

# Patient Outcomes of Emergent Venoarterial Extracorporeal Membrane Oxygenation Support in Acute Pulmonary Embolism

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## Introduction

- High-risk pulmonary embolism (PE) is associated with high mortality rates, particularly in patients requiring intravenous vasopressors or those who have suffered cardiac arrest<sup>1</sup>.
- Large-bore aspiration thrombectomy has emerged as a promising reperfusion strategy for these patients, especially when traditional thrombolysis is contraindicated<sup>2</sup>.
- The use of venoarterial extracorporeal membrane oxygenation (VA-ECMO) is increasing in patients with high-risk PE following cardiac arrest or with hemodynamic instability
- Despite the potential benefits, data on the outcomes of patients undergoing aspiration thrombectomy while on VA-ECMO support is limited<sup>1,3</sup>.

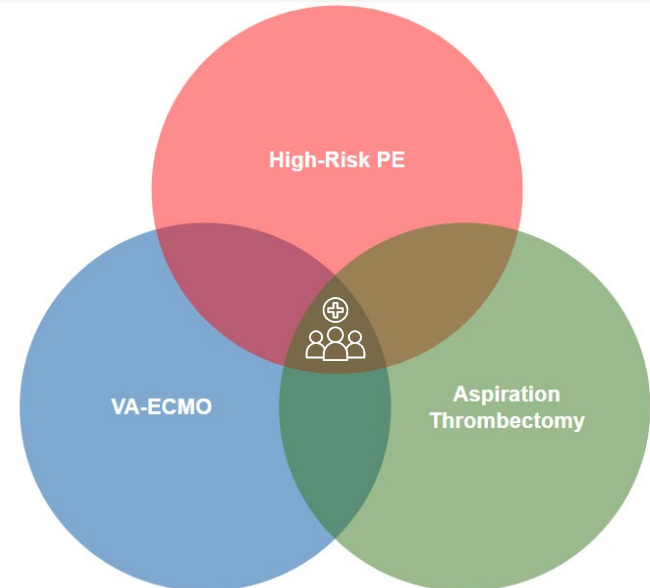
## Objective

- To evaluate the outcomes of high-risk pulmonary embolism (PE) patients requiring VA-ECMO support who underwent percutaneous aspiration thrombectomy.

## Methods

- A retrospective analysis was conducted using data collected from January 2021 to June 2024 at a single tertiary care center.
- The study included patients with high-risk pulmonary embolism (PE) who required VA-ECMO support and subsequently underwent percutaneous aspiration thrombectomy.
- High-risk PE was defined according to the European Society of Cardiology PE classification system<sup>4</sup>.
- All patients underwent VA-ECMO cannulation before aspiration thrombectomy
- Patient data included demographics, clinical presentations, and outcomes, such as survival to discharge, complications, and duration of VA-ECMO support, ICU stay, and total hospital stay.

## Study Population



## Results

**Table 1: Baseline Characteristics, Pulmonary Embolism Severity and Patient Outcomes**

Demographics	Entire Cohort		
Average Age (years ± SD)	49.8 ± 16.8		
Gender	3 Female, 6 Male		
Race	4 Black, 5 White		
Average BMI (kg/m <sup>2</sup> ± SD)	36.1 ± 6.9		
PE Characteristics and Management	Entire Cohort (n=9)	Survivors (n=6)	Non-Survivors (n=3)
Average PE Severity Index (± SD)	169.8 ± 49.5	167.5 ± 48.3	174.3 ± 54.4
Average Lactate (mmol/L ± SD)	9.0 ± 4.2	7.6 ± 2.5	11.7 ± 4.3
Mechanical Ventilation	9	6	3
Acute Kidney Injury	9	6	3
IV Vasopressors	9	6	3
Elevated Troponin	8/8	5/5	3/3
Elevated BNP	5/5	4/4	1/1
RV Dysfunction on Imaging	9	6	3
Cardiac Arrest	7	4	3
Contraindication to Lysis	5	4	1
Patient Outcomes	Entire Cohort (n=9)	Survivors (n=6)	Non-Survivors (n=3)
Thrombolysis before VA-ECMO	2	2	0
Thrombectomy after VA-ECMO	9	6	3
Bleeding on VA-ECMO	6	3	3
Average Time from PE to Aspiration Thrombectomy	1.9d	2.5d	0.7d
Average Time from PE to VA-ECMO	1.6d	2.3d	0.3d
Average Time on VA-ECMO for Survivors	n/a	8.0d	n/a
Average ICU Stay after PE for Survivors	n/a	25.4d	n/a
Average Hospital Stay after PE for Survivors	n/a	38.2d	n/a
Average Time to Death after PE Diagnosis	n/a	n/a	22.3d
Average Time to Death after VA-ECMO Initiation	n/a	n/a	22.0d

**Legend:** BMI: Body Mass Index; BNP: Brain Natriuretic Peptide; ICU: Intensive Care Unit; IQR: Interquartile Range; IV: Intravenous; PE: Pulmonary Embolism; RV: Right Ventricle; SD: Standard Deviation; VA-ECMO: Venoarterial Extracorporeal Membrane Oxygenation

## Discussion

- High-risk pulmonary embolism (PE) patients who require VA-ECMO support face a high mortality risk, especially after cardiac arrest or with hemodynamic instability.
- The study demonstrates the feasibility and technical success of performing large-bore aspiration thrombectomy in these critically ill patients, with a 70% survival rate to discharge despite the high-risk nature of the cohort.
- Complications such as bleeding and stroke were observed, highlighting the risks associated with emergent VA-ECMO cannulation and aspiration thrombectomy in this patient population.
- The study's findings align with limited prior data, suggesting that aspiration thrombectomy supported by VA-ECMO may benefit a subset of very high-risk PE patients<sup>1,3</sup>.
- The small sample size and single-center design limit the generalizability of the results, and further studies are needed to better identify risk factors and optimize treatment strategies for this patient population.

## References

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## Conclusion

- Large-bore aspiration thrombectomy, when supported by VA-ECMO in high-risk pulmonary embolism (PE) patients, is a feasible and potentially life-saving intervention, with a notable survival rate despite the high-risk nature of the cohort.

## Future Discussion

- Further research is needed to determine the optimal criteria for selecting high-risk pulmonary embolism (PE) patients who would benefit most from VA-ECMO-supported aspiration thrombectomy. Additionally, studies should focus on refining risk stratification parameters, improving the timing of interventions, and minimizing complications associated with this complex management strategy.

## Conflicts of Interest

Dr. Arvinda Nanjundappa is a consultant for Argon Medical Devices and Medtronic. Dr. Nanjundappa has speakership roles for Medtronic, Zoll Medical, Recor Medical, and Philips Healthcare. The other authors have no conflicts of interest.