Deep vein thrombosis

DVT – Epidemiology and Etiology

- Annual incidence of venous thromboembolism (VTE) is 1/1000
- DVT accounts for one half of VTE
- Carefully evaluated, up to 80% of patients with VTE have one or more risk factors
- Majority of lower extremity DVT arise from calf veins but ~20% begin in proximal veins
- About 20% of calf-limited DVTs will propagate proximally

DVT – VTE Risk Factors

- Malignancy
- Surgery
- Trauma
- Pregnancy
- Oral contraceptives or hormonal therapy
- Immobilization
- Inherited thrombophillia
- Presence of venous catheter
- Congestive failure
- Antiphospholipid antibody syndrome
- Hyperviscosity
- Nephrotic syndrome
- Inflammatory bowel disease

Deep vein thrombosis

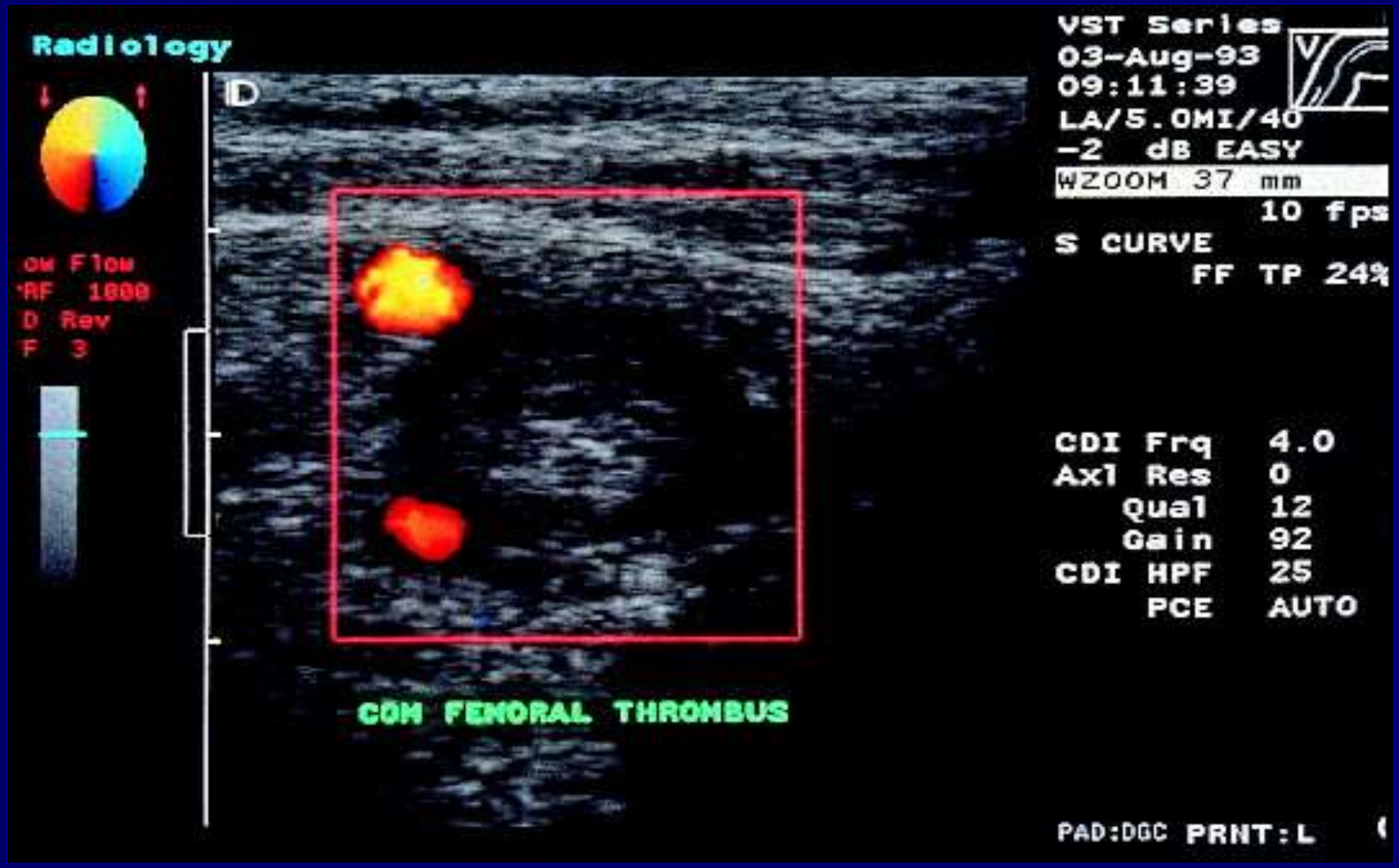
- predisposing factors
  - immobility/bed rest
  - post-operative
  - pregnancy and post-partum
  - oral contraceptives
  - severe burns
  - cardiac failure
  - disseminated cancer

