



8th International Congress

H T D I
HOW TO DO IT

AORTIC SURGERY
PERIPHERAL & VENOUS



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Acute Deep Vein Thrombosis: indication and treatment with a mechanical thrombectomy system

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San Raffaele Scientific Institute

Deep vein thrombosis

- Third leading vascular disease after MI and Stroke
- Incidence 100 -180/ 100.000 year
- Incidence rates increase with age in both genders
- Over 250.000 new cases/year.
- Expected to double (2018 – 2050)



Raskob GE, ATVB 2014;
Heit JA, Nat. Rev. Cardiol 2015;
Silverstein MD, Ar. Int. Med. 1998

DVT: complications

1. Phlegmasia cerulea dolens
2. Pulmonary embolism (TE)
3. Postthrombotic syndrome (PTS)

Phlegmasia cerulea dolens



Surgical or Endovascular Thrombectomy recommended (Grade 1B)



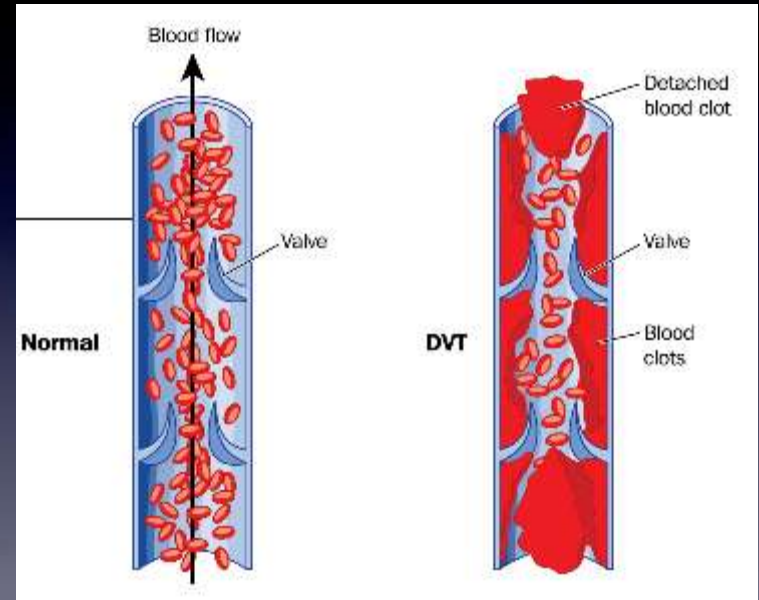
Pulmonary Embolism

- 50% of Deaths in not anticoagulated patients
- 200,000 deaths from PE every year



Post Thrombotic Syndrome (PTS)

- ✓ Incomplete recanalization
- ✓ Deep valve damage
- ✓ Venous Hypertension



Post Thrombotic Syndrome (PTS)

- Chronic Leg heaviness
- Venous claudication
- Edema
- Varicosities
- Trophic skin changes (lipodermatosclerosis)
- Venous Ulcers



Conservative management

- Anticoagulation
 - Unfractionated Heparine
 - LMWH (X factor inhibitors)
 - OAC (K vitamine antagonist)
 - DOAC (Thrombine inhibitors)
- Compression stockings
- Ultrasound monitoring



Antithrombotic Therapy for VTE Disease CHEST Guideline and Expert Panel Report

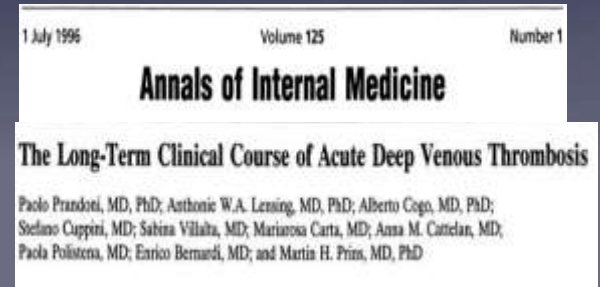
Clive Kearon, MD, PhD; Elie A. Akl, MD, MPH, PhD; Joseph Ornelas, PhD; Allen Balvas, DO, FCCP; David Jiménez, MD, PhD, FCCP; Henri Bounameaux, MD; Menno Huisman, MD, PhD; Christopher S. King, MD, FCCP; Timothy A. Morris, MD, FCCP; Namita Sood, MD, FCCP; Scott M. Stevens, MD; Jenine R. E. Vintch, MD, FCCP; Philip Wells, MD; Scott C. Wolter, MD; and Col. Lisa Moores, MD, FCCP

Anticoagulation Therapy

Systemic anticoagulation has been the “Gold Standard” treatment for many years.

