

# LEG ULCERS EFFECTIVE COMPRESSION PREVENTION OF PTS



**Practice Nurses Programme  
GPCME Rotorua 2010**

Peter Chapman-Smith  
Skin and Vein Clinic

Whangarei – Otago - Hibiscus Coast

# Leg Ulcers

1-2% public health cost annually in NZ

80% are venous in origin

20% arterial, diabetic, decubitus, malignant etc...



# Incidence of Varicose Veins

40-70% of the population

Men and women

Sedentary occupations

FH

Hormonal- grand multips

Urban > rural





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# Treatment of Leg Ulcers

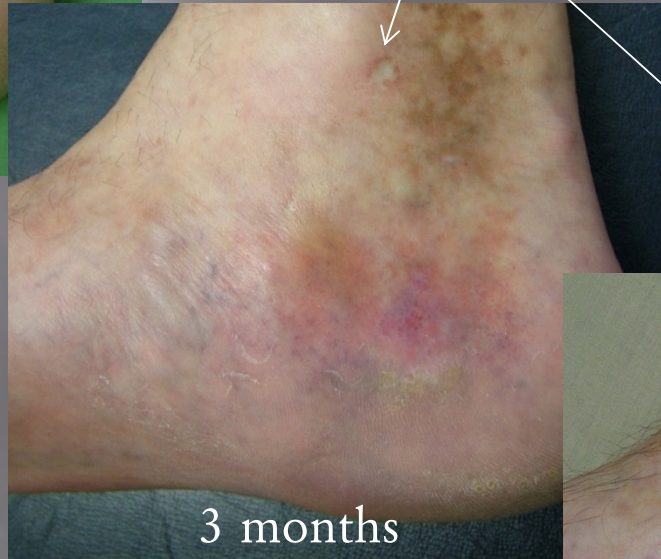
- ▣ **Nursing** – debridement, dressings, sepsis
- ▣ **Compression** – class 2 hose, layered bandaging
- ▣ **Rx of underlying cause = varicose veins** – CVI, chronic venous hypertension, interstitial oedema, local ischaemia and hypoxia



# Farmer, Ankle ulcer 2yrs.



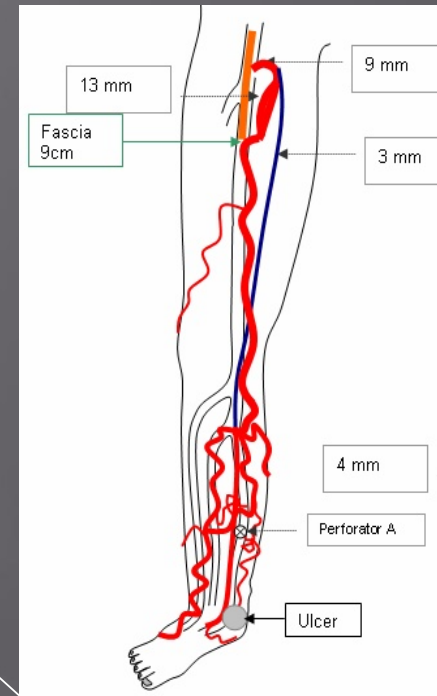
Ulcer pre EVLA



3 months



12 months





# Bimalleolar Ulcers x10yrs. 18cm diameter



Pre



6mths post



12 mths



# EVLA – hairdresser 43yrs

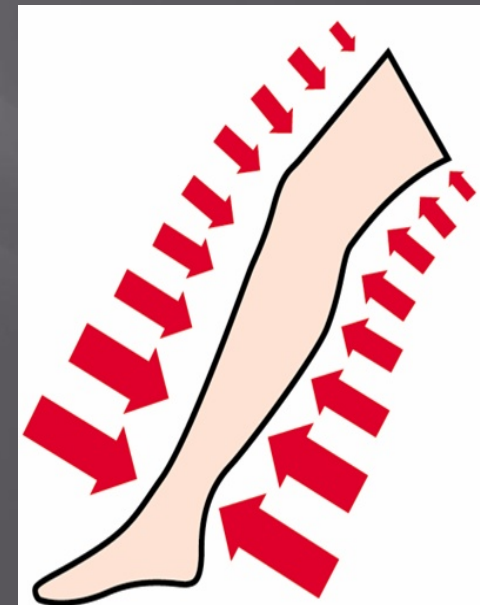


# Compression Therapy

- ▣ Graduated Compression
  - Higher pressure at ankle
  - Promote cephalad flow of blood

- ▣ Reducing ambulatory venous pressure:

- Compress varicose veins
- Prevent pooling at ankle
- Reduce oedema
  
- PVD can be a problem – ABIs
- Tubigrip second best



# Compression Classes

## Compression power, height on leg

- ▣ Level of compression at the ankle
- ▣ European Standard
  - 1 – 18-21 mmHg
  - 2 – 25-32 mmHg
  - 3 – 36-48 mmHg
  - 4 – 48+ mmHg
  - Travel – 8-15mmHg





# TED stockings

- ▣ 18 mmHg
- ▣ Use: prevention of DVT intra and post-operatively

Manufacturers Recommendation:

**“For use in the non-ambulant convalescing patient”**





**NOT** designed for ambulant use

# Dressings

- ▣ Duoderm, Comfeel, Allevyn .....
- ▣ Honey
- ▣ Silver, seaweed (arginates)
- ▣ Ichthyopaste

**THEY ALL WORK**

- ▣ Frequency 1-2 x weekly
- ▣ XXX saline and guaze



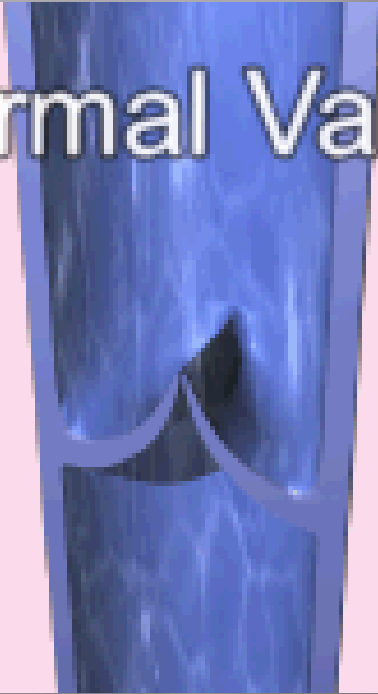
# Varicose Veins



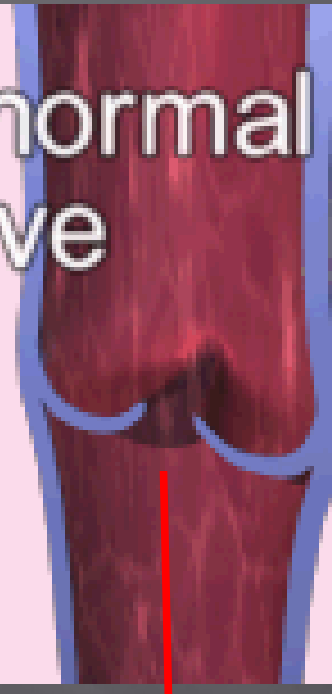
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After foam UGS