DVT – Clinical Presentation

- Classically = calf pain, tenderness, swelling, redness and Homan's sign
  - Overall sens/spec = 3-91%
  - Unreliable for diagnostic decisions
- Wells developed and tested a clinical prediction model for DVT

Wells PS, Anderson DR, Bormanis J, et al. Value of assessment of pretest probability of deep-vein thrombosis in clinical management. Lancet 1997;350 (9094):1795-8.

Color duplex scan of DVT



Phlegmasia cerulea dolens

→ Venous gangrene

DVT – Wells Score

The following were assigned a point value of 1 if present:

- Cancer
- Paralysis or plaster immobilization
- Bedrest > 3d or surgery in past 4 wks
- Localized tenderness
- Entire leg swollen
- Calf > 3cm larger than unaffected leg
- Pitting edema greater than unaffected leg
- Collateral superficial veins

- Alternative diagnosis more likely than DVT = - 2 points
- Probability High (≥ 3), Moderate (1-2) or Low (0 or less)
- DVT risk: High – 75%, Moderate – 17%, Low – 3%

Wells PS, Andersen DR, Bormanis J *et al. Lancet.* 1997;350:1795-8

HOMAN'S SIGN

DVT – D-Dimer

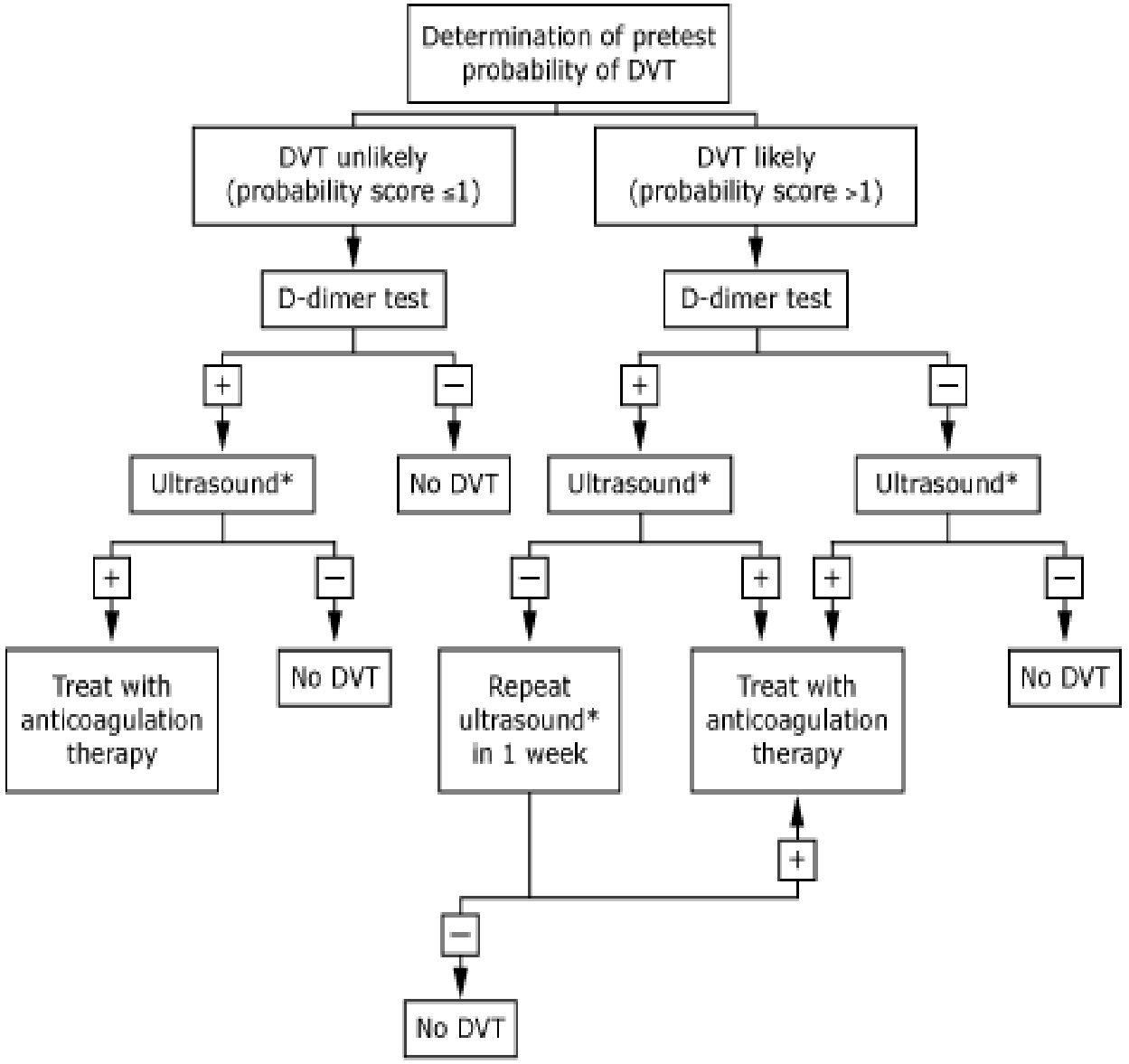
- Fibrin degradation product elevated in active thrombosis
- Negative test can help exclude VTE
