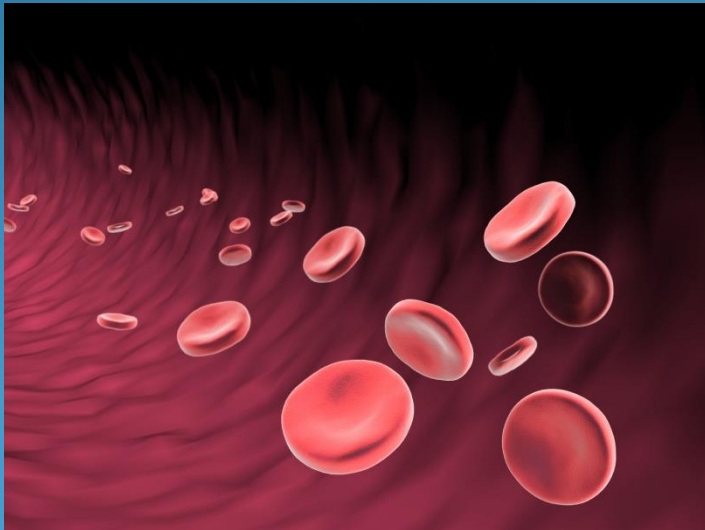


The Role of limited Compression Ultrasound

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Problems

- Rising requests
- Decreasing positive scans
- Variation



Variation

- 'How is DVT diagnosed and managed in UK & Australian Emergency Departments'

Sampson et al EMJ 2005; 22: 780-782

- 73% UK EDs, 94% Oz EDs
- Most use US to diagnose DVT
- Most use D-dimer & clinical scoring to exclude some
- 20% use only US

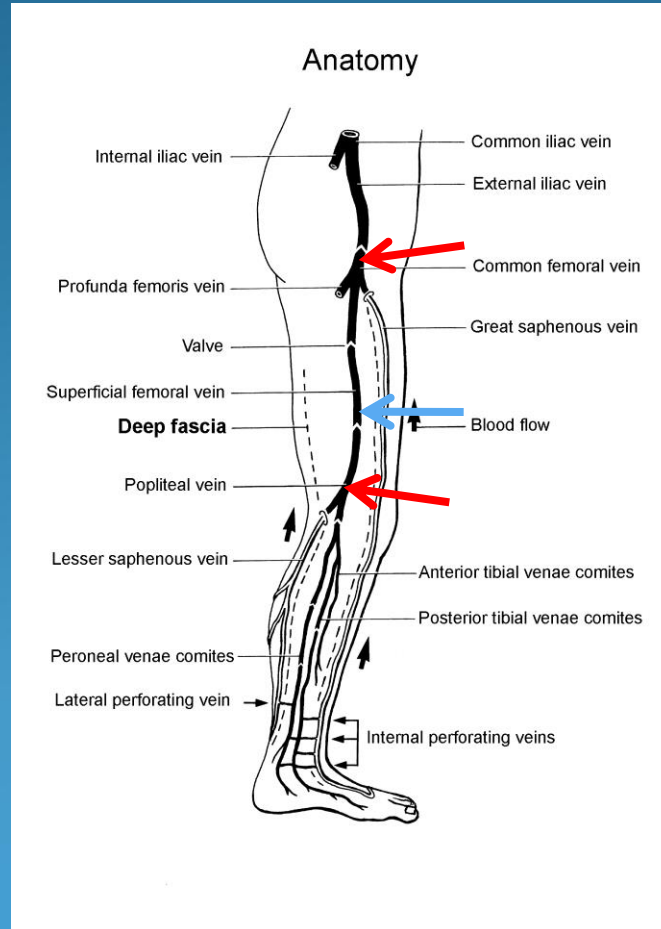


N.I.C.E Guidelines

- 'Venous thromboembolic diseases: the management of venous thromboembolic diseases and the role of thrombophilia testing'
- Guideline 144