Objective: To determine the clinical course of patients during the 8 years after the first episode of symptomatic Deep Venous Thrombosis. A prospective study of 355 patients with first episode of symptomatic DVT.

Conclusion: Patients with symptomatic DVT, especially those without transient risk factors for DVT, have a high risk for recurrent venous thromboembolism that persists for many years. The **post-thrombotic syndrome occurs in almost one third of these patients** and is strongly related to ipsilateral recurrent deep venous thrombosis. These findings challenge the widely adopted use of short course anticoagulation therapy in patients with symptomatic deep venous thrombosis.



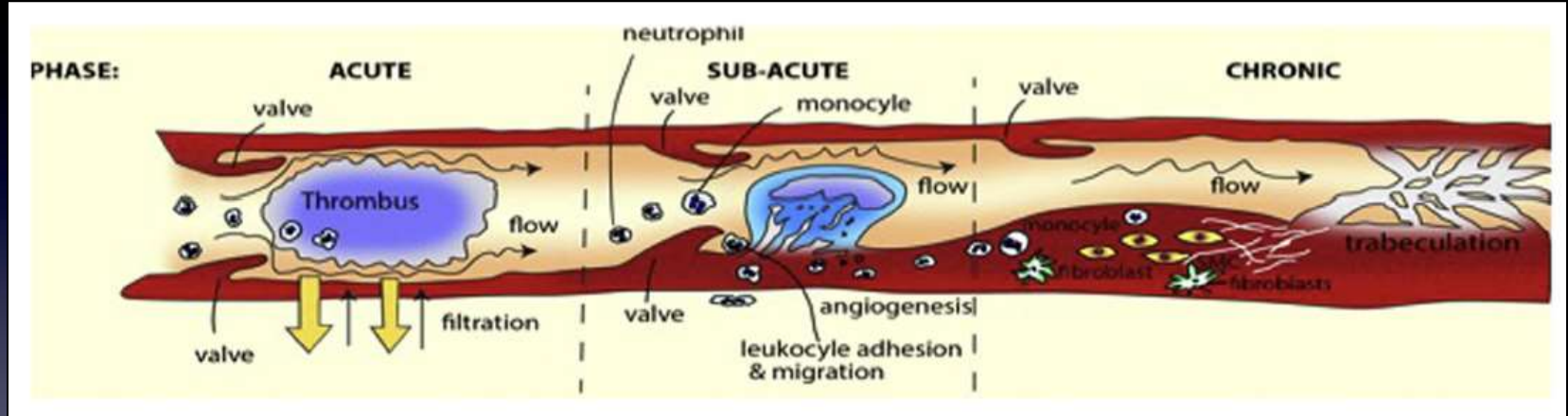
Compression Stockings

Randomized controlled trials on PTS prevention
with conservative treatment



- 50% Reduction of PTS
- No prevention of PTS at 2 years after DVT

Vein damage



Time is VALVES!

New approach to DVT

- Anticoagulation
- Early thrombous removal
- Endovascular repair



SVS and AVF Guidelines



Early thrombus removal strategies for acute deep venous thrombosis: Clinical Practice Guidelines of the Society for Vascular Surgery and the American Venous Forum

Mark H. Meissner, MD,^a Peter Gloviczki, MD,^b Anthony J. Comerota, MD,^c Michael C. Dalsing, MD,^d Bo G. Eklof, MD,^e David L. Gillespie, MD,^f Joann M. Lohr, MD,^g Robert B. McLafferty, MD,^h M. Hassan Murad, MD,ⁱ Frank Padberg, MD,^j Peter Pappas, MD,^k Joseph D. Raffetto, MD,^l and Thomas W. Wakefield, MD,^m *Seattle, Wash; Rochester, Minn; Toledo, Ohio; Indianapolis, Ind; Helsingborg, Sweden; Rochester and New York, NY; Cincinnati, Ohio; Springfield, Ill; Newark, NJ; West Roxbury, Mass; Ann Arbor, Mich*

