

# Post thrombotic syndrome

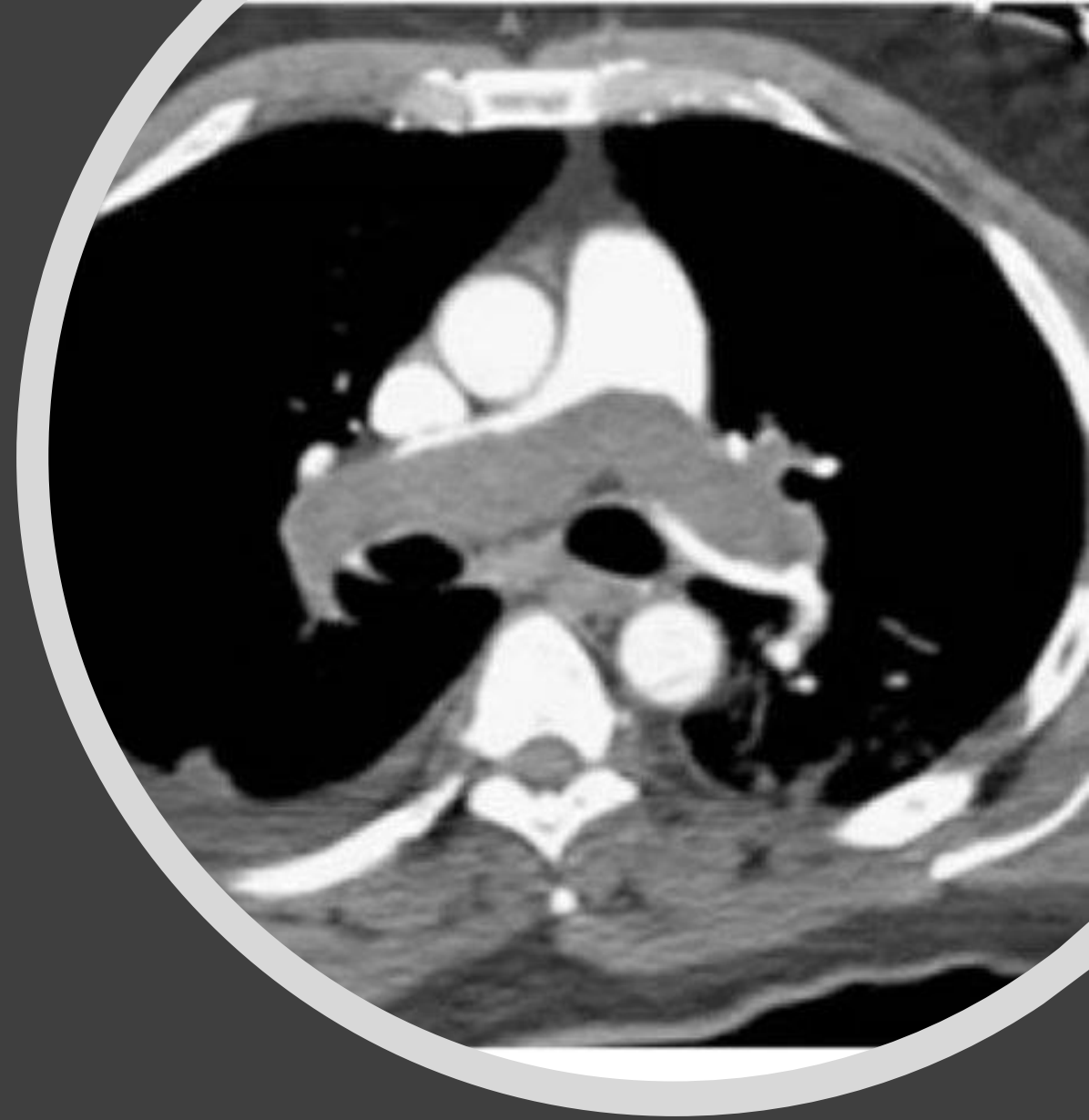
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Bristol Bath Weston Vascular Network

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University of Bristol

## Sequae of DVT

- Pulmonary embolism



# Sequae of DVT

- Post thrombotic syndrome



# Sequae of DVT

- Post thrombotic syndrome
  - 20%-50% of patients



# Sequae of iliofemoral DVT

- Post thrombotic syndrome
  - ½ of patients



# Conservative treatment

Anticoagulation

Compression

Leg elevation

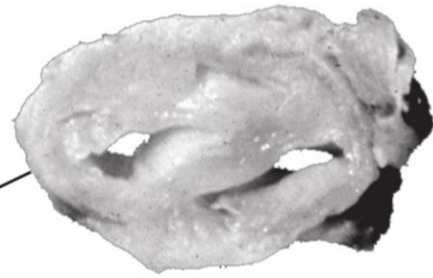
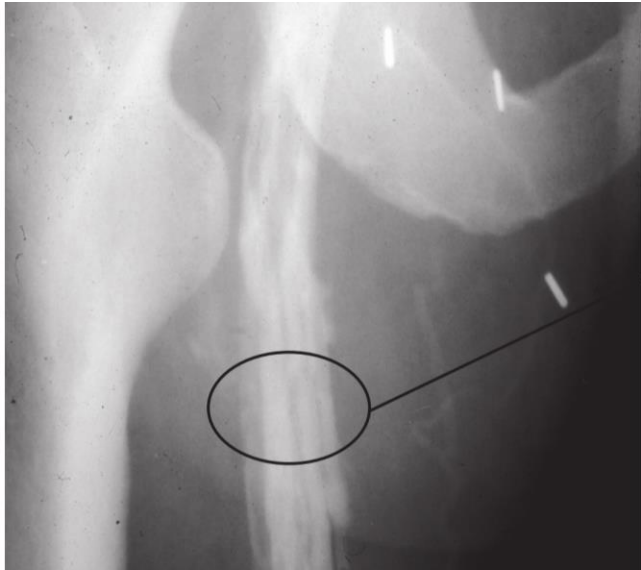
## Conservative treatment

Anticoagulation

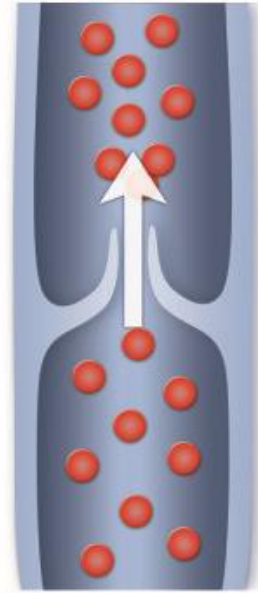
Compression

Leg elevation

Limited impact on post  
thrombotic syndrome

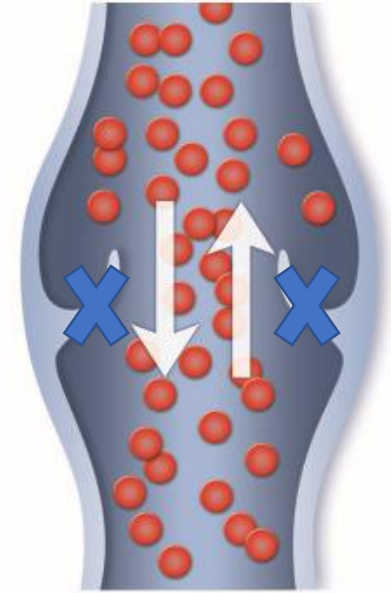


### Healthy Vein Valve



Healthy valves keep blood moving in one direction

### Diseased Vein Valve

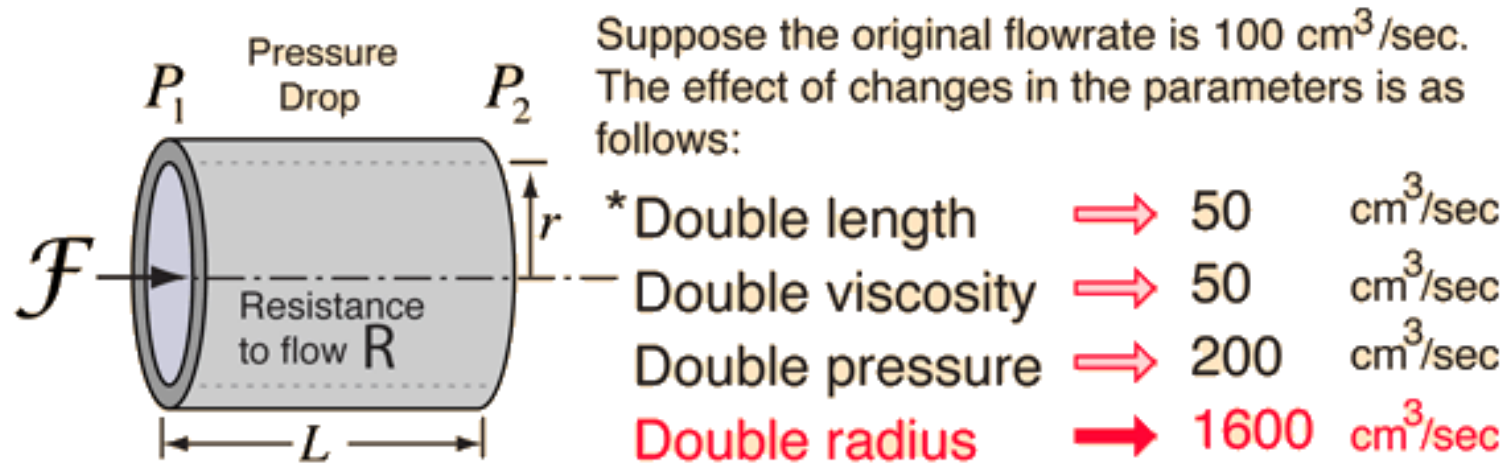


Diseased valves cause blood to move in both directions, elevating venous pressure