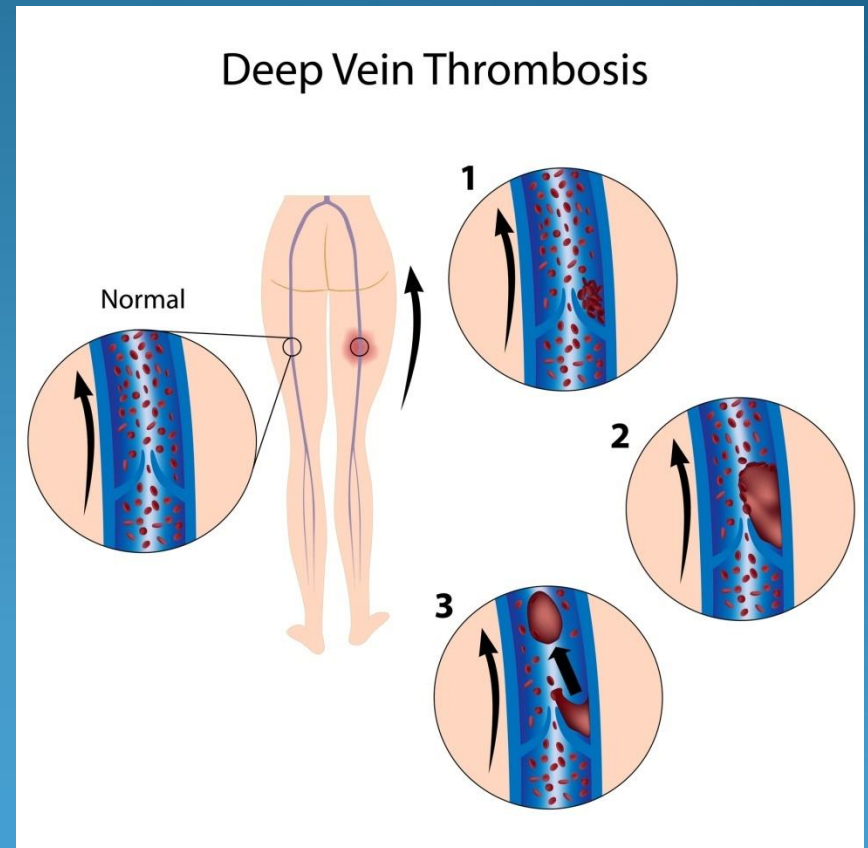


The Limited Scan



Issues

- Reliability of US
- Natural history of DVT
- Isolated SFV or calf clot
- Safety – no anticoagulation
 - PE
 - Post-thrombotic syndrome
- Safety – anticoagulation
- Cost effectiveness



Reliability of Ultrasound

- Sens, Spec, PPV, NPV
- Prox DVT: sens 97%, spec 98%, PPV 97%, NPV 98%
- Distal DVT: Sens 50-75%, spec 90-95%

