0.96\\ 0.83\\ 0.96\\ 0.83\\ 0.79\\ 1.46\\ 1.30\\ 1.40\\ \end{array}$	$ \begin{bmatrix} 1.21; 1.33\\ 1.13; 1.33\\ 1.24; 1.36\\ 1.24; 1.36\\ 1.37; 1.71\\ 1.58; 1.80\\ 1.00; 1.40\\ 1.49; 2.03\\ 1.15; 1.27\\ 1.49; 2.23\\ 1.29; 1.52\\ 1$	$\begin{array}{c} 18.1\%\\ 5.4\%\\ 25.6\%\\ 16.6\%\\ 1.8\%\\ 4.5\%\\ 0.7\%\\ 0.7\%\\ 0.4\%\\ 0.5\%\\ 0.4\%\\ 0.5\%\\ 0.14\%\\ 0.13\%\\ 0.1\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.5\%\\ 92.2\%\\ \end{array}$	$\begin{array}{c} 6.4\%\\ 6.0\%\\ 6.5\%\\ 6.4\%\\ 5.2\%\\ 5.9\%\\ 4.9\%\\ 3.7\%\\ 4.0\%\\ 6.4\%\\ 3.0\%\\ 3.2\%\\ 0.7\%\\ 2.5\%\\ 1.0\%\\ 0.6\%\\ 4.7\%\\ 0.5\%\\ 0.3\%\\ 1.0\%\\ 3.3\%\\ 0.1\%\\ 3.3\%\\ \end{array}$
Access = Mix T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde	56	2.17	0.9600	+	2.17	[ 1.92; 2.42]	0.9%	4.2%
Access = open / sternotomy N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. R. J. Damiano, Jr., H. A. Dabie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. Common effect model Random effects model Heterogeneity: $l^2 = 0\%$ , $s^2 = 0$ , $p = 0.45$	56 32 88	1.45 1.30	0.7000 1.0000		1.45 1.30 1.42 1.42	[ 1.27; 1.63] [ 0.95; 1.65] [ 1.26; 1.58] [ 0.63; 2.21]	1.7% 0.5% 2.1%	5.1% 3.2% 8.2%
Common effect model Random effects model Heterogeneity: $l^2 = 86\%, \tau^2 = 0.0285, p < 0.01$	6544			-2 -1 0 1 2 3 4	1.32 1.44	[ 1.30; 1.34] [ 1.33; 1.56]	100.0%	100.0%
Test for subgroup differences (common effect): $\chi_3^c = 64.87$ , df = 3 ( $p < 0.01$ ) Test for subgroup differences (random effects): $\chi_3^c = 32.23$ , df = 3 ( $p < 0.01$ )								

Figure S6 Forest plot for access approach stratified for ICU length of stay.

Study	Total	Mean	SD	Mean	MRAW	95%-CI	Weight (common)	Weight (random)
$\begin{array}{l} \label{eq:Access} = MIDCAB \\ A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al. \\ M. Varrone, I. C. Sarmiento, L. Pirelli, D. R. Brinster, V. P. Singh, M. C. Kim, et al. \\ W. N. Raad, S. Forest, M. Follis, P. Friedmann and J. J. DeRose \\ R. Casula, E. Khoshbin and T. Athanasiou \\ M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al. \\ S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al. \\ Common effect model \\ Random effects model \\ Heterogeneity: l^2 = 88\%, \tau^2 = 0.0640, \rho < 0.01 \end{array}$	1000 1080 142 100 307 150 2779	4.43 4.00 5.00 4.00 3.60	2.5100 0.5000 3.8000 1.0000 6.2500 2.9000		4.43 4.00 5.00 4.00 3.60 4.02 4.14	[ 4.27; 4.59] [ 3.97; 4.03] [ 4.37; 5.63] [ 3.80; 4.20] [ 3.30; 4.70] [ 3.14; 4.06] [ 3.99; 4.04] [ 3.71; 4.57]	1.7% 45.7% 0.1% 1.1% 0.2% 48.8%	3.0% 3.0% 2.7% 2.9% 2.7% 2.8% 
Access = total / pure endoscopic S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al. M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy A. Spanjersberg, L. Hoek, J. P. Ottervanger, T. Y. Nguyen, E. Kaplan, R. Laurens, et al. G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al. H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy H. Haalkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy H. Kitahara, S. Patel, S. Nisivaco and H. H. Balkhy H. Kitahara, S. Patel, S. Nisivaco and H. H. Balkhy H. Kitahara, S. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. M. E. Currie, J. Romsa, S. A. Fox, W. C. Vezina, C. Akincioglu, J. C. Warrington, et al. M. Balkhy, L. S. Wann, D. Krienbring and S. E. Arnsdorf N. Bonaros, T. Schachner, D. Wiedemann, P. Ruetzler, G. Feuchtner, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schach	525 133 720 544 107 600 263 234 50 500 140 500 140 334 150 82 25 25 25 25 25 93 85 10 5645	2.59 2.70 2.35 2.72 3.07 5.00 3.60 4.07 3.361 6.00 3.30 6.00 3.30 6.00 3.30 6.00 3.30 6.00 3.30 6.00 3.30 6.00 3.30 6.00 3.30 5.20 3.30 6.00 3.30 6.00 3.30 6.00 3.30 5.20 3.30 6.00 3.30 6.00 3.40 5.20 3.20 5.20 3.55 5.20 3.55 5.00 3.55 5.00 5.00 3.55 5.00 5.00	1.2500 1.2900 1.2900 0.5000 1.2000 0.7500 2.9000 1.2100 2.9400 3.0600 4.400 1.5000 1.3000 0.4400 1.5000 1.0000 5.5000 2.7500 4.0000 1.0000 2.7500 2.5000 2.5000 2.7500 3.4000 2.0000		$\begin{array}{c} 2.59\\ 2.70\\ 2.35\\ 2.72\\ 3.07\\ 5.00\\ 2.30\\ 3.60\\ 4.07\\ 2.90\\ 3.55\\ 3.61\\ 7.00\\ 3.10\\ 6.00\\ 6.00\\ 3.80\\ 5.20\\ 3.30\\ 9.80\\ 7.00\\ 6.00\\ 5.10\\ 2.80\\ 5.10\\ 2.80\\ 3.396\\ 4.34\end{array}$	$\begin{bmatrix} 2.48; 2.70 \\ [ 2.51; 2.83 \\ [ 2.26; 2.42 ] \\ 2.61; 2.83 \\ [ 2.77; 3.37 \\ ] \\ 4.86; 5.14 \\ [ 1.71; 2.83 \\ ] \\ 3.28; 3.92 \\ 3.65; 4.49 \\ 2.74; 3.06 \\ [ 3.19; 3.91 \\ ] \\ 3.22; 4.306 \\ [ 3.19; 3.91 \\ ] \\ 3.22; 4.306 \\ [ 3.19; 3.91 \\ ] \\ 3.22; 4.306 \\ [ 3.19; 3.91 \\ ] \\ 3.25; 4.30 \\ [ 3.25; 3.35 \\ ] \\ 2.85; 3.35 \\ [ 3.56; 4.04 \\ ] \\ 4.15; 6.25 \\ [ 2.87; 3.73 \\ ] \\ 8.16; 11.44 \\ 5.92; 8.08 \\ [ 4.43; 7.57 \\ ] \\ 8.16; 11.44 \\ 5.92; 8.08 \\ [ 4.43; 7.57 \\ ] \\ 4.61; 5.39 \\ [ 5.00; 6.98 \\ ] \\ 4.38; 5.82 \\ [ 1.56; 4.04 \\ ] \\ 3.33; 3.99 \\ ] \\ 3.70; 4.99 \\ \end{bmatrix}$	$\begin{array}{c} 3.6\%\\ 1.1\%\\ 9.6\%\\ 3.5\%\\ 2.0\%\\ 2.0\%\\ 2.0\%\\ 2.0\%\\ 0.4\%\\ 0.2\%\\ 0.4\%\\ 0.2\%\\ 0.0\%\\ 0.7\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%\\ 0.1\%\\ 0.0\%$	3.0% 2.9% 3.0% 2.9% 3.0% 2.9% 2.9% 2.9% 2.9% 2.9% 2.9% 2.9% 2.5% 2.5% 2.5% 2.4% 2.9% 2.4% 2.4% 2.8% 2.5% 2.4% 2.5% 2.4% 2.5% 2.4% 2.5% 2.4% 2.5% 2.4% 2.5% 2.4% 2.5% 2.4% 2.5% 2.4% 2.5% 2.4% 2.5% 2.5% 2.4% 2.5% 2.4% 2.5% 2.5% 2.4% 2.5% 2.4% 2.5% 2.5% 2.4% 2.5%
${\sf Access}$ = ${\sf Mix}$ T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde	56	7.10	3.5000		7.10	[ 6.18; 8.02]	0.0%	2.5%
Access = open / sternotomy N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. Common effect model Random effects model Heterogeneity: $l^2 = 99\%$ , $\tau^2 = 92.4667$ , $\rho < 0.01$	56 32 88	19.20 5.50	11.9000 2.7000	+	19.20 5.50 6.63 12.27	[16.08; 22.32] [4.56; 6.44] [5.74; 7.53] [-74.76; 99.30]	0.0% 0.0% 0.1%	0.9% 2.4% 3.3%
Common effect model Random effects model Heterogeneity: $l^2 = 99\%$ , $\tau^2 = 1.0610$ , $p = 0$ Test for subroup differences (common effect): $\tau_2^2 = 85.56$ , df = 3 ( $p < 0.01$ )	8568			-50 0 50	3.99 4.49	[ 3.97; 4.01] [ 3.80; 5.17]	100.0%	100.0%

Test for subgroup differences (common effect):  $\chi_3^2 = 36.96$ , df = 3 (p < 0.01) Test for subgroup differences (random effects):  $\chi_3^2 = 36.96$ , df = 3 (p < 0.01)

Figure S7 Forest plot for access approach stratified for hospital LOS.