Normal Valve



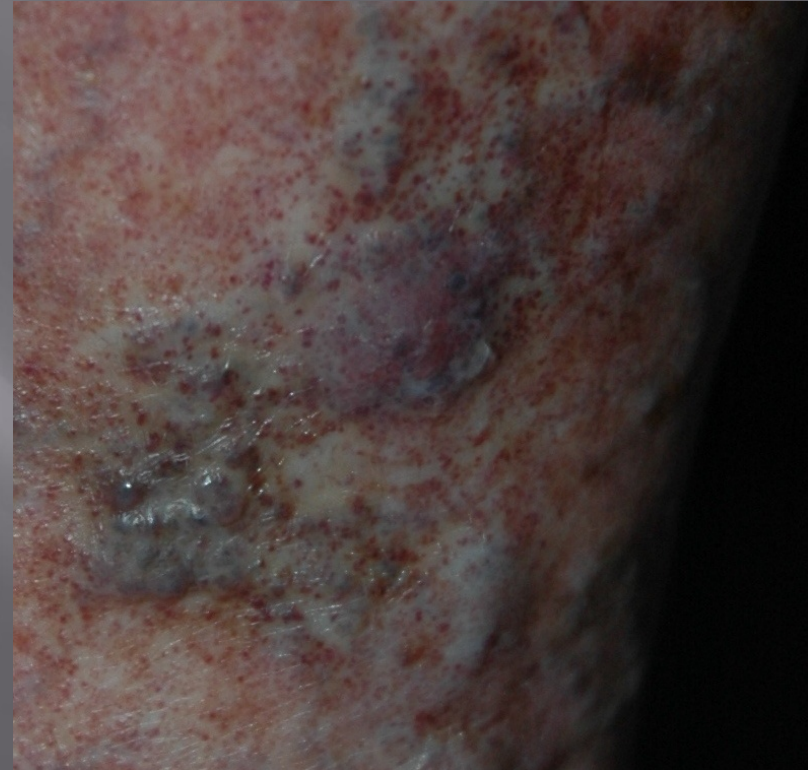
Abnormal Valve



Retrograde downward flow

# Long-term Complications

- ▣ Varicose eczema
- ▣ Thrombophlebitis
- ▣ Pigmentation
- ▣ Bleeding
- ▣ Ulceration
- ▣ DVT risk
- ▣ Reduced QOL



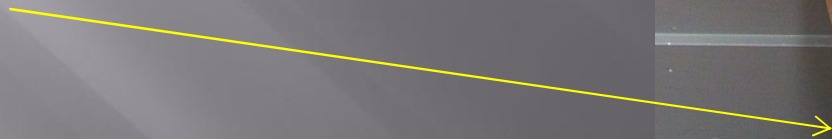
Lipodermatosclerosis  
= skin infarction



Lower venous pressure (top)



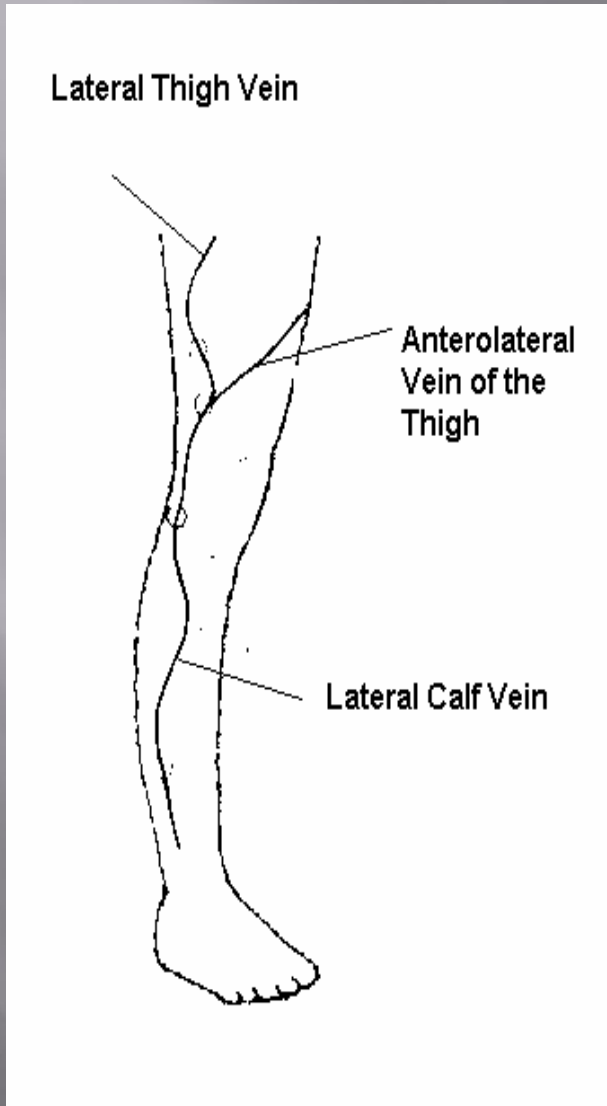
Higher hydrostatic pressure lower leg



Bluish feet, poor oxygenation and skin nutrition



# VVs may not be obvious



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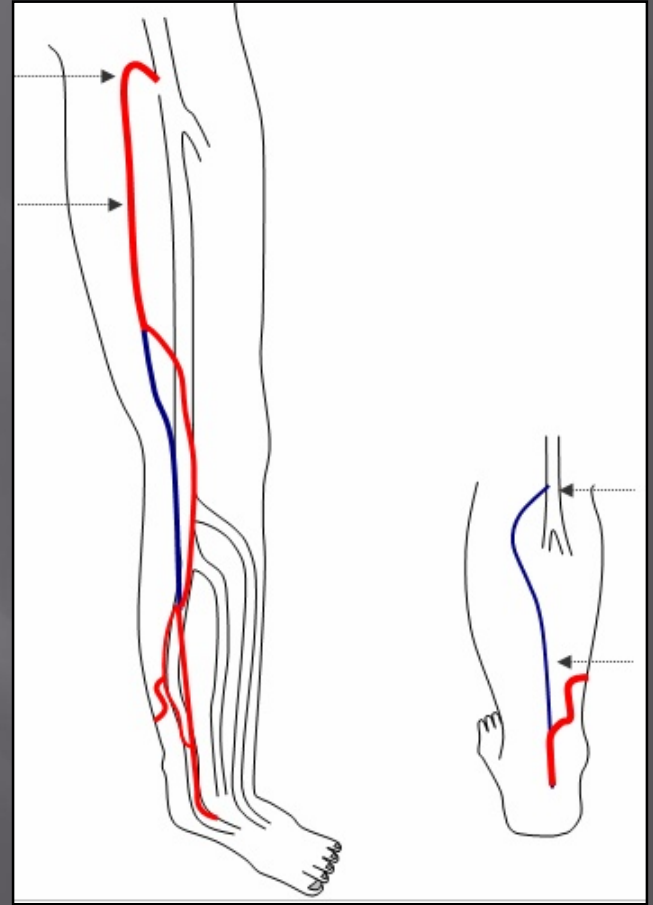
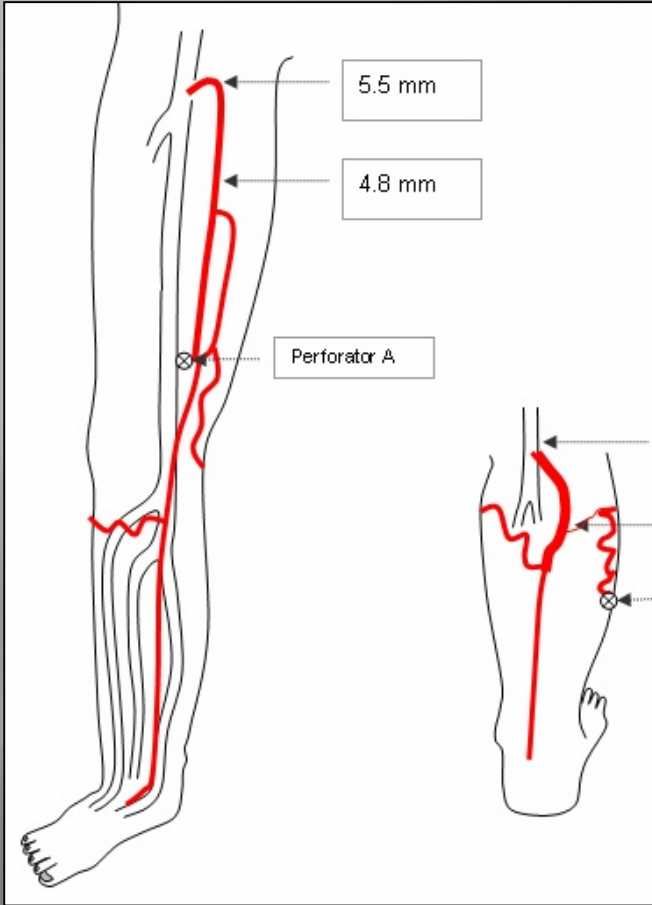
25% incidence VVs

