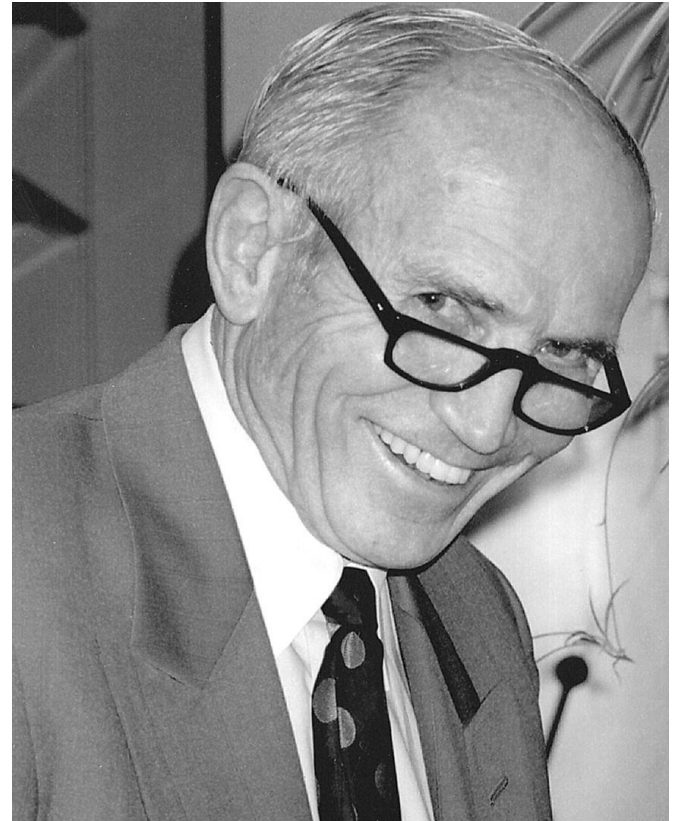


Diagnosis And Management of Upper Extremity DVT

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DISCLOSURE

Michael Caps, MD, MPH

**No Relevant Financial
Relationship Reported**



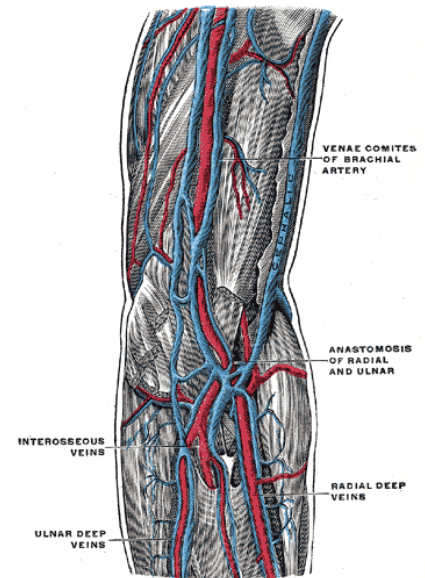
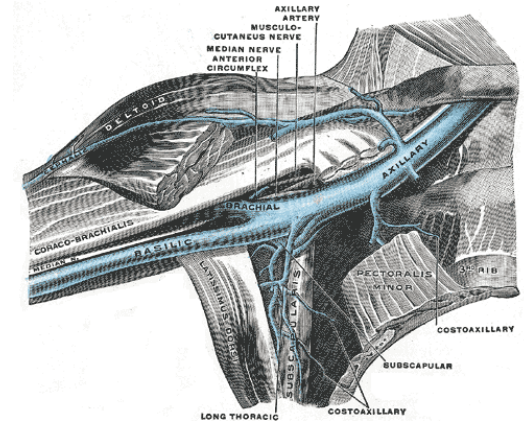
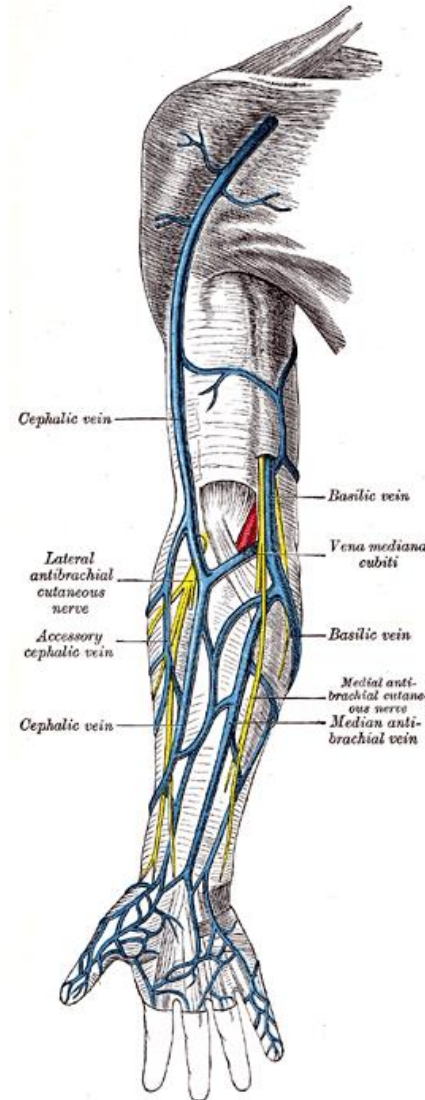
Diagnosis And Management of Upper Extremity DVT