- Preferred test
  - Quantitative Rapid ELISA – sensitivity 96/95% for DVT/PE
  - Other methods include latex agglutination and RBC agglutination (SimpliRED)

Stein PD, Hull RD, Patel KC, et al. D-dimer for the exclusion of acute venous thrombosis and pulmonary embolism: a systematic review. *Ann Int Med*. 2004;140(8):589-602

DVT – Imaging

- Available imaging and ancillary tests:
  - Compression US – first line test, high sens/spec
  - Venography – gold standard
  - MRI – Lower quality evidence only at present
  - Impedance plesmythography – not in US

Diagnostic algorithm using D-dimer testing and ultrasound imaging in patients with suspected DVT



* Imaging done from proxima

Table I : Criteria proposed by Wells et al for calculating the risk of DVT

Clinical feature	Score
1. Active cancer within 6 months	1
2. Paralysis, paresis, or cast of lower extremity	1
3. Recently bedridden > 3 d or major surgery within 4 wk	1
4. Localized tenderness along deep vein system	1
5. Calf diameter > 3 cm larger than opposite leg at 10 cm below the tibial tuberosity	1
6. Pitting edema	1
7. Collateral superficial veins (non-varicose)	1
8. Alternative diagnosis as ≥ likely than that of DVT	-2