Kearon et al 1998, Annals Int Med 129 12 1044-104

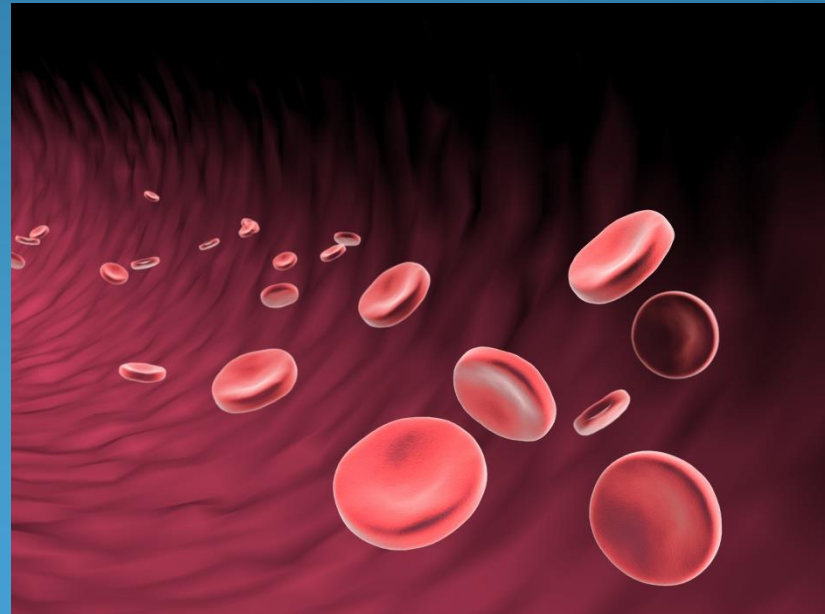
- Interobserver reliability prox US = 1.0
- Interobserver reliability distal US = 0.9 (CI 0.79- 1.0)
- PT veins: 0.84
- Peroneal veins: 0.77
- Calf muscle veins: 0.74

Schwartz et al 2002, Clin Appl Thromb/Haem 8 1 45-9



Other patient groups

- Asymptomatic post surgical: Sens lower: 62%, PPV 75%
- Harder to detect as very recent onset
- Technical difficulties
- Venography better



Natural History

- Prevalence isolated distal DVT – 20%?
 - Outpatients - higher
- PE from isolated distal DVT is rarer than proximal (1/2 risk)
- Rate of propagation untreated: 10%
- Rate of propagation treated: 4%

Lopez et al 2004 Haematology 439-456

Righini et al 2006 Thromb Haemost 95 56-64



Isolated SFV clot

- 0 of 59 DVT pts had isolated SFV clot

Rose et al 1994 J Ultrasound Med 13 115-118

- 'Thrombus isolated to a single vein is rare' (n=209)

Markel et al 1992 Arch Surg 127 305-309

- Single vein clot found only in popliteal veins (n=189)

Cogo et al 1993 Arch Intern Med 153 2777-2780

- Isolated SFV clot in 6 of 755 pts (4.6%)

Frederick et al 1996 Radiology 199 45-7

- SFV clot commoner in inpatient population



Safety – limited US

Righini 2006 Thromb Haemost 95 56-64

| Author | Year | Number pts | 3 month VTE risk |
|-----------------|------|------------|------------------|
| Birdwell | 1998 | 405 | 0.6% |
| Cogo | 1998 | 1702 | 0.7% |
| Bernadi | 1998 | 946 | 0.4% |
| Wells | 1997 | 593 | 0.6% |
| Kraaijenhagen | 2002 | 1756 | 0.6% |
| Perrier | 1999 | 474 | 2.6% |
| Pooled estimate | | 5876 | 0.6% |



Safety – full US

Righini 2006 Thromb Haemost; 95: 56-64

| Author | Year | Number pts | 3 month VTE risk |
|-----------------|------|------------|------------------|
| Elias | 2003 | 623 | 0.5% |
| Schellong | 2003 | 1646 | 0.3% |
| Stevens | 2004 | 445 | 0.8% |
| Pooled estimate | | 2714 | 0.4% |



Post-thrombotic syndrome

- Estimated: 1 in 3 have some PTS within 5 years

| Author | Year | Study | Conclusion |
|-------------|------|--------------------------------------|--|
| Meissner | 1997 | 268 rx'd dvt/29 lone calf | Pain/oedema 54% vs 23% (9% in other leg) |
| Masuda | 1998 | 58 lone calf dvt 6 years. ½ rx'd | No sig diff rx'd vs not 95% asymptomatic |
| Saarinen | 2000 | 26 rx'd dvts 2 yrs | No diff calf vs prox for sympts or reflux |
| MacDonald | 2003 | 135 lone gas/sol dvts Not rx'd. 3/12 | 3% progression, to pop vein only Did not look at PE/PTS |
| Asbeutah | 2004 | Rx'd dvts 5 yrs | 95% prox had reflux, most CEAP 4-6 36% calf had reflux, most CEAP 0 |
| Schulman | 2006 | 545 dvts 10 yrs 6/12 vs 6/52 | No diff for PTS, PE, death |
| Labropoulos | 2008 | 120 dvts rx'd | Lone calf dvts most likely to be asymptomatic |