“We suggest the use of early thrombus removal strategies in patients with - good functional capacity and first episode of iliofemoral DVT of <14 days in duration (grade 2C) and strongly recommend their use in patient with limb-threatening ischemia due to iliofemoral venous outflow obstruction (Grade 1B)”

Early thrombotous Removal

- Relief of symptoms
- Preservation of valve function
- Reduction in clot recurrence
- Reduction in PTS



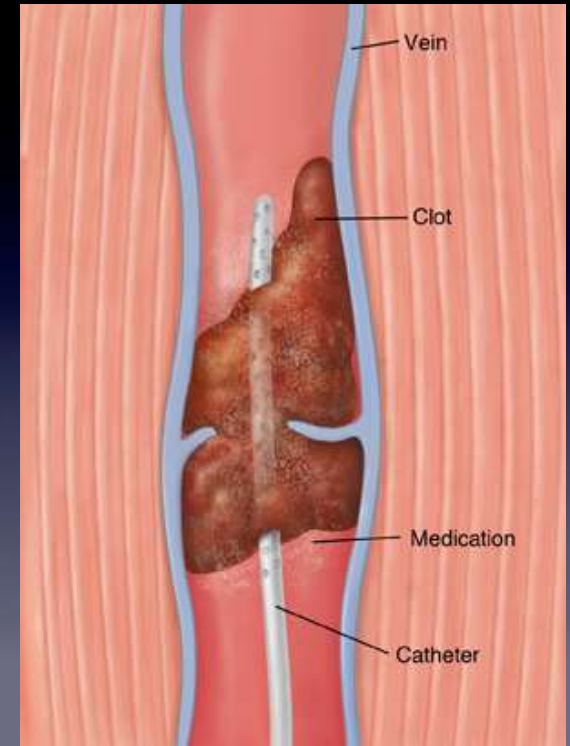
Early thrombous Removal: techniques

1. Catheter Direct Thrombolysis (CDT)
2. Mechanical Thrombectomy
3. Pharmaco-mechanical thrombolysis



Catheter Direct Thrombolysis

- Venous US guided puncture
- rTPA - Urokinase
- Saline solution
- Unfractionated Heparin
- Monitoring



CDT: contraindications

ABSOLUTE	RELATIVE
Active or recent (<3months) bleeding	Recent (10d) mayor surgery, trauma, CPR
Recent Stroke	Uncontrolled Hypertension
History of intracranial or intraspinal tumor, vascular malformation or aneurysms	Bacterial endocarditis
Recent craniotomy	Diabetic retinopathy
Pregnancy	Mild hepatic dysfunction
Coagulopathy	
Severe Liver dysfunction	

Mechanical Thrombectomy

- On-label
- Quick reperfusion
- Removal of thrombus
- Can be used with other treatment strategies