Study	Total	Mean	SD	Mean	MRAW	95%-CI	Weight (common)	Weight (random)
Access = total / pure endoscopic S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy H. H. Balkhy, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy G. Torregrossa, M. P. Så, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al. H. H. Balkhy, K. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy G. Torregrossa, M. P. Så, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al. H. H. Balkhy, K. Kitahara, B. Mitzma and S. Nisivaco H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Coiffic, G. Colonna, et al. N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, F. Weidinger, B. Wehman, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. D. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. S. Srivastava, S. Gadasalli, M. Aguusala, R.	525 133 720 544 100 0 60 220 263 50 0 220 263 50 50 50 75 50 75	237.00 254.00 254.00 255.20 223.00 270.00 243.00 293.00 305.00 240.00 305.00 240.00 375.00 326.00 400.00 280.00 272.00 280.00 272.30 353.00	82.0000 62.0000 85.0000 84.0000 84.0000 88.9000 87.0000 84.0000 84.0000 84.0000 84.0000 84.0000 84.0000 84.0000 84.0000 134.5000 134.5000 135.0000 95.0000 91.0000 89.0000 89.0000		237.00 325.00 254.00 251.00 223.00 223.00 223.00 293.00 198.00 305.00 293.00 305.00 293.00 305.00 240.00 330.00 272.00 330.00 272.30 333.00 272.30 286.68 291.00	$ \begin{bmatrix} 229.99; 244.01 \\ 314.46; 335.54 \\ [247.79; 260.21] \\ (243.94; 258.06 \\ (238.75; 273.25 \\ (349.82; 360.58 \\ (238.75; 273.25 \\ (349.82; 360.58 \\ (238.75; 273.25 \\ (349.82; 347.01 \\ (245.99; 294.11 \\ (231.90; 254.10 \\ (245.99; 294.11 \\ (231.90; 254.10 \\ (235.39; 2392.08 \\ (284.45; 325.55 \\ (225.56 \\ (244.24; 304.76 \\ (233.65; 254.42 \\ (233.65; 254.42 \\ (233.64; 326.42 \\ (233.64; 326.42 \\ (233.64; 326.42 \\ (233.64; 326.42 \\ (233.33; 307.67 \\ (246.29; 298.31 \\ (234.56; 284.80 \\ (246.56; 284.80$	$\begin{array}{c} 3.9\%\\ 1.7\%\\ 4.9\%\\ 3.8\%\\ 0.6\%\\ 6.6\%\\ 0.3\%\\ 1.9\%\\ 1.9\%\\ 1.5\%\\ 10.6\%\\ 0.9\%\\ 0.5\%\\ 0.9\%\\ 0.3\%\\ 0.3\%\\ 0.1\%\\ 0.1\%\\ 0.1\%\\ 0.1\%\\ 0.3\%\\ 0.5\%\\ 0.2\%\\ 0.2\%\\ 0.1\%\\ 0.3\%\\ 0.5\%\\ 0.1\%\\ 0.1\%\\ 0.3\%\\ 0.5\%\\ 0.5\%\\ 0.1\%\\ 0.1\%\\ 0.1\%\\ 0.5\%\\ 0.5\%\\ 0.5\%\\ 0.1\%\\ 0.5\%$	$\begin{array}{c} 4.0\%\\ 3.9\%\\ 4.0\%\\ 4.0\%\\ 3.8\%\\ 4.0\%\\ 3.6\%\\ 3.9\%\\ 3.6\%\\ 3.9\%\\ 3.9\%\\ 3.9\%\\ 3.9\%\\ 3.9\%\\ 3.8\%\\ 3.9\%\\ 3.8\%\\ 3.9\%\\ 3.6\%\\ 3.6\%\\ 3.6\%\\ 3.6\%\\ 3.6\%\\ 3.6\%\\ 3.8\%$
Access – miDGAB S. J. Forest, V. S. Srinivas, M. Greenberg, N. Wang, A. Mais, et al. S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al. Common effect model Random effects model Heterogeneity: $l^2 = 100\%$ , $\tau^2 = 3999.1161$ , $p < 0.01$	150 150 300	222.00 311.60	66.0000 11.5400	•	222.00 311.60 308.94 266.96	[211.44; 232.56] [309.75; 313.45] [307.12; 310.76] [-302.28; 836.19]	1.7% 55.8% 57.5%	3.9% 4.0% 7.9%
Access = Mix T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde Common effect model Random effects model Heterogeneity: $l^2$ = 99%, $\tau^2$ = 1537.5955, $\rho$ = 0	56 <b>5431</b>	274.00	118.0000	-200 0 200 400 600 800	274.00 299.45 288.29	[ 243.09; 304.91] [ 298.08; 300.83] [ 267.94; 308.63]	0.2% 100.0%	3.4% 100.0%
Test for subgroup differences (common effect): $\chi_2^2 = 246.44$ , df = 2 ( $p < 0.01$ )								

Test for subgroup differences (common effect):  $\chi_2^2 = 246.44$ , df = 2 ( $p < 0.0^\circ$ Test for subgroup differences (random effects):  $\chi_2^2 = 0.96$ , df = 2 (p = 0.62)

Figure S8 Forest plot for access approach stratified for operation time.

Study	vents Total	Proportion	95%-CI	Weight (common) (	Weight (random)
$\label{eq:Access} = MIDCAB \\ A.Jonsson, J.Binongo, P.Patel, Y.Wang, V.Garner, D.Mitchell-Cooks, et al. \\ M.E.Halkos, H.A.Liberman, C.Devireddy, P.Walker, A.V.Finn, W.Jaber, et al. \\ G.Leyvi, S.J.Forest, V.S.Srinivas, M.Greenberg, N.Wang, A.Mais, et al. \\ S.Srivastava, S.Gadasalli, M.Agusala, R.Kolluru, J.Naidu, M.Shroff, et al. \\ Common effect model \\ Random effects model \\ Heterogeneity: l^2 = 88\%, \tau^2 = 0.5923, \rho < 0.01 \\ \end{aligned}$	205 1000 47 307 19 150 5 150 1607	<ul> <li>■ 0.20</li> <li>0.15</li> <li>0.13</li> <li>0.03</li> <li>0.18</li> <li>0.12</li> </ul>	[0.18; 0.23] [0.12; 0.20] [0.08; 0.19] [0.01; 0.07] [0.16; 0.20] [0.06; 0.23]	18.3% 4.5% 1.9% 0.5% 25.1%	5.8% 4.8% 3.6% 1.7% 15.9%
<ul> <li>Access = total / pure endoscopic</li> <li>S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy</li> <li>S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy</li> <li>S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy</li> <li>H. Balkhy, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy</li> <li>A. Spanjersberg, L. Hoek, J. P. Ottervanger, T. Y. Nguyen, E. Kaplan, R. Laurens, et al.</li> <li>G. Torregrossa, M. P. Så, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al.</li> <li>H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy</li> <li>H. Halkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. Kitahara, M. McCrorey, S. Nisivaco and H. H. Balkhy</li> <li>Y. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Coiffe, G. Colonna, et al.</li> <li>J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.</li> <li>J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Wiedinger, B. Wehman, et al.</li> <li>J. Bonatti, T. Schachner, N. Wiedemann, F. Wiedinger, B. Wehman, et al.</li> <li>J. Bonatti, T. Schachner, N. Diedemann, F. Wiedemann, E. Ruetzler, et al.</li> <li>J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.</li> <li>J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.</li> <li>J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.</li> <li>J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.</li> <li>J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.</li> <li>J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.</li> <li>J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.</li> <li>J. Bonat</li></ul>	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	0.12 0.12 0.12 0.13 0.14 0.14 0.16 0.00 0.28 0.22 0.28 0.22 0.28 0.22 0.28 0.22 0.28 0.22 0.23 0.28 0.22 0.28 0.23 0.20 0.28 0.20 0.28 0.22 0.28 0.20 0.28 0.20 0.28 0.20 0.28 0.20 0.28 0.20 0.28 0.20 0.28 0.20 0.28 0.15 0.28 0.28 0.15 0.28 0.28 0.15 0.28 0.15 0.28 0.15 0.28 0.15 0.28 0.15 0.15 0.28 0.15 0.15 0.15 0.28 0.15 0		$\begin{array}{c} 6.4\%\\ 1.6\%\\ 8.7\%\\ 6.9\%\\ 1.3\%\\ 0.1\%\\ 5.5\%\\ 1.1\%\\ 3.1\%\\ 5.5\%\\ 4.7\%\\ 0.6\%\\ 4.8\%\\ 2.0\%\\ 1.6\%\\ 1.3\%\\ 0.2\%\\ 0.3\%\\ 0.2\%\\ 0.1\%\\ 0.1\%\\ 7.8\%\\ 1.2\%\\ 0.1\%\\ 1.2\%\\ 0.1\%\\ 1.2\%\\ 0.1\%\\ 0.1\%\\ 1.2\%\\ 0.1\%$	5.2% 3.3% 5.4% 5.2% 3.1% 0.2% 5.0% 4.4% 4.9% 3.7% 3.4% 3.7% 3.4% 3.1% 0.8% 1.1% 0.5% 0.5% 0.5% 0.4%
Access = open / sternotomy R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. Common effect model Random effects model	3 32	0.09 0.16 0.15	[0.03; 0.25] [0.15; 0.17] [0.13; 0.17]	0.3% <b>100.0%</b>	1.1% 100.0%
Heterogeneity: $l^2 = 69\%$ , $\tau^2 = 0.0814$ , $p < 0.01$ Test for subgroup differences (common effect): $\chi_2^2 = 8.90$ , df = 2 ( $p = 0.01$ ) Test for subgroup differences (random effects): $\chi_2^2 = 1.22$ , df = 2 ( $p = 0.54$ )	0.1	0.2 0.3 0.4			

Figure S9 Forest plot for access approach stratified for post-operative atrial fibrillation.

	_	-	-		Weight	Weight
Study	Events	Total	Proportio	n 95%-CI	(common)	(random)
0//		1				
pump = Off-pump		1000 L			10 50/	10 501
A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al.	0	1000	0.0		13.5%	13.5%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy	3	525	0.0	1 [0.00; 0.02]	7.5%	7.5%
S. Nisivaco, H. Kitanara, A. Abutaleb, S. Nathan and H. H. Balkhy	3	133	0.0	2 [0.00; 0.06]	0.5%	0.5%
S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy	6	720 =	0.0	1 [0.00; 0.02]	7.0%	7.0%
H. H. Balkny, S. Nisivaco, H. Kitanara, G. Torregrossa, B. Patel, K. Grady, et al.	5	544 #	0.0	1 [0.00; 0.02]	4.8%	4.8%
M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy	0	100 -	0.0	0 [0.00; 0.04]	1.7%	1.7%
A. Spanjersberg, L. Hoek, J. P. Ottervanger, T. Y. Nguyen, E. Kaplan, R. Laurens, et al.	0	107	0.0	0 [0.00; 0.03]	1.9%	1.9%
G. Torregrossa, M. P. Sa, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al.	8	600	0.0	1 [0.01; 0.03]	3.7%	3.7%
M. Varrone, I. C. Sarmiento, L. Pirelli, D. R. Brinster, V. P. Singh, M. C. Kim, et al.	5	1080	0.0	0 [0.00; 0.01]	18.9%	18.9%
H. H. Balkhy, H. Kitanara, B. Mitzman and S. Nisivaco	0	16	0.0	J [0.00; 0.21]	0.0%	0.0%
H. Kitanara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkny	5	308	0.0	2 [0.01; 0.04]	1.6%	1.6%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	0	50	0.0	0 [0.00; 0.07]	0.4%	0.4%
H. H. Balkhy, S. Nisivaco, H. Kitanara, M. McCrorey and B. Patel	4	220	0.0	2 [0.00; 0.05]	1.0%	1.0%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	4	263	0.0	2 [0.00; 0.04]	1.4%	1.4%
H. Kitanara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy	4	234	0.0	2 [0.00; 0.04]	1.1%	1.1%
C. Pasrija, Z. N. Kon, M. Gnoreisni, E. J. Lenr, J. S. Gammie, B. P. Griffith, et al.	0	50	0.0	0.00; 0.07]	0.4%	0.4%
H. H. Baikny, S. Nathan, S. E. Arnsdorf and D. J. Krienbring	1	140	0.0	1 [0.00; 0.04]	1.6%	1.6%
C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Colffic, G. Colonna, et al.	0	38	0.0	0.00; 0.09]	0.2%	0.2%
R. Casula, E. Knoshbin and T. Athanasiou	0	100	0.0	0 [0.00; 0.04]	1.7%	1.7%
M. E. Haikos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al.	4	307	0.0	1 [0.00; 0.03]	1.9%	1.9%
G. Leyvi, S. J. Forest, V. S. Srinivas, M. Greenberg, N. Wang, A. Mais, et al.	0	150	0.0	J [0.00; 0.02]	3.7%	3.1%
R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney	4	106	0.0	4 [0.01; 0.09]	0.2%	0.2%
S. Srivastava, R. Barrera and S. Quismundo	1	164	0.0	1 [0.00; 0.03]	2.2%	2.2%
H. H. Balkhy, L. S. Wann, D. Krienbring and S. E. Arnsdorf	1	120	0.0	1 [0.00; 0.05]	1.2%	1.2%
T. A. Folliguet, A. Dible, F. Philippe, F. Larrazet, M. S. Siama and F. Laborde	1	56	0.0	2 [0.00; 0.10]	0.3%	0.3%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, R. Barrera, S. Quismundo, et al.	0	93	0.0	0 [0.00; 0.04]	1.4%	1.4%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al.	0	150	0.0	J [0.00; 0.02]	3.7%	3.7%
J. W. Bolton and J. E. Connally	0	10	0.0	J [0.00; 0.31]	0.0%	0.0%
Common effect model		7384	0.0	1 [0.00; 0.01]	83.6%	
Random effects model		1	0.0	1 [0.00; 0.01]		83.6%
Heterogeneity: $I^{-} = 0\%, \tau^{-} = 0, \rho = 0.63$						
pump = Mix	-	500	0.0		4 40/	4 40/
N. Bonaros, T. Schachner, E. Lenr, M. Kotler, D. Wiedemann, P. Hong, et al.	5	500	0.0		4.1%	4.1%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weldinger, B. Wehman, et al.	1	334	0.0	0 [0.00; 0.02]	9.0%	9.0%
J. Bonatti, E. J. Lenr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wenman, et al.	3	150	0.0	2 [0.00; 0.06]	0.6%	0.6%
Common effects model		984	0.0		13.7%	42 70/
Random effects model		Ŷ	0.0	1 [0.00; 0.01]		13.7%
Heterogeneity: $I^{-} = 40\%, \tau^{-} = < 0.0001, p = 0.19$						
N Beneres T Schechner D Wiedemenn A Ochlinger E Bustelss O Faultises at a		FF		10 00. 0 001	0 50/	0.5%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oenlinger, E. Ruetzler, G. Feuchtner, et a	I. U	55	0.0		0.5%	0.5%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oenlinger, E. Ruetzier, G. Feuchtner, et a	I. U	56	0.0	0.00; 0.06]	0.5%	0.5%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzier, et al.	0	25	0.0	J [0.00; 0.14]	0.1%	0.1%
J. Bonatti, T. Schachner, N. Bonaros, A. Ochlinger, D. Wiedemann, E. Ruetzier, et al.	0	25	0.0	0 [0.00; 0.14]	0.1%	0.1%
J. Bonatti, T. Schachner, N. Bonaros, A. Ochlinger, D. Wiedemann, E. Ruetzler, et al.	0	25	0.0	0 [0.00; 0.14]	0.1%	0.1%
J. Bonatti, T. Schachner, N. Bonaros, A. Oenlinger, D. Wiedemann, E. Ruetzier, et al.	0	25	0.0	0 [0.00; 0.14]	0.1%	0.1%
M. Argenziano, M. Katz, J. Bonatti, S. Shvastava, D. Murphy, R. Poiner, et al.	0	200	0.0	0 [0.00; 0.04]	1.2%	1.2%
Common effects model		290	0.0		2.170	2 70/
Random energia model Heterogeneibu $l^2 = 0.9$ , $z^2 = 0.0 = 1.00$			0.0	0.00; 0.01]		2.1%
1000000000000000000000000000000000000						
Common effect model		8664	0.0	1 [0 00. 0 01]	100 0%	
Pandom affects model			0.0	1 [0.00, 0.01]	100.0%	100 0%
		· · · · ·		[0.00, 0.01]		100.0%
Heterogeneity: $l^2 = 0\% \tau^2 = 0$ , $p = 0.84$		0 0 0 5 0 1 0	15 0 2 0 25 0 3			
Test for subgroup differences (common effect): $x_{i}^{2} = 1.32$ df = 2 ( $p = 0.52$ )		0 0.00 0.1 0.	10 0.2 0.20 0.0			
Test for subgroup differences (random effects); $\chi^2_{2} = 1.37$ , df = 2 (p = 0.50)						

