

# **Deep Vein Thrombosis In Orthopaedic Surgery**

**Special gratitude to  
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# Background

- DVT has been a well known complication of orthopaedic surgery since mid1960s.
- How relevant is it now with changes in surgical technique and mobilisation?

# Background

Without prophylaxis – in multiple placebo controlled trials:

(venographic confirmed DVT)

- VTE prevalence in THR ranges from 22-92%
- VTE prevalence in TKR ranges from 58-70%
- **But,**

- **SYMPTOMATIC VTE**  
PE and death PE not excluded)
  - only 1-6% in THR
  - and 29% in TKR

(included DVT,

- 1.25 million hip and knee replacements are preformed each year in Europe alone. (Warwick, 2004)
- Twice as many in USA
- Hip and knee joint replacements in NZ are increasing: 8 878 per year (2003) to <15 000 (2008). (NZ National Joint Registry)
- Probably impossible to predict the demands in the future.. (NZOA, 2003)

# DVT - Why does it happen?

## (Virchow's Triad)

- Injury to blood vessel wall
- Stasis of blood flow
- Hypercoagulability of blood

- Trouble with the vessel
- Trouble with the flow
- Trouble with the blood itself

# Injury to blood vessel

- Excessive vasodilatation from anaesthetic
- Flexion of knee & flexion/adduction of hip
- Tourniquet

# Stasis

- Immobilized on the surgery table
- Flexion of joints
- Tourniquet
- Post op immobility

# Hypercoagulability

- Antithrombin III is reduced for 3-5 days increasing the propensity towards clot formation
- Shut down of the fibrinolytic system

Patients bring with them to the  
operating table existing risk factors

# Age

- Risk increases with advancing age
- 20% increase in the 40-60 age group
- 40% increase in the 60-70 age group
- 60% increase over the age of 70

# BMI

- Diminished venous return & impairment in the fibrolytic system is reported in the overweight & obese patient

# High Risk Diseases

- Ulcerative colitis
- Diabetes
- Smoking
- Polycythaemia
- Varicose veins
- Chronic heart disease
- Acute MI (20% - 40%)
- Active malignancy
- CVA (42% - 60%)
- Hx DVT (48% - 68%)

# Increased coaguability

- HRT 2- 4 x increased risk
- Oral Contraception 2.5 x increased risk
- Pregnancy/puerperium
- Thrombophilia (inherited or acquired)

# Autar risk assessment scale

- The Autar DVT scale (1994) was developed to assess patient risk for DVT.
- Based on the Virchow's (1846) triad of risk factors in the genesis of DVT.

- Clinical diagnosis of patients with DVT is notoriously unreliable. (Sandler et al., 1984)
- Clinical signs and symptoms mimic many other conditions including normal postoperative pain and swelling. (Douketis & Ginsberg, 1996; Turkoski, 2000)
- Homans sign present in 1/3 of patients without DVT & only 1/2 with DVT  
(Hirsch & Hull 1987)

# Tests for DVT

- Venography
- Compression duplex ultra sound
- D-dimer test

# Venography

- First in 1938
- Considered the “gold standard”
- 93% accuracy (non-filling recognised source of error)
- No longer routine diagnostic test

- Invasive
- Often painful
- Demands time & expertise
- May result in allergic reaction (death 1/ 100 000)
- Ionizing radiation exposure
- Predispose to new thrombus formation

# Ultrasound

- Improved accuracy over recent years with added venous compression & colour flow
- Originally only 75% accurate now 95%
- Requires time & expertise to perform & interpret
- If result equivocal repeat test in 72 hours
- Potential to dislodge thrombus

# D-Dimers Blood Test

- Fibrin break down product
- Elevated levels found in any situation where there is thrombus
- A normal D-dimer makes DVT/PE unlikely
- Elevated level has a poor predictive value

Prevention rather than routine testing  
and treatment

# Prophylaxis Options

- Early mobilisation / exercises
- Intermittent compression devices
- TED stockings
- LMWH
- Warfarin
- Oral direct Thrombin / Anti-Xa inhibitors
- Aspirin
- Spinal anaesthetic

**Name**

**Unit No.**

**Ward**

**AGE SPECIFIC GROUP**

<u>Age group</u>	<u>Score</u>
10-30	0
31-40	1
41-50	2
51-60	3
61+	4

**BUILD**  
Body mass index (BMI):  
wt (Kg)/Ht(M)<sup>2</sup>

<u>Build</u>	<u>BMI</u>	<u>Score</u>
Underweight	16-19	0
Average	20-25	1
Overweight	26-30	2
Obese	31-40	3
Very obese	41+	4