Pretest Probability For DVT based upon Wells Score And Frequency of DVT

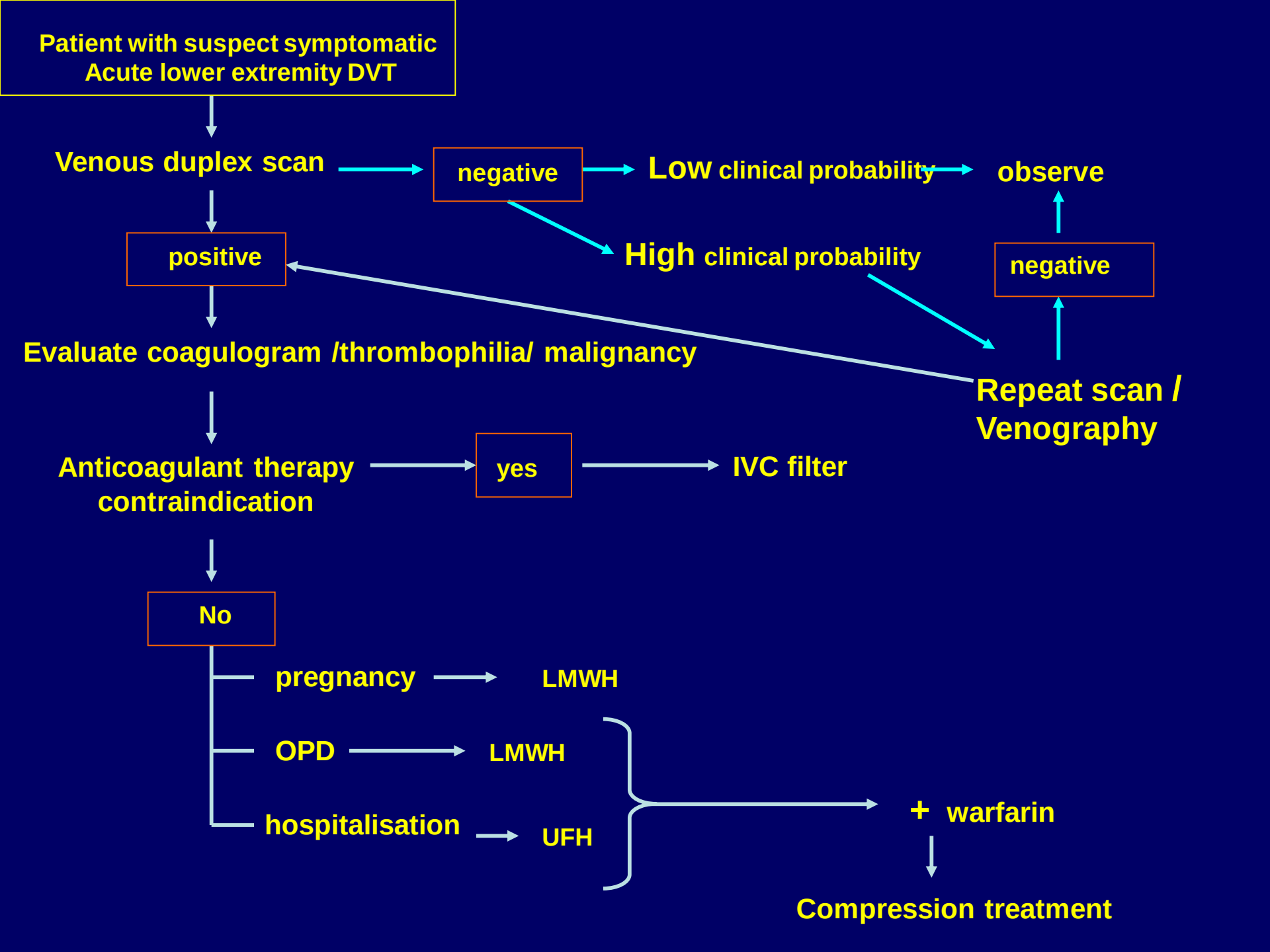
Score	Probability	Frequency of DVT(%)
0	low	03
1-2	medium	17
≥ 3	high	75

Can DVT be prevented?