Figure S10 Forest plot for pump-stratified 30-day mortality.

Study	Total	Mean	SD	Mean	MRAW	95%-CI	Weight (common)	Weight (random)
<ul> <li>pump = Off-pump</li> <li>A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al.</li> <li>H. H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al.</li> <li>M. Varrone, I. C. Sarmiento, L. Pirelli, D. R. Brinster, V. P. Singh, M. C. Kim, et al.</li> <li>H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. Klahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy</li> <li>H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy</li> <li>H. Balkhy, S. Nathan, S. E. Arnsdorf and D. J. Krienbring</li> <li>R. Casula, E. Khoshbin and T. Athanasiou</li> <li>M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al.</li> <li>R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney</li> <li>H. H. Balkhy, L. S. Wann, D. Krienbring and S. E. Arnsdorf</li> <li>T. A. Folliguet, A. Dible, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde</li> <li>J. W. Bolton and J. E. Connally</li> <li>Common effect model</li> <li>Heterogeneity: I<sup>2</sup> = 86%, τ<sup>2</sup> = 2.7343, p &lt; 0.01</li> </ul>	1000 544 1080 16 50 220 263 140 100 307 106 120 56 10 4012	64.00 66.00 66.30 60.60 72.80 63.80 63.40 62.00 62.70 63.60 66.30 66.00 61.00	11.0000 10.5000 10.9000 13.5000 10.0000 10.6000 11.2000 11.0000 11.6000 11.5000 10.4000 11.4000		64.00 66.00 66.30 63.80 65.40 63.40 62.00 62.70 63.60 66.30 66.30 66.30 66.30 66.30 64.87	[63.32; 64.68] [65.12; 66.88] [65.65; 66.95] [59.97; 75.63] [62.48; 65.12] [64.12; 66.68] [51.54; 65.26] [59.84; 64.16] [61.40; 65.26] [61.40; 64.00] [61.41; 65.79] [64.44; 68.16] [53.32; 68.88] [53.33; 68.07] [64.70; 65.37]	16.7% 10.0% 18.4% 0.2% 1.0% 2.3% 1.7% 4.6% 2.2% 0.9% 0.2% 68.9%	$\begin{array}{c} 4.5\%\\ 4.5\%\\ 4.5\%\\ 1.9\%\\ 3.6\%\\ 4.3\%\\ 4.3\%\\ 4.0\%\\ 4.0\%\\ 4.0\%\\ 1.7\%\\ 53.4\%\end{array}$
pump = Mix N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. M. E. Currie, J. Romas, S. A. Fox, W. C. Vezina, C. Akincioglu, J. C. Warrington, et al. Common effect model Random effects model Heterogeneity: I <sup>2</sup> = 91%, r <sup>2</sup> = 56789, p < 0.01	500 334 150 82 1066	62.00 60.00 61.00 55.50	9.0000 14.7500 11.2500 9.8000	+++	62.00 60.00 61.00 55.50 60.99 59.74	[61.21; 62.79] [58.42; 61.58] [59.20; 62.80] [53.38; 57.62] [60.37; 61.62] [55.25; 64.23]	12.5% 3.1% 2.4% 1.7% 19.7%	4.5% 4.2% 4.1% 4.0% 16.8%
pump = On-pump N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al. R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. Common effect model Heterogeneity: I <sup>2</sup> = 85%, r <sup>2</sup> = 8.2782, p < 0.01	55 56 25 25 25 25 25 25 85 32 328	60.20 64.20 59.00 54.00 58.00 58.00 63.00	6.0000 7.3000 6.0000 7.2500 9.5000 8.5000 10.0000 9.0000	<b>♦</b> <b>↓</b> <b>↓</b> <b>↓</b> <b>↓</b> <b>↓</b> <b>↓</b> <b>↓</b>	60.20 64.20 59.00 58.00 58.00 58.00 63.00 59.89 59.39	[58.61; 61.79] [62.29; 66.11] [56.65; 61.35] [51.16; 56.84] [54.28; 61.72] [54.67; 61.33] [55.87; 60.13] [59.07; 60.72] [56.70; 62.07]	3.1% 2.1% 1.4% 0.6% 0.7% 1.7% 0.8% 11.4%	4.2% 4.1% 3.9% 3.6% 3.2% 4.0% 3.4% 4.0% 3.5%
Common effect model Random effects model Heterogeneity: $l^2 = 93\%$ , $r^2 = 8.0391$ , $p < 0.01$ Test for subgroup differences (common effect): $\chi_2^2 = 213.08$ , df = 2 ( $p < 0.01$ ) Test for subgroup differences (random effect): $\chi_2^2 = 22.59$ , df = 2 ( $p < 0.01$ )	5406			55 60 65 70 7	63.65 62.34	[63.37; 63.93] [60.77; 63.92]	100.0%	100.0%

Figure S11 Forest plot for pump-stratified age.

Study	Total	Mean	SD	Mean	MRAW	95%-CI	Weight (common)	Weight (random)
<ul> <li>pump = Off-pump</li> <li>A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al.</li> <li>S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy</li> <li>S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy</li> <li>S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan, and H. H. Balkhy</li> <li>S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa, and H. H. Balkhy</li> <li>S. Nisivaco, S. Nisivaco, T. Groregrossa, A. Arastu, S. Shahui and H. H. Balkhy</li> <li>G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al.</li> <li>H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco</li> <li>H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy</li> <li>H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. Kitahara, M. McCrorey, S. Nisivaco and H. H. Balkhy</li> <li>H. Kitahara, B. Patel, S. Nisivaco and H. H. Balkhy</li> <li>H. Kitahara, B. Atorrey, S. Nisivaco and H. H. Balkhy</li> <li>C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al.</li> <li>M. E. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney</li> <li>T. A. Folliguet, A. Dible, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde</li> <li>Common effect model</li> </ul>	1000 525 133 720 544 100 600 16 308 50 220 263 234 50 307 106 55232	1.57 1.23 1.25 1.30 1.54 1.69 1.20 1.70 1.76 1.21 1.73 1.81 1.79 1.00 2.30 2.17	1.7874 0.6500 0.6400 0.6900 0.8900 1.3900 0.4000 2.6000 0.4900 2.6700 2.8200 1.2440 4.7500 5.5000 0.9600	**************************************	1.57 1.27 1.23 1.25 1.30 1.54 1.20 1.70 1.70 1.71 1.73 1.81 1.73 1.81 1.79 1.00 2.30 2.17 1.32 1.49	$ \begin{bmatrix} 1.46; 1.68] \\ 1.21; 1.33 \\ 1.13; 1.33 \\ 1.20; 1.30 \\ 1.24; 1.36 \\ 1.37; 1.71 \\ 1.48; 1.80 \\ 1.10; 1.40 \\ 1.41; 1.99 \\ 1.49; 2.03 \\ 1.15; 1.27 \\ 1.44; 2.03 \\ 1.15; 1.27 \\ 1.44; 2.13 \\ 1.45; 2.14 \\ 1.45; 2.13 \\ 1.45; 2.13 \\ 1.45; 2.14 \\ 1.45; 2.13 \\ 1.45; 2.14 \\ 1.45; 2.13 \\ 1.45; 2.14 \\ 1.45; 2.13 \\ 1.45; 2.14 \\ 1.45; 2.15; 2.15; 2.15 \\ 1.45; 2.15; 2.15; 2.15; 2.15; 2.15; 2.15; 2.15; 2.15$	$\begin{array}{c} 4.6\%\\ 18.1\%\\ 5.4\%\\ 25.6\%\\ 11.6\%\\ 4.5\%\\ 1.5\%\\ 0.7\%\\ 0.8\%\\ 1.3\%\\ 0.5\%\\ 0.2\%\\ 0.4\%\\ 0.5\%\\ 0.2\%\\ 0.9\%\\ 95.5\%\\ \end{array}$	5.9% 6.4% 6.5% 6.4% 5.2% 4.9% 3.7% 4.0% 3.4% 3.2% 1.8% 0.6% 4.2% 7.6%
$ \begin{array}{l} \mbox{Heterogeneity:} \ l^2 = 91\%, \ \tau^2 = 0.0304, \ \rho < 0.01 \\ \mbox{pump} = Mix \\ \mbox{N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al. \\ \mbox{J. Bonatit, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. \\ \mbox{J. Bonatit, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. \\ \mbox{Common effect model} \\ \mbox{Random effects model} \\ \mbox{Heterogeneity:} \ l^2 = 28\%, \ \tau^2 = 0.0486, \ \rho = 0.25 \\ \end{array}$	500 334 150 984	0.96 0.88 1.63	10.8000 3.9400 4.8800		0.96 0.88 1.63 1.04 1.09	[ 0.01; 1.91] [ 0.46; 1.30] [ 0.85; 2.41] [ 0.69; 1.38] [ 0.11; 2.06]	0.1% 0.3% 0.1% 0.5%	0.7% 2.5% 1.0% 4.2%
pump = On-pump N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Sonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Sonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. Graper, A. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. Common effects model Heterogeneity: I <sup>2</sup> = 0%, i <sup>2</sup> = 0, p = 0.68	55 56 25 25 25 25 25 85 32 328	1.28 1.45 0.96 0.83 0.83 0.79 1.46 1.30	0.8100 0.7000 2.8200 3.8600 1.9600 8.8800 1.5400 1.0000		1.28 1.45 0.96 0.83 0.83 - 0.79 1.46 1.30 1.36 1.36	[1.07; 1.49] [1.27; 1.63] [-0.15; 2.07] [-0.68; 2.34] [0.06; 1.60] [-2.69; 4.27] [1.13; 1.79] [0.95; 1.65] [1.24; 1.48]	1.2% 1.7% 0.0% 0.1% 0.0% 0.5% 0.5% 4.0%	4.7% 5.1% 0.5% 0.3% 1.0% 0.1% 3.3% 3.2% 18.1%
Common effect model Random effects model Heterogeneity: $l^2 = 86\%$ , $r^2 = 0.0285$ , $p < 0.01$	6544			-2 -1 0 1 2 3 4	1.32 1.44	[ 1.30; 1.34] [ 1.33; 1.56]	100.0%	100.0%
Test for subgroup differences (common effect): $\chi_2^2 = 2.96$ , df = 2 ( <i>p</i> = 0.23) Test for subgroup differences (random effects): $\chi_2^2 = 4.17$ , df = 2 ( <i>p</i> = 0.12)								

Figure S12 Forest plot for pump-stratified ICU length of stay.