# It is principally about Radius



$$\mathcal{R} = \frac{8\eta L}{\pi r^4} \quad \text{where } \eta = \text{viscosity}$$

$$\text{Volume Flowrate} = \mathcal{F} = \frac{P_1 - P_2}{\mathcal{R}} = \frac{\pi(\text{Pressure difference})(\text{radius})^4}{8(\text{viscosity})(\text{length})}$$

\* With other parameters held at original values

**A 19% increase in radius will double the volume flowrate!**

## Interventions for iliofemoral DVT

Catheter directed  
thrombolysis

Pharmaco-mechanical  
thrombectomy

Mechanical  
thrombectomy

# Trials of clot removal

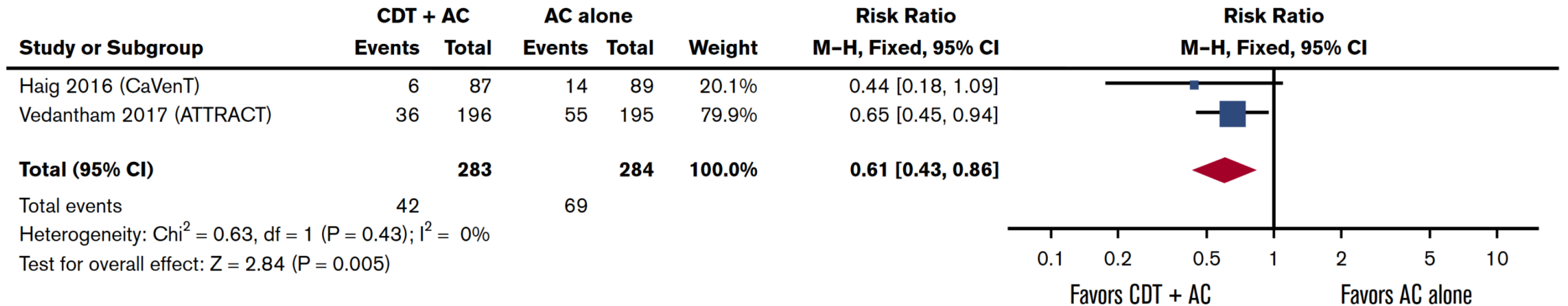
- CAVENT

- Norwegian multicentre RCT
- BMT vs BMT and CDT
- 5 year follow-up
- PTS 63% BMT vs 43% CDT arms
- NNT 4

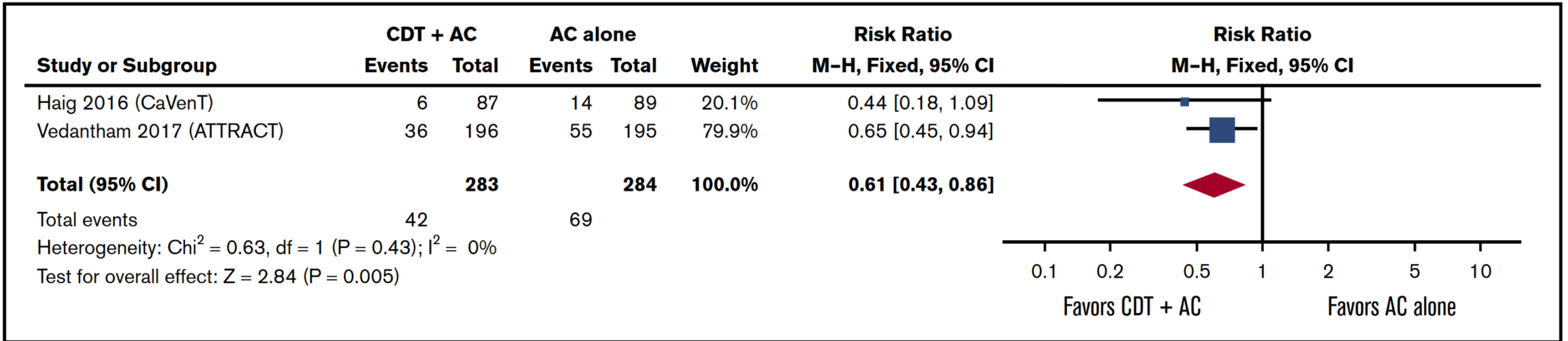
- ATTRACT

- North American multicentre RCT
- BMT vs BMT and CDT/PMT
- 2 year follow up
- **Included femoral and iliofemoral DVT!**
- **Many other problems with this trial!!**
- PTS 48% BMT vs 47% CDT/PMT