Indigo Penumbra

- Continuous Mechanical Aspiration
- High pressure
- Separator brakes thrombous



MECHANICAL CLOT ENGAGEMENT

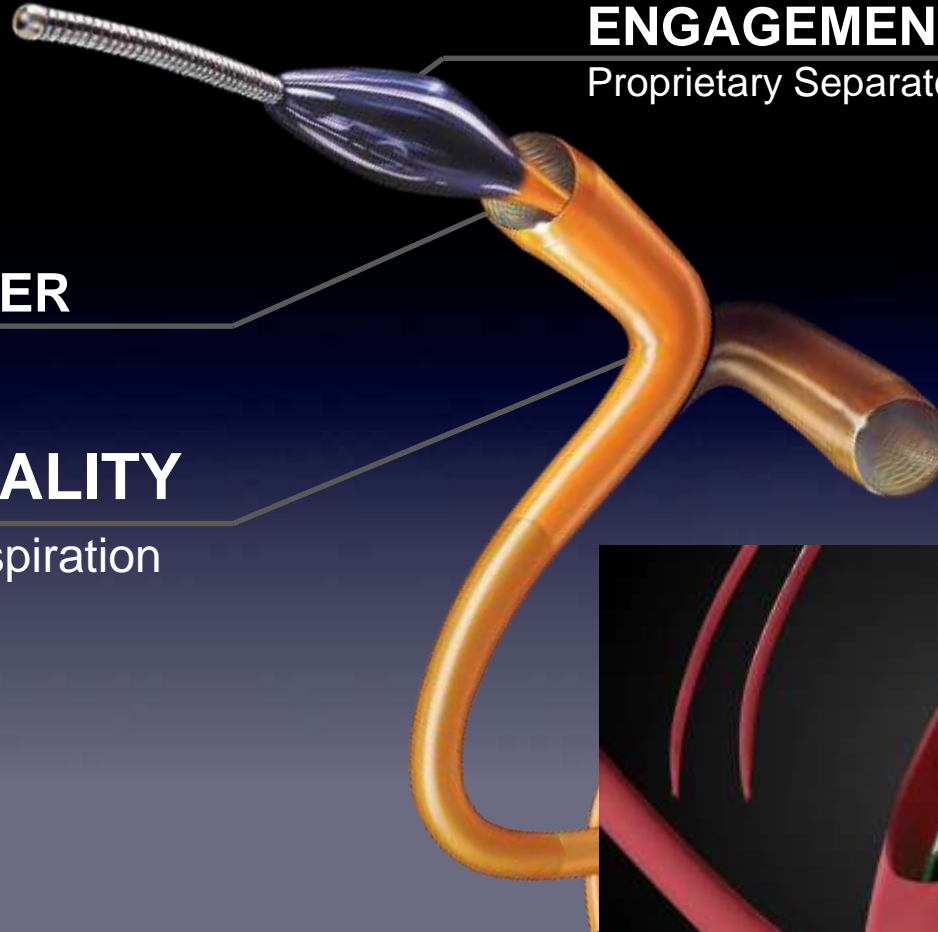
Proprietary Separator Technology

MAXIMISED ASPIRATION POWER

Large Lumen Aspiration

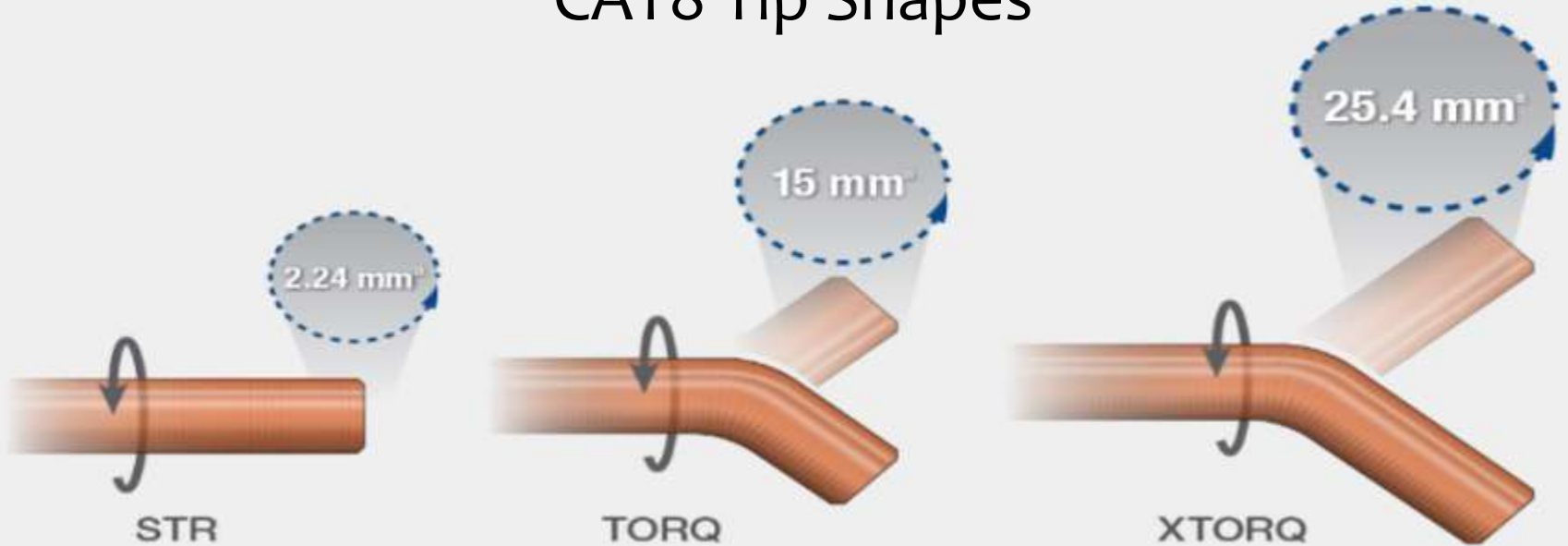
TIP DIRECTIONALITY