? Normal  
legs



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HDI  
3500

VASCULAR U/S NORTH

L12-5 38 PVasc/VEIN

12:20:12

TIs 0.5 MI 0.4

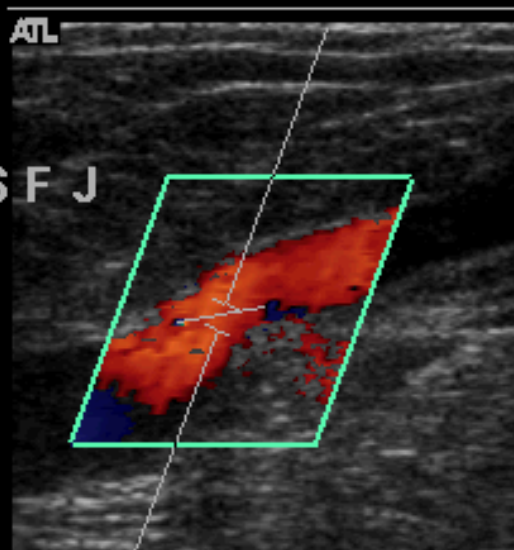
Fr #155 4.1 cm

Col 60% Map 5

WF Low

PRF 1865 Hz L T S F J

Flow Opt: Med V



+ 11.9

- 11.9  
cm/s

SV Angle 60°

Dep 2.4 cm

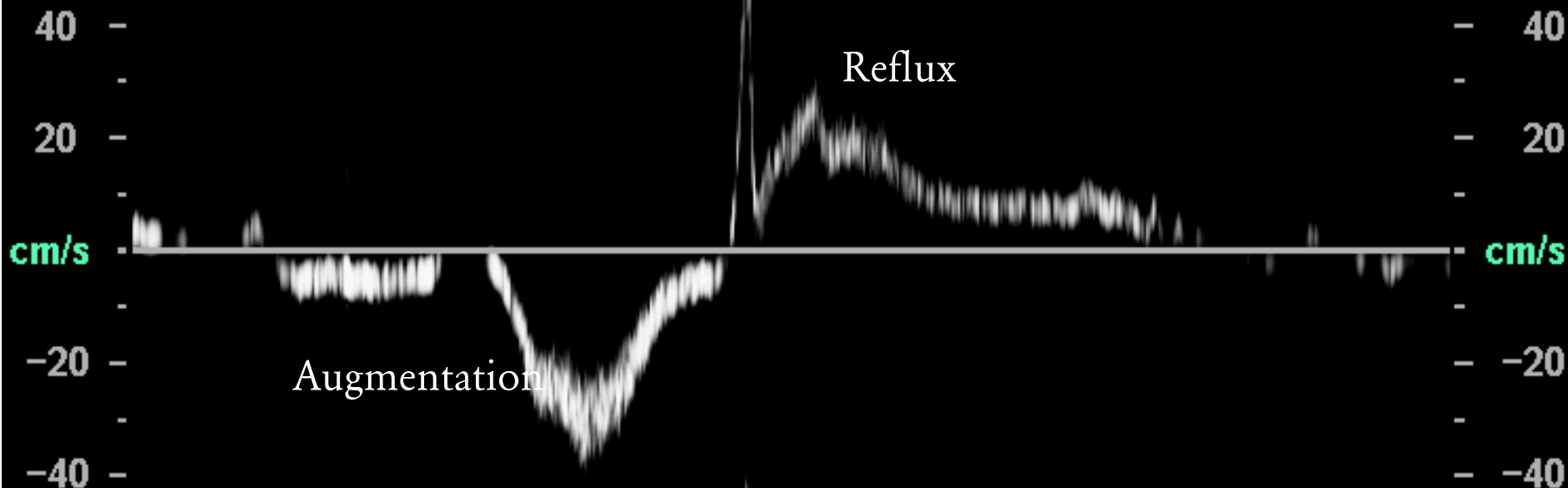
Size 2.0 mm

Freq 6.0 MHz

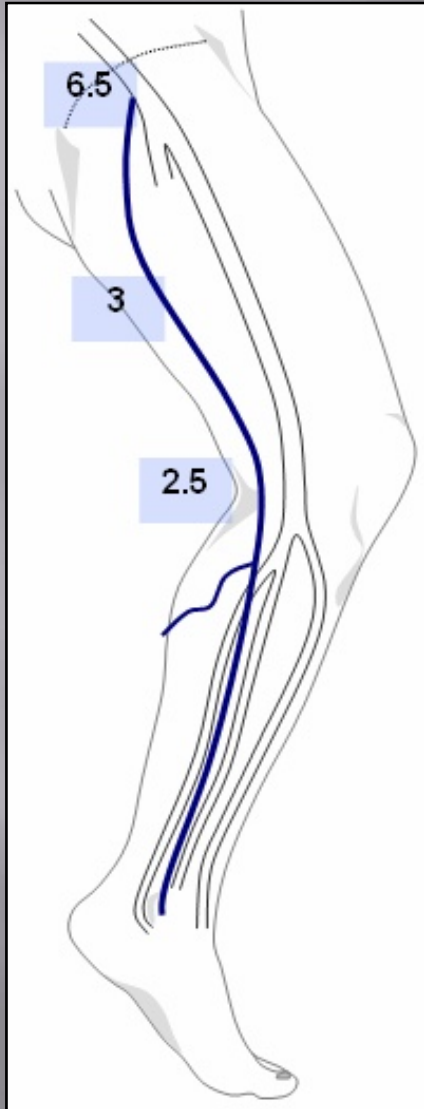
WF Low

Dop 41% Map 2

PRF 3731 Hz

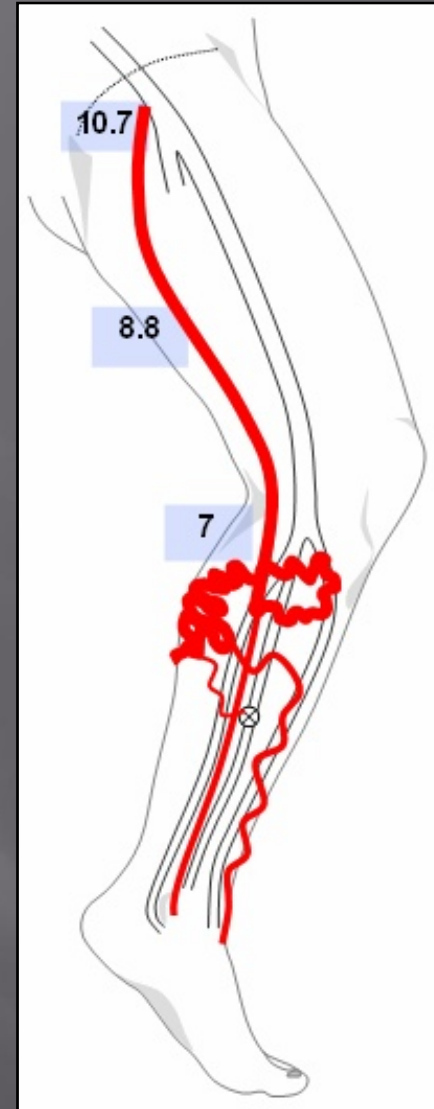


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Normal scan,  
Blood flow to the heart

