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Vena Cava Filter deployment prior to Percutaneous Endovenous Therapy for proximal Lower Limb Deep Venous Thrombosis: Should we routinely practice?

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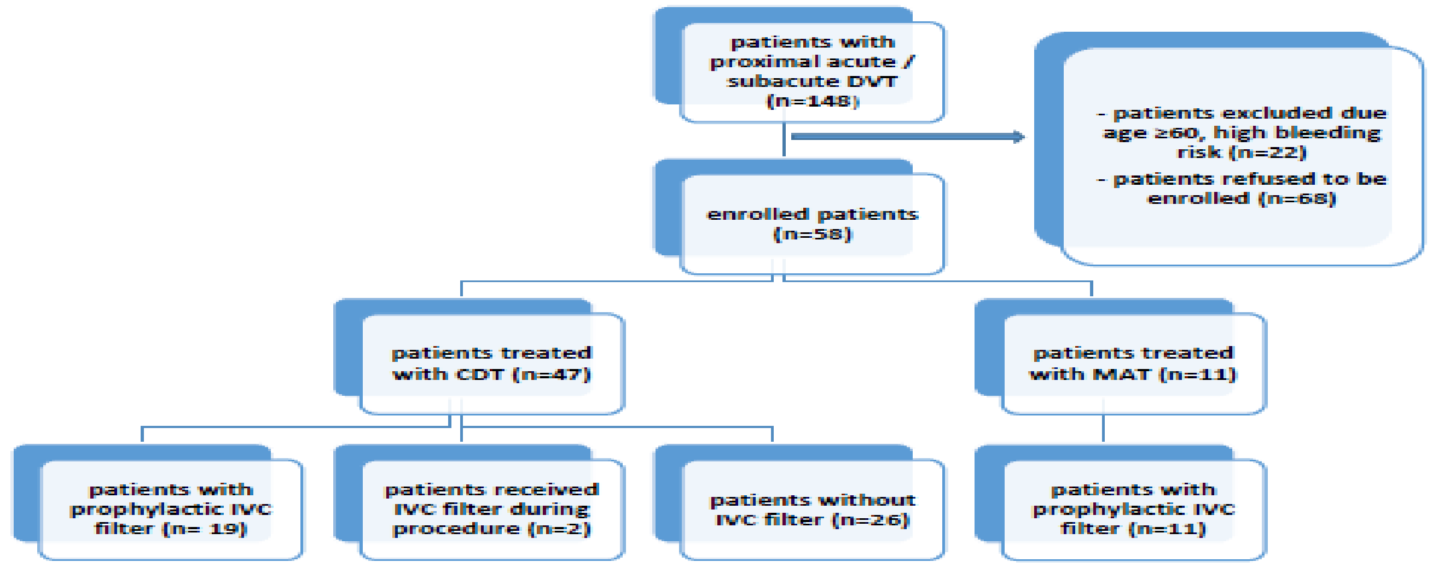
ABSTRACT

BACKGROUND

Anticoagulant therapy remains the prevalent treatment for venous thromboembolism (VTE). In the new era of percutaneous endovenous intervention, there is a progressive raise in the use of percutaneous endoluminal clot dissolution techniques as catheter directed thrombolysis (CDT) and mechanical aspiration thrombectomy (MAT) devices due to its established shortterm benefits. Prophylactic Deployment of inferior vena cava (IVC) filter during percutaneous endovenous therapy for lower extremities deep venous thrombosis (DVT) is still debatable issue.

PURPOSE

Our study aims to retrospectively assess the frequency of embolization and the need for deployment of a retrievable IVC filter during endovenous treatment of proximal lower extremity DVT using percutaneous CDT and MAT techniques


patients with proximal acute / subacute DVT (n=148)

- patients excluded due age ≥60, high bleeding risk (n=22)
- patients refused to be enrolled (n=68)

enrolled patients (n=58)

patients treated with CDT (n=47)

patients treated with MAT (n=11)

patients with prophylactic IVC filter (n= 19)

patients received IVC filter during procedure (n=2)

patients without IVC filter (n=26)

patients with prophylactic IVC filter (n=11)

Fig. 1: Patient consort and flow chart of the study design.

METHODS

Percutaneous endoluminal clot dissolution using either CDT or MAT for proximal lower extremity DVT was performed on 64 limbs in 58 patients of 148 patients diagnosed with proximal acute / subacute DVT in vascular surgery department of study hospitals. IVC filter was deployed in 31 patients prior or during the procedure.