# Iliofemoral DVT



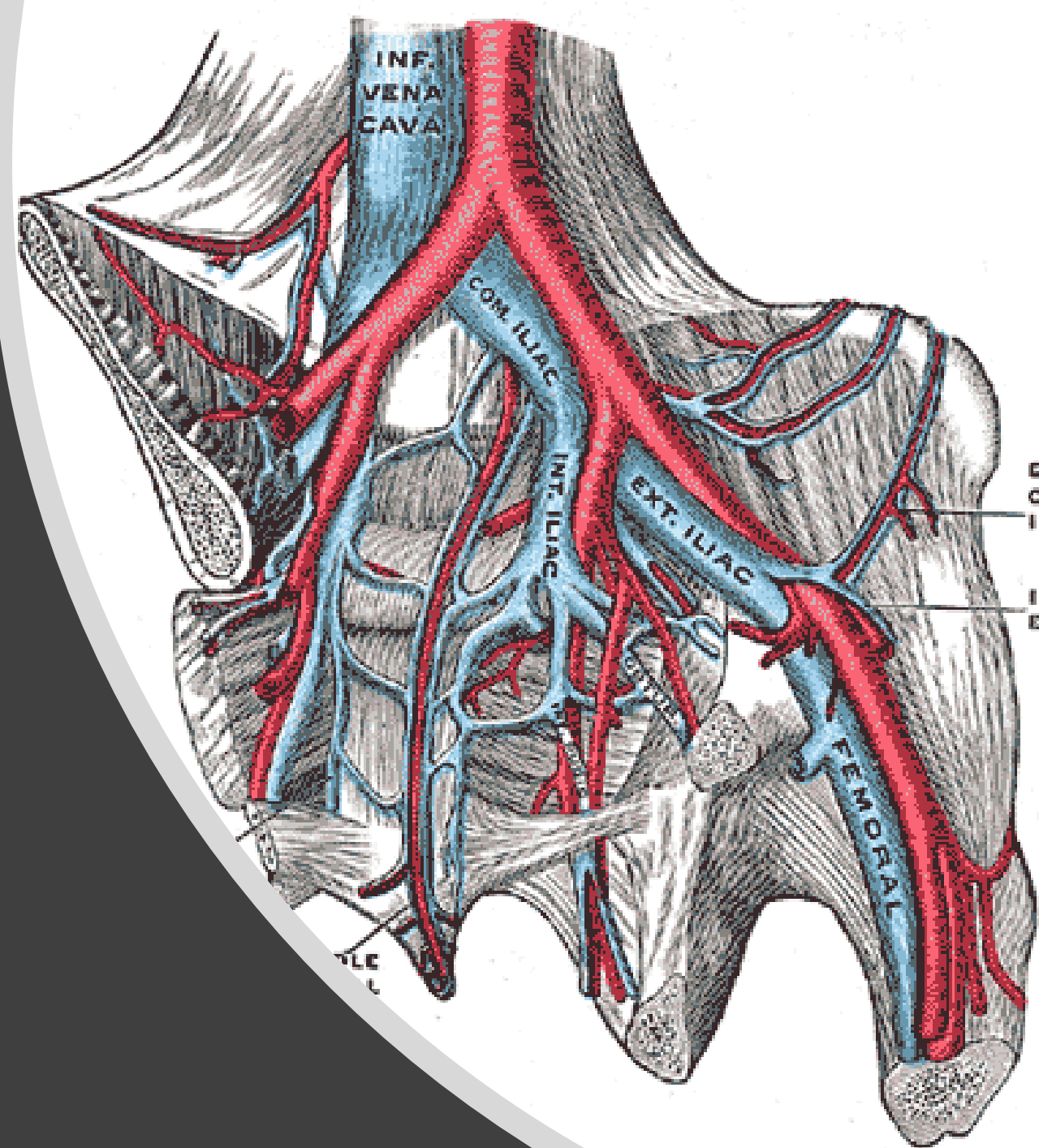
# Iliofemoral DVT

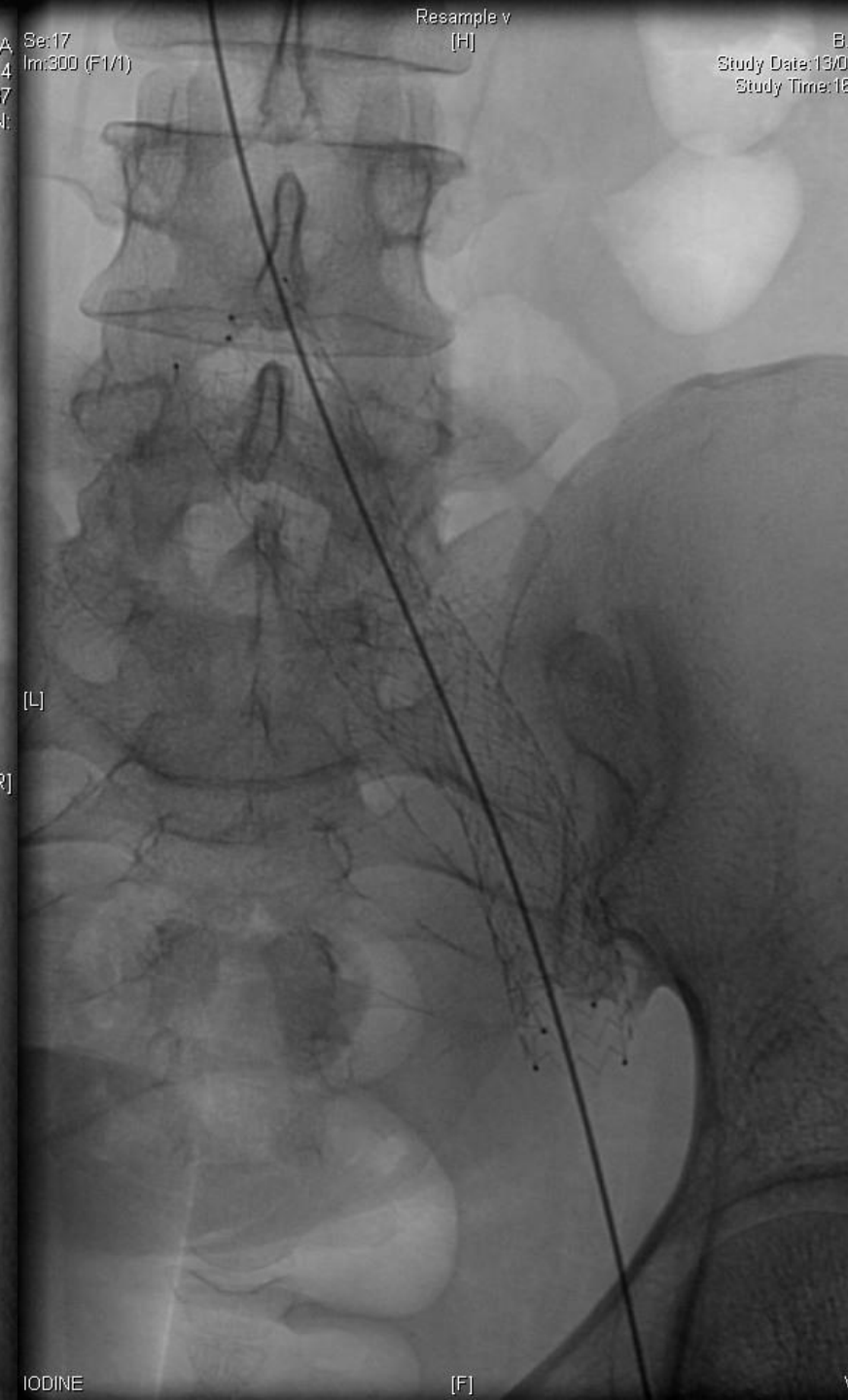
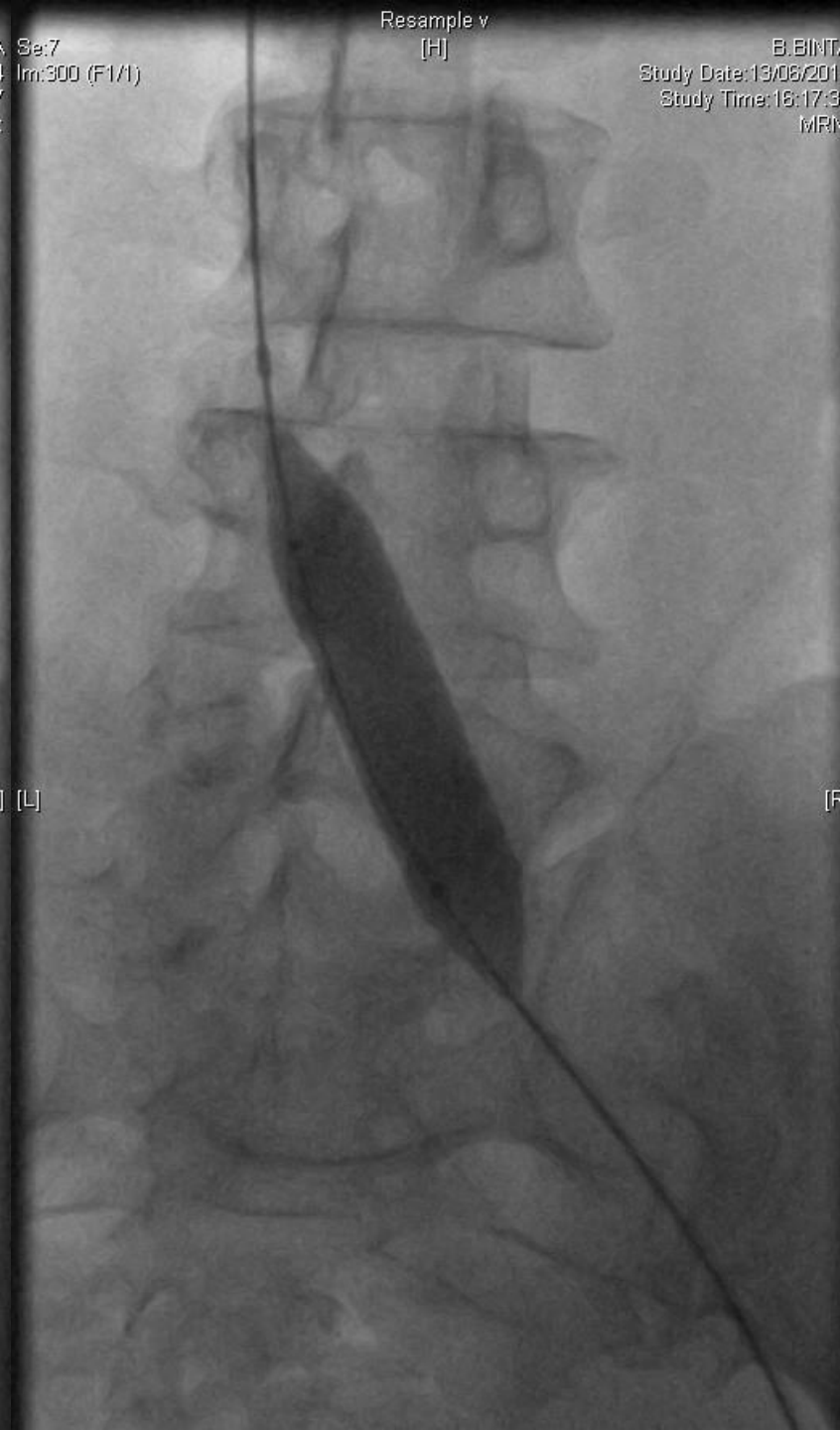