## Duplex US Map



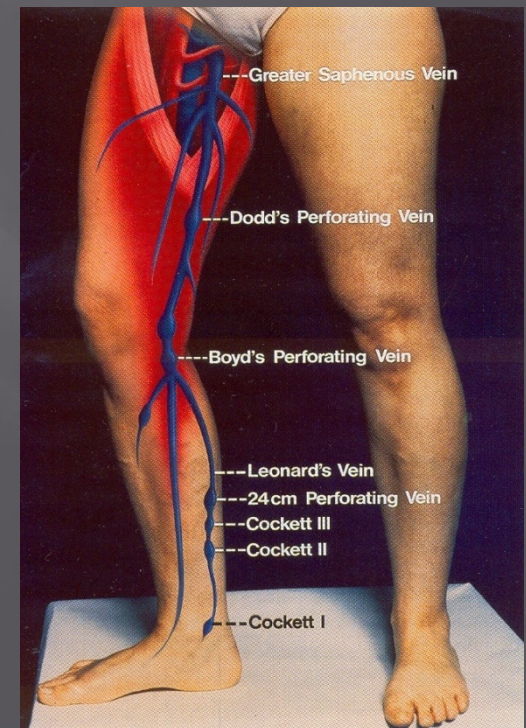
Severe varicose veins.  
Blood retrograde flow

# Rx of Varicose Veins

- ▣ Surgical -
- ▣ Non surgical – EVLA, RF, UGS
  
- ▣ Issues: efficacy, safety (VTE risk ), scarring, recurrence , QOL, patient compliance and cosmesis
- ▣ Risk v gain
- ▣ Chronic relapsing disease
- ▣ Often not diagnosed

# Varicose Veins RX Options

- None – ignore them
- External Lasers
- Creams....."Vein Away"
- Graduated compression hose
- Surgery- ambulatory phlebectomy, stripping , flush ligation, stab avulsion, endoscopy, morcillation.
- Free injection (blind)
- UGS- US Guided Sclerotherapy
- VNUS
- EVLA
- ELLE catheter
- **Combined UGS & EVLA**





# Surgery for VVs

- Time off work 1-3 weeks
- Scars
- GA risks
- VTE risk 5%

## Recurrence post Surgery:

- SFJ : 23% at 3 yrs
- SPJ : 52% at 3 Yrs
- Clinical recurrence 47.1% at 5 yrs, 62% at 11yrs
- Physiologic recurrence 66% at 5 yrs

1. Recurrence after varicose vein surgery: A prospective long-term clinical study with duplex ultrasound scanning and air plethysmography. Andre` M. van Rij, MD, FRACS, Perry Jiang, MB, ChB, Clive Solomon, FRACS, Ross A. Christie, NZCS, and Gerry B. Hill. (J Vasc Surg 2003;38:935-43.)
2. Winterborn RJ, Foy C, Earnshaw JJ. Causes of varicose vein recurrence: late results of a randomised controlled trial of stripping the long saphenous vein. J Vasc Surg 2004;40: 634-9.

# NON-SURGICAL VARICOSE VEIN TREATMENTS

Endovenous Laser Ablation (EVLA)

Ultrasound Guided Sclerotherapy (UGS)

# EVLA FU data

- 97.5% closure at 1 yr (810nm diode)
- 93.5% closure at 2 yrs, 3yrs
- Recurrences mostly in the first 3-9mths
- 5yr data 1320nm Whangarei – 0.001% re Rx rate

**Endovenous Laser Treatment of Saphenous Vein Reflux: Long-Term Results**

**Robert J. Min, MD, Neil Khilnani, MD and Steven E. Zimmet, MD . 2003**



# SCLEROTHERAPY

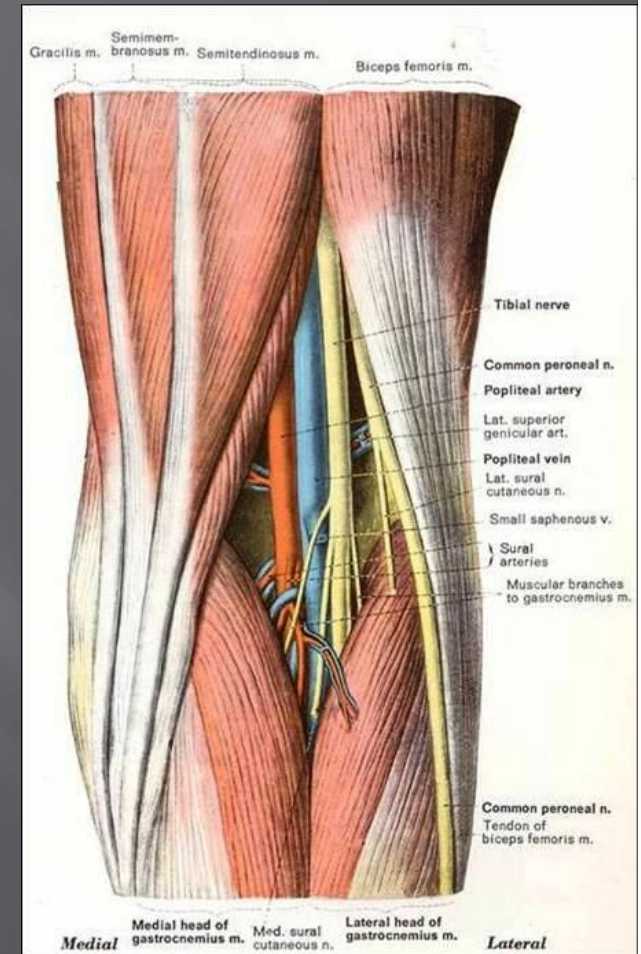
Injecting a foreign substance into a vessel lumen causing endothelial damage , with or without thrombosis, inducing total FIBROSIS of the vessel.