Bleeding complications

Cochrane Collaboration : Home vs Inpatient treatment for DVT 2008

| Trial | Year | N | Minor bleed | Major bleed | Total |
|---------------|------|-----|-------------|-------------|--------|
| Chong | 2005 | 298 | 10.70% | 1% | 11.70% |
| Daskalopoulos | 2005 | 108 | 5.50% | 5.50% | 11% |
| Koopman | 1996 | 400 | 10.50% | 1.30% | 11.80% |
| Levine | 1996 | 500 | 2.40% | 1.60% | 4% |
| Boccalon | 2000 | 201 | 13.90% | 1.90% | 15.90% |
| Ramaciotti | 2004 | 201 | 10.40% | 2.50% | 12.90% |



Cost Benefit Analysis

- Kim HM et al Acad Radiol 2000; 7: 67-76
- Computer model
- Hypothetical patients
- 6 initial imaging strategies:
 - 2 point limited study, unilateral & bilateral
 - 3 point limited study, unilateral & bilateral
 - Full study, unilateral & bilateral
- Various second imaging strategies if 1st negative (including 'none')
- 20 combinations total



Assumptions – evidence based, weighted for quality of life

- Proximal DVT treated
- Lone calf DVT treated in single examination strategy
- Lone calf DVTs did not propagate if treated
- Sequelae of calf DVT = same as proximal
- Estimates of prevalence of various locations of DVT
- Modelled sens, spec etc
- Anticoagulation risks/benefits
- PTS, PE, CNS bleed, Other bleeds



Results

- Most effective **and** cost effective strategy:
 - Bilateral 2 point compression with same follow up study.
- Complete study only most effective when bleeding risk $< 0.05\%$ or if risk of propagation $> 42\%$



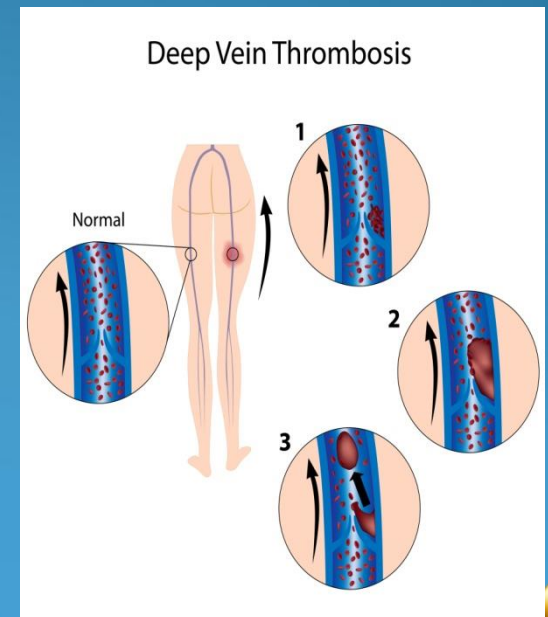
New anticoagulants

- N.I.C.E guideline Rivaroxaban
- EINSTEIN study
 - Major bleeds: 0.8% (Rivaroxaban) vs 1.2%,
 $p=0.21$
 - Clinically relevant non major bleeds; 8.1% vs
8.1%
 - DVT recurrence: 2.1% (Rivaroxaban) vs 3.0%
 - PE: 1.44% vs 1.44%



Conclusions

- Full study is safe
- Limited study is safe
- Choose depending on your population
- Treating lone calf DVT controversial
- Further trials required



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