**MOBILITY**

<u>Risks</u>	<u>Score</u>
Ambulant	0
Limited (uses aids self)	1
Very limited (requires help)	2
Chair bound	3
Complete bed rest	4

**SPECIAL RISK CATEGORY**

<u>Risks</u>	<u>Score</u>
Contraceptive pill (20-35 years)	1
(35+ years)	2
Pregnancy/puerperium	3

**ASSESSMENT PROTOCOL**

**Score < 6 No risk**

**Score 7-10 Low risk (< 10%)**

**Score 11-14 Moderate risk (11-40%)**

**Score > 15 High risk (> 41%)**

**SCORING**  
Identify appropriate items, add and record the scores below

<u>Assessor</u>	<u>Date</u>	<u>Score</u>

**TRAUMA RISK FACTORS**

Score only pre-operatively and score only *one* item in this box

<u>Risk</u>	<u>Score</u>
Head	1
Chest	1
Head & chest	2
Spinal	2
Pelvic	3
Lower limb	4

**SURGICAL INTERVENTIONS**

Minor surgery < 30 mins	1
Major surgery	2
Emergency major surgery	3
Pelvic	3
Thoracic	3
Abdominal	3
Orthopaedic (below waist)	4
Spinal	4

**HIGH RISK DISEASES**

<u>Risk</u>	<u>Score</u>
Ulcerative colitis	1
Anaemia: sickle cell	2
polycythaemia	2
haemolytic	2
Chronic heart disease	3
Myocardial infarction	4
Malignancy	5
Varicose veins	6
Previous DVT or CVA	7

- Assist focussed history taking.
- Complement clinical judgement in prescribing prophylaxis.
- Numerically ranks risk
  - it assists with consistently applying escalating prophylaxis in line with escalating risk.

# Current overview of DVT prophylaxis

Orthop Clin N Am, 2009

# Problems with studies

- Studies rely on venographic outcome measures, because of difficulty in clinical diagnosis
- This does not correlate with symptomatic VTE!
- Infrequent symptomatic numbers would require massive sample sizes
- This necessitates a surrogate endpoint with venographic diagnosed DVT
- Natural hx of asymptomatic DVT not known

# Problems with chemical prophylaxis

- Bleeding
  - “Major bleeding episode” normally listed in trials:
    - fatal,
    - critical organ (CVI),
    - significant decrease in Hb requiring transfer of 2+ units red cells
  - Up to 17% in VTE treatment studies (Am Collge of Chest physicians guidelines)
  - 13% case-fatality rate in these patients

# “Minor” bleeding

- Surgery site
  - Increased ecchymosis, hemarthrosis and wound drainage, associated with TWICE the infection rate (Sachs et al, 2002)
- Higher transfusion rates
- GI bleeding

- With chemical prophylaxis the risk of DVT is 17.7 % to 31.1 %, depending on the method chosen. (Freedman, Grookenthal, Fitzgerald, Williams, & Lonner, 2000).
- Timing of chemical prophylaxis:
  - <12h post-op more effective, but more major bleeding
  - Increased risk in hip surgery up to 35 days, but questionable cost / compliance /safety issues of extended prophylaxis - reserved for extreme high risk pt
    - Previous VTE, morbid obesity, cancer
  - Current chest physicians' recommendation at least 10 days

# Risk vs Benefits

- Relative low incidence of symptomatic VTE
- Risk of bleeding
- Possible late infection

# Mechanical prophylaxis

- TED's
  - 51% reduction in risk of DVT
- IPC devices
  - 56% reduction in risk
- Foot Impulse devices
  - 65% reduction

# Aspirin

- Single prophylaxis – 30% reduction in risk
- Rather as an adjuvant therapy with mechanical prophylaxis

# Culture/ Values

- Unaware of the DVT/PE prevented
- Painfully aware of bleeding complications

*PE thought of as an act of God, bleeding and infection is the fault of the surgeon.*

# Role of the Nurse

- Assessment of risk factors & alerting the team
- Positioning of patient in bed
- Dorsiflexion exercises as soon as sensation returns
- Implementing prophylaxis ensuring accuracy and safety with timing of LMWH / fit of TED's / compliance with foot pumps

- Early mobilisation of patient
- Assessment & early detection of prophylaxis complications
- Assessment & early detection of DVT/PE
- Patient and family discharge education

**Thank you**