For Circumferential Aspiration



Circumferential Aspiration

CAT8 Tip Shapes



Angle: 20–45°
Tip length: 1.8 cm

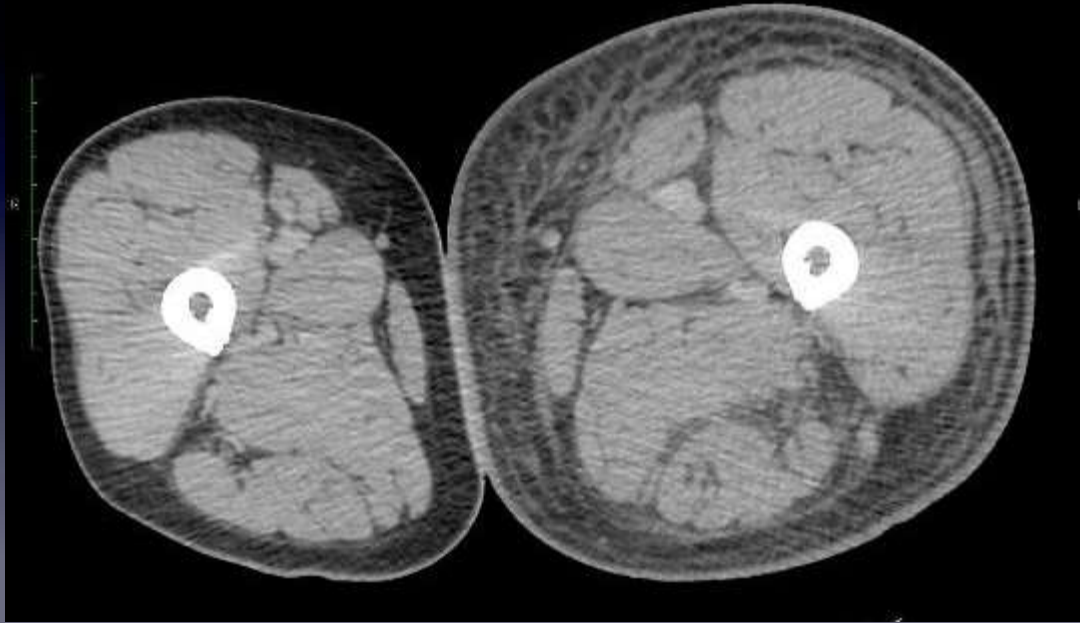
Acute DVT

67 Years Old Male,

- Previous Urologic Surgery
- Acute DVT
- Left Compression of EIA
- Severe Leg Swelling
- 3 day of Persistent Pain