Agenda

- Normal upper ext venous anatomy/physiology
- Problems
 - Acute DVT of the upper extremity
 - Others: SVT, PTS
- Elements
 - Etiology
 - Diagnosis
 - Prognosis/natural history
 - Treatment

Upper Extremity Venous Anatomy

- Superficial veins
 - Superficial to the deep fascia (except uppermost cephalic/basilic)
 - More variable than the deep veins
 - Digital, metacarpal, median, cephalic, basilic
- Deep veins
 - Deep to deep fascia
 - Accompany arteries
 - Usually paired (below axilla)
 - Radial, ulnar, brachial, axillary, subclavian, innominate, SVC



Variation In Superficial Veins

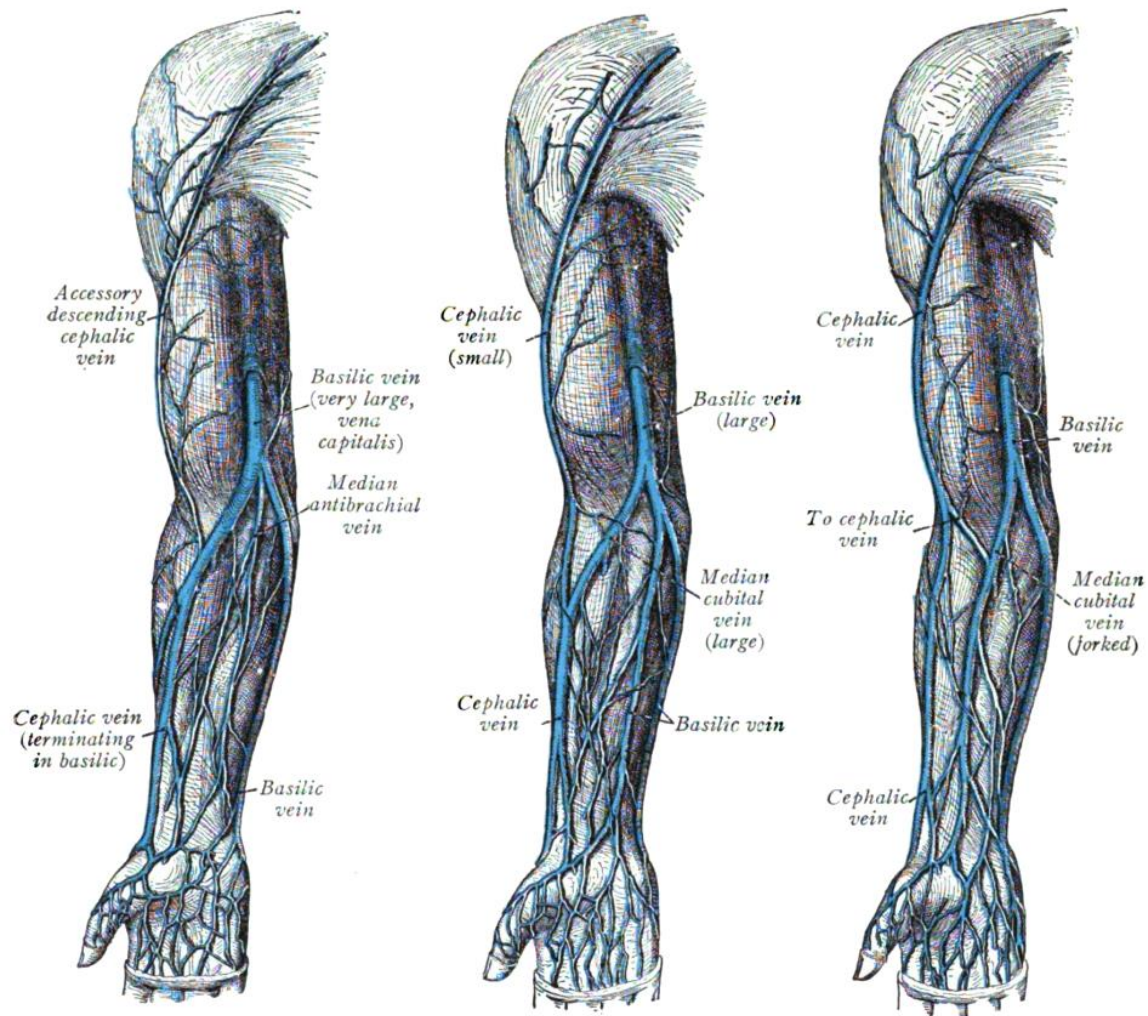


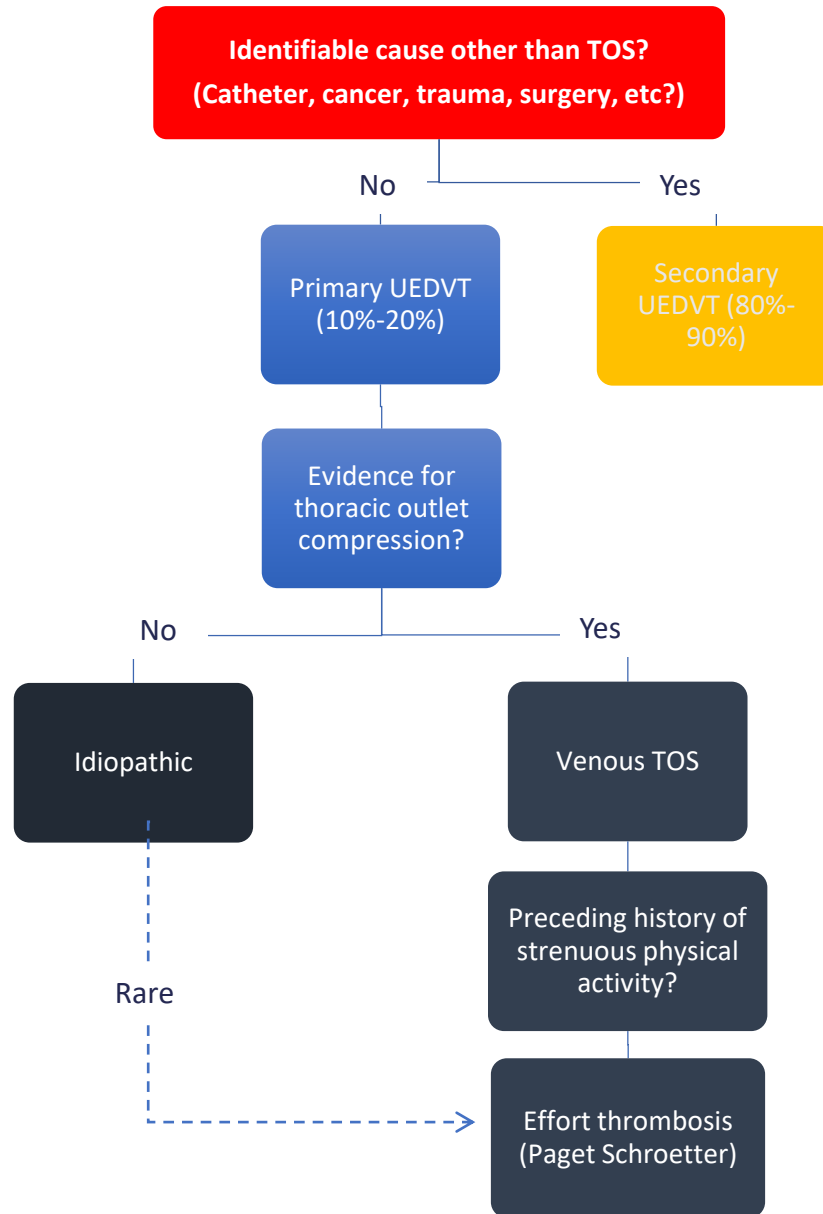
FIG. 597.—The most frequent variations in the veins of the forearm (schematic).