Study	Total	Mean	SD		Mean		MRAW	95%-CI	Weight (common)	Weight (random)
<ul> <li>pump = Off-pump</li> <li>A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al.</li> <li>S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy</li> <li>S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy</li> <li>S. Nisivaco, S. Batel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy</li> <li>H. Balkhy, S. Nisivaco, T. Groregrossa, A. Arastu, S. Shahul and H. H. Balkhy</li> <li>A. Spanjersberg, L. Hoek, J. P. Ottervanger, T. Y. Nguyen, E. Kaplan, R. Laurens, et al.</li> <li>G. Torregrossa, J. P. Sai, J. Van den Eynde, J. H. Mailin, A. Dokollari, O. Erten, et al.</li> <li>M. Varrone, I. C. Sarmiento, L. Pirelli, D. R. Brinster, V. P. Singh, M. C. Kim, et al.</li> <li>M. Varrone, N. McCrorey, S. Patel, S. Nisivaco and H. H. Balkhy</li> <li>H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. Kitahara, M. McCrorey, S. Nisivaco and H. H. Balkhy</li> <li>H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy</li> <li>H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. Kitahara, B. Stel, M. McCorey, S. Nisivaco and H. H. Balkhy</li> <li>K. Haaka, S. Forest, M. Follis, P. Friedmann and J. J. DeRose</li> <li>R. Casula, E. Khoshbin and T. Athanasiou</li> <li>M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al.</li> <li>R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney</li> <li>H. Balkhy, L. S. Wann, D. Krienbring and S. E. Arnsdorf</li> <li>T. A Follguet, A. Dibler, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde</li> <li>Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al.</li> <li>J. W. Bolton and J. E. Connally</li> <li>Common effect model</li> <li>Hatomometre andel</li> <li>Hatoma effects model</li> <li>Hatoma effec</li></ul>	1000 525 133 720 107 544 100 107 1080 1080 1080 200 203 234 50 263 234 50 263 234 50 140 142 100 106 93 3150 056 93 150 7174	4.43 2.59 2.70 2.35 5.00 4.00 2.30 3.55 3.61 7.00 4.00 4.07 5.00 4.00 5.20 3.35 5.361 7.00 5.20 3.30 3.40 3.30 5.20 3.30 5.20 3.30 5.20 3.30 5.20 3.30 5.20 5.20 5.20 5.20 5.20 5.20 5.20 5.00 5.0	2.5100 1.2200 0.8900 1.2900 0.7500 0.5000 2.9000 1.2000 2.9000 1.2100 4.4400 1.5100 6.2500 5.5000 6.2500 5.5000 2.9000 2.9000 2.0000	<u> </u>			4.43 2.59 2.70 3.07 5.00 2.35 5.00 2.30 3.60 2.30 3.60 2.30 3.65 3.61 7.00 4.00 4.00 4.00 4.00 4.00 4.00 4.00	$ \begin{bmatrix} 4.27; \ 4.59\\ [2.48; \ 2.70]\\ [2.51; \ 2.89]\\ [2.48; \ 2.42]\\ [2.61; \ 2.83]\\ [2.77; \ 3.37]\\ [4.86; \ 5.14]\\ [4.96; \ 5.04]\\ [3.97; \ 4.03]\\ [1.71; \ 2.89]\\ [3.28; \ 3.42]\\ [3.65; \ 4.49]\\ [2.74; \ 3.06]\\ [3.19; \ 3.91]\\ [3.22; \ 4.00]\\ [3.32; \ 4.20]\\ [3.30; \ 4.70]\\ [3.30; \ 4.70]\\ [4.15; \ 6.25]\\ [2.87; \ 3.73]\\ [3.80; \ 4.20]\\ [3.30; \ 4.70]\\ [3.30; \ 4.$	$\begin{array}{c} 1.7\%\\ 3.6\%\\ 1.1\%\\ 9.6\%\\ 3.5\%\\ 2.0\%\\ 25.4\%\\ 0.1\%\\ 0.4\%\\ 0.2\%\\ 0.1\%\\ 0.0\%\\ 0.7\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.0\%\\ 0.8\%\\ 0.0\%$	3.0% 3.0% 3.0% 3.0% 3.0% 2.9% 2.9% 2.9% 2.9% 2.2% 2.9% 2.2% 2.3% 2.2% 2.3% 2.2% 2.2% 2.7% 2.7%
pump = Mix N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. M. E. Currie, J. Romas, S. A. Fox, W. C. Vezina, C. Akincioglu, J. C. Warrington, et al. Common effect model Random effects model Heterogeneity: I <sup>2</sup> = 94%, τ <sup>2</sup> = 2.1503, p < 0.01	500 334 150 82 1066	6.00 6.00 6.00 3.80	13.0000 7.7500 6.2500 1.1000	\ +++ •••			6.00 6.00 6.00 3.80 4.14 5.40	[4.86; 7.14] [5.17; 6.83] [5.00; 7.00] [3.56; 4.04] [3.92; 4.36] [3.61; 7.20]	0.0% 0.1% 0.0% 0.7% 0.8%	2.3% 2.5% 2.4% 2.9% 10.1%
pump = On-pump N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. Ganatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. Ganatti, S. Schachner, N. Bonaros, A. Gehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al. R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. Common effect model Heterogeneity: I <sup>2</sup> = 94%, τ <sup>2</sup> = 3.4202, p < 0.01	55 56 25 25 25 25 25 85 32 328	9.80 19.20 7.00 6.00 5.00 6.00 5.10 5.50	6.2000 11.9000 2.7500 4.0000 1.0000 2.5000 3.4000 2.7000	- + + + + + <b>~</b> ()			9.80 19.20 7.00 5.00 5.00 5.10 5.50 5.58 7.34	[8.16; 11.44] [16.08; 22.32] [5.92; 8.08] [4.43; 7.57] [5.02; 6.98] [4.38; 5.82] [4.56; 6.44] [5.30; 5.87] [3.91; 10.76]	0.0% 0.0% 0.0% 0.3% 0.0% 0.1% 0.5%	1.8% 0.9% 2.3% 1.9% 2.9% 2.4% 2.6% 2.4% 17.2%
Common effect model Random effects model	8568			¢			3.99 4.49	[ 3.97; 4.01] [ 3.80; 5.17]	100.0%	100.0%
Heterogeneity: $l^2 = 99\%$ , $\tau^2 = 1.0610$ , $\rho = 0$ Test for subgroup differences (common effect): $\chi_2^2 = 122.98$ , df = 2 ( $\rho < 0.01$ ) Test for subgroup differences (random effects): $\chi_2^2 = 11.87$ , df = 2 ( $\rho < 0.01$ )				5	10 15	20				

Figure S13 Forest plot for pump-stratified hospital length of stay.

Study	Total	Mean	SD			Mean	,	MRAW	95%-0	Weight I (common)	Weight (random)
<ul> <li>pump = Off-pump</li> <li>A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al.</li> <li>N. C. Patel, J. M. Hemil, K. Seetharam, V. P. Singh, S. J. Scheinerman, L. Pirelli, et al.</li> <li>M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy</li> <li>G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al.</li> <li>H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy</li> <li>H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel</li> <li>H. H. Balkhy, S. Nisivaco, B. Patel, S. Nisivaco and H. H. Balkhy</li> <li>C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al.</li> <li>W. N. Raad, S. Forest, M. Follis, P. Friedmann and J. J. DeRose</li> <li>C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Colific, G. Colonna, et al.</li> <li>M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al.</li> <li>G. Leyvi, S. J. Forest, V. S. Srinivas, M. Greenberg, N. Wang, A. Mais, et al.</li> <li>R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney</li> <li>S. Srivastava, R. Barrera and S. Quismundo</li> <li>T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde</li> <li>S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al.</li> <li>J. W. Bolton and J. E. Connally</li> <li>Common effect model</li> <li>Hatorgonetty, P.<sup>4</sup> = 33.4986, p &lt; 0.01</li> </ul>	1000 158 100 308 50 220 263 50 142 38 307 150 164 56 150 10 3872	55.20 53.20 31.00 60.00 50.30 39.50 55.00 55.00 54.00 55.00 54.20 53.90 54.20 53.90 54.20 55.50	9.2000 10.4000 8.5000 11.1900 13.7000 14.2500 14.9300 10.4500 10.4500 10.5800 13.0000 9.0000 7.5000	+		++++++++++++++++=	-	55.20 53.20 31.00 60.00 50.30 39.50 55.00 55.00 54.00 56.00 54.20 53.90 54.20 53.90 54.20 53.90 54.20 53.90 54.20 53.90 54.20	$ \begin{bmatrix} 54,63;55,77\\ 51,58;54,8\\ (29,33;32,61\\ (59,10;60,99)\\ (48,77;51,63)\\ (48,77;51,63)\\ (54,87;54,34)\\ (54,89,85;54,77)\\ (53,20;56,86)\\ (52,10;57,96)\\ (52,10;57,96)\\ (52,10;57,96)\\ (52,10;57,96)\\ (52,10;57,96)\\ (52,10;57,96)\\ (53,10;57,96)\\ (54,23$	$\begin{bmatrix} 27.0\% \\ 3.3\% \\ 3.2\% \\ 10.9\% \\ 0.6\% \\ 0.6\% \\ 1.5\% \\ 0.6\% \\ 0.6\% \\ 0.6\% \\ 0.6\% \\ 0.6\% \\ 0.6\% \\ 0.3.1\% \\ 0.3.6\% \\ 0.3.6\% \\ 0.4\% \\ 0.4\% \\ 0.4.4\% \\ 0.4.4\% \\ 0.4.4\% \\ 0.4.4\% \\ 0.6\% \\ 0.4.4\% \\ 0.6\% \\ 0.4.4\% \\ 0.6\% \\$	3.6% 3.6% 3.6% 3.2% 3.5% 3.5% 3.4% 3.6% 3.6% 3.6% 3.6% 3.6% 3.6% 3.6% 3.6% 3.6% 3.6% 3.6% 3.6% 3.6%
$\begin{array}{l} pump=Mix\\ N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al.\\ \mathsf{J. Bonati, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.\\ J. Bonati, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.\\ Common offect model\\ Random effects model\\ Heterogeneity; \mathit{I}^2 = 0\%, \mathit{r}^2 = 0, \mathit{p} = 1.00 \end{array}$	500 334 150 984	60.00 60.00 60.00	17.0000 17.0000 13.7500				+++ -	60.00 60.00 60.00 60.00 60.00	[58.51; 61.49 [58.18; 61.82 [57.80; 62.20 [58.98; 61.02 [60.00; 60.00	] 4.0% ] 2.6% ] 1.8% ] 8.4% ] .	3.6% 3.5% 3.5% 10.6%
$\begin{array}{l} pump = On-pump \\ N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. N. Bonaros, T. Schachner, N. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. Genzuit, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. R. J. Banatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. R. J. Banatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. Genzuit, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al. R. J. Baniano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. Common effects model Heterogeneity; l^2 = 81\%, \tau^2 = 11.3410, p < 0.01$	55 56 25 25 25 25 25 32 328	59.00 64.00 65.00 64.00 60.00 56.20 54.00	10.0000 11.2500 10.0000 10.2500 10.0000 8.2500 10.2000 12.0000				+ + + + + + + + + + + + + + + + + + +	59.00 64.00 65.00 64.00 60.00 56.20 54.00 59.67 60.21	[56.36; 61.64 [61.05; 66.95 [56.08; 63.92 [60.98; 69.02 [56.77; 63.22 [54.03; 58.37 [49.84; 58.16 [58.57; 60.78 [56.98; 63.45]	1.3%         1.0%         0.6%         0.5%         0.6%         0.6%         0.8%         1.9%         0.5%         7.2%	3.4% 3.2% 3.2% 3.2% 3.4% 3.5% 3.2% 26.6%
Common effect model Random effects model	5184						•	54.82 55.03	[54.52; 55.12 [52.41; 57.66	] 100.0% ] .	100.0%
Heterogeneity: $l^2 = 98\%$ , $\tau^2 = 32.9482$ , $p < 0.01$ Test for subgroup differences (common effect): $\chi_p^2 = 204.39$ , df = 2 ( $p < 0.01$ )				30	40	50	60				

Test for subgroup differences (contribute effects):  $\chi_2^2 = 25.76$ , df = 2 (p < 0.01)

Figure S14 Forest plot for pump-stratified LVEF preoperatively.

