

Comparison of Catheter-Based Therapies with Anticoagulation Alone in Treatment of Pulmonary Embolism: A Propensity-Matched Multicenter Study

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Purpose

This study aims to evaluate the efficacy and safety of catheter-based therapies (CBT), mechanical thrombectomy (MT) or catheter-directed thrombolysis (CDT), compared with anticoagulation (AC) alone for the treatment of pulmonary embolism (PE).

Background

Previous studies have shown the success of CBTs, but many of these studies lack a control arm involving AC alone. Further evidence is needed to better understand whether interventional treatment is beneficial and safe compared to AC alone. While previous trials have shown improved outcomes with MT compared to CDT, the decision to use either procedure is individualized and complex.

Demographic/Diagnosis	CBT	AC Alone
Sample Size	1,219	1,219
Age at Index	59.9 ± 14.7	60.3 ± 15.5
Sex		
Male	629 (51.6%)	635 (52.1%)
Female	590 (48.4%)	584 (47.9%)
Race		
White	796 (65.3%)	785 (64.4%)
Black or AA	352 (28.9%)	375 (30.8%)
Asian	13 (1.1%)	11 (0.9%)
American Indian or Alaskan Native	10 (0.8%)	10 (0.8%)
Native Hawaiian or Other Pacific Islander	10 (0.8%)	10 (0.8%)
Other	20 (1.6%)	16 (1.3%)
Unknown	35 (2.9%)	28 (2.3%)
Hypertension	751 (61.6%)	769 (63.1%)
Ischemic Heart Disease	393 (32.2%)	405 (33.2%)
Heart Failure	298 (24.5%)	300 (24.6%)
CKD	155 (12.7%)	148 (12.1%)
Diabetes Mellitus	344 (28.2%)	346 (28.4%)
Obesity	242 (19.9%)	224 (18.4%)
Cases of Malignancy*	193	193
Systolic Blood Pressure	114 ± 21.7	115 ± 22.8
Heart Rate**	95.7 ± 20	93.2 ± 19.6

Table 1: Patient characteristics after propensity matching. *Cases of malignancy denotes total number of malignancies recorded (not number of patients) **All differences not significant except for heart rate (P = 0.001).