Acute DVT of the Upper Extremity

Etiology

- Approx 10% of all DVTs
- Incidence 4-10 per 100,000
- Rising due to increasing use of central (PICC) lines, pacemakers, defibrillators

Primary (10%-20%)	
“Effort Thrombosis”/Paget Schroetter/Venous TOS	Venous compression at costoclavicular space, common in young, healthy athletes, 2/3 antecedent history of exertion
Idiopathic	No evidence for venous TOS or any other cause. Thrombophilia may be present
Secondary (80%-90%)	
Catheter associated	PICC lines, pacer/defibrillator wires, more common on left
Cancer	Particularly ovarian, lung, metastatic, chemo infusions, TPN
Other	Trauma, shoulder surgery, pregnancy, OCP use



Acute DVT of the Upper Extremity

- Symptoms
 - Swelling, pain, paresthesias
 - Asymptomatic
- Signs
 - Edema, discoloration, visible collaterals
- Pre-test clinical prediction score



Variable	Score
Central catheter/pacemaker	+1
Arm pain	+1
Arm edema	+1
Likely alternative Dx	-1



Total Score	UE DVT Prevalence
-1 or 0	13%
1	38%
≥ 2	69%

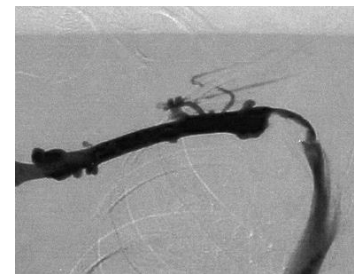
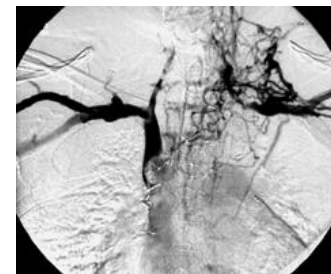
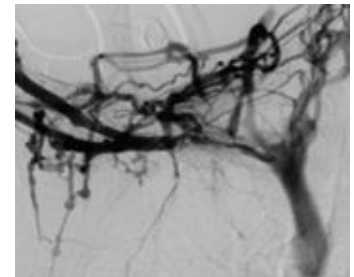
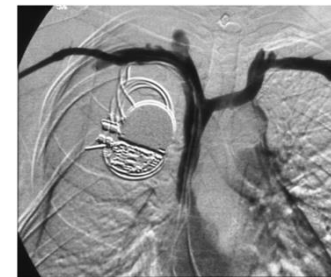
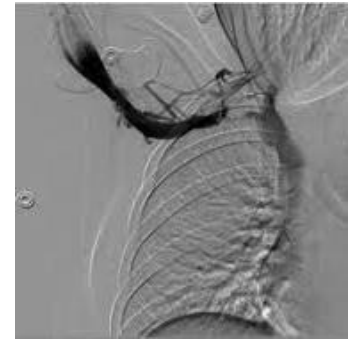
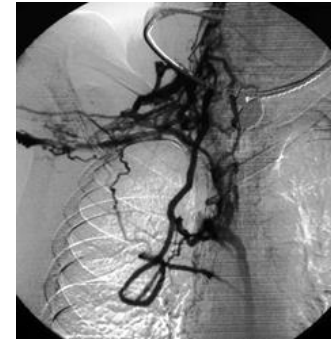
Upper Extremity Venous Duplex Scanning

- Diagnostic test of choice for most patients
- Sensitivity/specificity 90%-100%

Duplex Criteria For Upper Extremity DVT		
	NORMAL	ABNORMAL
Spectral Doppler	Spontaneous	Absent
	Phasic	Continuous
	Pulsatile	Decreased pulsatility
	Augmentation	Diminished augmentation
Color Doppler	Complete color filling	Incomplete color filling
B-mode	Complete compression	Incomplete compression
		Intraluminal echoes

Other Diagnostic Modalities

- D-dimer
 - Of limited usefulness
- CTV and MRV
 - Sparse data on accuracy
- VENOGRAPHY
 - Esp when considering thrombolysis/PTA
 - Provocative arm positions helpful