Neither trial represents the modern standard of care

# The permissive lesion

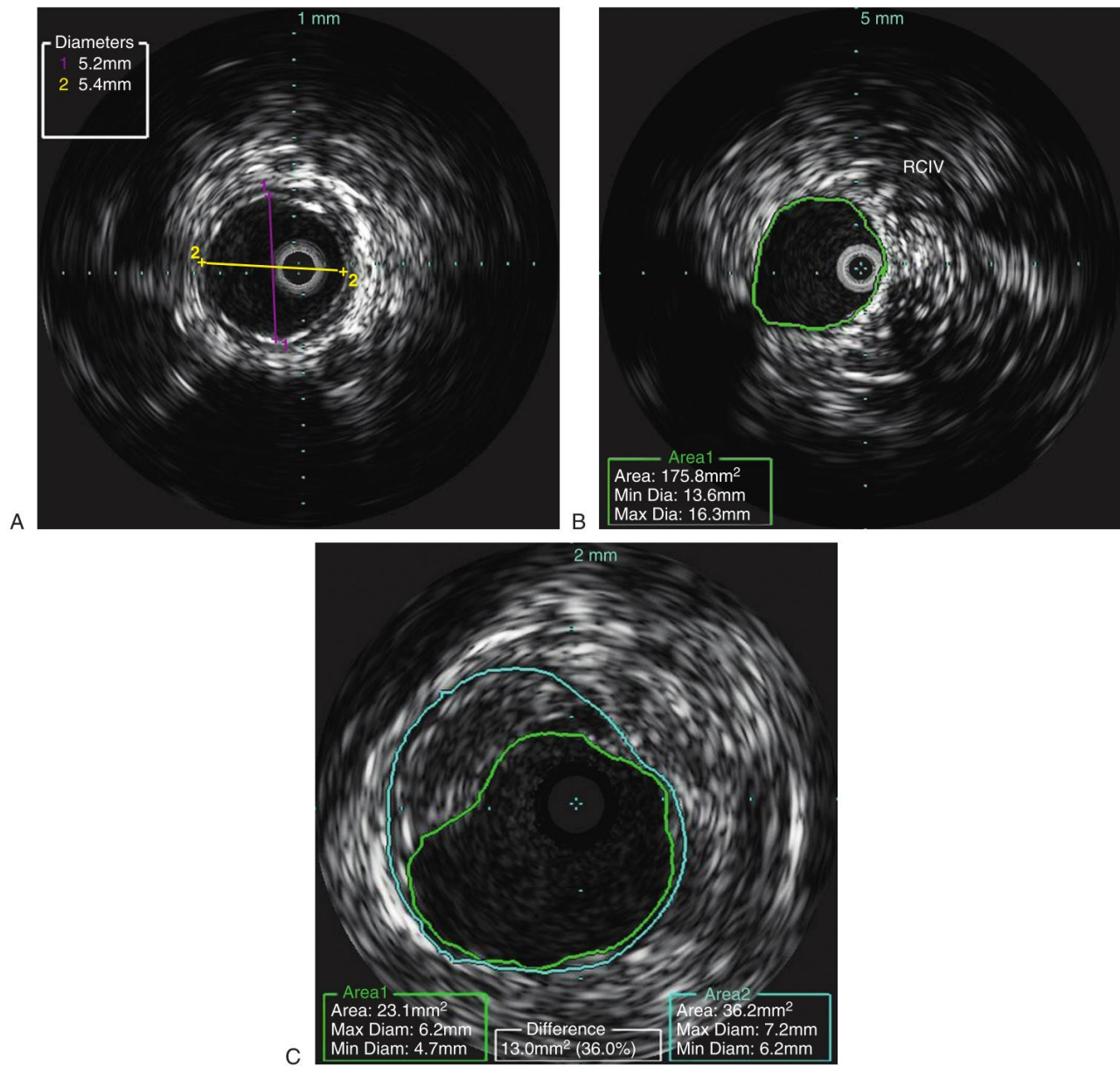
- May-Thurner/Cockett Syndrome
- Other compressive syndromes
- Diagnosed by intravascular ultrasound
- Require venoplasty and stenting





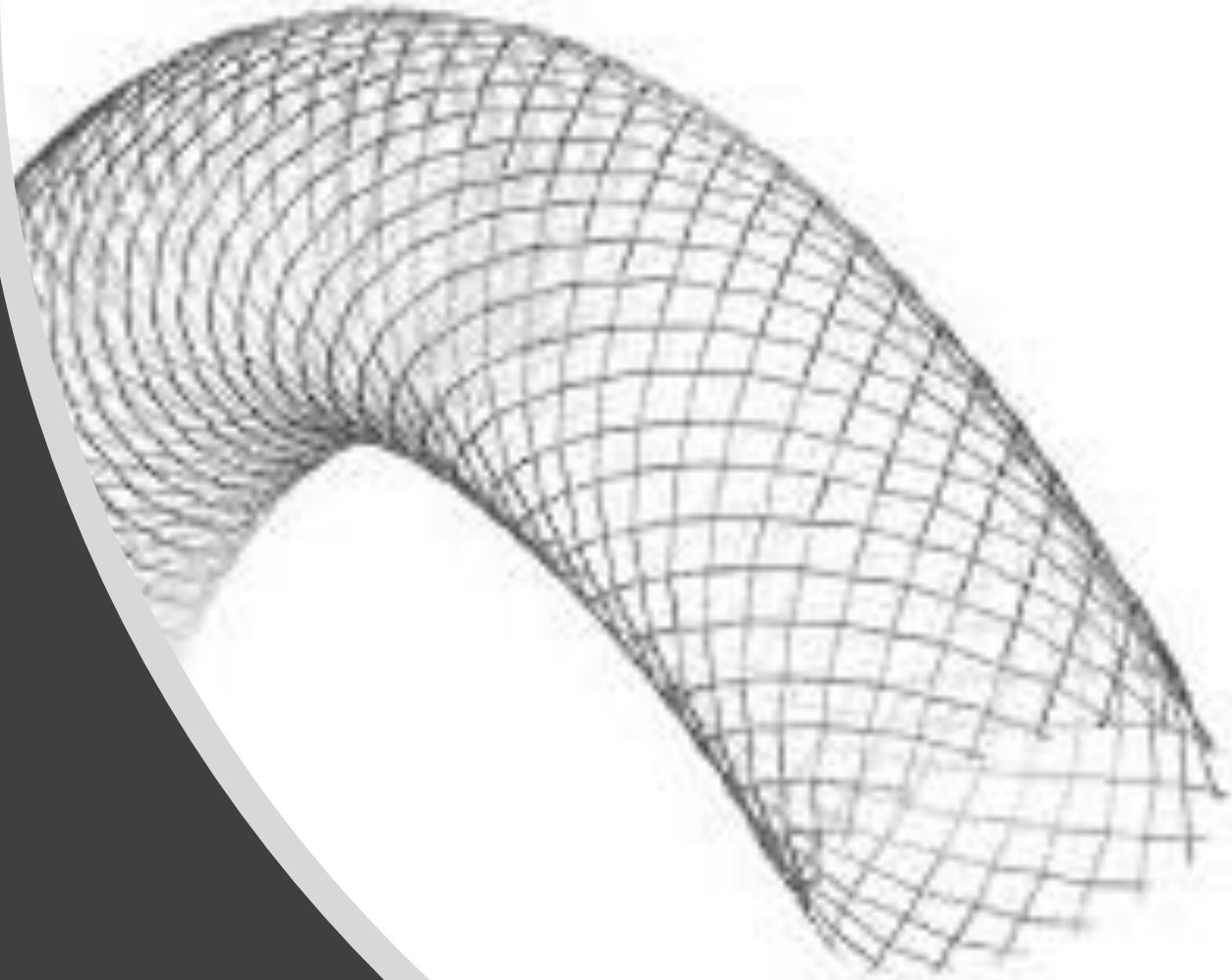


# IVUS



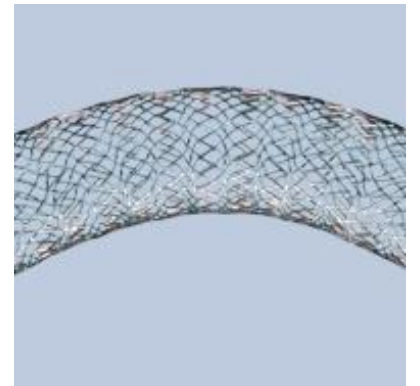
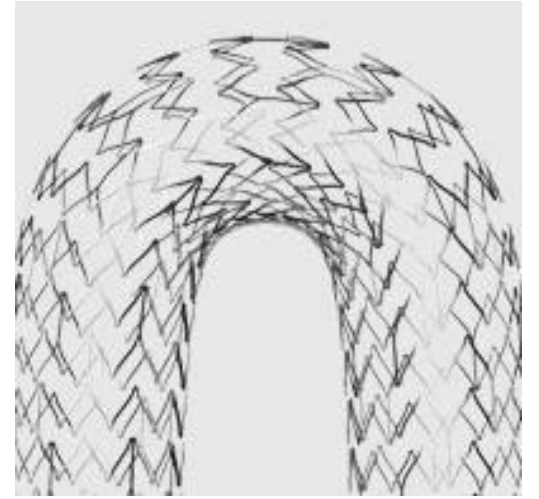
# Original options limited

- Wallstent
- Arterial Stents - small diameters
- High radial force does not imply crush resistance