Study	Total	Mean	SD	Mean	MRAW	95%-CI (	Weight common)	Weight (random)
pump = Off-pump S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, H. Kitahara, G. Torregrossa and H. H. Balkhy S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy H. H. Balkhy, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy G. Torregrossa, M. P. Sai, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al. H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco H. Kitahara, M. McCorrey, B. Patel, S. Nisivaco and H. H. Balkhy H. Balkhy, S. Nisivaco, H. Kitahara, M. McCorrey and B. Patel H. Kitahara, M. McCorrey, B. Patel, S. Nisivaco and H. H. Balkhy C. Paorija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al. H. H. Balkhy, S. Nathan, S. E. Arnsdorf and D. J. Krienbring C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Colific, G. Colonna, et al. G. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Colific, G. Colonna, et al. G. Shivastava, S. Gadasalli, M. Agusala, R. Kolluru, R. Barrera, S. Quismundo, et al. S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al. Common effect model Handom Metcats	525 133 720 544 100 600 16 308 50 220 263 50 140 38 150 106 56 93 3150 4262	237.00 325.00 254.00 255.00 255.20 223.00 282.70 293.00 198.00 293.00 373.00 222.00 326.00 274.00 272.30 311.60	82,0000 62,0000 85,0000 84,0000 67,2000 49,0000 88,0000 87,0000 84,0000 35,0000 53,7300 71,0000 60,0000 139,0000 118,0000 115400	· · · + · · · + · + · + · + · + · + ·	237.00 325.00 254.00 256.00 355.20 223.00 243.00 293.00 198.00 293.00 373.00 222.00 373.00 222.00 371.60 274.00 274.30 276.83	$\begin{array}{l} [229.99; 244.01] \\ [314.46; 335.54] \\ [247.79; 260.21] \\ [243.94; 228.06] \\ [238.75; 273.25] \\ [349.82; 360.58] \\ [369.99; 247.01] \\ [272.77; 292.63] \\ [245.89; 224.11] \\ [231.90; 254.10] \\ [288.77; 297.23] \\ [183.11; 212.89] \\ [281.24; 304.76] \\ [281.24; 304.76] \\ [295.44; 352.46] \\ [294.54]; 352.46] \\ [243.09; 304.91] \\ [246.29; 298.31] \\ [246.29; 298.31] \\ [246.79; 7], 300.76] \\ [254.51; 299.44] \end{array}$	$\begin{array}{c} 3.9\%\\ 1.7\%\\ 4.9\%\\ 3.8\%\\ 0.6\%\\ 6.6\%\\ 0.3\%\\ 1.9\%\\ 1.5\%\\ 10.6\%\\ 0.9\%\\ 1.5\%\\ 1.6\%\\ 0.3\%\\ 5.8\%\\ 97.3\%\\ \end{array}$	$\begin{array}{c} 4.0\%\\ 3.9\%\\ 4.0\%\\ 4.0\%\\ 3.8\%\\ 4.0\%\\ 3.8\%\\ 3.9\%\\ 3.9\%\\ 4.0\%\\ 3.9\%\\ 3.9\%\\ 3.9\%\\ 3.9\%\\ 3.8\%\\ 3.9\%\\ 3.6\%\\ 3.4\%\\ 3.4\%\\ 3.6\%\\ 4.0\%\\ -72.6\%\end{array}$
$\begin{array}{l} pump = \text{Mix} \\ \text{N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al. \\ J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. \\ J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.  Gommon effect model \\ Random effects model \\ Heterogeneity: l^2 = 98\%, \tau^2 = 4415.6161, p < 0.01 \\ \end{array}$	500 334 150 984	305.00 240.00 375.00	234.5000 134.5000 156.7500	+	305.00 240.00 375.00 282.04 - 306.12	[284.45; 325.55] [225.58; 254.42] [349.92; 400.08] [271.36; 292.73] [138.43; 473.82]	0.5% 0.9% 0.3% 1.7%	3.7% 3.9% 3.6% 11.2%
$\begin{array}{l} pump = On-pump\\ J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al. Common effect model Random effects model Heterogeneity: l^2 = 87\%, r^2 = 1905.3793, p < 0.01 \end{array}$	25 25 25 85 185	400.00 330.00 280.00 272.00 353.00	107.5000 95.0000 119.5000 91.0000 89.0000	+++++++++++++++++++++++++++++++++++++++	400.00 330.00 280.00 272.00 353.00 336.64 327.72	[357.86; 442.14] [292.76; 367.24] [233.16; 326.84] [236.33; 307.67] [334.08; 371.92] [322.93; 350.35] [262.85; 392.59]	0.1% 0.1% 0.1% 0.1% 0.5% 1.0%	3.1% 3.2% 2.9% 3.3% 3.8% 16.2%
Common effect model Random effects model Heterogeneity: $l^2 = 99\%$ , $r^2 = 1537.5955$ , $p = 0$ Tot for subrup diffeomeon (common effect), $r^2 = 28.47$ , df = 2 (o < 0.01)	5431		;	150 200 250 300 350 400 450	299.45 288.29	[298.08; 300.83] [267.94; 308.63]	100.0%	100.0%

Test for subgroup differences (common effect):  $\chi_2^2 = 38.47$ , df = 2 (p < 0.01) Test for subgroup differences (random effects):  $\chi_2^2 = 4.20$ , df = 2 (p = 0.12)

Figure S15 Forest plot for pump-stratified operation timing.

Study	Events	Total		Proportion	95%-CI	Weight (common)	Weight (random)
pump = Off-pump A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al. S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy H. H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al. M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy A. Spanjersberg, L. Hoek, J. P. Ottervanger, T. Y. Nguyen, E. Kaplan, R. Laurens, et al. G. Torregrossa, M. P. Sá, J. Van den Evnde, J. H. Malin, A. Dokollari, O. Erten, et al.	205 65 16 88 71 14 21 91	1000 525 133 720 544 100 107 600	*	0.20 0.12 0.12 0.13 0.14 0.20 0.15	[0.18; 0.23] [0.10; 0.15] [0.08; 0.19] [0.10; 0.15] [0.10; 0.16] [0.08; 0.22] [0.13; 0.28] [0.13; 0.28]	18.3% 6.4% 1.6% 8.7% 6.9% 1.3% 1.9% 8.7%	5.8% 5.2% 3.3% 5.4% 5.2% 3.1% 3.6% 5.4%
H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy G. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Cofffic, G. Colonna, et al. M. E. Hallkow, H. A. Liberger, D. Pavierd, P. Welker, A. Y. Eino, W. Jaber, et al.	0 62 14 33 57 54 7 47	16 308 50 220 263 234 38 307		0.00 0.20 0.28 0.15 0.22 0.23 0.23 0.18 0.15	[0.00; 0.34] [0.16; 0.25] [0.17; 0.42] [0.17; 0.20] [0.17; 0.27] [0.18; 0.29] [0.09; 0.34] [0.12; 0.20]	0.1% 5.5% 1.1% 3.1% 5.0% 4.7% 0.6% 4.5%	0.2% 5.0% 2.8% 4.4% 4.9% 4.8% 2.0%
M. L. Harkos, N. X. Eldefinian, S. Berkeldy, F. Wanke, K. Y. Hint, W. Jaba, et al. G. Leyvi, S. J. Forest, V. S. Srinivas, M. Greenberg, N. Wang, A. Mals, et al. R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney S. Srivastava, R. Barera and S. Quismundo S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, R. Barrera, S. Quismundo, et al. S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al. J. W. Bolton and J. E. Connally Common effect model Random effects model	47 19 17 13 12 5 1	150 106 164 93 150 10 5838	++	0.13 0.13 0.16 0.08 0.13 0.03 - 0.10 0.16 0.15	[0.12; 0.23] [0.08; 0.19] [0.10; 0.24] [0.05; 0.13] [0.07; 0.21] [0.01; 0.07] [0.01; 0.47] [0.15; 0.17] [0.13; 0.18]	4.3% 1.9% 1.6% 1.3% 1.2% 0.5% 0.1% 84.9%	3.6% 3.4% 3.1% 2.9% 1.7% 0.4%
$\label{eq:second} \begin{split} & \text{Heterogeneity:} \ l^2 = 75\%, \ \tau^2 = 0.1020, \ p < 0.01 \\ & \text{pump} = \text{Mix} \\ & \text{N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al. \\ & J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. \\ & J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. \\ & Common effect model \\ & \text{Random effects model} \\ & \text{Heterogeneity:} \ l^2 = 0\%, \ \tau^2 = 0, \ p = 0.96 \end{split}$	73 50 21	500 334 150 984	**	0.15 0.15 0.14 0.15 0.15	[0.12; 0.18] [0.12; 0.19] [0.09; 0.21] [0.13; 0.17] [0.13; 0.17]	7.0% 4.8% 2.0% 13.8%	5.2% 4.9% 3.7% 13.8%
pump = On-pump J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al. R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al Common effect model Random effects model Heterogeneity: $I^2 = 10\%$ , $\epsilon^2 = <0.0001$ , $p = 0.35$	2 3 1 3 1 3	25 25 25 25 85 32 217	\$\$	0.08 0.12 0.04 0.12 0.01 0.09 0.08 0.08	$\begin{matrix} [0.02; \ 0.27] \\ [0.04; \ 0.31] \\ [0.01; \ 0.24] \\ [0.04; \ 0.31] \\ [0.03; \ 0.08] \\ [0.03; \ 0.25] \\ [0.05; \ 0.14] \\ [0.05; \ 0.14] \end{matrix}$	0.2% 0.3% 0.1% 0.3% 0.1% 0.3% 1.3%	0.8% 1.1% 0.5% 1.1% 0.5% 1.1% 5.1%
Common effect model Random effects model		7039	¢	0.16 0.15	[0.15; 0.17] [0.13; 0.17]	100.0%	100.0%
Heterogeneity: $l^2 = 69\%$ , $\tau^2 = 0.0814$ , $\rho < 0.01$ Test for subgroup differences (common effect): $\chi_2^2 = 8.49$ , df = 2 ( $\rho = 0.01$ ) Test for subgroup differences (random effects): $\chi_2^2 = 5.46$ , df = 2 ( $\rho = 0.07$ )			0.1 0.2 0.3 0.4				

Figure S16 Forest plot for pump-stratified post-operative atrial fibrillation.