# Non Surgical RX UGS, EVLA

Popular  
Cheaper – procedure, time off  
Safer- low VTE risk (1:1500);  
no GAs, nerve damage, scars  
Immediately ambulant – RTW stat  
1st choice Rx most Western countries

**Combined EVLA and UGS best**

Easily repeatable



**SSV**

Vein symptoms are  
not related to vein size





Before UGS



After

Before  
1 previous surgery

Scars

6 months after UGS,  
and microsclerotherapy

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# UGS – Pre and post 3yrs



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Pre UGS



30 days



2 yrs

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H  
9500

VASCULAR U/S NORTH

L12-5 38 PVasc/VEIN

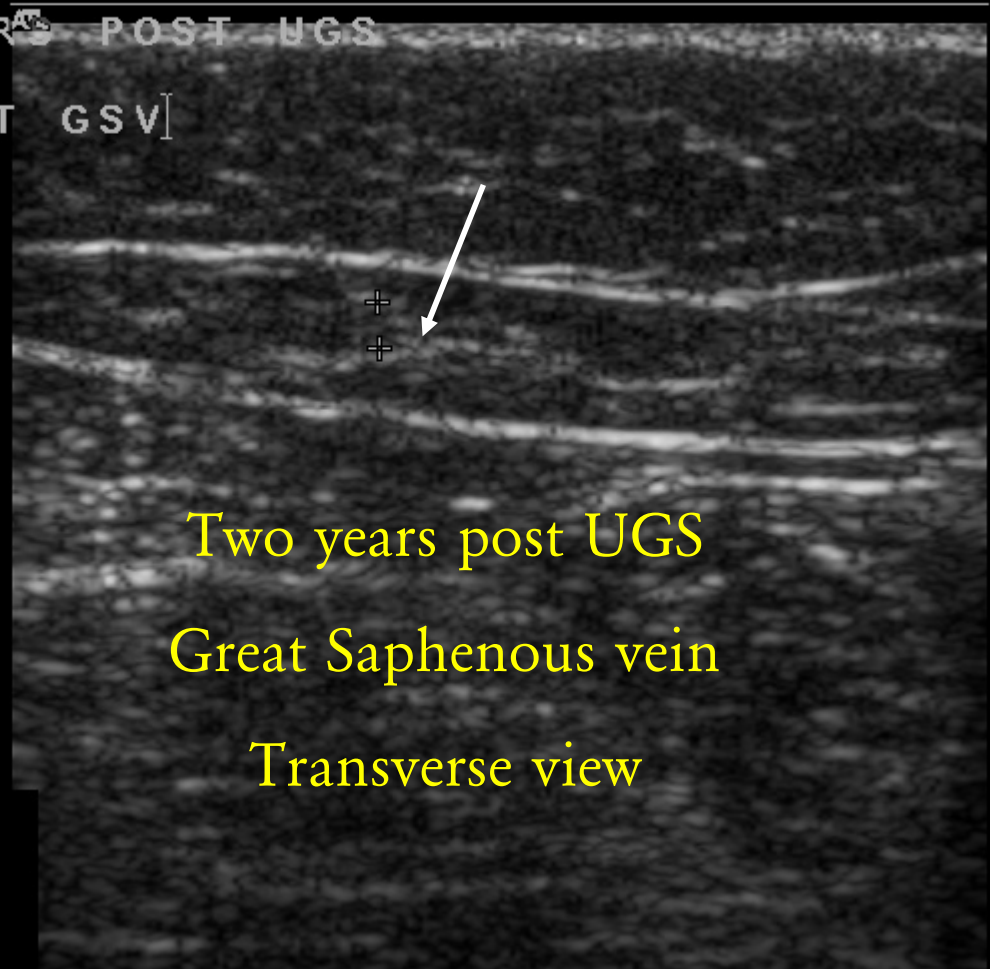
10 Aug 06  
15:04:28

TIs 0.2 MI 1.1  
Fr #253 3.8 cm

Map 7  
130dB/C 3  
Persist Med  
Fr Rate High  
2D Opt:Res

2 YRS POST UGS

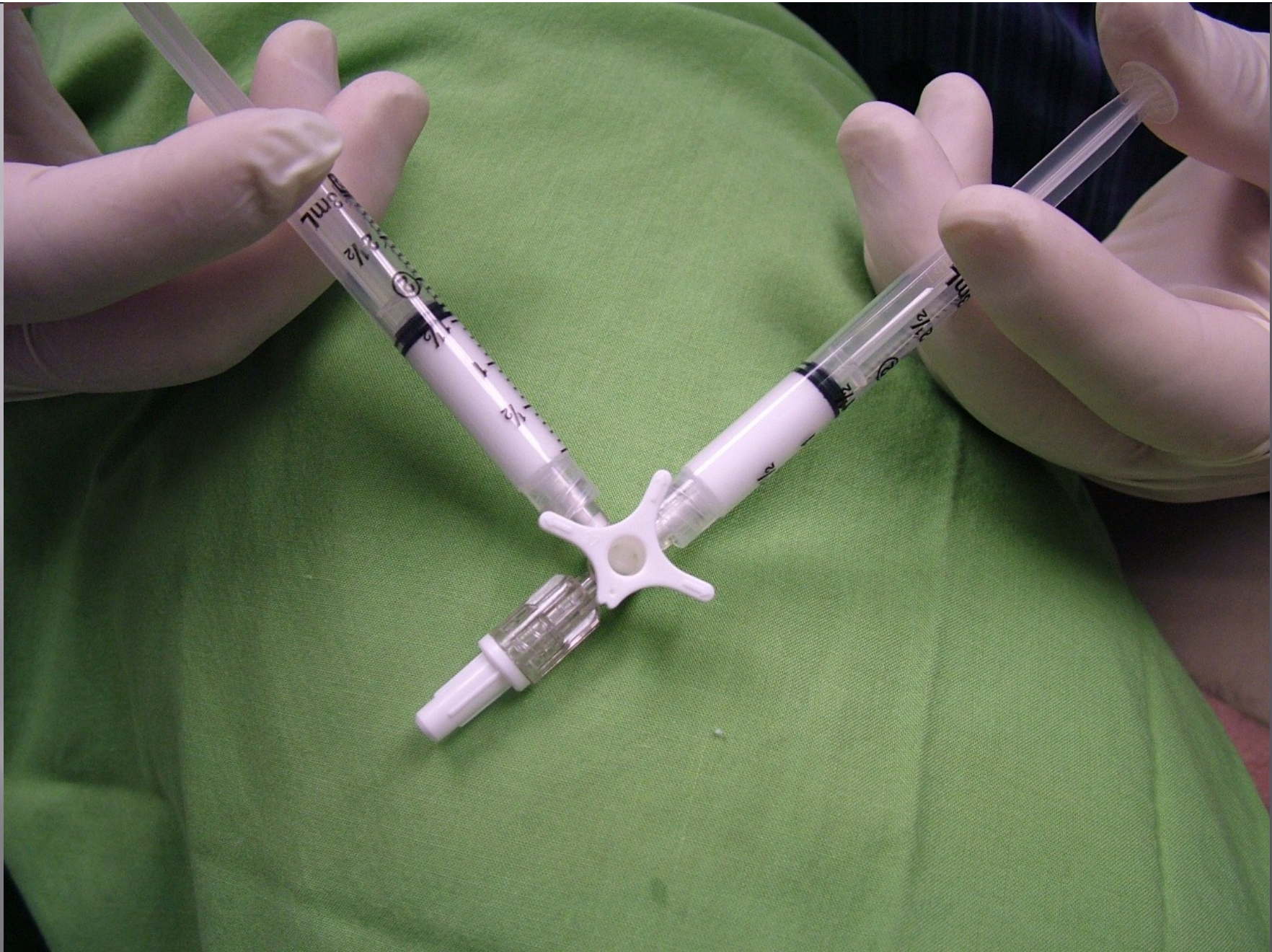
LT GSV



Two years post UGS  
Great Saphenous vein  
Transverse view

+ 0.18cm





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Deep Vein Thrombosis  
and  
Pulmonary Embolism



# Incidence of DVT

- ▣ 1-2 per 1000 per year
  - 2/3 are DVT
  - 1/3 PE
  - Risk doubles every decade after age 40
- ▣ Major complications
  - Post thrombotic syndrome (PTS)
  - Death (PE)
  - Bleeding (Warfarin)