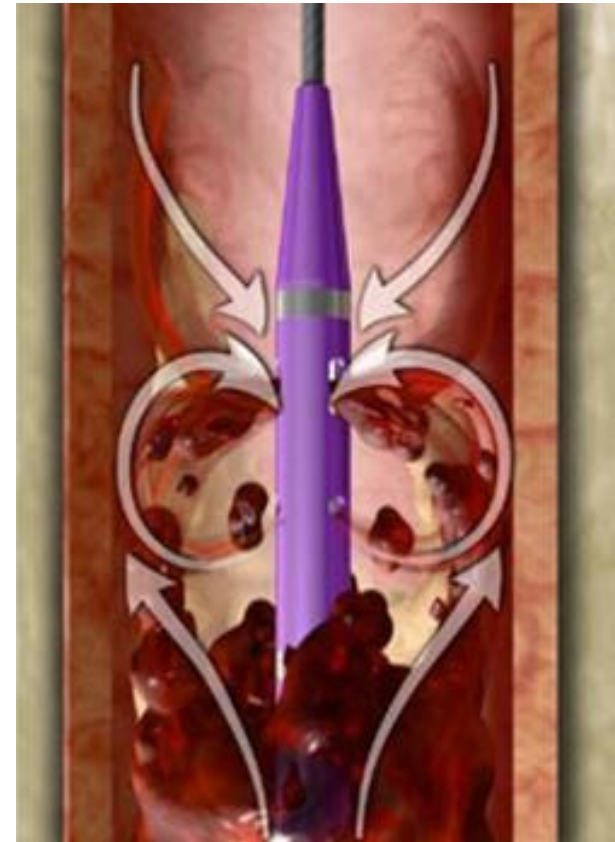
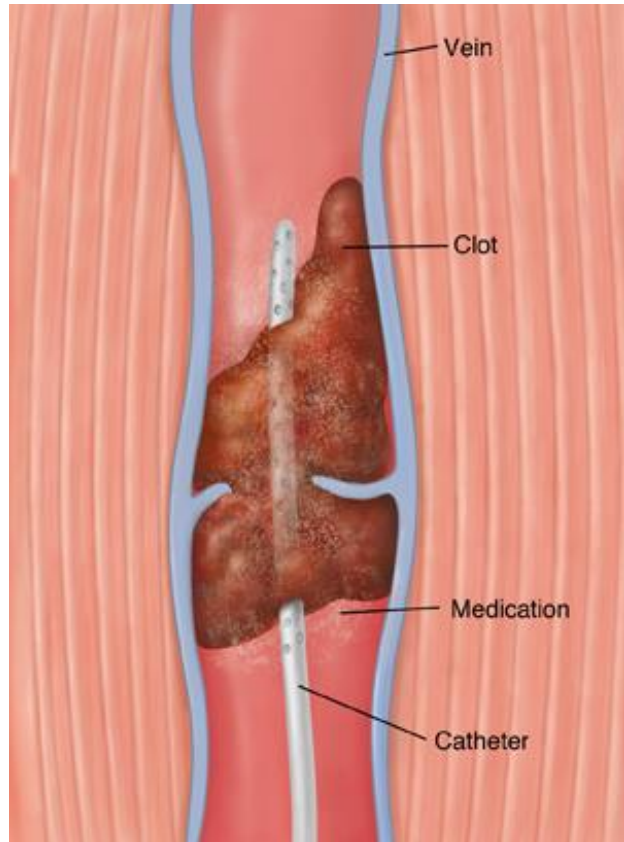
# New Dedicated Venous Stents