							Weight	Weight
Study	Total	Mean	SD	Mean	MRAW	95%-CI	(common)	(random)
A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al.	1000	1.57	1.7874	je.	1.57	[ 1.46; 1.68]	4.6%	5.9%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy	525	1.27	0.6500		1.27	[ 1.21; 1.33]	18.1%	6.4%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy	133	1.23	0.6000	-	1.23	[ 1.13; 1.33]	5.4%	6.0%
S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy	720	1.25	0.6400		1.25	[ 1.20; 1.30]	25.6%	6.5%
H. H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al.	544	1.30	0.6900	<b>1</b>	1.30	[ 1.24; 1.36]	16.6%	6.4%
M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy	100	1.54	0.8900	i <del>a</del> -	1.54	[ 1.37; 1.71]	1.8%	5.2%
G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al.	600	1.69	1.3900	-	1.69	[ 1.58; 1.80]	4.5%	5.9%
H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco	16	1.20	0.4000		1.20	[ 1.00; 1.40]	1.5%	4.9%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	308	1.70	2.6000	i+-	1.70	[ 1.41; 1.99]	0.7%	3.7%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	50	1.76	0.9600	<u> </u>	1.76	[ 1.49; 2.03]	0.8%	4.0%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	220	1.21	0.4900		1.21	[ 1.15; 1.27]	13.3%	6.4%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	263	1.73	2.6700	i+	1.73	[ 1.41; 2.05]	0.5%	3.4%
H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy	234	1.81	2.8200		1.81	[ 1.45; 2.17]	0.4%	3.0%
C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al.	50	1.79	1.2440	÷	1.79	[ 1.45; 2.13]	0.5%	3.2%
M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al.	307	1.00	4.7500		1.00	[ 0.47; 1.53]	0.2%	1.8%
N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al.	500	0.96	10.8000		0.96	[ 0.01; 1.91]	0.1%	0.7%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	334	0.88	3.9400		0.88	[ 0.46; 1.30]	0.3%	2.5%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	150	1.63	4.8800		1.63	[ 0.85; 2.41]	0.1%	1.0%
R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney	106	2.30	5.5000	÷	2.30	[ 1.25; 3.35]	0.1%	0.6%
T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde	56	2.17	0.9600	i +	2.17	[ 1.92; 2.42]	0.9%	4.2%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al.	55	1.28	0.8100	1	1.28	[ 1.07; 1.49]	1.2%	4.7%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al.	56	1.45	0.7000	+	1.45	[ 1.27; 1.63]	1.7%	5.1%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	0.96	2.8200		0.96	[-0.15; 2.07]	0.0%	0.5%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	0.83	3.8600		0.83	[-0.68; 2.34]	0.0%	0.3%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	0.83	1.9600		0.83	[ 0.06; 1.60]	0.1%	1.0%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	0.79	8.8800		0.79	[-2.69; 4.27]	0.0%	0.1%
M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al.	85	1.46	1.5400	+	1.46	[ 1.13; 1.79]	0.5%	3.3%
R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al.	32	1.30	1.0000	+	1.30	[ 0.95; 1.65]	0.5%	3.2%
Common effect model	6544				1.32	[ 1.30: 1.34]	100.0%	
Random effects model				•	1.44	1.33; 1.561		100.0%
Heterogeneity: $l^2 = 86\%$ , $\tau^2 = 0.0285$ , $p < 0.01$					,		-	
M				-2 -1 0 1 2 3 4				

Figure S17 Forest plot for total ICU length of stay.

Study	Total	Mean	SD		Mean		MRAW	95%-CI	Weight (common)	Weight (random)
A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al.	1000	4.43	2.5100	i.			4.43	[ 4.27; 4.59]	1.7%	3.0%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy	525	2.59	1.2500				2.59	[2.48; 2.70]	3.6%	3.0%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy	133	2.70	1.1200	•			2.70	[2.51; 2.89]	1.1%	2.9%
S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy	720	2.35	0.8900				2.35	[2.28; 2.42]	9.6%	3.0%
H. H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al.	544	2.72	1.2900				2.72	[2.61; 2.83]	3.5%	3.0%
M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy	100	3.07	1.5100	+			3.07	[2.77; 3.37]	0.5%	2.9%
A. Spanjersberg, L. Hoek, J. P. Ottervanger, T. Y. Nguyen, E. Kaplan, R. Laurens, et al.	107	5.00	0.7500	-			5.00	[4.86; 5.14]	2.0%	3.0%
G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al.	600	5.00	0.5000				5.00	[4.96; 5.04]	25.4%	3.0%
M. Varrone, I. C. Sarmiento, L. Pirelli, D. R. Brinster, V. P. Singh, M. C. Kim, et al.	1080	4.00	0.5000				4.00	[ 3.97; 4.03]	45.7%	3.0%
H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco	16	2.30	1.2000	+ !			2.30	[ 1.71; 2.89]	0.1%	2.7%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	308	3.60	2.9000	+			3.60	[ 3.28; 3.92]	0.4%	2.9%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	50	4.07	1.5100	+			4.07	[ 3.65; 4.49]	0.2%	2.9%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	220	2.90	1.2100	•			2.90	[2.74; 3.06]	1.6%	3.0%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	263	3.55	2.9400	-1			3.55	[ 3.19; 3.91]	0.3%	2.9%
H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy	234	3.61	3.0600	-1			3.61	[ 3.22; 4.00]	0.3%	2.9%
C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al.	50	7.00	4.4400	1	-		7.00	[ 5.77; 8.23]	0.0%	2.2%
H. H. Balkhy, S. Nathan, S. E. Arnsdorf and D. J. Krienbring	140	3.10	1.5000	•			3.10	[2.85; 3.35]	0.7%	2.9%
W. N. Raad, S. Forest, M. Follis, P. Friedmann and J. J. DeRose	142	5.00	3.8000	÷+-			5.00	[4.37; 5.63]	0.1%	2.7%
R. Casula, E. Khoshbin and T. Athanasiou	100	4.00	1.0000	ŧ			4.00	[ 3.80; 4.20]	1.1%	2.9%
M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al.	307	4.00	6.2500	÷			4.00	[ 3.30; 4.70]	0.1%	2.7%
N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al.	500	6.00	13.0000	1			6.00	[4.86; 7.14]	0.0%	2.3%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	334	6.00	7.7500	i			6.00	[5.17; 6.83]	0.1%	2.5%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	150	6.00	6.2500				6.00	[ 5.00; 7.00]	0.0%	2.4%
M. E. Currie, J. Romsa, S. A. Fox, W. C. Vezina, C. Akincioglu, J. C. Warrington, et al.	82	3.80	1.1000	4			3.80	[ 3.56; 4.04]	0.7%	2.9%
R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney	106	5.20	5.5000	ų.			5.20	[4.15; 6.25]	0.0%	2.3%
H. H. Balkhy, L. S. Wann, D. Krienbring and S. E. Arnsdorf	120	3.30	2.4000	+1			3.30	[2.87; 3.73]	0.2%	2.8%
T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde	56	7.10	3.5000	- ii +			7.10	[ 6.18; 8.02]	0.0%	2.5%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al.	55	9.80	6.2000		<u> </u>		9.80	[8.16; 11.44]	0.0%	1.8%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al.	56	19.20	11.9000			<u> </u>	19.20	[16.08; 22.32]	0.0%	0.9%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	7.00	2.7500				7.00	[ 5.92; 8.08]	0.0%	2.3%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	6.00	4.0000				6.00	[4.43; 7.57]	0.0%	1.9%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	5.00	1.0000	+			5.00	[4.61; 5.39]	0.3%	2.9%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	6.00	2.5000				6.00	[ 5.02; 6.98]	0.0%	2.4%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, R. Barrera, S. Quismundo, et al.	93	3.40	2.0000	+			3.40	[ 2.99; 3.81]	0.2%	2.9%
M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al.	85	5.10	3.4000	÷+-			5.10	[ 4.38; 5.82]	0.1%	2.6%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al.	150	3.60	2.9000				3.60	[ 3.14; 4.06]	0.2%	2.8%
J. W. Bolton and J. E. Connally	10	2.80	2.0000				2.80	[ 1.56; 4.04]	0.0%	2.2%
R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al.	32	5.50	2.7000	-			5.50	[4.56; 6.44]	0.0%	2.4%
Common effect model	8568						3.99	[ 3.97: 4.01]	100.0%	
Random effects model	5000						4.49	[ 3.80: 5.17]		100.0%
Heterogeneity: $l^2 = 99\%$ , $\tau^2 = 1.0610$ , $p = 0$				Ť	-			[,]	•	
				5	10	15 20				

Figure S18 Forest plot for total hospital length of stay.

Study	Total	Mean	SD	•	Me	an	MRAW	95%-CI	Weight (common)	Weight (random)
A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al.	1000	55.20	9.2000	)		ġ.	55.20	[54.63; 55.77]	27.0%	3.6%
N. C. Patel, J. M. Hemli, K. Seetharam, V. P. Singh, S. J. Scheinerman, L. Pirelli, et al.	158	53.20	10.4000	)			53.20	[51.58; 54.82]	3.3%	3.6%
M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy	100	31.00	8.5000	) -*-			31.00	[29.33; 32.67]	3.2%	3.6%
G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al.	600	60.00	11.1900	)			60.00	[59.10; 60.90]	10.9%	3.6%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	308	50.30	13.7000	)	-	<b>⊷</b> [	50.30	[48.77; 51.83]	3.7%	3.6%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	50	39.50	14.2500	) –	<b>—</b>		39.50	[35.55; 43.45]	0.6%	3.2%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	220	52.30	18.2500	)			52.30	[49.89; 54.71]	1.5%	3.5%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	263	55.00	14.9300	)		+	55.00	[53.20; 56.80]	2.7%	3.5%
C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al.	50	55.00	10.4500	)		<b>→</b>	55.00	[52.10; 57.90]	1.0%	3.4%
W. N. Raad, S. Forest, M. Follis, P. Friedmann and J. J. DeRose	142	54.00	10.0000	)			54.00	[52.36; 55.64]	3.2%	3.6%
C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Coiffic, G. Colonna, et al.	38	56.00	12.0000	)		- <del> -</del>	56.00	[52.18; 59.82]	0.6%	3.3%
M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al.	307	55.50	8.7000	)		÷	55.50	[54.53; 56.47]	9.3%	3.6%
G. Leyvi, S. J. Forest, V. S. Srinivas, M. Greenberg, N. Wang, A. Mais, et al.	150	54.20	10.5800	)			54.20	[52.51; 55.89]	3.1%	3.6%
N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al.	500	60.00	17.0000	)		*	60.00	[58.51; 61.49]	4.0%	3.6%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	334	60.00	17.0000	)		·	60.00	[58.18; 61.82]	2.6%	3.5%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	150	60.00	13.7500	)		·	60.00	[57.80; 62.20]	1.8%	3.5%
R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney	106	53.90	13.0000	)		-+ <u>+</u>	53.90	[51.43; 56.37]	1.4%	3.5%
S. Srivastava, R. Barrera and S. Quismundo	164	55.00	9.0000	)		÷	55.00	[53.62; 56.38]	4.6%	3.6%
T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde	56	49.00	6.0000	)	-+	- 1	49.00	[47.43; 50.57]	3.6%	3.6%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al.	55	59.00	10.0000	)		\$ <b>→</b>	59.00	[56.36; 61.64]	1.3%	3.4%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al.	56	64.00	11.2500	)		·	64.00	[61.05; 66.95]	1.0%	3.4%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	60.00	10.0000	)		}	60.00	[56.08; 63.92]	0.6%	3.2%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	65.00	10.2500	)		_ { _ →	- 65.00	[60.98; 69.02]	0.5%	3.2%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	64.00	10.0000	)			64.00	[60.08; 67.92]	0.6%	3.2%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	60.00	8.2500	)		\$ <del></del>	60.00	[56.77; 63.23]	0.8%	3.4%
M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al.	85	56.20	10.2000	)		÷	56.20	[54.03; 58.37]	1.9%	3.5%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al.	150	50.70	9.0000	)		*	50.70	[49.26; 52.14]	4.2%	3.6%
J. W. Bolton and J. E. Connally	10	55.50	7.5000	)		<u> </u>	55.50	[50.85; 60.15]	0.4%	3.1%
R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al	. 32	54.00	12.0000	)		<del> -</del>	54.00	[49.84; 58.16]	0.5%	3.2%
Common effect model	5184						54,82	[54.52: 55.12]	100.0%	
Random effects model	0.04					$\diamond$	55.03	[52.41: 57.66]		100.0%
Heterogeneity: $l^2 = 98\%$ , $\tau^2 = 32.9482$ , $p < 0.01$					1	<u> </u>	20.00	[02, 07.00]		
				30	40 5	0 60				

Figure S19 Forest plot for total LVEF.