RESULTS

From 58 patients were treated for proximal DVT with clot debulking procedures, IVC filter was prophylactically deployed in 30 patients (51.7%). Trapped thrombus in the deployed filters as revealed on venocavography was observed in 8/30 (26.7%) filters deployed prophylactically with overall rate of thrombus embolization during percutaneous endovenous thrombus dissolution techniques was 11/58 patients (18.9%).

Table (1): Demographic data, clinical presentation and risk factors

Study group	Number	Percent
Sex		
- M	20	34.5%
- F	38	65.5%
Age (years)		
- Range	24-56 years	
- Mean±S.D.	34.5±7.16	
Symptom duration (days) (CDT)	4-20 45.96±11.0	
Clinical presentation		
1- edema	26	44.8%
2- pain and edema	21	36.2%
3- pain	6	10.3%
4- phlegmasia cerulea dolens	5	8.6%
5- associated pulmonary embolism	2	3.4%
Patients with bilateral lower limb DVT	6	10.3%
Thrombus location		
- Iliac	15	25.9%
Without extension to inferior vena cava (IVC)	10	17.2%
With extension to IVC	5	8.6%
- Iliofemoral	32	55.2%
Without extension to IVC	28	48.3%
With extension to IVC	4	6.9%
- Femoral-popliteal	11	18.9%
Without extension to calf veins	8	13.8%
With extension to calf veins	3	5.1%
Risk factors		
- Patients with risk factors	45	77.6%
-Strong risk factors	5	8.6%
- moderate risk factors	26	44.8%
- weak risk factors	6	10.3%
- combined risk factors	8	13.8%
- Patients with absent risk factors	13	22.4%
Risk factors classification		
1- Strong risk factors		
- Major surgery	8/45	17.8%
2- moderate risk factors		
- oral contraceptive pills	10/45	22.2%
- thrombophilia	8/45	17.8%
- Pregnancy	4/45	8.9%
- Post cesarean section	12/45	26.7%
- Malignancy	5/45	11.1%
- Previous DVT	9/45	20%
- Family history	5/45	11.1%
3- weak risk factors		
- immobilization	8/45	17.8%
Patients with permissive lesion (iliac vein compression)	18	31%

Table (2) Procedure details

Procedure details	Number	Percent
Procedure		
- catheter direct thrombolysis (CDT)	47	81%
- mechanical aspiration thrombectomy (MAT)	11	19%
Access		
1- single access	26	44.8%
- popliteal access	23	88.6%
- posterior tibial access	3	11.5%
2- dual access	32	55.2%
- main procedure access (popliteal access)	32	55.2%
- filter deployment access		
a- trans-jagular access	17	53.1%
b- contralateral common femoral vein access	15	46.9%
Filter deployment	32	55.2%
- prophylactic	30	51.7%
- during procedure	2	3.4%
Retrieved filters	15/32	46.8%
Non-retrieved filters	17/32	53.1%
- failed retrieval	7/32	19.4%
- patients lost during follow-up	10/32	32.2%
Procedure duration		
A – CDT		
- 24 hours duration	7	12.1%
- 48 hours duration	37	63.8%
- 72 hours duration	3	5.1%
B – MAT		
- Single session therapy (average 3hours)	6	10.3%
- Single session with 12 hours extended lytic therapy	5	8.6%
Iliac vein stenting	23/58	39.6%
- Due to iliac vein outflow obstruction	18	31%
- Due to residual iliac thrombus	5	8.6%
Complications	9/58	15.5%
- Procedure related PE	3	5.1%
- symptomatic	2	3.4%
- a symptomatic	1	1.7%
- Puncture site bleeding	6	10.3%

RESULTS

Fig. 2: A 28-year-old male with left femoropopliteal DVT (prone position) A) irregular filling defect of femoral vein B) extension of fountain catheter to iliac vein beyond the level of thrombus C, D&E) uninterrupted flow through recanalized femoral and iliac vein 48 hours after pulse-spray CDT.

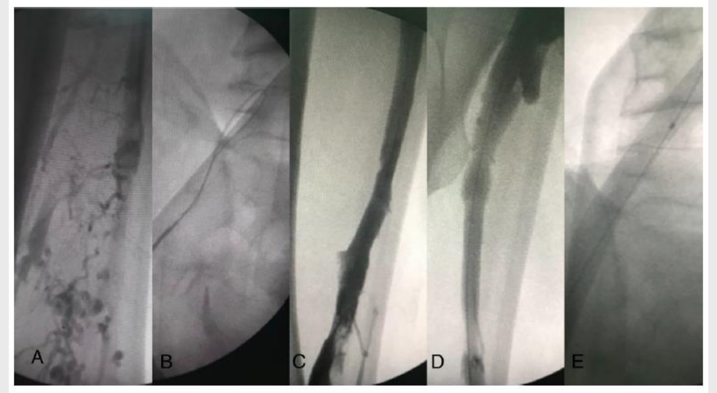


Figure 3: A 48-year-old male with left iliofemoral DVT (prone position) A) irregular filling defect of femoral vein B) Terumo wire made a loop through iliac lesion C, D, and E) uninterrupted flow through recanalized femoral vein and stented iliac vein 48 hours after pulse-spray pharmacological CDT.

