Pulmonary Embolism Outcomes in Sickle Cell vs. Non–Sickle Cell Patients: A Propensity-Matched Analysis Using the TriNetX Research Network

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Background

Sickle cell disease patients experience increased thrombotic risk, but the comparative outcomes of pulmonary embolism in this population versus those without SCD remain insufficiently characterized.

Objective

To compare clinical outcomes and mortality rates between sickle cell disease (SCD) patients with pulmonary embolism (PE) and non-SCD patients with PE.

Methods

Design: Retrospective cohort study using TriNetX Research Network (129 healthcare organizations)

Population: Patients with PE who had SCD (n=4,742) vs. PE without SCD (n=938,500)

Analysis: Propensity score matching for age, race, gender, endocrine disorders, hypertensive diseases, and kidney disease

Final Cohorts: 4,655 patients each after matching

Primary outcome: All-cause mortality

Secondary outcomes: Cardiac complications, cerebrovascular events, hospital/ICU admissions, arrhythmias, kidney injury

Statistical methods: Risk ratio analysis, 5-year follow-up period

Primary Outcome

All-cause mortality:

13.6%	12.1%
SCD with PE	Non-SCD with PE

Risk Ratio: 1.124
95% CI: 1.010-1.250
p-value: 0.032

Secondary Outcomes

Heart Failure	RR 1.457
Acute Kidney Injury	RR 1.625
Acute MI	RR 1.369
Cerebrovascular Disease	RR 1.557

Additional findings with SCD (all p<0.001):

- *Heart failure: 11.2% vs 7.7%*
- *Acute kidney injury: 15.4% vs 9.5%*
- *Acute MI: 5.2% vs 3.8%*
- *Cerebrovascular disease: 8.8% vs 5.7%*

Results Summary

12%
Higher Mortality in SCD

Key Findings:

- SCD patients with PE had 12% higher all-cause mortality
- 46% increase in heart failure risk
- 63% increase in acute kidney injury
- 37% increase in acute MI risk
- 56% increase in cerebrovascular disease

Conclusion

Patients with SCD who develop pulmonary embolism experience significantly worse outcomes, including higher mortality, heart failure, acute kidney injury, myocardial infarction, and cerebrovascular events compared to non-SCD patients with PE.

Clinical Implications: These findings highlight the need for specialized management approaches for PE in the SCD population and suggest potential cardiovascular advantages of enhanced monitoring in this high-risk population.

Strengths and Limitations

Strengths:

- Large sample size
- Propensity matching
- Comprehensive outcome assessment
- Multi-center data

Limitations:

- Retrospective design
- Potential residual confounding
- Unknown medication adherence
- Database limitations