- high risk patients must be identified and offered prophylaxis
  - heparin sub-cutaneously
  - leg compression during surgery

Can DVT be treated?

- intravenous heparin
- oral warfarin


Patient with suspect symptomatic
Acute lower extremity DVT
Venous duplex scan
negative
Low clinical probability
observe
positive
High clinical probability
negative
Evaluate coagulogram /thrombophilia/ malignancy
Repeat scan /
Venography
Anticoagulant therapy
contraindication
yes
IVC filter
No
pregnancy
LMWH
OPD
LMWH
hospitalisation
UFH
+ warfarin
Compression treatment

PE – Epidemiology and Etiology

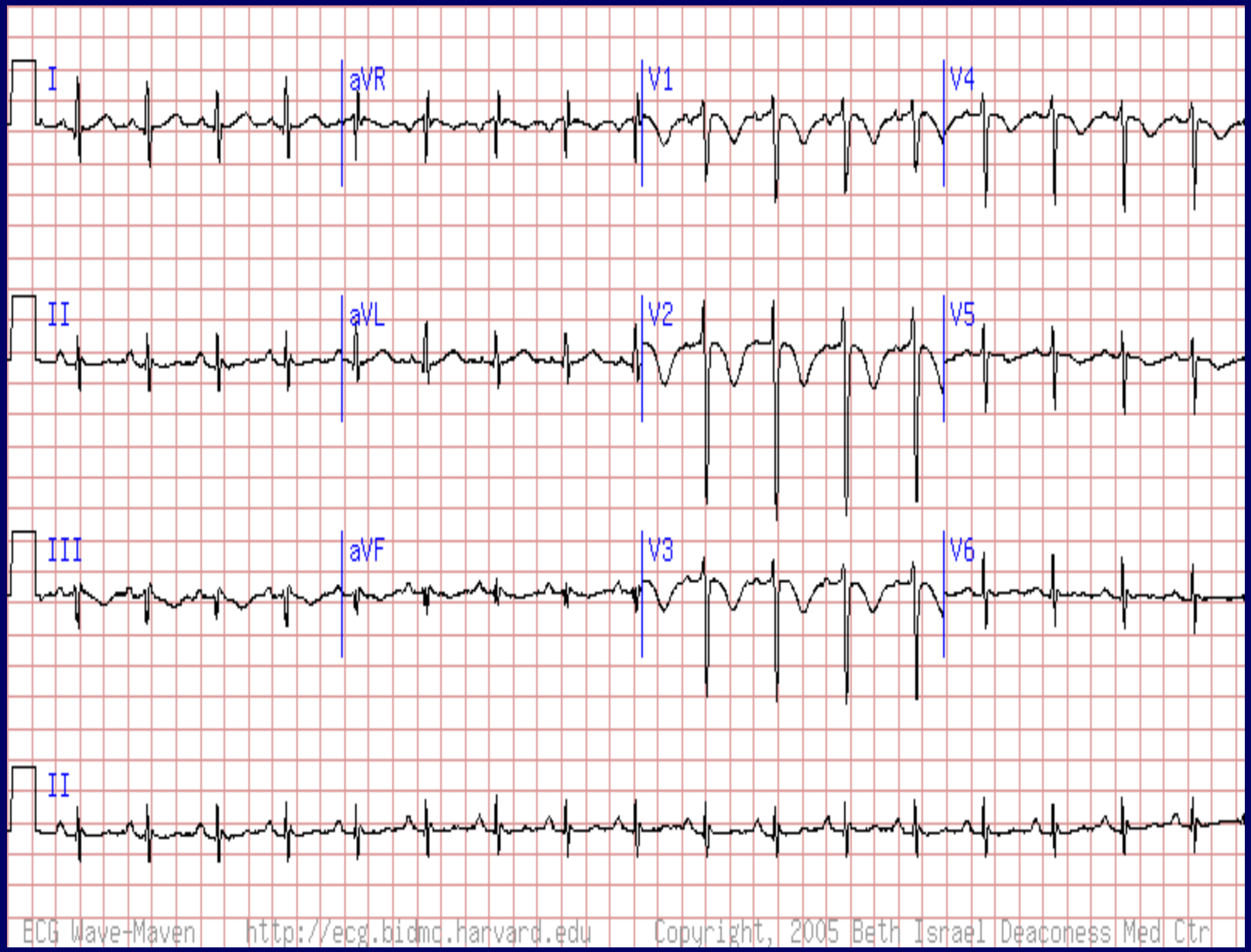
- 100-200,000 deaths per year due to PE
- Most PE arise from lower extremity DVT
- In patients with DVT, 40-60% will have a PE on V/Q scanning