- Optimed
- Cook
- Veniti
  
- Bard
- Medtronic
  
- Boston Scientific

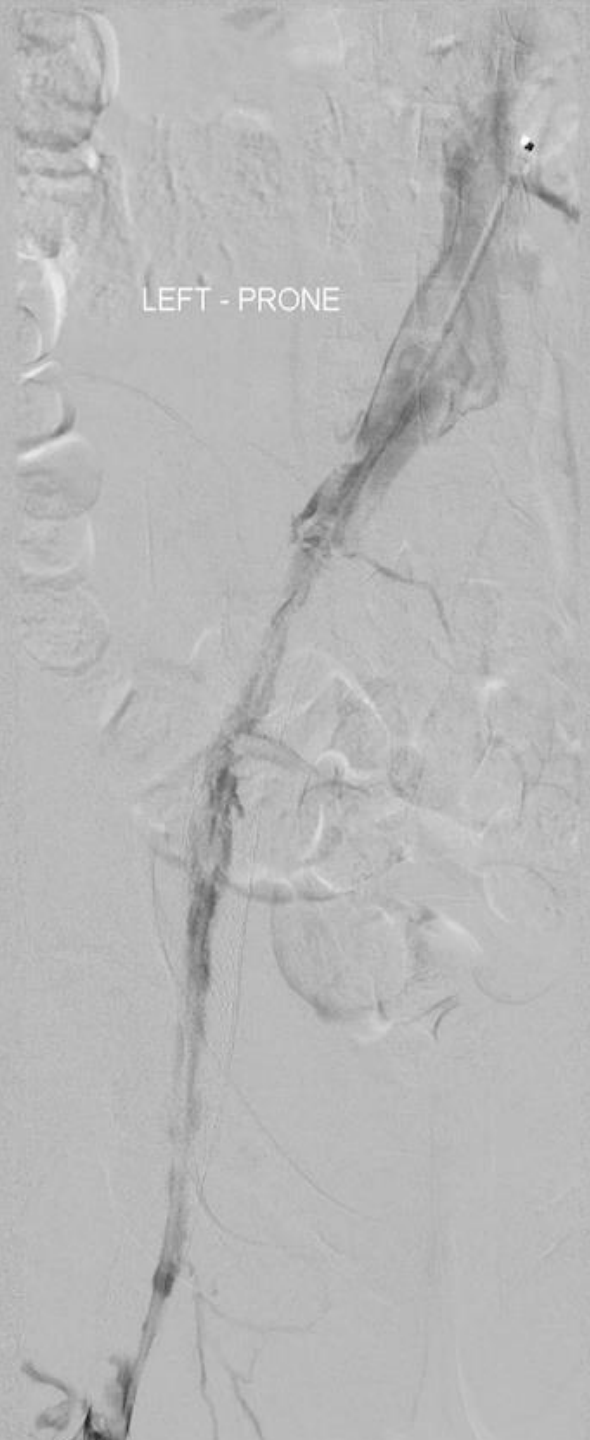


# CDT vs PMT

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LEFT - PRONE





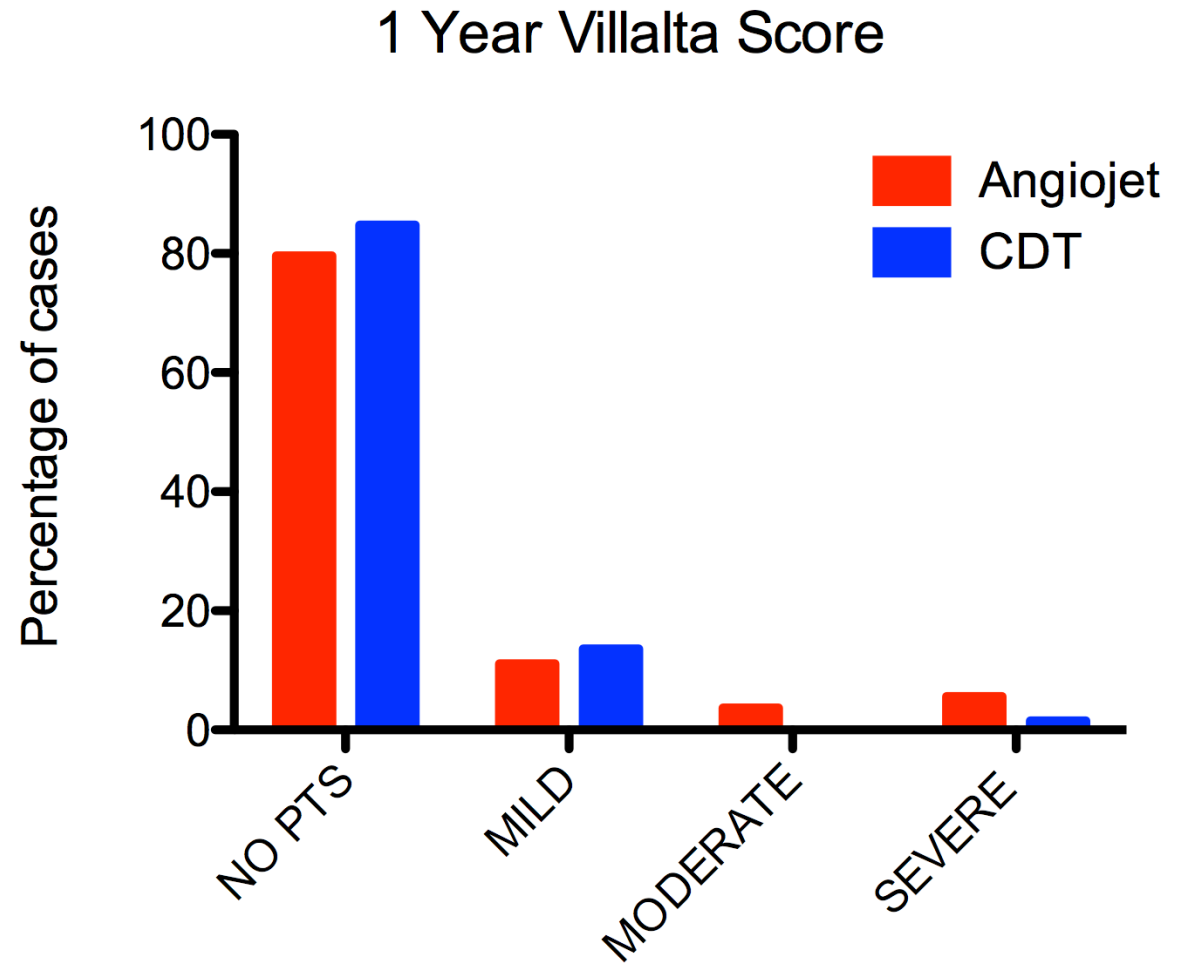
LEFT - PRONE

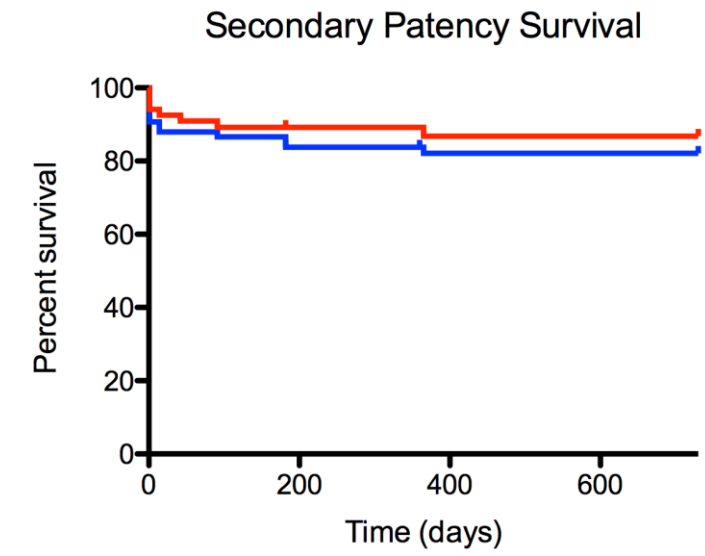
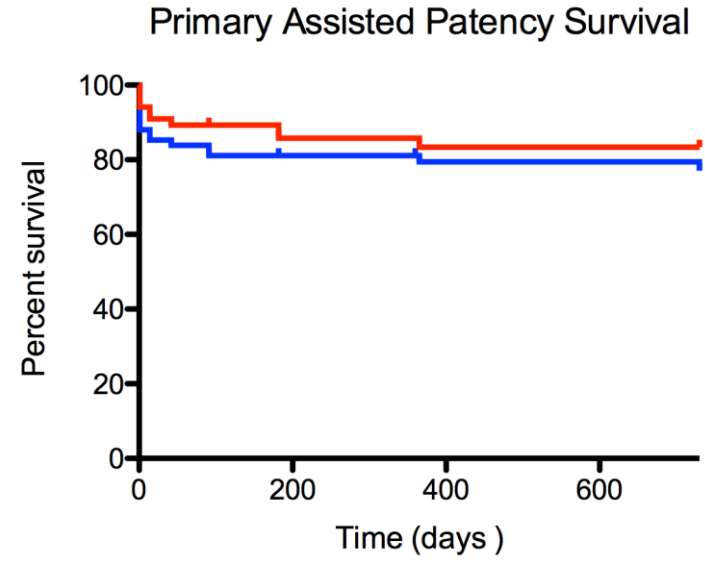
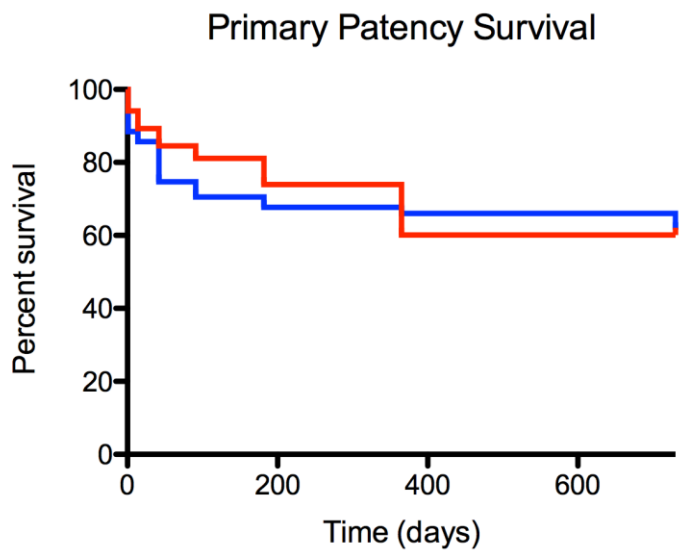


LEFT  
PRONE

## Contemporary outcomes

- CDT **15.2%** vs. AngioJet **20.4%** PTS
- ATTRACT **48.2%** PTS





# Contemporary outcomes

CAVENT Trial 66% patency at 6 months

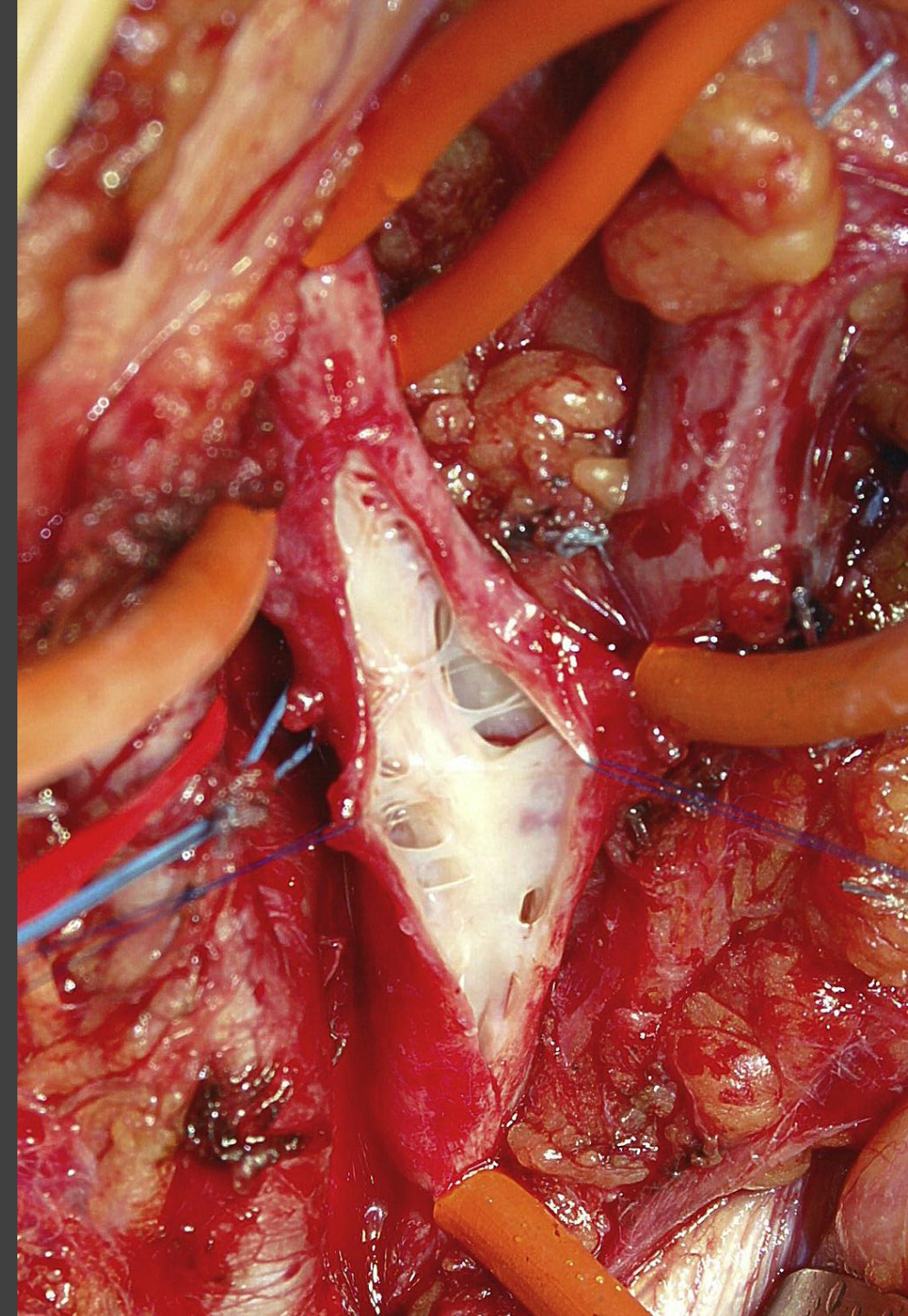




Established Post Thrombotic  
Syndrome

# Established Post Thrombotic Syndrome

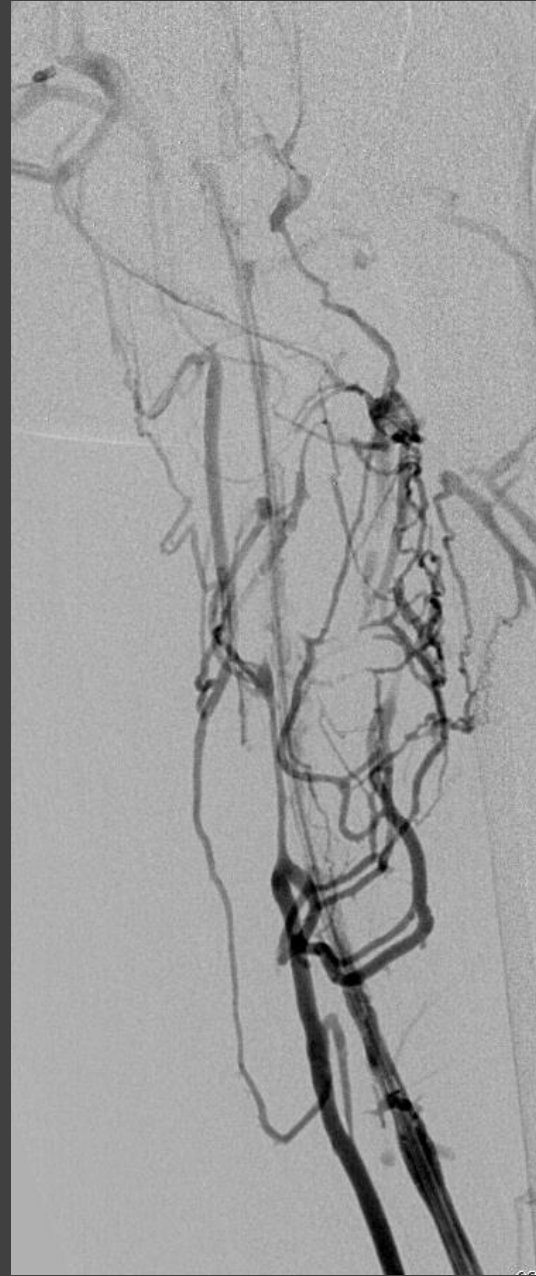
- Elevation
- Compression hosiery
- Moisturisation
- Decrease BMI
- (Supervised) Exercise
- (Intermittent pneumatic compression devices)
  