Acute DVT of the Upper Extremity

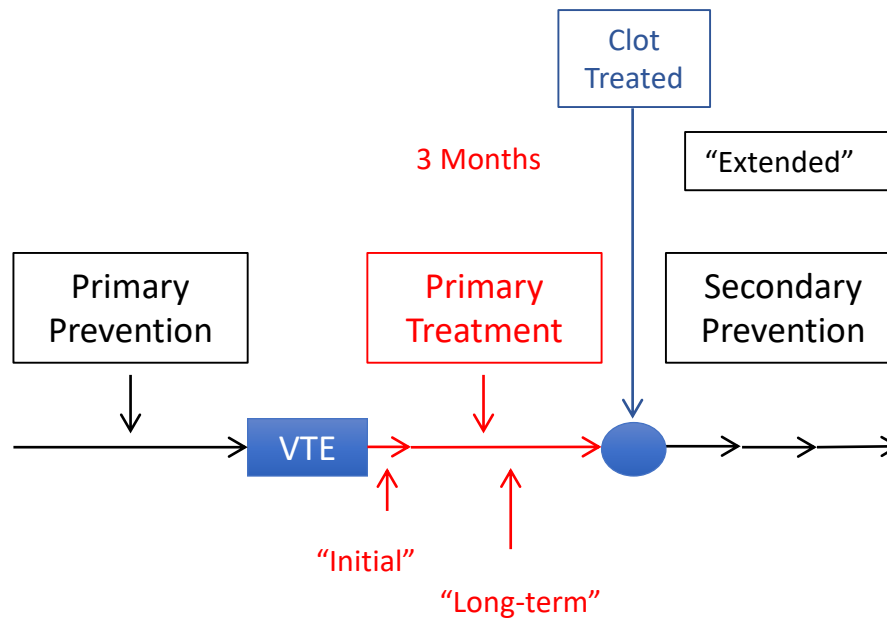
Prognosis/Natural History

Outcome	Upper Ext DVT	Lower Ext DVT
Pulmonary Embolus	5%-10%	15%-30%
Recurrence at 12 months	2%-5%	10%
Postthrombotic syndrome	5%	30%-50%
Mortality at 3 months*	11%	8%

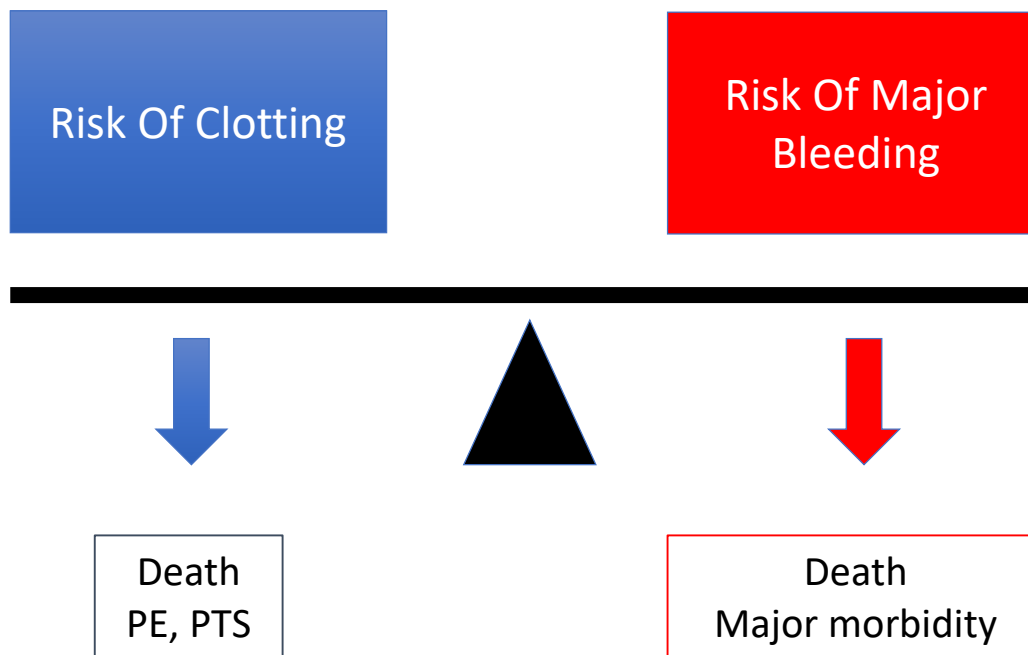
* Very few deaths due to PE after upper extremity DVT