Study	Total	Mean	SD		Mean	MRAW	95%-CI	Weight (common)	Weight random)
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy	525	237.00	82.0000	-	- 11	237.00	[229.99; 244.01]	3.9%	3.9%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy	133	325.00	62.0000		÷:	325.00	[314.46; 335.54]	1.7%	3.8%
S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy	720	254.00	85.0000		+	254.00	[247.79; 260.21]	4.9%	3.9%
H. H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al.	544	251.00	84.0000		+	251.00	[243.94; 258.06]	3.8%	3.9%
M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy	100	256.00	88.0000			256.00	[238.75; 273.25]	0.6%	3.8%
G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al.	600	355.20	67.2000		+	355.20	[349.82; 360.58]	6.6%	3.9%
H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco	16	223.00	49.0000		- 11	223.00	[198.99; 247.01]	0.3%	3.7%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	308	282.70	88.9000		-+	282.70	[272.77; 292.63]	1.9%	3.8%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	50	270.00	87.0000			270.00	[245.89; 294.11]	0.3%	3.7%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel	220	243.00	84.0000	-	+ !!	243.00	[231.90; 254.10]	1.5%	3.8%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy	263	293.00	35.0000		æ	293.00	[288.77; 297.23]	10.6%	3.9%
C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al.	50	198.00	53.7300	<b>—</b>		198.00	[183.11; 212.89]	0.9%	3.8%
H. H. Balkhy, S. Nathan, S. E. Arnsdorf and D. J. Krienbring	140	293.00	71.0000		<del></del>	293.00	[281.24; 304.76]	1.4%	3.8%
C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Coiffic, G. Colonna, et al.	38	373.00	60.0000		:: —	373.00	[353.92; 392.08]	0.5%	3.7%
G. Leyvi, S. J. Forest, V. S. Srinivas, M. Greenberg, N. Wang, A. Mais, et al.	150	222.00	66.0000	+		222.00	[211.44; 232.56]	1.7%	3.8%
N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al.	500	305.00	234.5000		÷	305.00	[284.45; 325.55]	0.5%	3.7%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	334	240.00	134.5000	-	-	240.00	[225.58; 254.42]	0.9%	3.8%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al.	150	375.00	156.7500			375.00	[349.92; 400.08]	0.3%	3.6%
R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney	106	326.00	139.0000			326.00	[299.54; 352.46]	0.3%	3.6%
T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde	56	274.00	118.0000			274.00	[243.09; 304.91]	0.2%	3.5%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	400.00	107.5000		· · · · ·	400.00	[357.86; 442.14]	0.1%	3.3%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	330.00	95.0000		÷	330.00	[292.76; 367.24]	0.1%	3.4%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	280.00	119.5000	-		280.00	[233.16; 326.84]	0.1%	3.2%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al.	25	272.00	91.0000			272.00	[236.33; 307.67]	0.1%	3.4%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, R. Barrera, S. Quismundo, et al.	93	272.30	128.0000			272.30	[246.29; 298.31]	0.3%	3.6%
M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al.	85	353.00	89.0000		·	353.00	[334.08; 371.92]	0.5%	3.7%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al.	150	311.60	11.5400		•	311.60	[309.75; 313.45]	55.8%	3.9%
Common effect model	5431					299.45	[298.08: 300.83]	100.0%	
Random effects model	- /01				$\overset{\cdot}{\diamondsuit}$	288.69	[269.30: 308.08]		100.0%
Heterogeneity: $l^2 = 99\%$ , $\tau^2 = 2520,4498$ , $\rho = 0$						200.00	[	•	
				200	250 300 350 40	0			

Figure S20 Forest plot for total operation time.

Study	Evente	Total		Proportion	95%-CI	Weight	Weight (random)
Study	Lventa	Total		rioportion	3378-01	(common)	(random)
A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al. 2023	205	1000	: <del></del>	0.20	[0.18: 0.23]	18.3%	5.8%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy 2023	65	525		0.12	[0.10: 0.15]	6.4%	5.2%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy 2023	16	133		0.12	[0.08; 0.19]	1.6%	3.3%
S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy 2023	88	720		0.12	[0.10; 0.15]	8.7%	5.4%
H. H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al. 2022	71	544		0.13	[0.10; 0.16]	6.9%	5.2%
M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy 2022	14	100		0.14	[0.08; 0.22]	1.3%	3.1%
A. Spanjersberg, L. Hoek, J. P. Ottervanger, T. Y. Nguyen, E. Kaplan, R. Laurens, et al. 2022	21	107		0.20	[0.13; 0.28]	1.9%	3.6%
G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al. 2022	91	600		0.15	[0.13; 0.18]	8.7%	5.4%
H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco 2020	0	16		0.00	[0.00; 0.34]	0.1%	0.2%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy 2019	62	308		0.20	[0.16; 0.25]	5.5%	5.0%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel 2018	14	50		0.28	[0.17; 0.42]	1.1%	2.8%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel 2018	33	220	<u></u>	0.15	[0.11; 0.20]	3.1%	4.4%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy 2018	57	263		0.22	[0.17; 0.27]	5.0%	4.9%
H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy 2018	54	234		0.23	[0.18; 0.29]	4.7%	4.8%
C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Coiffic, G. Colonna, et al. 2015	7	38		0.18	[0.09; 0.34]	0.6%	2.0%
M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al. 2014	47	307	- <u></u>	0.15	[0.12; 0.20]	4.5%	4.8%
G. Leyvi, S. J. Forest, V. S. Srinivas, M. Greenberg, N. Wang, A. Mais, et al. 2014	19	150		0.13	[0.08; 0.19]	1.9%	3.6%
N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al. 2013	73	500	- <u>#</u> -	0.15	[0.12; 0.18]	7.0%	5.2%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. 2012	50	334	- <u>e</u> -	0.15	[0.12; 0.19]	4.8%	4.9%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. 2012	21	150		0.14	[0.09; 0.21]	2.0%	3.7%
R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney 2012	17	106		0.16	[0.10; 0.24]	1.6%	3.4%
S. Srivastava, R. Barrera and S. Quismundo 2012	13	164		0.08	[0.05; 0.13]	1.3%	3.1%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. 2009	2	25		0.08	[0.02; 0.27]	0.2%	0.8%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. 2009	3	25		0.12	[0.04; 0.31]	0.3%	1.1%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. 2009	1	25		0.04	[0.01; 0.24]	0.1%	0.5%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. 2009	3	25		0.12	[0.04; 0.31]	0.3%	1.1%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, R. Barrera, S. Quismundo, et al. 2008	12	93		0.13	[0.07; 0.21]	1.2%	2.9%
M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poirier, et al. 2006	1	85		0.01	[0.00; 0.08]	0.1%	0.5%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kolluru, J. Naidu, M. Shroff, et al. 2006	5	150		0.03	[0.01; 0.07]	0.5%	1.7%
J. W. Bolton and J. E. Connally 2004	1	10		- 0.10	[0.01; 0.47]	0.1%	0.4%
R. J. Damiano, Jr., H. A. Tabaie, M. J. Mack, J. R. Edgerton, C. Mullangi, W. P. Graper, et al. 2001	3	32		0.09	[0.03; 0.25]	0.3%	1.1%
Common effect model		7039	•	0.16	[0.15: 0.17]	100.0%	
Random effects model			$\diamond$	0.15	[0.13; 0.17]		100.0%
Heterogeneity: $I^2 = 69\%$ , $\tau^2 = 0.0814$ , $p < 0.01$							
			0.1 0.2 0.3 0.4				

Figure S21 Forest plot for total post-operative atrial fibrillation.

Study	Events Total	Proportion	95%-CI	Weight (common)	Weight (random)
A. Jonsson, J. Binongo, P. Patel, Y. Wang, V. Garner, D. Mitchell-Cooks, et al. 2023	6 1000 📫	0.01 [	0.00; 0.01]	7.3%	6.8%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy 2023	3 525 🖶	0.01	0.00; 0.02]	3.6%	3.8%
S. Nisivaco, H. Kitahara, A. Abutaleb, S. Nathan and H. H. Balkhy 2023	3 133 🔚 🚽	0.02	0.00; 0.06]	3.6%	3.7%
S. Nisivaco, B. Patel, C. Coleman, H. Kitahara, G. Torregrossa and H. H. Balkhy 2023	6 720 🖛	0.01	0.00; 0.02]	7.3%	6.8%
H. H. Balkhy, S. Nisivaco, H. Kitahara, G. Torregrossa, B. Patel, K. Grady, et al. 2022	5 544 🖷	0.01	0.00; 0.02]	6.0%	5.9%
M. P. Peev, S. Nisivaco, G. Torregrossa, A. Arastu, S. Shahul and H. H. Balkhy 2022	0 100 +	0.00	0.00; 0.04]	0.6%	0.7%
A. Spanjersberg, L. Hoek, J. P. Ottervanger, T. Y. Nguyen, E. Kaplan, R. Laurens, et al. 2022	0 107 🕂	0.00 [	0.00; 0.03]	0.6%	0.7%
G. Torregrossa, M. P. Sá, J. Van den Eynde, J. H. Malin, A. Dokollari, O. Erten, et al. 2022	8 600 🗮	0.01 [	0.01; 0.03]	9.6%	8.5%
M. Varrone, I. C. Sarmiento, L. Pirelli, D. R. Brinster, V. P. Singh, M. C. Kim, et al. 2022	5 1080 🖾	0.00 [	0.00; 0.01]	6.1%	5.9%
H. H. Balkhy, H. Kitahara, B. Mitzman and S. Nisivaco 2020	0 16	0.00 [	0.00; 0.21]	0.6%	0.7%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy 2019	5 308 📻	0.02 [	0.01; 0.04]	6.0%	5.8%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel 2018	0 50	0.00 [	0.00; 0.07]	0.6%	0.7%
H. H. Balkhy, S. Nisivaco, H. Kitahara, M. McCrorey and B. Patel 2018	4 220 💻	0.02 [	0.00; 0.05]	4.8%	4.8%
H. Kitahara, M. McCrorey, B. Patel, S. Nisivaco and H. H. Balkhy 2018	4 263 🗰	0.02 [	0.00; 0.04]	4.8%	4.8%
H. Kitahara, B. Patel, M. McCrorey, S. Nisivaco and H. H. Balkhy 2018	4 234 🚈	0.02 [	0.00; 0.04]	4.8%	4.8%
C. Pasrija, Z. N. Kon, M. Ghoreishi, E. J. Lehr, J. S. Gammie, B. P. Griffith, et al. 2018	0 50	0.00 [	0.00; 0.07]	0.6%	0.7%
H. H. Balkhy, S. Nathan, S. E. Arnsdorf and D. J. Krienbring 2017	1 140 🗕	0.01 [	0.00; 0.04]	1.2%	1.4%
C. Zaouter, J. Imbault, L. Labrousse, Y. Abdelmoumen, A. Coiffic, G. Colonna, et al. 2015	0 38 +	0.00 [	0.00; 0.09]	0.6%	0.7%
R. Casula, E. Khoshbin and T. Athanasiou 2014	0 100 +	0.00 [	0.00; 0.04]	0.6%	0.7%
M. E. Halkos, H. A. Liberman, C. Devireddy, P. Walker, A. V. Finn, W. Jaber, et al. 2014	4 307 ∓	0.01 [	0.00; 0.03]	4.8%	4.8%
G. Leyvi, S. J. Forest, V. S. Srinivas, M. Greenberg, N. Wang, A. Mais, et al. 2014	0 150 ++-	0.00 [	0.00; 0.02]	0.6%	0.7%
N. Bonaros, T. Schachner, E. Lehr, M. Kofler, D. Wiedemann, P. Hong, et al. 2013	5 500 🗮	0.01 [	0.00; 0.02]	6.0%	5.9%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. 2012	1 334 +	0.00 [	0.00; 0.02]	1.2%	1.4%
J. Bonatti, E. J. Lehr, T. Schachner, D. Wiedemann, F. Weidinger, B. Wehman, et al. 2012	3 150 💻	0.02 [	0.00; 0.06]	3.6%	3.7%
R. Dhawan, J. D. Roberts, K. Wroblewski, J. A. Katz, J. Raman and M. A. Chaney 2012	4 106	0.04 [	0.01; 0.09]	4.7%	4.7%
S. Srivastava, R. Barrera and S. Quismundo 2012	1 164 **	0.01 [	0.00; 0.03]	1.2%	1.4%
H. H. Balkhy, L. S. Wann, D. Krienbring and S. E. Arnsdorf 2011	1 120 +	0.01 [	0.00; 0.05]	1.2%	1.3%
T. A. Folliguet, A. Dibie, F. Philippe, F. Larrazet, M. S. Slama and F. Laborde 2010		0.02 [	0.00; 0.10]	1.2%	1.3%
N. Bonaros, I. Schachner, D. Wiedemann, A. Oenlinger, E. Ruetzler, G. Feuchtner, et al. 200	9 0 55	0.00 [	0.00; 0.06]	0.6%	0.7%
N. Bonaros, T. Schachner, D. Wiedemann, A. Oehlinger, E. Ruetzler, G. Feuchtner, et al. 200		0.00 [	0.00; 0.06]	0.6%	0.7%
J. Bonatti, T. Schachner, N. Bonaros, A. Oehlinger, D. Wiedemann, E. Ruetzler, et al. 2009	0 25	0.00 [	0.00; 0.14]	0.6%	0.7%
J. Bonatti, I. Schachner, N. Bonaros, A. Oenlinger, D. Wiedemann, E. Ruetzler, et al. 2009	0 25	0.00 [	0.00; 0.14]	0.6%	0.7%
J. Bonatti, T. Schachner, N. Bonaros, A. Ochlinger, D. Wiedemann, E. Ruetzier, et al. 2009	0 25	0.00 [	0.00; 0.14]	0.6%	0.7%
J. Bonatti, T. Schachner, N. Bonaros, A. Oenlinger, D. Wiedemann, E. Ruetzier, et al. 2009	0 25	0.00 [	0.00; 0.14]	0.6%	0.7%
S. Srivastava, S. Gadasalli, M. Agusala, R. Kollurd, K. Barrera, S. Quismundo, et al. 2008	0 93	0.00 [	0.00; 0.04]	0.6%	0.7%
M. Argenziano, M. Katz, J. Bonatti, S. Srivastava, D. Murphy, R. Poiner, et al. 2006	0 85	0.00 [	0.00; 0.04]	0.6%	0.7%
S. Srivastava, S. Gadassalli, M. Agusala, K. Kolluru, J. Naldu, M. Shroll, et al. 2006		0.00	0.00, 0.02]	0.6%	0.7%
J. W. DORON and J. C. CONNAILY 2004	0 10	— 0.00 [	0.00; 0.31]	0.6%	0.7%
Common effect model	8664 🕴	0.01 [	0.01; 0.01]	100.0%	
Random effects model	<b>*</b>	0.01 [	0.01; 0.01]		100.0%
Heterogeneity: $l^2 = 0\%$ , $\tau^2 = 0.0388$ , $\rho = 0.86$		I			
	0 0.05 0.1 0.15 0.2 0.25	0.3			