Acute DVT



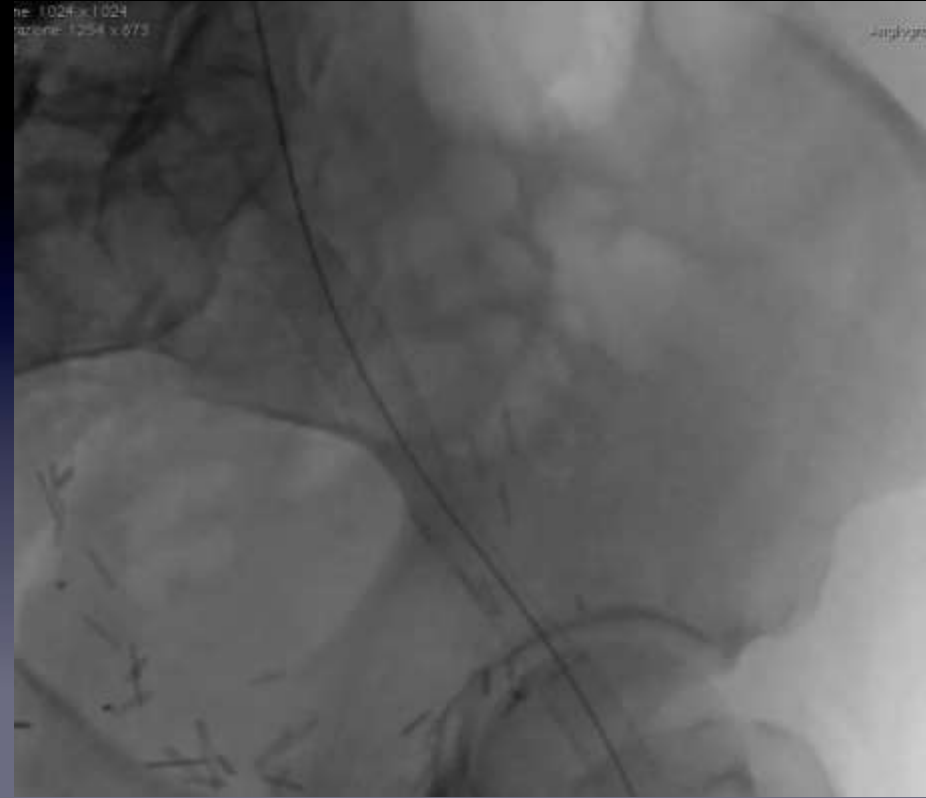
Acute DVT

Dimensione immagine: 1024 x 1024
Dimensioni visualizzazione: 673 x 673
WL: 512 WW: 1024

3703325 (167 y, 67 y)
Angiogramma Venoso (Itrazocorato)