- Deep venous stenting

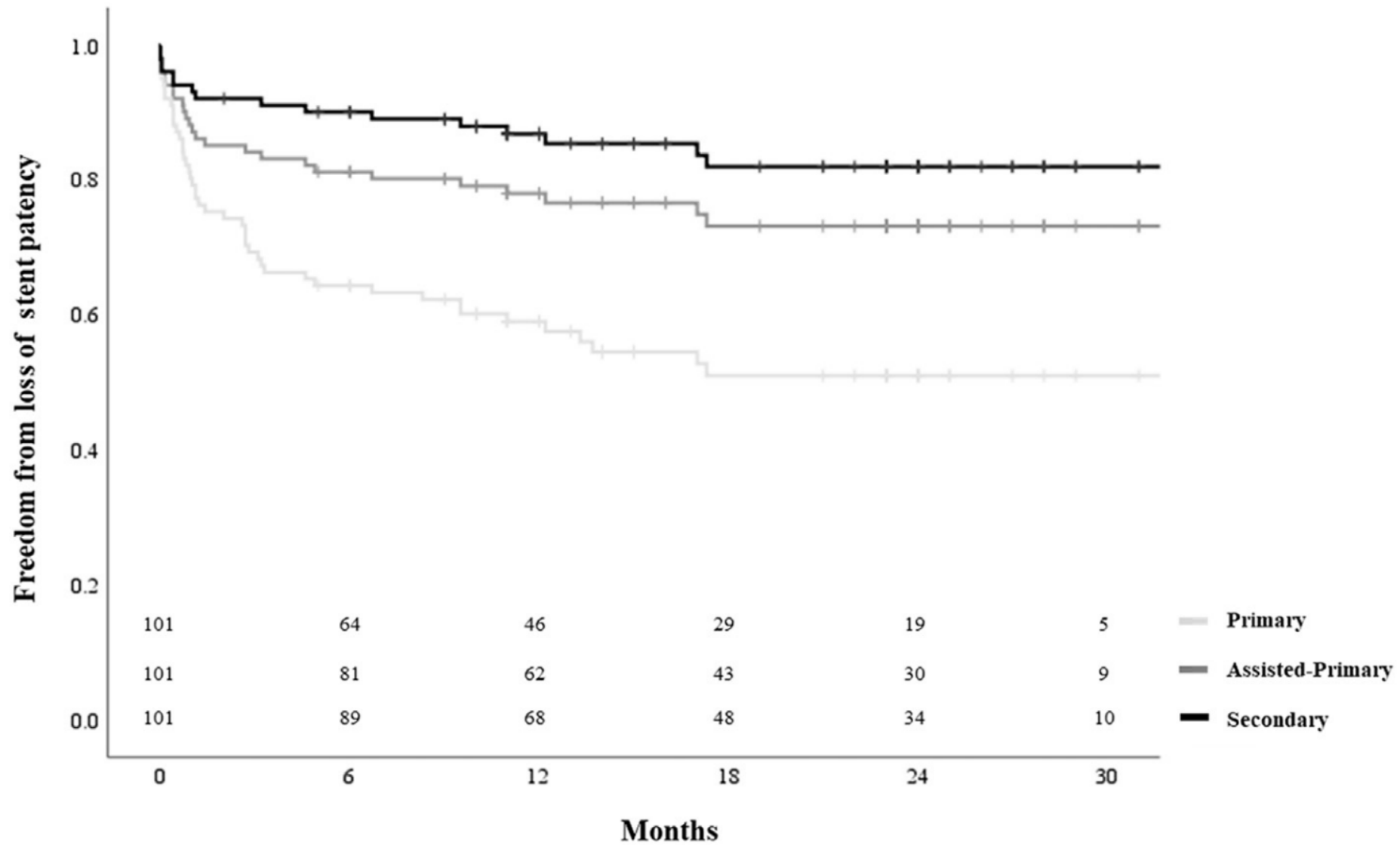


# Established Severe Post Thrombotic Syndrome

- MDT
  - Refer all ulcers not healed within 2 weeks
  - Compression bandaging
  - Superficial venous ablation
- Deep venous stenting









LEFT

PRONE

ILIACS IVC

RAO 1°  
CRAN 1°  
FD 42 cm

C: 508.0, W: 640.0  
C=508.0, W=640.0 1/1  
722023-67 100135525 50024114 02 0 0041



RIGHT

ATLAS GOLD  
14MM X 40MM

ATLAS GOLD  
14MM X 40MM

□ 10:93  
▶▶ 14:57:28

58  
42

G.A

Indications: Obstructed IVC (PTS)  
Dilated left iliac veins

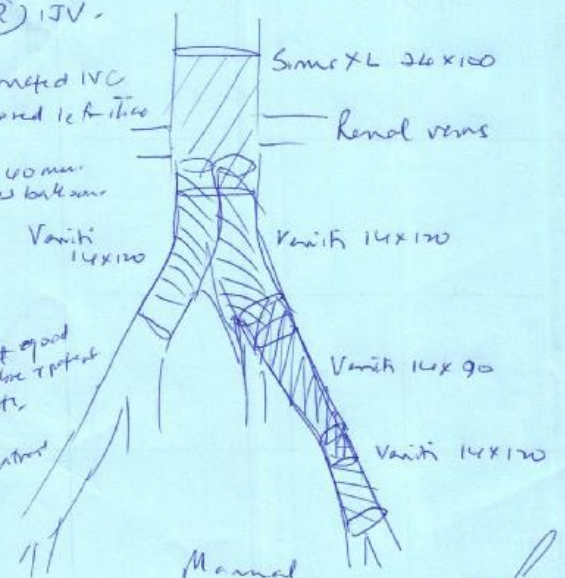
Access: (L) + (R) FV (mid)  
(R) IJV

Pre op  
IVUS: Obstructed IVC  
dilated left iliac

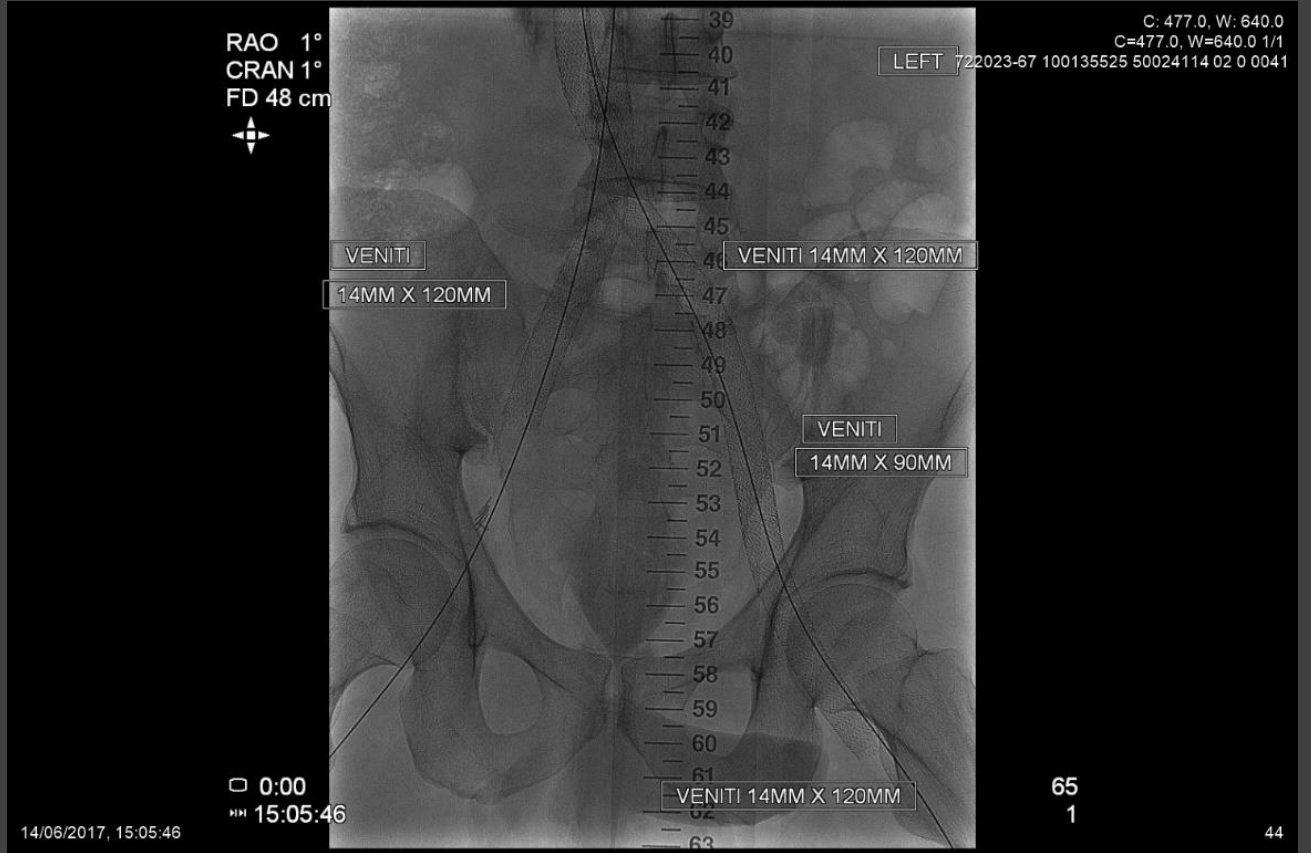
Venoplasty  
(pre op  
+ fix stent)  
14x120mm  
Atlas balloon