# Symptoms of DVT

- ▣ Swelling
- ▣ Pain, tenderness
- ▣ Pitting oedema
- ▣ Distension of superficial vessels
- ▣ Positive Homan's sign
- ▣ Shortness of breath
- ▣ Cutaneous erythema



# Risk Factors

▣ Surgery	20%
▣ Trauma	12%
▣ PHx - DVT / PE	25%
▣ Immobility (Hospital or Nursing Home)	8%
▣ Lower Extremity paresis	3%
▣ Cancer	4-6%
▣ Hormone replacement therapy	2%
▣ Oral Contraceptive pill	3%
▣ Inherited Thrombophilia	
▪ Factor V Leiden (>50%)	
▪ Protein C, S deficiency	
▪ Lupus	

- ▣ Pregnancy
- ▣ Heart Disease
- ▣ Obesity
- ▣ Sepsis
- ▣ Age
- ▣ Gender (Female > Male)
- ▣ Sedentary occupation

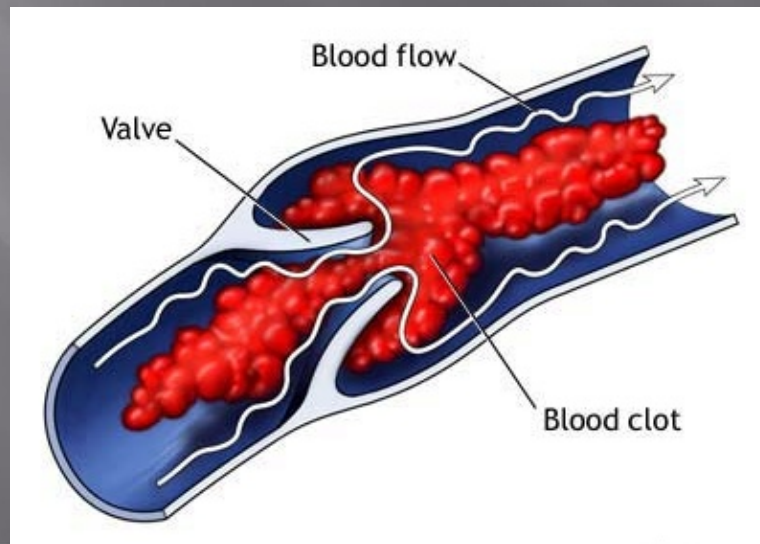
# PE.

- 2 million cases DVT in USA pa
- PE 300,000 deaths pa in USA
- PE : leading cause of hospital preventable death
- 50% chance of PE with proximal DVT ( ? sx)
- 3-5% chance of PE with distal DVT
- DVT risk factors- PH DVT, FHx thrombophilia
- L term risk post thrombotic syndrome



# Virchow's Triad

- Blood Vessel Wall (endothelium)
- Blood Flow – smooth, turbulent, slow etc
- Blood factors as “Hypercoagulability”



# Hypercoagulability

## Recent hx: trauma, or surgery

- Thrombocytosis
- Activated platelets
- Elevated **procoagulant** proteins – F VIII, fibrinogen (consider tissue factor)
- Reduced **anticoagulant** proteins – AT3, plasminogen activator inhibitor.
- Blood flow – venous stasis, local hypercoagulability

Generalised hypercoagulability (“thrombophilia”) –  
congenital  
inherited  
acquired

# Thrombophilia

Predisposition to venous thrombosis (rarely arterial)

**Clinically:** unprovoked DVT, PE +/- FHx

**Laboratory:** deficiency anticoagulant factors (usually hereditary)

or added procoagulant factors (usually transient and acquired)

# Thrombophilia Blood Screen

- Antithrombin III - High
- Protein C - Moderate to High
- Protein S - Low
- Activated Prot C Resistance (FV Leiden) Low
- Factor V Leiden - Low RR 8
- Prothrombin Mutation (PTG20210A) Low RR 4-8
- Homocysteine – high relevant ? Causal- acquired/congenital
- Lupus Anticoagulant (APLS) – ? acquired , high risk
- Anticardiolipin Antibodies – IgG and IgM
- Others – platelets, fibrinogen, FVIII etc

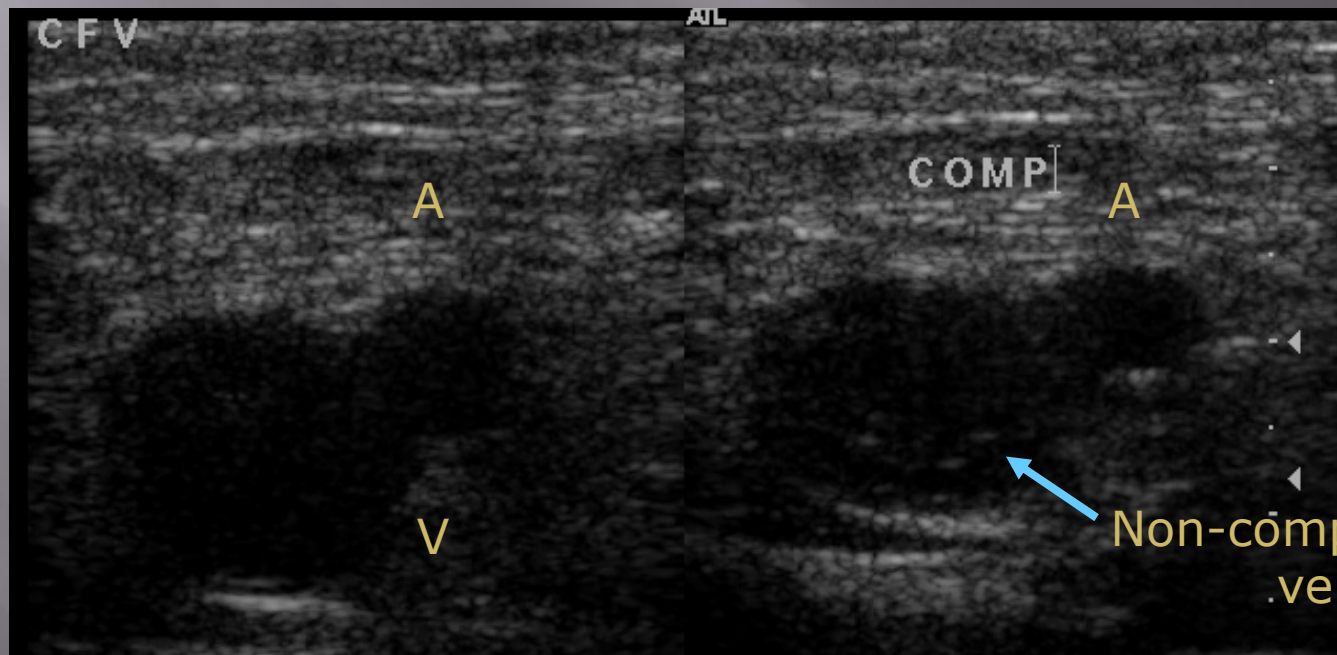
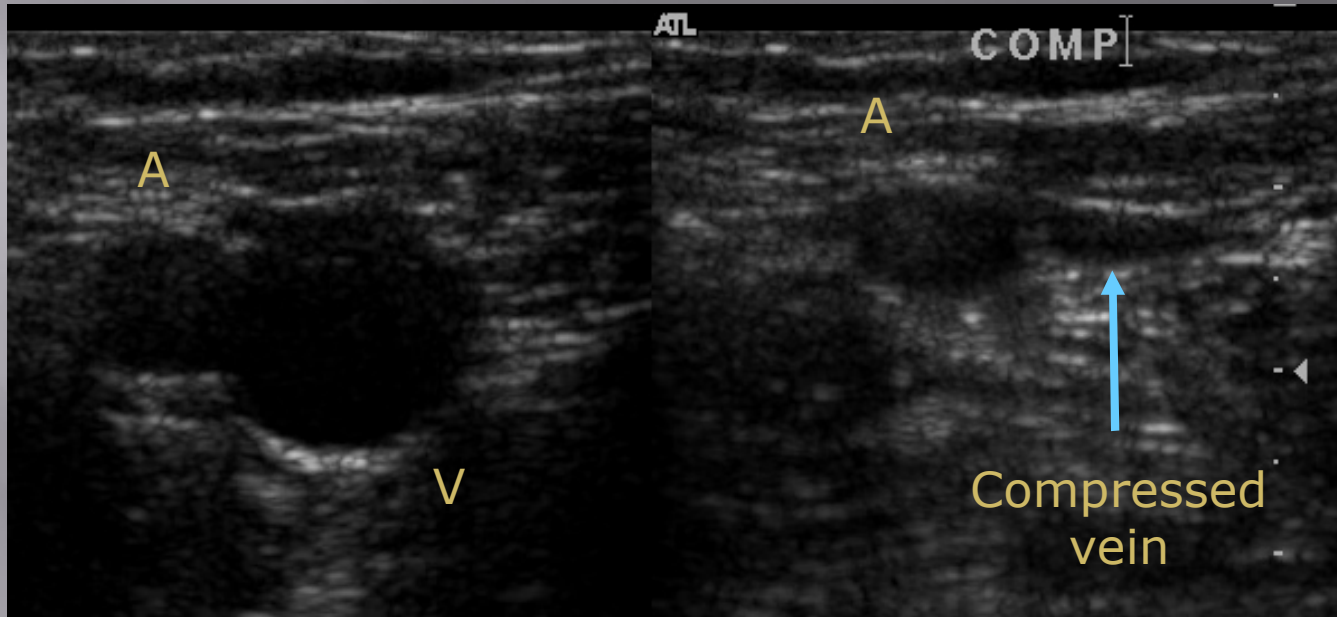
**30% with strong FH - no diagnosis**