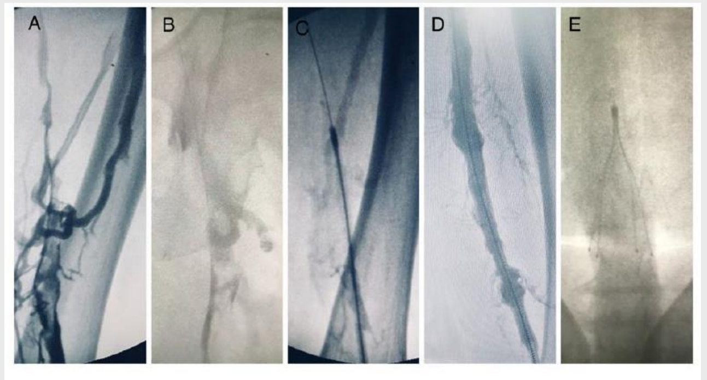


Fig. 4: A 39-year old female with right femoral DVT (prone position) A&B) femoral vein thrombosis with prominent collaterals C) MAT by Aspirex 8F catheter D) uninterrupted flow through femoral vein D) cavogram shows grade 0 filter thrombus load.

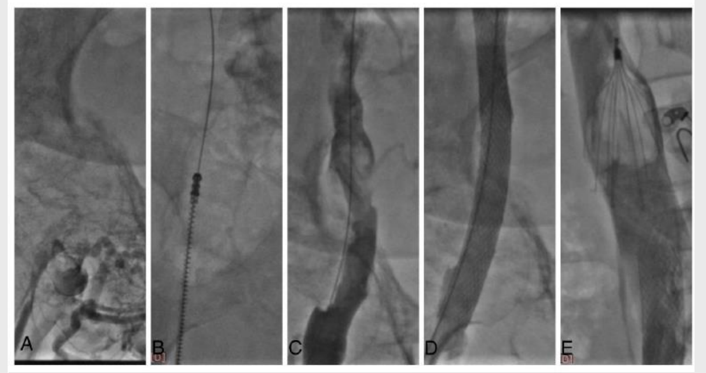


Fig. 5: A 35-year old female with right lower limb phlegmasia cerulea dolens (supine position) A) common femoral and iliac veins thrombosis with prominent groin collaterals B) MAT with Aspirex 8F catheter C) residual iliac vein thrombus D) poststenting venogram with adequate flow E) cavogram with grade 3 trapped filter thrombus.

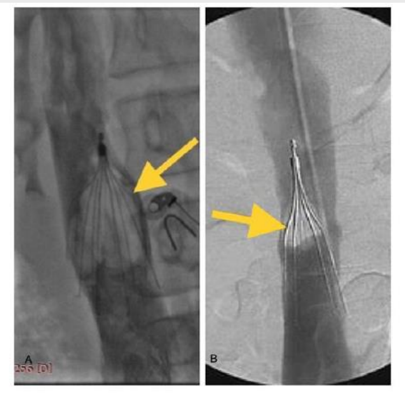


Fig. 6: Trapped thrombus in filter as revealed on venocavography

(A) Grade 3, the trapped thrombus filled ≥ ½ but within the height of the filter.
(B) Grade 2, the trapped thrombus filled ≥ ¼ to < ½ the height of the filter.

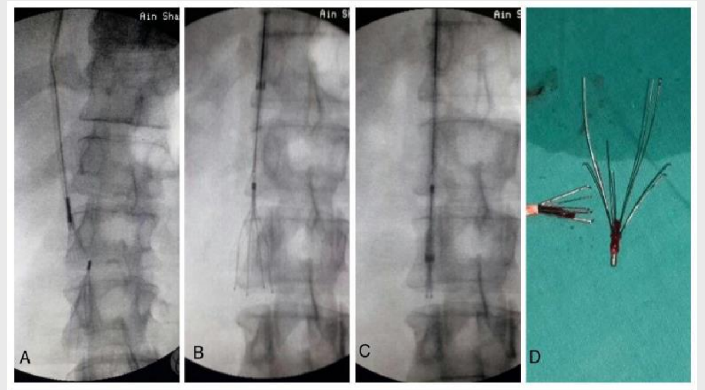


Fig. 7: Filter retrieval procedure (A, B&C) snaring and sheathing of filter (D) retrieved filter with no retained thrombus along its struts.