Final IUS: ~~good~~ good  
caliber + patent  
stents

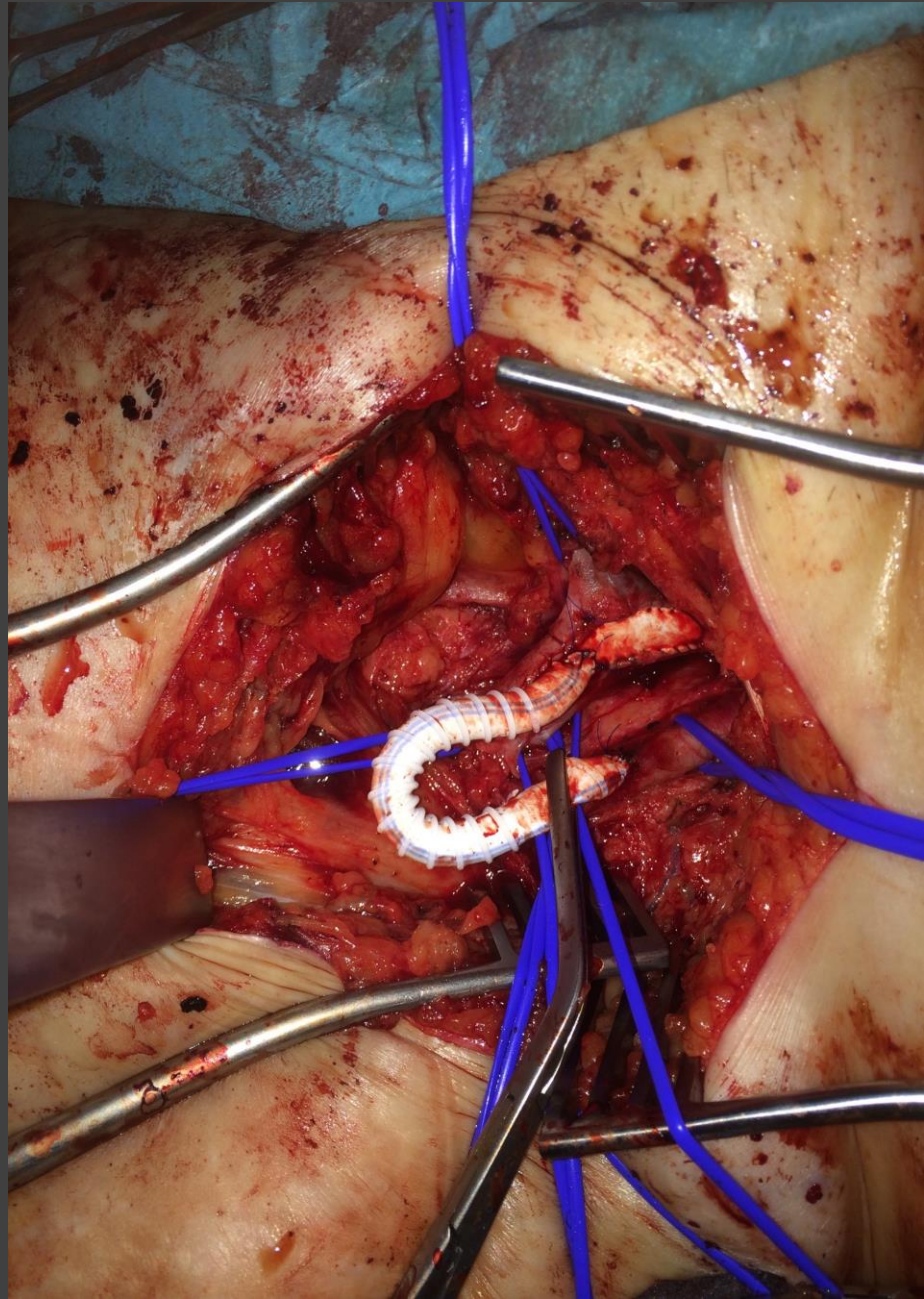
Venogram  
Good flow of contrast  
in both iliacs  
+ IVC



- Post op
- 1) Strick TEDS + Flotation
  - 2) Dabigatran 7500 units BID from 17:00 today
  - 3) CTU tomorrow
  - 4) Analgesia

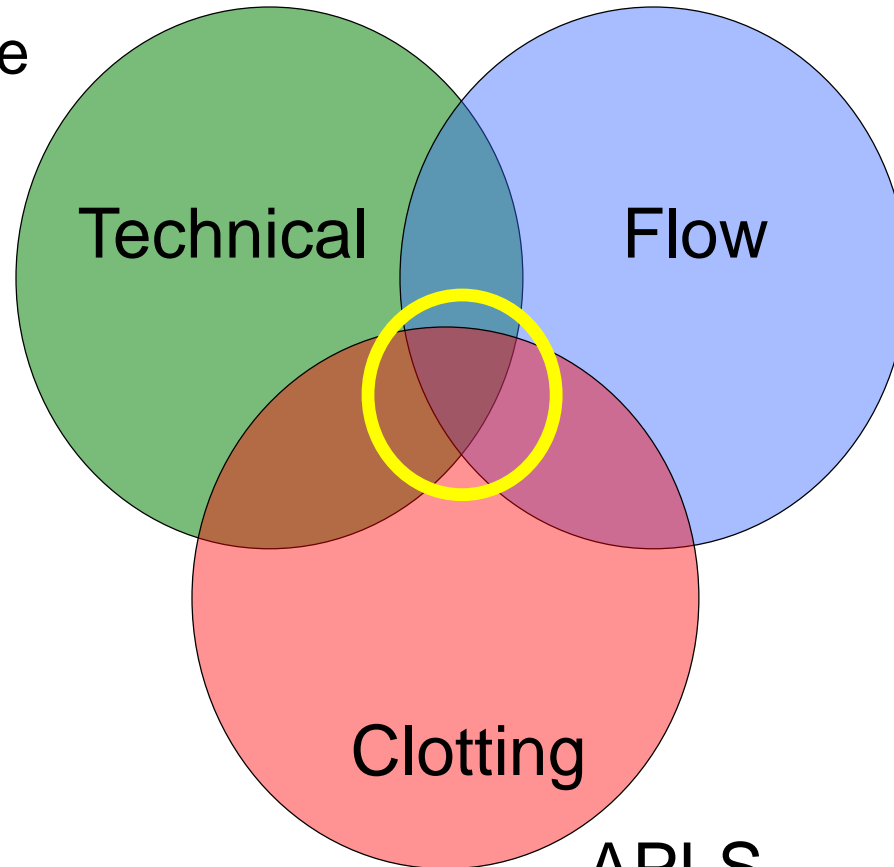






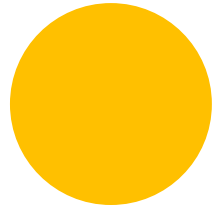
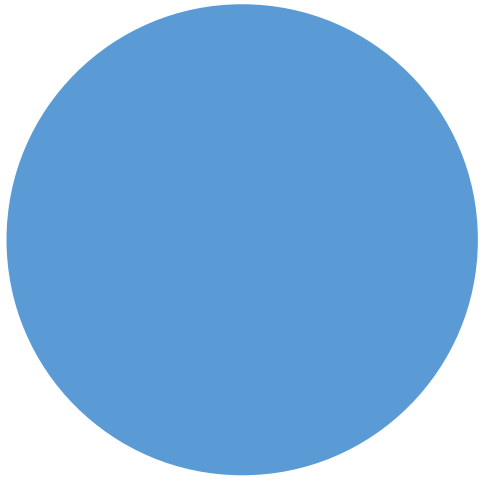
# Patency

Stent Choice  
Placement  
Errors  
Mistakes



Inflow!!!  
FV  
PFV  
AV fistula

APLS  
Behcet's  
Anti-coagulation



Questions?

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