# Suspected DVT and/or PE?

- History – provoked or unprovoked
- Personal risk factors
- Clinical evidence
- Personal risk questionnaire
- Family history
- D-Dimer (useful if NEG)
- Wells Score
- Imaging – duplex US, venography, pulmonary CTA

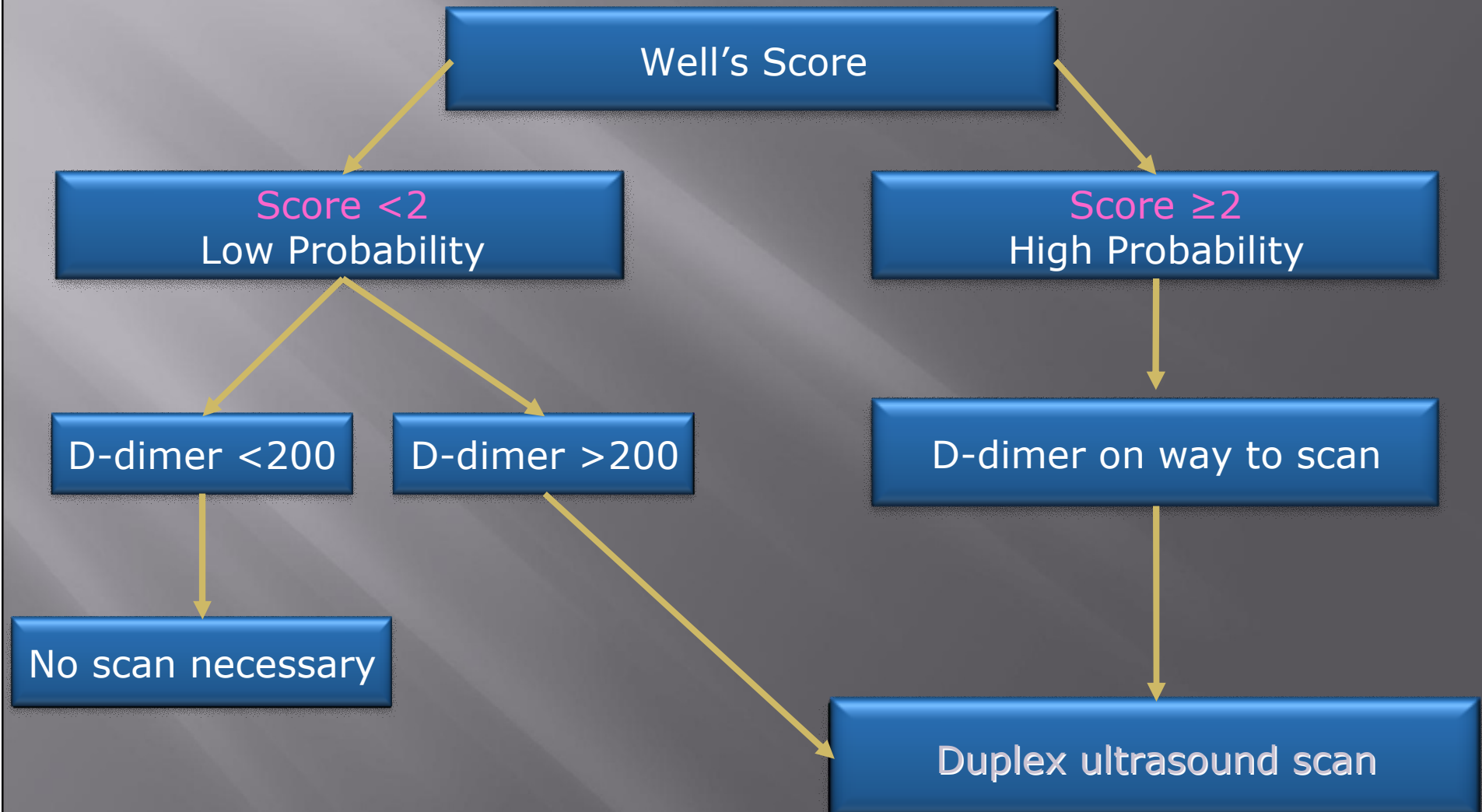




# Clinical Score (Wells)

	Score
Active cancer	1
Paralysis or recent plaster immobilisation	1
Recent immobilisation for more than 3 days or major surgery within 12 weeks requiring general or regional anaesthesia.	1
Localised tenderness along the deep venous system	1
Entire leg swollen	1
Calf swelling (circumference >3cm more than normal side measured 10cm below tibial tuberosity)	1
Pitting oedema confined to the symptomatic leg	1
Collateral superficial veins (non-varicose)	1
Alternative diagnosis as likely or greater than that of DVT	-2

# Algorithm





# D-dimer

- ▣ Byproduct of Fibrinolysis
- ▣ Diagnoses thrombotic activity
- ▣ Non-specific in diagnosis of DVT
  - -ve D-dimer = DVT unlikely
  - +ve D-dimer = DVT or other coagulable state
  
- ▣ Other conditions cause raised D-dimer
  - Active cancer
  - Pregnancy
  - Infection
  - Post-surgery
  - Inflammatory processes
  - Trauma

# Clinical Assessment

- ▣ Large differential diagnosis
  - Ruptured Baker's cyst
  - Cellulitis
  - Haematoma
  - Compartment syndrome
  - Superficial thrombophlebitis
  - Lymphoedema
  - CHF
  - Adenopathy
- ▣ Need standardised procedure...