Table (3) patients' characteristics and proximal embolization

	Proximal embolization		FET	P value
	Yes (11)	No (47)		
Sex				
Male	4(36.4)	16(34.0)	0.0	1.0
Female	7(63.6)	31(66.0		
Age (year)				
Mean ±SD	37.82±10.99	33.72±5.83	St t= 1.74	0.09
Range	24-50	24-56		
Clinical presentation				
Edema	6(54.5)	20(42.6)	1.46	0.80
Pain and edema	4(36.4)	17(36.2)		
Pain	0(0.0)	6(12.8)		
Phlegmasia cerulean dolens	1(9.1)	4(8.5)		
Level of DVT				
Iliac	3(27.3)	7(14.9)	7.14	0.041*
Ilio-caval	4(36.4)	5(10.6)		
Ilio-femoral with caval extension	4(36.4)	24(51.1)		
Femoral-popliteal	0(0.0)	11(23.4)		
Risk factors				
Patients with absent risk factors	0(0.0)	13(27.7)	9.4	0.026*
-Strong risk factors	0(0.0)	5(10.6)		
- moderate risk factors	6(54.5)	21(44.7)		
-weak risk factors	1(9.1)	5(10.6)		
- combined risk factors	4(36.4)	3(6.4)		
Risk factors classification				
1- Strong risk factors (Major surgery)	3(27.3)	7(14.9)	0.29	0.38
2- Moderate risk factors				
- oral contraceptive pills	2(18.2)	8(17.0)	0.0	1.0
- thrombophilia	2(18.2)	6(12.8)	0.0	0.64
-Pregnancy	1(9.1)	1(2.1)	0.05	0.35
-Post cesarean section	1(9.1)	10(21.3)	0.25	0.67
- Malignancy	3(27.3)	2(4.3)	3.43	0.04*
- Previous DVT	4(36.4)	9(19.1)	0.69	0.24
- Family history	0(0.0)	3(6.4)	0.01	1.0
3- Weak risk factors (immobilization)	3(27.3)	5(10.6)	0.91	0.17
Patients with permissive lesion (iliac vein compression)	3(27.3)	15(31.9)	0.0	1.0

Table (4) procedure details in relation to proximal embolization

Procedure details	Proximal embolization		FET	P value
	Yes (11)	No (47)		
Procedure				
catheter direct thrombolysis (CDT)	7(63.6)	40(85.1)	1.46	0.19
mechanical aspiration thrombectomy (MAT)	4(36.4)	7(14.9)		
Pre-procedure CTPA evidence of pulmonary embolism	2(18.2)	0(0.0)	4.23	0.033*
Post-procedure CTPA evidence of proximal lung showering	3(27.3)	0(0.0)	8.53	0.005**
Filter deployment				
- prophylactic	8(72.7)	22(46.8)	0.93	0.31
- during procedure	2(18.2)	0(0.0)	0.64	0.19
Filter deployment				
Yes	8(72.7)	24(51.1)	2.3	0.09
No	3(27.3)	23(48.9)		
Procedure duration				
A – CDT				
- 24 hours duration	1(9.1)	6(12.8)		
- 48 hours duration	5(45.5)	32(68.1)	4.36	0.30
- 72 hours duration	1(9.1)	2(4.3)		
B – MAT				
- Single session therapy (average 3hours)	3(27.3)	5(10.6)		
- Single session with 12 hours extended lytic therapy	1(9.1)	2(4.3)		
Iliac vein stenting				
- Due to iliac vein compression	3(27.3)	15(31.9)	0.0	1.0

RESULTS

Limitation and Recommendation

Our study was a retrospective study and our patient sample was small, coincidence may be considered as a reason of our findings. With most studies reporting the risk of PE with CDT to be very low, larger studies with very specific selection criteria are needed to make such recommendations. Mechanical aspiration thrombectomy techniques require more evaluating controlled studies to clarify the safety of this procedure with or without filter placement.

CONCLUSION

- Catheter directed thrombolysis could be done safely and effectively without routine prophylactic IVC filter placement in treating acute DVT. Selective filter placement may be considered in patients undergoing mechanical thrombectomy or patients with more proximal thrombus pattern with multiple risk factors.

DISCLOSURES

No disclosures