Dimensione immagine: 1024 x 1024
Dimensioni visualizzazione: 673 x 673

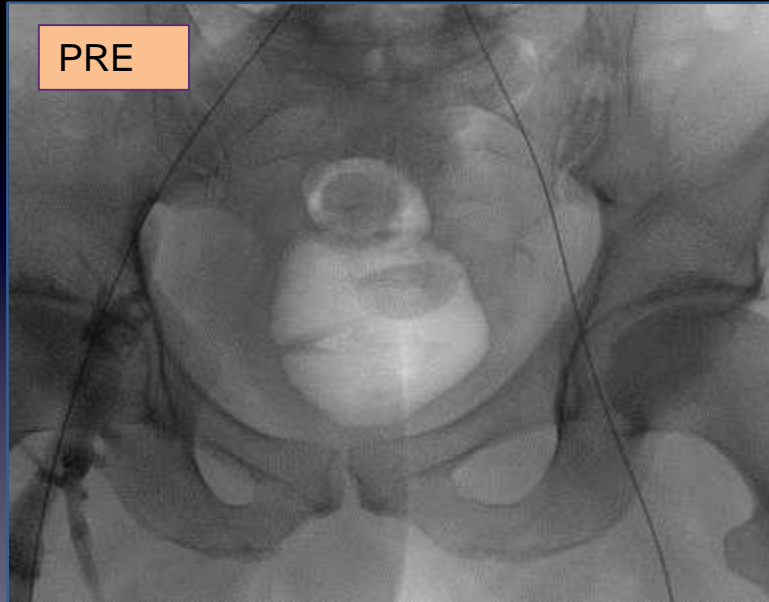
Angiogramma



Acute DVT



IVC/Iliac Vein Thrombosis



Drs. Bella Huasen & Stephen D'Souza, Royal Preston, United Kingdom

Iliac Vein Thrombosis

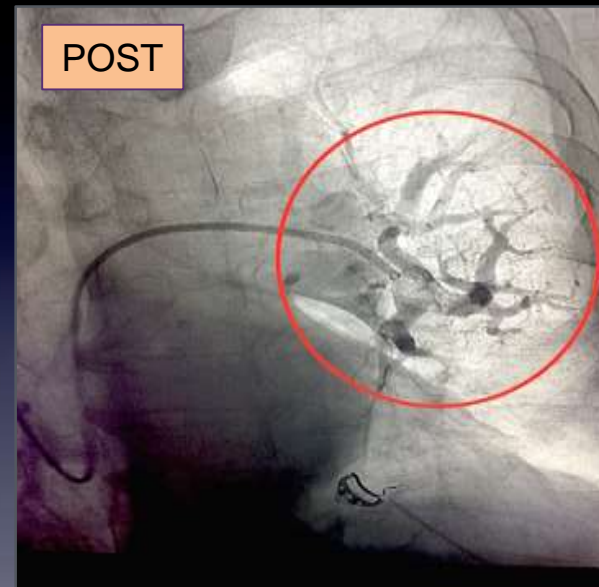
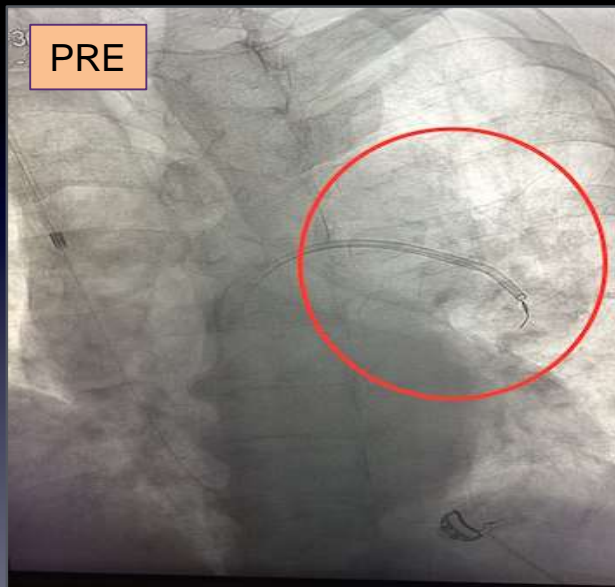
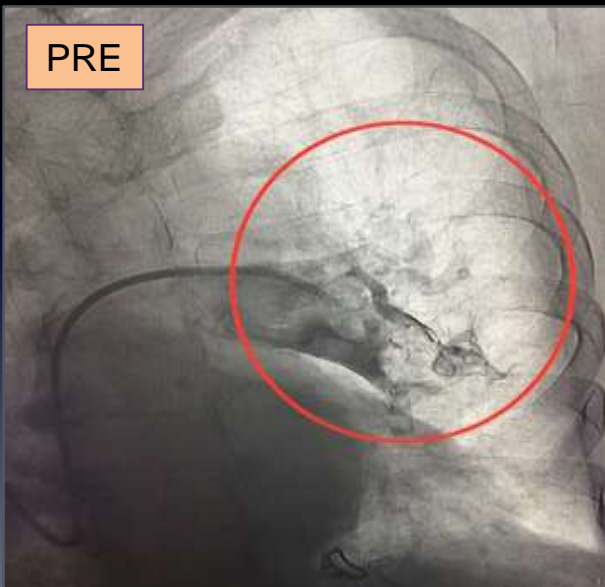
CAT8XTORQ with SEP8



Dr. Lawrence Whitney,
Lakeland Regional Medical Center, FL,
USA

Images used with permission. Consent on file at Penumbra, Inc.

Pulmonary Artery Thrombus



Dr. Corey Teigen, Sanford Health, ND, USA

Images used with permission. Consent on file at Penumbra, Inc.



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Conclusion

- Early thrombous removal is safe and effective in selected patients
- Decision making in referral centers
- Mechanical Thrombectomy can restore quickly flow to preserve valve and veins and prevent PTS