



Incidence and Risk Factors for Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) in Necrotizing Pancreatitis (NP)- An Underappreciated Sequelae

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Background/Aims

- Inflammatory dysregulation of the coagulation cascade and vascular stasis in hospitalized necrotizing pancreatitis (NP) patients serve as a milieu for venous thromboembolism (VTE), which is often underrecognized.
- Deep vein thrombosis (DVT) and pulmonary embolism (PE) increase morbidity and mortality in patients with acute pancreatitis, including NP.
- Yet, the incidence of and risk factors for DVT and PE development in NP has sparsely been reported on.
- We aimed to identify the incidence and independent risk factors for DVT and PE in our large single-center NP cohort.

Methods

- All adult NP patients hospitalized at our center between 2009-2022 were identified from a prospectively maintained database and categorized into two groups based on development of DVT or PE (cases) or not (controls), within 3 months after NP hospitalization (Figure 1).
- Baseline data included demographics, ASA score, SIRS and organ failure on admission and at 48 hours, interventions (endoscopic, percutaneous or surgical), length of stay, transfer status, need for ICU, clinical and imaging characteristics and anticoagulation during admission.
- Univariable and multivariable analysis identified independent predictors for DVT and PE. $P < 0.05$ was considered significant.

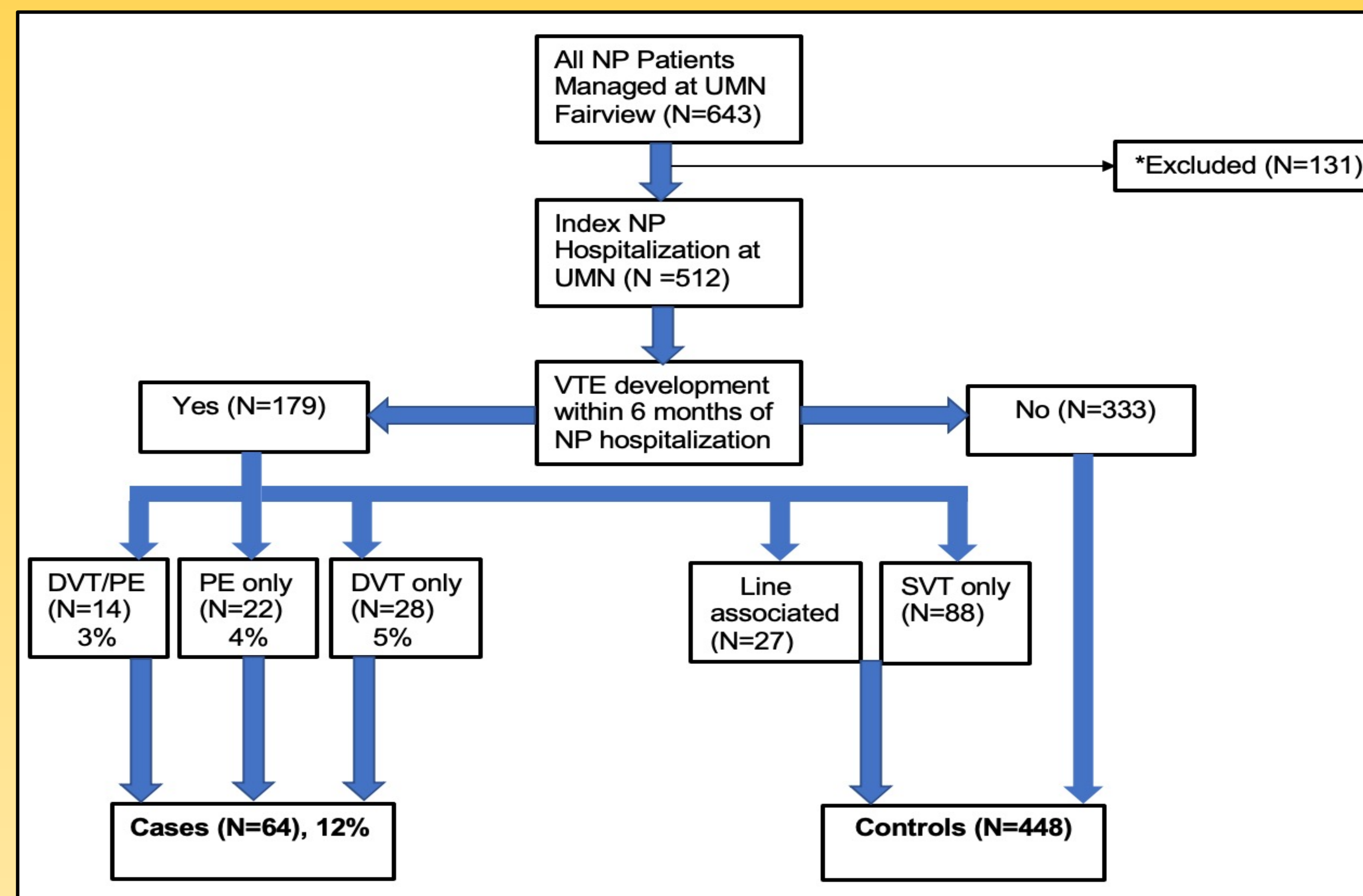


Figure 1. Flowchart of cohort included for investigation. *Exclusion criteria included patients <18 years and those without NP index hospitalization at UMN Fairview. Line associated DVTs and splanchnic vein thrombosis (SVT) were included as controls.

Characteristic	Univariable OR (95% CI)	P-value	Multivariable OR (95% CI)	P-value
Age (> 50 years)	2.26 (1.26-4.02)	0.006	1.77 (0.93- 3.40)	0.0842
Personal h/o cancer	3.89 (1.41-10.78)	0.009	2.84 (0.81-10.02)	0.104
ASA grading	2.21 (1.46-3.34)	0.0002	1.29 (0.74-2.26)	0.3677
Persistent multiorgan failure	3.04 (1.59-5.80)	<0.0001	1.87 (0.80-4.39)	0.1506
Peripancreatic involvement	6.94 (3.94-12.21)	<0.0001	5.57 (2.98-10.41)	<0.0001
Infected necrosis	3.07 (1.74-5.44)	0.0001	2.00 (1.04-3.87)	0.0384
TLOS	1.03 (1.02-1.03)	<0.0001	1.01 (1.00-1.02)	0.0403
Collection size	1.07 (1.02-1.12)	0.005	1.02 (0.96-1.08)	0.5368

Table 1. Univariable and multivariable analysis of clinical and imaging predictors for DVT and PE in NP. ASA- American society of anesthesiologists, TLOS- total length of stay.

Results

- Among 643 NP patients, 512 [males-349 (68%), median age- 52 years (IQR 38-64)] were eligible for inclusion.
- DVT/PE developed in 64 (12%) patients; 28 DVT (5%), 22 PE (4%) and 14 with both (3%) after a median 17 (IQR 7-34) days from NP.
- Demographics were similar between groups though cases were older with more comorbidities (higher ASA) including personal history of cancer. Nearly all patients [n=508, (99%)] including all cases were on DVT prophylaxis (pharmacologic or mechanical) during hospitalization.
- Significant clinical and imaging predictors for DVT/PE on multivariable analysis are per Table 1.

Conclusions

- **The incidence of DVT/PE in our NP cohort was 12% (comparable to incidence rates in cancer and IBD), usually diagnosed within 1 month of NP hospitalization.**
- **Peripancreatic necrosis involvement, infected necrosis, and prolonged hospitalization were significant independent risk factors.**
- **This high-risk group of patients may benefit from intensified DVT prophylaxis during hospitalization and closer follow up after discharge.**

