

Use of mechanical pulmonary reperfusion and fibrinolysis in acute massive pulmonary embolism requiring extracorporeal membrane oxygenation support: a systematic review and meta-analysis

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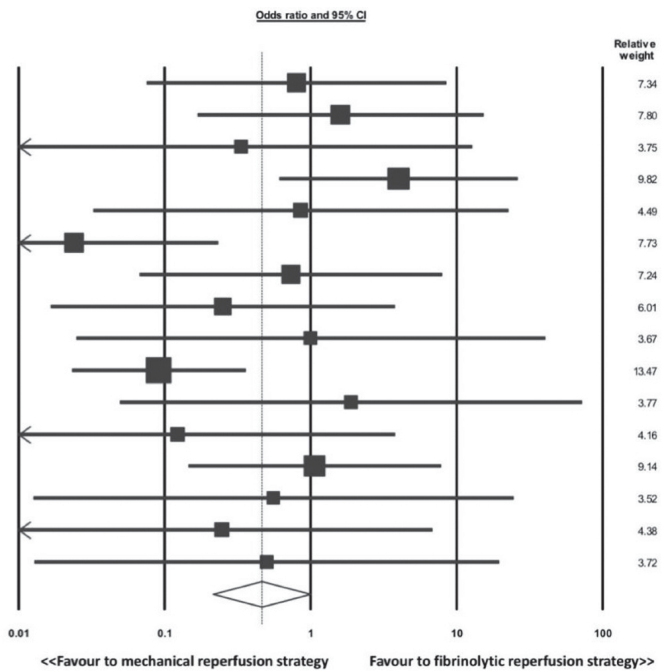
Background and objectives: The optimal pulmonary revascularization strategy in acute massive pulmonary embolism (PE) requiring the implantation extra corporeal membrane oxygenation remains controversial, and data are sparse.

Methods: We conducted a systematic review and meta-analysis of available evidence regarding the use of mechanical reperfusion (i.e. surgical or catheter-based embolectomy) and fibrinolytic strategies (i.e. systemic fibrinolysis, catheter-directed fibrinolysis, or as stand-alone therapy) in terms of mortality and bleeding outcomes.

Results: The literature search identified 835 studies, 17 of which were included or a total of 321 PE patients with ECMO. In total, 31.1% were treated with mechanical pulmonary reperfusion, while 78.9% received fibrinolytic strategies. The mortality rate was 23.0% in the mechanical reperfusion group and 43.1% in the fibrinolysis group (Figure). The pooled OR for mortality with mechanical reperfusion was 0.46 (95% CI, 0.213–0.997; I²=28.3%) versus fibrinolysis. The rate of bleeding in PE patients under ECMO was 29.1% in the mechanical reperfusion group and 26.0% in the fibrinolytic reperfusion (OR, 1.09; 95% CI, 0.46–2.54; I²=0.0%) among 10 eligible studies with available bleeding data. The meta-regression model did not identify any relationship between the covariates “more than one pulmonary reperfusion therapy” and “ECMO implantation before pulmonary reperfusion therapy”, and outcomes.

Conclusions: The results of the present meta-analysis and meta-regression suggest that surgical embolectomy yields the best results, regardless of the timing of VA-ECMO implantation in the reperfusion timeline, and regardless of whether fibrinolysis has been administered or not.

Study name	Mortality / Total						Mechanical reperfusion strategy	Fibrinolytic reperfusion strategy
	Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	p-Value		
Al-Bawardy (2018)	0.800	0.076	8.474	-0.185	0.853	2 / 4	5 / 9	
Corsi (2017)	1.600	0.168	15.273	0.408	0.683	2 / 4	5 / 13	
Dolmatova (2017)	0.333	0.009	12.815	-0.590	0.555	0 / 1	2 / 4	
George (2018)	4.000	0.612	26.123	1.448	0.148	4 / 6	9 / 27	
Goreishi (2019)	0.855	0.032	22.551	-0.094	0.925	0 / 11	1 / 30	
Ius (2019)	0.024	0.002	0.232	-3.220	0.001	1 / 20	11 / 16	
Kjaergaard (2019)	0.733	0.068	7.951	-0.255	0.799	1 / 4	10 / 32	
Luna-Lopez (2019)	0.250	0.017	3.770	-1.001	0.317	1 / 5	3 / 6	
Mij (2014)	1.000	0.025	40.276	0.000	1.000	1 / 1	4 / 5	
Meneveau (2018)	0.091	0.023	0.359	-3.425	0.001	4 / 17	27 / 35	
Myazaki (2019)	1.889	0.050	72.022	0.342	0.732	0 / 1	1 / 9	
Mbon (2018)	0.123	0.004	3.781	-1.199	0.230	0 / 1	9 / 12	
Oh (2019)	1.067	0.145	7.822	0.063	0.949	4 / 9	3 / 7	
Omar (2013)	0.556	0.013	24.513	-0.304	0.761	2 / 3	1 / 1	
Pasirja (2017)	0.246	0.009	6.823	-0.827	0.408	0 / 11	1 / 9	
Szol (2015)	0.500	0.013	19.562	-0.371	0.711	1 / 2	2 / 3	
Overall	0.461	0.213	0.997	-1.967	0.049	23 / 100	94 / 218	



I-squared = 28.3%, p = 0.139

NOTE: Weights are from random effects analysis