Anticoagulant Treatment of Acute VTE

Phases of Treatment



Anticoagulation and Thrombolysis



Net Clinical Benefit = VTE events averted – Bleeding events incurred

Acute DVT of the Upper Extremity Treatment

ACCP Guidelines 9th Ed, Kearon, et al., CHEST, 2012

- UE DVT = axillosubclavian vein thrombosis
- Very little high quality evidence
- Recs are mostly extrapolation from LE DVT data
- Much needs updating after several DOAC RCTs

	“We Recommend...”	“We Suggest...”
Strength of Recommendation	Strong (1)	Weak (2)
Quality of Evidence		
-High (A)	1A	2A
-Moderate (B)	1B	2B
-Low (C)	1C	2C

Anticoagulant Treatment Of UE DVT

Primary Phase

- Acute VTE, no cancer
 - 2012: *Suggest* VKA over LMWH (2C)
 - 2016: *Suggest* DOACs over VKA (2B)
- Acute VTE, active cancer (2012 and 2016)
 - *Suggest* LMWH over DOACs or VKA (2C)
 - Likely to change
- Parenteral Phase
 - *Recommend* initial parenteral treatment (1B)
 - Until INR ≥ 2 , at least 5 days
 - *Suggest* LMWH or fondaparinux over IV UFH (2B)
 - Not required for rivaroxaban and apixaban

Management of Catheters in UE DVT

- *Suggest* the catheter not be removed if it is needed and functional (2C)
- *Recommend* anticoagulation be continued as long as the catheter is in place in cancer patients (1C). *Suggest* (2C) in non-cancer patients.
- If the catheter is removed, *recommend* 3 months of anticoagulation (1B)

Thrombosis Confined to the Brachial or Proximal Basilic/Cephalic Veins

- Need for anticoagulation uncertain
- Therapeutic options:
 - Serial ultrasound surveillance
 - Full dose anticoagulation
 - Prophylactic dose anticoagulation
- Consider anticoagulation in presence of:
 - Severe symptoms
 - Cancer
 - Catheter
- High risk of bleeding argues against anticoagulation