Figure S22 Forest plot for total 30-day mortality.

Table S1 Detailed study characteristics (I)													
Primary author	Year	Country	Study design	Males	Age ± SD (years)	HTN	T2DM	Dyslipidemia	MI history (all)	PVD	30-D Mort		
A. Jonsson	2023	USA	SC; RCS	758	64±11	915	356	-	479	-	6		
S. Nisivaco	2023	USA	SC; RCS	117	66	447	209	402	128	50	3		
S. Nisivaco	2023	USA	SC; RCS	29	67	117	64	110	33	18	3		
S. Nisivaco	2023	USA	SC; RCS	557	66	615	294	564	187	74	6		
H. H. Balkhy	2022	USA	SC; RCS	411	66±10.5	451	219	410	149	62	5		
N. C. Patel	2022	USA	SC; RCS	113	62.6	-	73	-	51	14	-		
M. P. Peev	2022	USA	SC; RCS	76	66	91	48	80	38	17	0		
A. Spanjersberg	2022	Netherlands	SC; PCS	77	65.3	56	16	-	20	-	0		
G. Torregrossa	2022	USA	SC; RCS	0	74	532	266	548	336	88	8		
M. Varrone	2022	USA	SC; RCS	809	66.3±10.9	-	556	-	374	109	5		
H. H. Balkhy	2020	USA	SC; RCS	12	60.6±13.5	9	2	-	7	-	0		
H. Kitahara	2019	USA	SC; RCS	83	65.6	254	123	230	-	41	5		
H. H. Balkhy	2018	USA	SC; RCS	27	72.8±10.2	48	33	36	-	19	0		
H. H. Balkhy	2018	USA	SC; RCS	168	63.8±10.0	173	76	166	-	15	4		
H. Kitahara	2018	USA	SC; RCS	192	65.4±10.6	219	106	199	81	35	4		
H. Kitahara	2018	USA	SC; RCS	62	66	193	94	177	74	-	4		
C. Pasrija	2018	USA	SC; RCS	36	62	36	17	33	-	5	0		
H. H. Balkhy	2017	USA	SC; RCS	106	63.4±11.2	-	-	-	-	-	1		
W. N. Raad	2016	USA	SC; RCS	96	64.2	128	73	-		22	-		
C. Zaouter	2015	France	SC; RCS	33	64	28	14	36	-	5	0		
R. Casula	2014	UK	SC; RCS	95	62±11	-	17	-	18	-	0		
M. E. Halkos	2014	USA	SC; PCS	219	62.7±11.6	282	109	296	161	38	4		

SD, standard deviation; HTN, hypertension; T2DM, type 2 diabetes; MI, myocardial infarction; PVD, peripheral vascular disease; 30-D Mort, thirty-day mortality; SC, single-center; RCS, retrospective cohort study; PCS, prospective cohort study.

Table S2 Detailed	Table S2 Detailed study characteristics (II)												
Primary author	Year	COPD	CKD	Operation time (min)	Post-op AF	ICU stay (days)	Hospital stay (days)	Cohort N	Graft number				
A. Jonsson	2023	-	20	-	-	1.6±1.8	4.43±2.51	1000	-				
S. Nisivaco	2023	45	108	237±82	205	1.27±0.65	2.59±1.25	525	836				
S. Nisivaco	2023	8	39	325±62	65	1.23±0.6	2.70±1.12	133	272				
S. Nisivaco	2023	61	159	254±85	16	1.25±0.64	2.35±0.89	720	-				
H. H. Balkhy	2022	52	112	251±84	88	1.30±0.69	2.72±1.29	544	892				
N. C. Patel	2022	-	-	-	71	-	-	158	158				
M. P. Peev	2022	16	33	256±88	-	1.54±0.89	3.07±1.51	100	162				
A. Spanjersberg	2022	15	-	-	14	-	5 (4–7)	107	107				
G. Torregrossa	2022	115	-	355.2 [315–405]	21	1.7 [1–2.9]	5.00 [4.00; 6.00]	600	689				
M. Varrone	2022	-	46	-	91	-	4 (3–5)	1080	-				
H. H. Balkhy	2020	0	1	223±49	-	1.2±0.4	2.3±1.2	16	16				
H. Kitahara	2019	31	62	282.7±88.9	0	1.7±2.6	3.6±2.9	308	513				
H. H. Balkhy	2018	13	28	270±87	62	1.76±0.96	4.07±1.51	50	80				
H. H. Balkhy	2018	14	27	243±84	14	1.21±0.49	2.90±1.21	220	375				
H. Kitahara	2018	26	54	293 (210–350)	33	1.73±2.67	3.55±2.94	263	-				
H. Kitahara	2018	23	49	295	57	1.81±2.82	3.61±3.06	234	399				
C. Pasrija	2018	-	-	198	54	1.8 (IQR 1–2.7)	7 (IQR 6–12)	50	50				
H. H. Balkhy	2017	-	50	293±71	-	-	3.1±1.5	140	288				
W. N. Raad	2016	22	-	-	-	-	5 (3.8)	142	-				
C. Zaouter	2015	7	-	373±60	-	0.88	8	38	38				
R. Casula	2014	7	-	-	7	-	4±1	100	100				
M. E. Halkos	2014	-	10	-	-	1.0 (0–19)	4 (2–27)	307	307				

COPD, chronic obstructive pulmonary disease; CKD, chronic kidney disease; AF, atrial fibrillation; ICU, intensive care unit.

Table S3 Detailed study characteristics (III)													
Primary author	Year	Country	Study design	Males	Age ± SD (years)	HTN	T2DM	Dyslipidemia	MI history (all)	PVD	30-D Mort		
G. Leyvi	2014	USA	PCS	103	64.76	-	76	-	59	-	0		
N. Bonaros	2013	USA; Austria	MC; RCS	364	62±9	406	133	419	162	32	5		
J. Bonatti	2012	Austria; USA	MC; RCS	233	60 (31–90)	-	-	-	91	22	1		
J. Bonatti	2012	Austria; USA	MC; RCS	117	61 (38–83)	-	-	-	61	9	3		
M. E. Currie	2012	Canada	SC; RCS	77	55.5±9.8	-	10	-	7	2	-		
R. Dhawan	2012	USA	SC; RCS	79	63.6±11.5	98	36	78	30	5	4		
S. Srivastava	2012	USA	SC; RCS	128	63	91	9	0	26	2	1		
H. H. Balkhy	2011	USA	SC; RCS	86	66.3±10.4	73	23	67	-	7	1		
T. A. Folliguet	2010	France	SC; PCS	46	66±11	32	14	-	37		1		
N. Bonaros	2009	USA	SC; RCS	43	60.2±6.0	49	7	44	-	0	0		
N. Bonaros	2009	USA	SC; RCS	49	64.2±7.3	41	9	50	-	2	0		
J. Bonatti	2009	USA	SC; RCS	17	59 (46–70)	22	3	21	10	0	0		
J. Bonatti	2009	USA	SC; RCS	21	54 (38–67)	19	1	20	8	1	0		
J. Bonatti	2009	USA	SC; RCS	25	58 (38–76)	20	4	22	5	0	0		
J. Bonatti	2009	USA	SC; RCS	18	58 (40–74)	22	1	22	5	1	0		
S. Srivastava	2008	USA	SC; PSC	47	67.4	73	38	31	26	-	0		
M. Argenziano	2006	USA; Austria	MC; RCS	69	58±10	47	18	68	32	2	0		
S. Srivastava	2006	USA	SC; RCS	99	67.2	117	69	-	42	21	0		
J. W. Bolton	2004	USA	SC; PCS	6	61±11.4	-	2	-	3	-	0		
R. J. Damiano	2001	USA	MC; PCS	24	63±9	-	-	-	-	-	-		

SD, standard deviation; HTN, hypertension; T2DM, type 2 diabetes; MI, myocardial infarction; PVD, peripheral vascular disease; 30-D Mort, thirty-day mortality; PCS, prospective cohort study; MC, multi-center; SC, single-center; RCS, retrospective cohort study.

Table S4 Detailed study characteristics (IV)									
Primary Author	Year	COPD	CKD	Operation time (min)	Post-op AF	ICU stay (h)	Hospital stay (days)	Cohort N	Graft number
G. Leyvi	2014	103	-	222±66	19	-	6	150	-
N. Bonaros	2013	364	8	305 (112–1050)	73	23 (11–1,048)	9 (0–704)	500	683
J. Bonatti	2012	233	1	240 (112–650)	50	21 (11–389)	6 (2–33)	334	334
J. Bonatti	2012	117	0	375 (168–795)	21	39 (12–480)	6 (2–27)	150	300
M. E. Currie	2012	77	-	-	-	-	3.8±1.1	82	-
R. Dhawan	2012	79	_	326±139	17	2.3 (0–22)	5.2 (2–24)	106	192
S. Srivastava	2012	128	2	-	13	-	-	164	243
H. H. Balkhy	2011	86	3	-	-	-	3.3±2.4	120	167
T. A. Folliguet	2010	46	2	274±118		52±23	7.1±3.5	56	59
N. Bonaros	2009	43	-	-	-	30.6±19.5	9.8±6.2	55	55
N. Bonaros	2009	8	-	-	-	46±21.1	-	9	123
N. Bonaros	2009	49	_	-	-	34.7±16.8	_	56	25
J. Bonatti	2009	17	0	400 (260–690)	2	23 (11–282)	7 (4–15)	25	25
J. Bonatti	2009	21	0	330 (240–620)	3	20 (18–389)	6 (5–21)	25	25
J. Bonatti	2009	25	0	280 (205–683)	1	20 (14–61)	5 (4–8)	25	25
J. Bonatti	2009	18	0	272 (178–542)	3	19 (17–230)	6 (4–14)	25	136
S. Srivastava	2008	47	3	272.3±128	12	-	3.4±2.0	93	85
M. Argenziano	2006	69	1	353±89	1	35±37	5.1±3.4	85	390
S. Srivastava	2006	99	7	311.6±11.54	4.7	-	3.6±2.9	150	12
J. W. Bolton	2004	6	0	200	1	-	2.8 (1–9)	10	90
R. J. Damiano	2001	24	-	-	3	31±24	5.5±2.7	32	-

COPD, chronic obstructive pulmonary disease; CKD, chronic kidney disease; AF, atrial fibrillation; ICU, intensive care unit.