



Associations of markers of coagulation, fibrinolysis and inflammation with post thrombotic syndrome



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Background

- **Post-thrombotic syndrome (PTS) affect 20-50% of deep vein thrombosis (DVT), patients. Moderate to severe PTS impacts quality of life. Currently, there is no effective therapy.**
- **Hypofibrinolysis may cause persistent thrombosis resulting in PTS, but the studies on relationship between fibrinolysis markers (euglobulin lysis time) and the development of PTS are lacking.**
- **This information may lead to novel therapy or prevention targeting fibrinolysis.**

Objective

- To Study of the relationship of euglobulin lysis time with the occurrence of moderate to severe post thrombotic syndrome in adult DVT patients.

Methods

- This cross-sectional study analyzed patients with proximal DVT who were treated with anticoagulant at King Chulalongkorn Memorial Hospital(KCMH)
 - Moderate to severe PTS is diagnosed by **Villata score ≥ 10** combining patient-reported symptoms (pain, cramps, heaviness, pruritus, and paresthesia) and observed signs (edema, skin induration, hyperpigmentation, venous ectasia , erythema, and tenderness calf compression). **Venous ulcers** defined severe PTS.
 - The association between euglobulin lysis time, D-dimer . Hs-CRP and development of PTS were analyzed
 - Data on known PTS risk factors were also collected.
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- **Primary endpoint** : euglobulin lysis time, D-dimer, Hs-CRP, PTS
 - **Secondary endpoint** Other PTS risk factors

Results

- Between January 2024 to December 2024, 104 patients were enrolled and 88 patients (84.6%) developed PTS comprising 21% mild, 49% moderate and 14% severe PTS.

Table 1 Baseline characteristics

variable	Mean $\pm$ SD			p-value
	No+ mild PTS (n=38)	mod+ severe PTS (n=66)	Total (n=104)	
Gender				0.65
male	19 (50.0)	30 (45.45)	49 (47.12)	
female	19 (50.0)	36 (54.55)	55 (52.88)	
Age at Diagnosis (years)	57.96 $\pm$ 15.10	54.86 $\pm$ 15.46	56.0 $\pm$ 15.33	0.32
Body Mass Index (kg/m ²)	26.31 $\pm$ 6.65	26.26 $\pm$ 5.33	26.28 $\pm$ 5.82	0.96
Clinical characteristics				
Smoking	5 (13.16)	12 (18.18)	17 (16.35)	0.50
CVs dz	16 (42.11)	20 (30.30)	36 (34.62)	0.22
Side				0.54
right	11 (28.95)	26 (39.39)	37 (35.58)	
left	26 (68.42)	38 (57.58)	64 (61.54)	
both	1 (2.63)	2 (3.03)	3 (2.88)	
Number of Vessels				0.52
Iliac v	2 (5.26)	8 (12.12)	10 (9.62)	
Common femoral v	21 (55.26)	31 (46.7)	52 (50.0)	
Femoral v	8 (21.05)	18 (27.27)	26 (25.0)	
Popliteal v	7 (18.42)	9 (13.64)	16 (15.38)	
Thrombotic Event Type				0.11
first VTE	26 (68.42)	54 (81.82)	80 (76.92)	
recurrent VTE	12 (31.58)	12 (18.18)	24 (23.08)	
Pulmonary Embolism (PE)	9 (23.68)	16 (24.24)	25 (24.04)	0.94
surgery	3 (7.89)	7 (10.61)	10 (9.62)	0.65
Immobilization	5 (13.16)	14 (21.21)	19 (18.27)	0.30
Estrogen Use	1 (2.63)	4 (6.06)	5 (4.81)	0.43
Pregnancy/Postpartum	0 (0)	2 (3.03)	2 (1.92)	0.53
thrombophilia	3 (7.89)	12 (18.18)	15 (14.42)	0.24
Inflammatory Disease	7 (18.42)	6 (9.09)	13 (12.50)	0.22
Venous Insufficiency	3 (7.89)	15 (22.73)	18 (17.31)	0.05
Family History	2 (5.26)	5 (7.58)	7 (6.73)	0.65
Anticoagulation Therapy				0.93
warfarin	21 (55.26)	38 (57.58)	59 (56.73)	
DOAC	14 (36.84)	24 (36.36)	38 (36.54)	
LMWH	3 (7.89)	4 (6.06)	7 (6.73)	
INR Therapy Target				0.18
>50%	15 (75.0)	23 (57.50)	38 (63.33)	
≤50%	5 (25.0)	17 (42.50)	22 (36.67)	
Duration (month)	51.10 $\pm$ 39.39	53.01 $\pm$ 50.78	52.31 $\pm$ 46.91	0.84
Provoke				0.79
Provoked	14 (36.84)	26 (39.39)	40 (38.46)	
Unprovoked	24 (63.16)	40 (60.61)	64 (61.54)	

- Venous insufficiency was associated with moderate-severe PTS in multivariate analysis for moderate-severe PTS compare with no-mild PTS(Adjusted Odds ratio [adjOR] 1.00, 95% confidence interval [CI] 1.07-36.64, p=0.042).
- Euglobulin lysis time and D- dimer showed association with moderate-severe PTS. (adjOR1.03 ,95%CI 1.01-1.04, P<0.001 and adjOR 1.00,95%CI 1.00-1.00, P 0.017)

Figure 1. Characteristics associated with moderate-to-severe PTS

variable	Adj.Odds ratio	95%CI	p-value
Venous Insufficiency	6.25	1.07-36.64	0.042
Iliac vein involvement	2.77	0.38-20.36	0.317
BMI > 30	0.81	0.19-3.52	0.779
recurrent VTE	0.31	0.09-1.08	0.066
Inflammatory disease	0.27	0.06-1.28	0.100

Figure 2. Biomarkers associated with PTS

variable	Adj.Odds ratio	95%CI	p-value
Euglobulin Lysis Time (sec)	1.03	1.01-1.04	<0.001
D-dimer (ng/mL)	1.00	1.00-1.00	0.017
High-Sensitivity C-Reactive Protein (hs-CRP, mg/L)	1.01	0.91-1.12	0.838

Conclusions

- Measurement of euglobulin lysis time and D-dimer may aid in predicting which patients are at higher risk of developing PTS and who may benefit from preventative strategies.
- Previously reported clinical risk factors are not associated with PTS in Thai DVT patents
- Further prospective studies of the potential association between ELT and PTS are warranted to confirm this result.

Acknowledgments

The study was supported by Thai Society of Hematology