"Pulmonary embolus is not a disease. It is a complication of DVT." Ken Moser MD

PE – Clinical Presentation

- Dyspnea, pleuritic pain and cough most common symptoms
- Tachypnea, rales and tachycardia most common signs
- ABG limited value for diagnosis
- EKG and CXR often abnormal, but usually lacking specificity to aid diagnosis

PIOPED Study. JAMA. 1990;263(20):2753-59. Stein PD, Goldhaber SZ, Henry JW. *Chest* 1995;107:139-43


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
ECG Wave-Maven
http://ecg.bidmc.harvard.edu
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Cronic Venous Insufisiensi

Definition

- Chronic venous insufficiency (CVI) is a common cause of leg pain and swelling, and is commonly associated with varicose veins. It occurs when the valves of the veins do not function properly, and the circulation of blood in the leg veins is impaired.

Causes

- **The cause of CVI is related either to poorly functioning vein valves or blockage in the veins. Vein valves are de- signed to allow blood to flow against gravity from the legs back to the heart. When the values fail to close properly, gravity wins and the flow reverses. This is called venous reflux.**

Vein valves may fail to close due to:

- Vein wall weakness that causes the vein to enlarge so that the valves can not close
- A history of blood clots or deep vein thrombosis in the vein that damage the valve
- An absence of vein valves since birth

Risk Factors

The most important factors leading to the development of chronic venous insufficiency and varicose veins include:

Family history

- **Increasing age over 30**
- **One or more blood clots in superficial or deep veins**
- **Female gender, although varicose veins occur nearly as commonly in men**
- **Multiple pregnancies**
- **Prolonged standing**
- **Heavy lifting**

Limited physical activity, high blood pressure and obesity have also been linked with the presence of varicose veins in women.