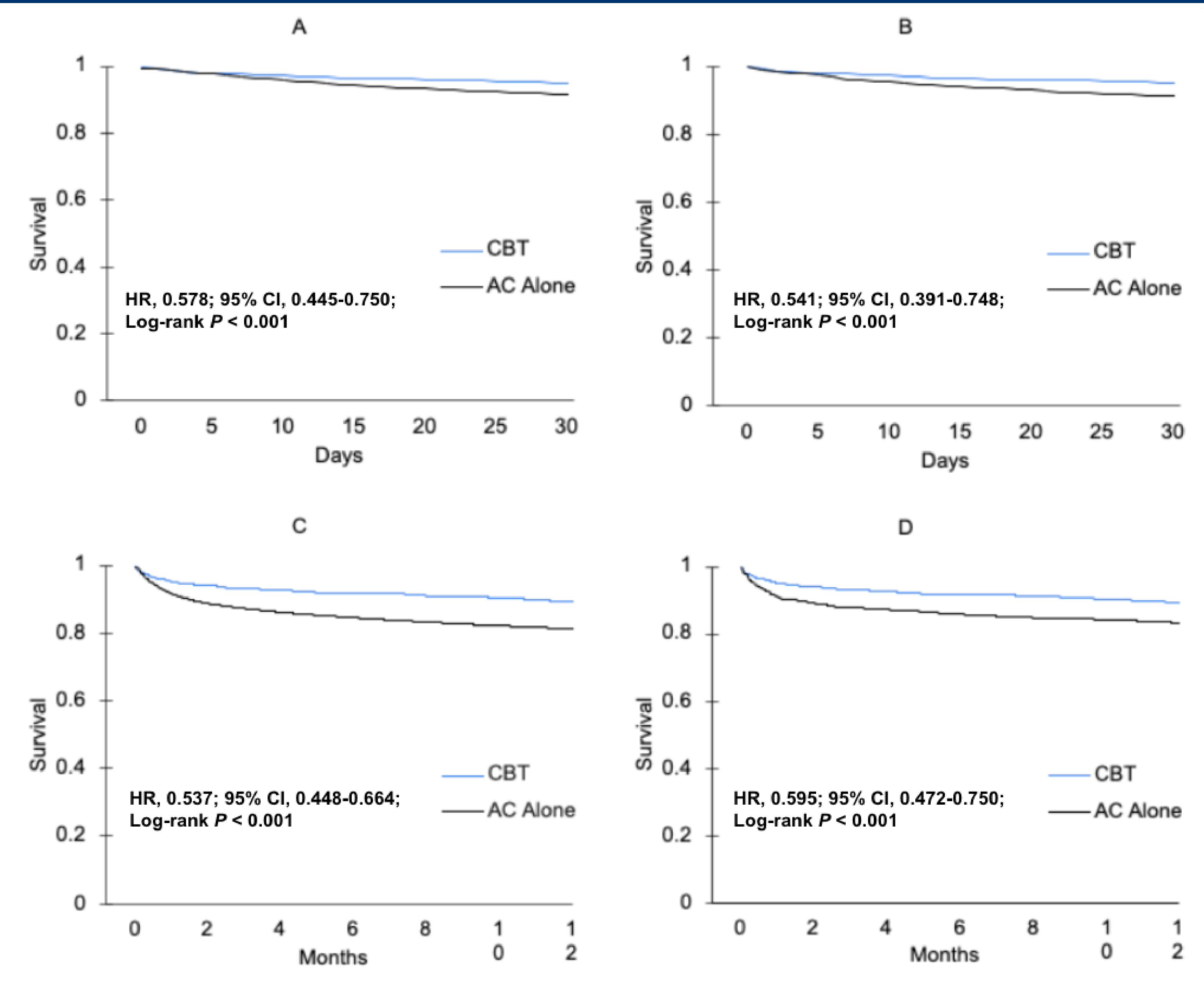


Figure 1: Kaplan Meier Survival Curves; A: 30 day mortality before matching; B: 30 day mortality after matching; C: 1 year mortality before matching; D: 1 year mortality after matching

Before Propensity Score Matching	CBT (n = 1220)	AC Alone (n = 88,606)	OR (CI 95%)	P value
30 Day Outcomes				
All-Cause Mortality	57 (4.7%)	6,998 (7.9%)	0.57 (0.438,0.746)	< 0.001
Blood Transfusion	63 (5.2%)	3,213 (3.6%)	1.45 (1.12,1.869)	0.004
GI Bleed	50 (4.1%)	3,768 (4.3%)	0.96 (0.724,1.279)	0.791
ICH	24 (2.0%)	1,368 (1.5%)	1.28 (0.851,1.924)	0.235
ED Visit 5 to 30 days after PE	76 (6.2%)	7,953 (9.0%)	0.67 (0.534,0.851)	0.001
1 Year Outcomes				
All-Cause Mortality	117 (9.6%)	14,944 (16.9%)	0.52 (0.432,0.633)	< 0.001
ED Visit 30 to 365 days after PE	252 (20.7%)	21,607 (24.4%)	0.81 (0.702,0.928)	0.003
Readmission 30 to 365 days after PE	332 (27.2%)	28,666 (32.4%)	0.78 (0.689,0.888)	< 0.001
After Propensity Score Matching				
30 Day Outcomes				
All-Cause Mortality	57 (4.7%)	103 (8.5%)	0.53 (0.381,0.742)	< 0.001
Blood Transfusion	63 (5.2%)	50 (4.1%)	1.27 (0.871,1.863)	0.211
GI Bleed	50 (4.1%)	63 (5.2%)	0.79 (0.537,1.148)	0.211
ICH	24 (2.0%)	20 (1.6%)	1.20 (0.662,2.191)	0.543
ED Visit 5 to 30 days after PE	76 (6.2%)	105 (8.6%)	0.71 (0.519,0.958)	0.025
1 Year Outcomes				
All-Cause Mortality	117 (9.6%)	188 (15.4%)	0.58 (0.455,0.745)	< 0.001
ED Visit 30 to 365 days after PE	251 (20.6%)	275 (22.6%)	0.89 (0.734,1.08)	0.237
Readmission 30 to 365 days after PE	331 (27.2%)	405 (33.2%)	0.75 (0.63,0.891)	0.001

Table 2: Outcomes comparing catheter-based therapies vs anticoagulation alone for PE

Methods

In this retrospective cohort study, data was obtained from the TriNetx database to identify patients aged 18 or over diagnosed with PE from 2014 to 2024. Patients were divided into two cohorts based on if they had undergone an intervention within 72 hours of PE diagnosis or if the PE was treated with AC alone. The interventions included MT or CDT, which were identified using CPT procedure codes. Propensity score matching was done on baseline demographics, chronic conditions, malignancy, systolic blood pressure, and heart rate on day of diagnosis. Outcomes analyzed included mortality, blood transfusions, gastrointestinal (GI) bleed, intracranial hemorrhage, ED visits, and readmissions at 30 days and 1 year.

Results

We identified 89,826 patients diagnosed with PE that received AC alone and 1,220 patients that underwent MT or CDT with an average age of 59.8. After propensity score matching, each cohort had 1,219 patients without significant difference in comorbidities. In the CBT cohort, 63% of patients received MT and 37% received CDT. Prior to matching, AC alone had significantly higher mortality at 30 days and 1 year (30 days: HR, 0.578; 95% CI, 0.445-0.750, p < 0.001; 1 year: HR, 0.537; 95% CI 0.448-0.664, p < 0.001). After propensity matching, there was an increase in mortality in the AC alone cohort (30 days: HR, 0.541; 95% CI, 0.391-0.748, p < 0.001; 1 year: HR, 0.595; 95% CI 0.472-0.750, p < 0.001). The CBT cohort had a significant increased risk of blood transfusion prior to matching, but this difference was insignificant after matching. No significant difference existed in GI bleeding or intracranial hemorrhage.

Conclusion

The results of this study show significant mortality benefit for those receiving MT or CDT. While bleeding risks exist indicated by the increase in blood transfusions, there appears to be no increased risk of major bleeding events (GI bleed or ICH).

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Disclosures: Dr. Li is a consultant for Abbott, Boston Scientific, Medtronic, and Inari