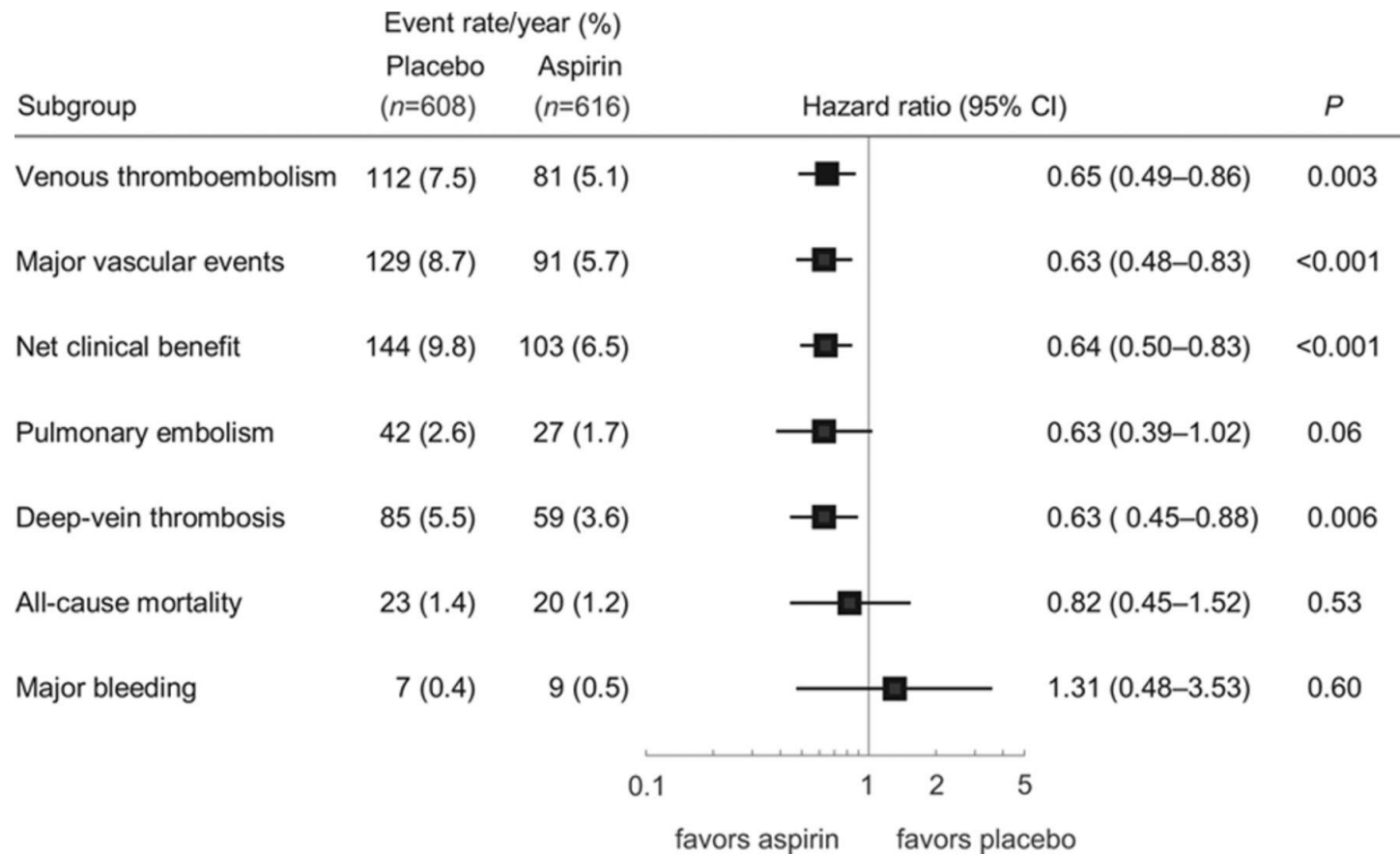
Superficial Venous Thrombophlebitis

- With some possible exceptions, SVT of the upper extremity should NOT be treated with anticoagulation
- Possible exceptions include:
 - Proximal cephalic/basilic SVT, esp associated with catheter/active cancer
 - Extensive severely symptomatic SVT associated with cancer
- CHEST guidelines for LE SVT:
 - *Suggest* the use of a prophylactic dose of fondaparinux or LMWH for 45 days over no anticoagulation (2B)

When To Consider Extended Therapy (Longer Than 3 Months)

- Extended therapy generally not recommended after 1st unprovoked or idiopathic DVT
- Extended therapy recommended if there is a catheter
- Consider if: low-moderate risk major bleeding on anticoagulation and:
 - Active cancer
 - Recurrent UE DVT
- Aspirin vs therapeutic vs prophylactic dose anticoagulation?
 - Choice depends on perceived thrombosis/bleeding risks

ASA For Secondary Prevention



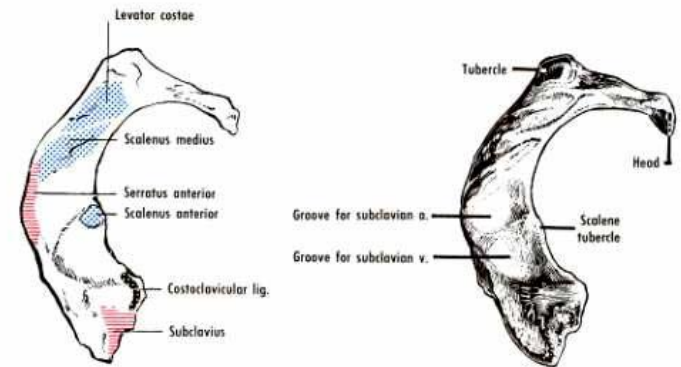
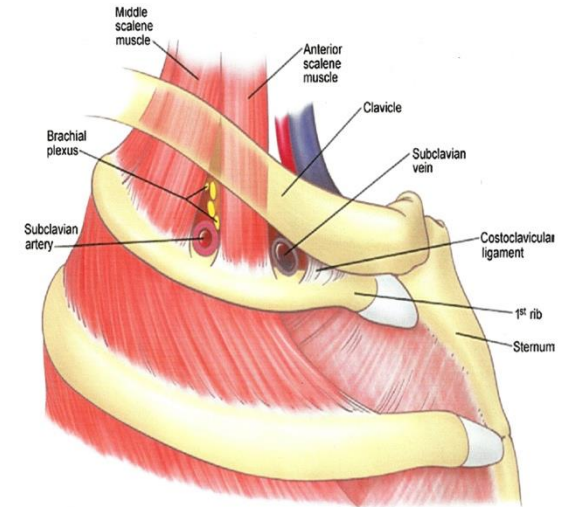
Catheter-Directed Thrombolytic Rx