# Treatment of DVT,PE

- LMWH (Clexane)
- Start Warfarin same time
- Aim INR of 2-3 in 48hrs
- Optimum therapeutic effect 4-5 days, then stop LMWH
- Continue Warfarin for 3 – 6 months
- Monitor INR – not >3 usual
- Consider risk of re thrombosis

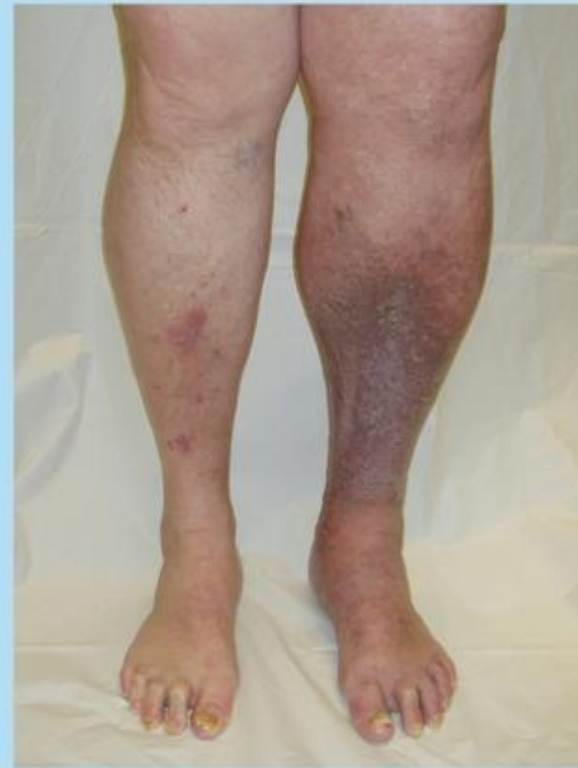
# Prevention of Post Thrombotic Syndrome, PTS



**Postthrombotic pigmentation**



**Healed skin ulcer and  
postthrombotic pigmentation**



**Chronic (left) leg swelling, skin hardening,  
and postthrombotic pigmentation**



# Post Thrombotic Syndrome

- ▣ Reported in 15-50% of patients with DVT
- ▣ Severe PTS 5% at 10 year follow up
- ▣ Higher thrombotic load (proximal DVT) higher risk
- ▣ PTS increases the risk of further VTE.

# Symptoms of PTS

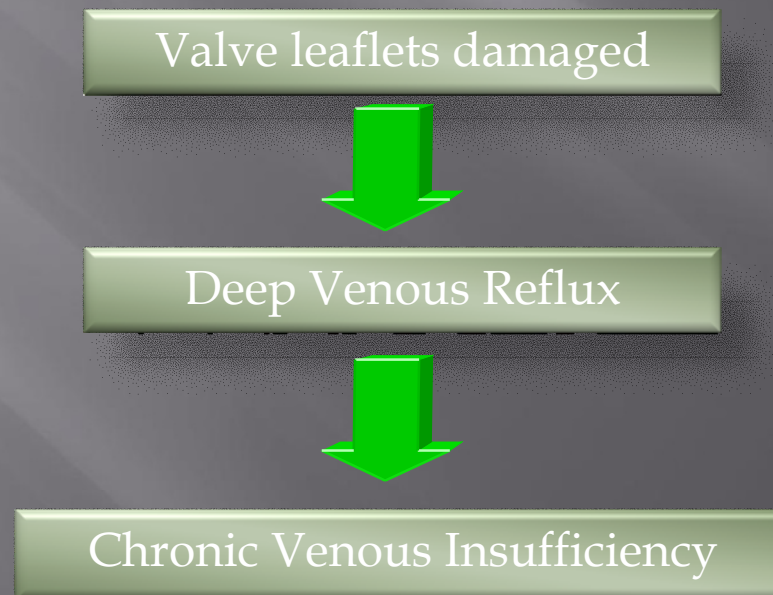
- ▣ Pain
- ▣ Oedema
- ▣ Hyperpigmentation (7-23%)
- ▣ Ulceration (4-6%)
- ▣ Lipodermatosclerosis (champagne glass leg)
- ▣ Heaviness
- ▣ Cramps
- ▣ Itchiness
- ▣ Numbness or tingling
- ▣ Dilatation of superficial veins
- ▣ Redness



# PTS mechanism

Chronic mechanical problem- CVI , damaged valves.  
Reduced blood flow, swelling, and limb pain.

**Leg pain and swelling** = post thrombotic syndrome.





# PTS incidence

- ▣ Chronic complication of acute DVT
- ▣ Multicentre study
- ▣ **1 yr cumulative incidence 25%, severe PTS 7%**
- ▣ Obesity increased risk (RR 1.5)
- ▣ Proximal DVT increased incidence (RR 1.3)
- ▣ Women more common (RR 1.5)
- ▣ Less common over 60yrs of age
- ▣ Reference: Risk factors for post-thrombotic syndrome in patients with a first deep venous thrombosis. Journal of Thrombosis and Haemostasis  
Volume 6, Issue 12, Date: December 2008, Pages: 2075-2081  
L. W. TICK, M. H. H. KRAMER, F. R. ROSENDAAL, W. R. FABER, C. J. M. DOGGEN



# 2 year RCT 2003

- ▣ 180 patients
- ▣ Class 2 graduated compression hose
- ▣ 1-2 years post DVT
- ▣ Significant reduction of PTS risk of up to 50%

Recommendation:

Prescribe compression therapy for DVT.

# PTS

**Level 1 evidence that wearing class 2 or 3 compression hose for 2 years will reduce the incidence of PTS by 50%, and reduces the severity of PTS.**

- Bernardi E and Prandoni P. The post-thrombotic syndrome. *Current Opinions in Pulmonary Medicine* 2000;volume 6:pages 335-42.
- P. Prandoni, A.W.A. Lensing, M.H. Prins, M. Frulla, A. Marchiori, E. Bernardi, D. Tormene, L. Mosenza, A. Pagnan, and A. Girolami. Below-Knee Elastic Compression Stockings To Prevent the Post-Thrombotic Syndrome. A Randomized, Controlled Trial. *Annals of Internal Medicine*. 2004; 141: 249-256).
- Sanjeev Chunilal, Hematology, North Shore Hospital, Auckland
- [www.vascular.co.nz](http://www.vascular.co.nz)
- <http://www.podiatrytoday.com/article/3335>
- <http://www.venous-info.com/handbook/hbk01c.html>
- Non-pharmaceutical measures for prevention of post-thrombotic syndrome; Kolbach DN, Sandbrink MWC, Hamulyak K, Neumann HAM, Prins MH
- <http://www.inate.org/en/1/2/6/23/default.aspx>
- Wells PS, Anderson DR, Rodger M, et al. Evaluation of D-dimer in the diagnosis of suspected deep-vein thrombosis. *N Engl J Med*. 2003; 349: 1227-1235
- Alexander, Leos & Katz, *Am Surg*, 2002 68(12)
- Beasley R, Raymond N, Hill S, Nowitz M, Hughes R. eThrombosis: the 21st century variant of venous thromboembolism associated with immobility. *Eur Respir J*. 2003;21:374-6.

# Severe PTS



Compression hose should be worn lifelong.



# SKIN & VEIN CLINIC

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0800 1 4 VEINS

Whangarei, Hibiscus Coast, Queenstown



**VASCULAR ULTRASOUND** NORTH

[vasultra@clear.net.nz](mailto:vasultra@clear.net.nz)

67 Maunu Rd, Whangarei