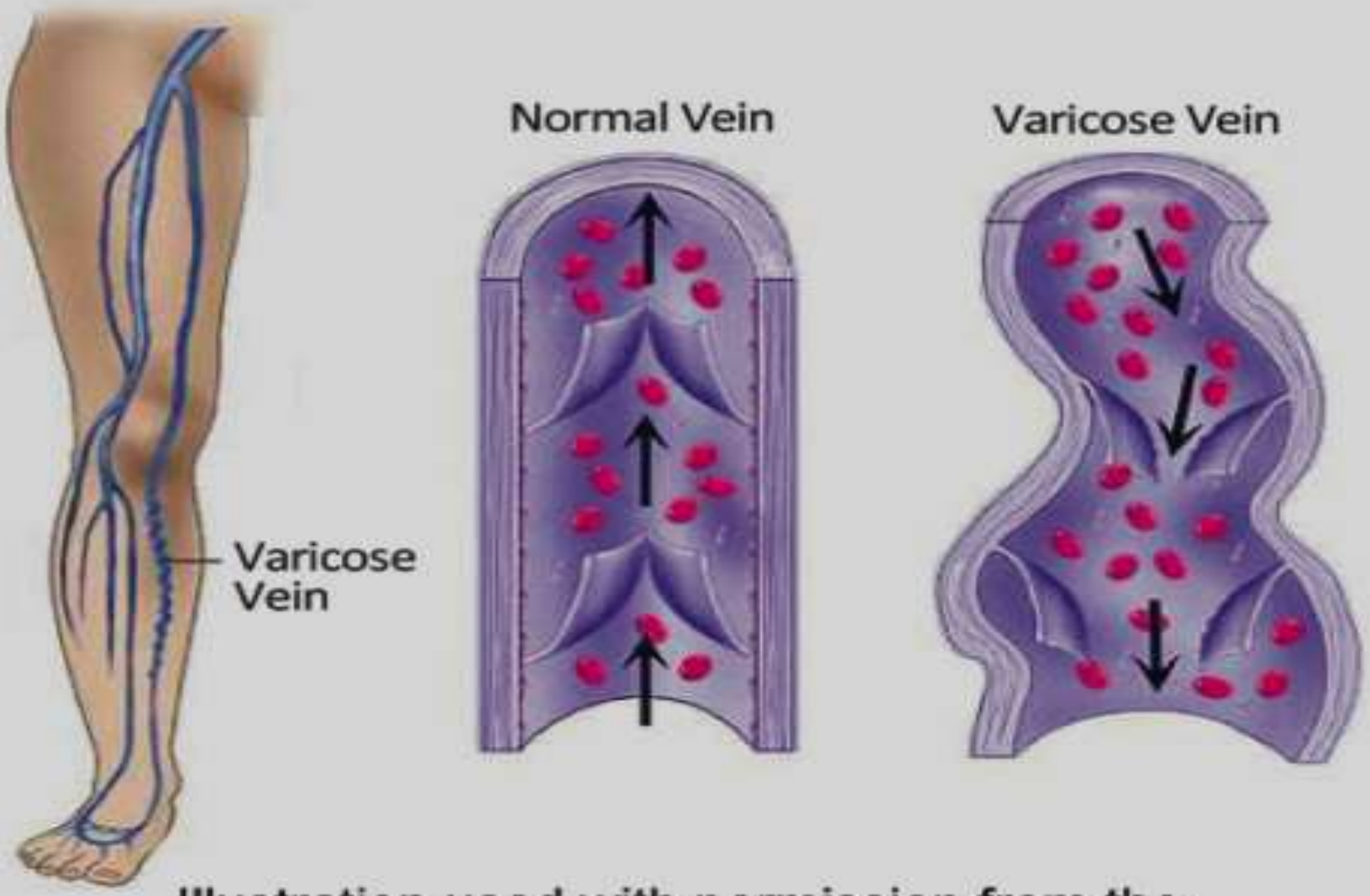

Illustration used with permission from the Society of Interventional Radiology

Symptoms

- Symptom free
- when varicose veins are associated with CVI :
- ankle and foot swelling
- Other skin changes in the lower leg that commonly occur include discoloration, eczema, scarring or hard, thickened skin and ulceration.

- When symptoms are present the most common are heaviness or fullness, aching, restlessness, tiredness, fatigue, pain, throbbing, burning, itching and muscle cramping.
- In advanced cases, breakdown of the skin may cause bleeding from varicose veins, and large varicosities may develop blood clots, a condition called superficial phlebitis or thrombophlebitis.

Diagnosis

- **Physical examination.**
- **Venous duplex ultrasound exam.**
- **A CAT scan or MRI may be used to ex- clude other causes of leg swelling. These diagnostic tests are painless.**

Treatment

The treatment of CVI involves both medical and surgical treatments:

- **Diet and lifestyle**
- **Avoid prolonged standing or sitting**
- **Elevate the feet above the thighs when sitting and above their heart when lying down three to four times a day if possible to reduce swelling**
- **Structured exercise such as walking to strengthen calf muscles may improve calf muscle function**