- *Suggest* anticoagulant therapy alone over thrombolysis (2C)
- Consider in the following circumstances:
 - Severe symptoms
 - <14 days duration
 - Good functional status
 - Favorable life expectancy
 - Low risk of bleeding
- Pharmacomechanical techniques decrease time and amount of lytic drug needed
 - Consider depending on local expertise

Thoracic Outlet Decompression

Venous TOS

- Subclavian vein most often compressed in the costoclavicular space
- Decompression typically includes:
 - Resection of the first rib
 - Division of the ant/mid scalene muscle attachments

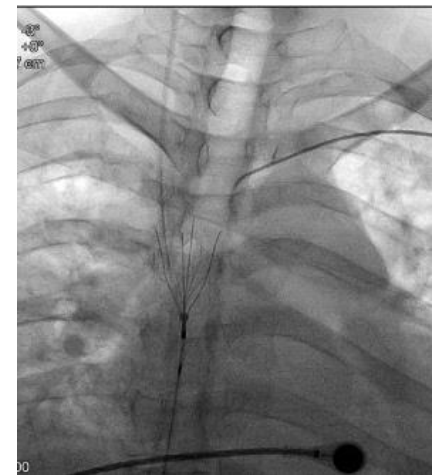
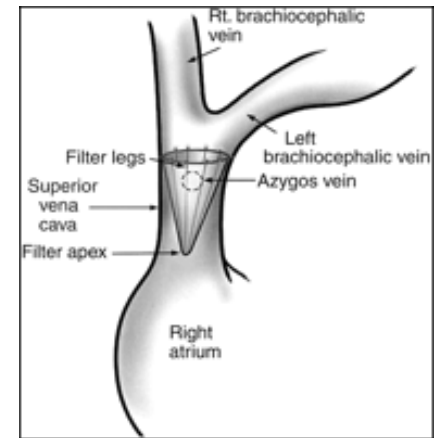


Controversies Surrounding Thoracic Outlet Decompression

Controversy	Questions?
Indication	Which patients require TOD?
Thrombolysis	Does it help?
Timing	How long to wait before TOD?
Approach	Transaxillary? Supraclavicular? Infraclavicular? Endoscopic? Posterior?
Residual vein stenosis	Venoplasty? Open reconstruction?
Anticoagulation	How long?
Chronic venous occlusion	Does TOD help?

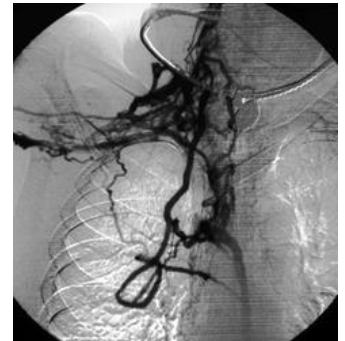
Superior Vena Cava Filters

- In a review that included 209 patients:
 - Risk of severe complications = 3.8%
 - Cardiac tamponade
 - Aortic perforation



Postthrombotic Syndrome of the Upper Extremity

- Substantially lower incidence in the upper ext
- Usually associated with central obstruction, not reflux
- Less common after catheter-associated UE DVT
- Treatment is supportive
 - Elevation and compression
- CHEST Guidelines:
 - We *suggest* a trial of compression bandages or sleeves to reduce symptoms (2C).



Primary Prevention of UE DVT

- Consider in patients with central venous catheters and active cancer
- Meta-analysis of 10 RCTs in 2564 adults:
 - Heparin vs no heparin
 - RR symptomatic DVT 0.48 (0.27, 0.86)
 - VKA vs no VKA
 - RR asymptomatic DVT 0.43 (0.30, 0.62)
- Results did not show or exclude a beneficial or detrimental effect in any other variable:
 - Mortality, bleeding, infection, QOL, etc
 - i.e., low-quality evidence