

# High Risk Groups for Deep Vein Thrombosis: A Surgical and Trauma Perspective

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# Overview

- Surgery and Trauma Patient Population
- Acquired and Inherent Risk Factors
- Screening for Deep Vein Thrombosis (DVT)
- Risk Factor Modification in Surgery/Trauma
  - Risk stratification
  - Preventive strategies
  - Complications of prophylaxis
- Conclusions

# Surgery and Trauma Patient Population

- Typically no underlying clotting disorder
- Injury to body tissues, whether by surgery or trauma, increases risk of DVT
- Can occur within hours; even during operation (some reported < 2 hours)
- Majority occur within 10-14 days of event
- Sub-groups can have even higher risk
- Can it predictably be prevented?

# Acquired and Inherent High Risk Factors

- Non-surgical:
  - Obesity, Cancer, Prior DVT/PE, Pregnancy, certain medications (birth control), IV line place in large central vein, > 72 hour ICU stay, kidney failure
- Surgical:
  - Pelvic surgery (gynecology and urology surgery), orthopedic surgery (hip replacement or fracture repair), prolonged immobilization (long plane flight, 3 or more days in hospital)
- Trauma:
  - Spinal cord paralysis injury, multiple limb fractures, pelvis/hip socket (acetabulum) injury, use of clotting medications (rVIIa) or transfusions (platelets)

# Screening for DVT

- Physical exam less than 50% accurate
- Duplex Ultrasound of major veins
  - US waves can show blood clots in major veins of legs, groin, arms, neck and abdomen
  - Done at bedside, risk free, repeatable
  - Recent study in ICU, using DVT prevention measures, showed 10% with DVT and 10% of those developed lung blood clot (pulmonary embolus-PE)
- X-ray studies (CT scan, venogram): requires contrast dye use, can cause kidney injury and must be done in x-ray department; not more sensitive

Deep Venous Thrombosis in medical-surgical critically ill patients; prevalence, incidence and risk factors. Cook D, et al. Crit Care Med 2005; 33:1565-1571

# Risk Factor Modification

- Stratification:
  - Any surgery or injury
  - Any additional risk factors (previous slides)
  - More than one risk factor
- High, Medium and Low risk groups
  - Prevention measures based on risk group
  - Eastern Association for Surgery of Trauma and American College of Chest Physicians have guidelines for surgery and trauma patient risk stratification and prophylaxis

# Preventive Strategies

- Mechanical

- Early ambulation: not possible in OR; not possible for many of highest risk patients
- Sequential compression devices (inflatable stockings worn on legs): essentially risk free; can't be used for all patients (leg injury or surgery); used during and after operations; fairly effective
- Vena Cava (main abdominal and chest vein) filters: small wire cages in vena cava to prevent PE; inserted by radiologists or surgeon in special x-ray suite; latest technology allows removal of filter once risk of PE minimal (~3 weeks after injury or surgery); does not prevent DVT; controversial due to long term complication risk but effective in PE prevention

# Preventive Strategies Con't

- Chemical
  - Heparin: 'blood thinner' anticoagulant medication; rapid onset (within minutes); given by IV or subcutaneous injection; administered once or twice a day or by an IV drip; now available in low molecular weight versions which are equally potent with lower side effect (bleeding) profile; may require blood tests to monitor; can be used during operation and at home
  - Coumadin: daily pill anticoagulant; slow onset (days); must be monitored with frequent blood tests; increased risk of bleeding complications; long track record of success; typically not administered during operation (stopped several days before surgery)

# Preventive Strategies, Con't

- Combination of mechanical and chemical measures may yield best results
  - Additive preventive effect
  - Combination recommended in higher risk groups
  - Best used in OR at beginning of operation or as soon after injury as feasible (within hours/days)
  - Cannot always use anticoagulants due to risk of bleeding
- Risks of preventive measures
  - Mechanical stockings: less effective, therefore: DVT/PE
  - Filters: decrease PE but increase risk of DVT long term, no proven decreased death rate; removable may be best temporary measure in highest risk group unable to use other measures
  - Chemical: bleeding is a problem after operation or injury, especially organ injury or brain/spine surgery; rare platelet decrease disorder

# Conclusions

- Mechanical and/or chemical preventive strategy should be individualized based on patient risk factors found in existing guidelines
- DVT and PE can be prevented in 90% or more of surgical and trauma patients without additional risk factors by use of preventive strategy
- Risk of DVT, PE and death related to PE in high risk surgical and trauma patients is significantly reduced by 60-70% using preventive strategy
- Screening for DVT in high risk groups using Duplex US is cost-effective and should be part of comprehensive DVT prevention strategy