DVT Prophylaxis - Concerns in Foot and Ankle Pathology
CSFA Tampa, Feb. 2018

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Goals

1. Define the problem of VTE
2. Determine if VTE is a problem in foot/ankle surgery
3. Determine what prophylactic treatment if any is indicated based on guidelines

What are We Concerned About?

- Asymptomatic DVT?
- Symptomatic DVT?
  - Below the knee?
  - Above the knee?
- Pulmonary Embolism?
  - Small PE?
  - Fatal PE?
Why Is VTE a Problem?
- Deep Venous Thrombosis (DVT):
  - Post phlebitis syndrome (Chronic swelling and leg pain after a DVT)
- Pulmonary Embolism (PE):
  - Can lead to chronic pulmonary compromise
  - Adds tremendous cost, inconvenience, and risk of long-term anticoagulation (usually 6 months)

Fatal PE - The Real Issue
- Is this a real problem after foot and ankle injury or surgery?
  - Probably not
- But it does occur!!!
  - Is devastating to all parties involved

There are Forces “Promoting” Anticoagulation
The Influence of SCIP Hospital Scoring Systems

Sample pt. - 45 y.o. healthy man
- 5'10" 182 lbs
- 46 mm ankle scope for OCL
- splinted for 2 weeks post op
- 25% WB

Total Score = 8 pts

Based on this scoring system we should be anticoagulating the pt.

Where is Aspirin on this form?

What should we do based on the literature???

Forces Against or Not Sure About Aggressive Anticoagulation
The American College of Chest Physicians Guides:

**Recommendation**

**1. We suggest no prophylaxis** rather than pharmacologic thromboprophylaxis in patients with isolated lower-leg injuries requiring leg immobilization (Grade IC).

**AAOS Guidelines**

**AAOS Guideline on Preventing Venous Thromboembolic Disease in Patients Undergoing Elective Hip and Knee Arthroplasty**

Current evidence is unclear about which prophylactic strategy (or strategies) is are optimal or suboptimal. Therefore, we are unable to recommend for or against specific prophylactics in these patients. (Grade of Recommendation: Inconclusive)

In the absence of reliable evidence about how long to employ these prophylactic strategies, it is the opinion of this work group that patients and physicians discuss the duration of prophylaxis. (Grade of Recommendation: Consensus)

ACFAS clinical consensus statement (foot and ankle surgery and injuries requiring immobilization.):

- Fleischer AE, et al. JFAS 2015
- Routine chemical prophylaxis - not warranted
- Patients should be stratified and have a prevention plan tailored to their individual risk level
- Multimodal
  - Address modifiable risk factors
  - Mechanical prophylaxis
  - Early mobilization
  - Careful use of chemical prophylaxis
- Come up with the plan in an informed consent model
What is the risk of VTE in our patients?

- Asymptomatic DVT - ???
- Symptomatic DVT - 1% or less
  - Except Achilles
- Pulmonary Embolism - Less than 0.5%
- Fatal Pulmonary Embolism - Less than 0.1%

- Calder JD, et. Al. KSSTA. 2016
- Foot / Ankle Frxs. No symptomatic DVT with or without Lovenox
- Selby R., et. Al. JBJS Am., 2014
- Frxs., 82% casted 7/1200 symptomatic VTE, 0 fatal PE
- Ahmad J, et. Al. FAS. 2017

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Argument Against “Aggressive Drugs” – Studies Showing Very Low Risk of VTE

  - Total Ankle Replacement
    - DVT clinically detected - 0.45%
    - 1. nonfatal pulmonary embolism
- Sonooh N. et. Al. FAI, 2011
  - Total Ankle Replacement
    - DVT and PE - 0.28% and 0.21%
- SooHoo NF, et. Al., FAS. 2011
  - DVT – 6/2733 (0.22%)
  - Nonfatal pulmonary emboli 4/2733 (0.15%)
- National Trauma Data Bank 2007 - 2009
  - Foot and Ankle trauma
    - DVT and PE - 0.28% and 0.21%
- Hamilton, et. Al. FAS 2011 June
  - 33,500 elective foot and ankle surgeries per year in UK
  - Incidence of DVT (0.6%), PE (0.1%), and fatal PE (0.02%)
  - Would have to treat 10,000 patients to prevent 1 fatal PE
In Favor of Aggressive Prophylaxis

- 88 pts.
- DVT - 5, PE nonfatal - 1
- They recommend routine prophylaxis

Repair of Chronic Achilles Ruptures Has a High Incidence of Venous Thromboembolism.
Bullock MJ, et. al. Foot Ankle Spec. 2017

- Retrospective, chronic Achilles ruptures - statistically significant higher incidence of VTE compared with acute Achilles ruptures or elective repair

With That Said:

- If you do nothing, VTE may occur
- Fatal PE's are devastating to all involved
  - I have had at least 2
  - So who should we prophylax and with what?
  - Anticoagulation has risks -
    - Bleed at the operative site
    - Low dose: major bleeding 0.7 - 1.4%, minor 0.1 to 0.2%
    - Arixtra, Xarelto: Any bleeding 2%, major - 0.1 to 0.2%
    - Some risk of VTE and higher TAT
    - Can lead to an increased risk of infection
    - Bleed at a remote site
    - Heparin-induced thrombocytopenia (thrombocytopenia, etc.)

Methods of Anticoagulation Currently Available

- Early Ambulation
- Sequential Compression Devices
- Aspirin alone
- Aspirin and SCD’s
- Aggressive anticoagulation (LMWH’s, Arixtra, Xarelto, Coumadin, etc.)
- Multimodal
Can The Literature Guide Us???

- Increased Risk:
  - Over 50
  - "Obese"
  - IWO VTE, Cancer
  - More comorbidities
  - Non-weight bearing
  - Immobilization
  - The more risk factors the greater the risk

  - 4412 pts. ORIF of Ankle Fractures
  - 33 (0.8%) had a VTE

- Mangwani J, et. Al. Foot 2015
- Systematic Lit. review
- 0-0.55% incidence of symptomatic VTE in foot and ankle surgery

Can we quantify the risk?

- Outpatient surgery (Unknown if VTE Proph was used, 30 day period)

- Independent risk factors Odds Ratios -
  - Pregnancy – 7.8
  - Active Cancer – 3.66
  - Age 41 to 59 years OR = 1.72
  - Age 60 years or more OR = 2.48
  - Body mass index > 40 kg/m2 OR = 1.81
  - Operative time 120 minutes or more OR = 1.69
  - Arthroscopic surgery OR = 5.16
  - Did not assess personal or family history of VTE
  - Did not assess previous history of VTE
  - Did not assess previous history of DVT

- Risk of DVT 20% increased risk (1.19%)

- Two Point Factors
  - Age < 65
  - Age > 65

- Two Point Factors
  - Body mass index < 35
  - Body mass index ≥ 35

- Two Point Factors
  - Dependent functional status
  - Independent functional status

- Mangwani J, et. Al. Foot 2015
- Increased Risk: BMI - 30 to 35 kg/m2 (OR = 4.77) BMI - 35 kg/m2 or higher (OR, 4.71)
- Heart disease OR, 3.28
- Dependent functional status OR, 2.59
Let's Say You Want To Lower the Risk:

Aggressive Anticoagulation Vs. Placebo – The Studies Show No Difference

- Fractures Below the Knee
  - Goel DP, et. Al. JBJS Br. 2009
    - Placebo (111)
    - DVT - 11 (8.7%)
    - LMWH (127) - 14 days
    - DVT - 14 (12.6%)

- Ankle Fractures
    - All patients - 1 week of Dalteparin then 5 weeks:
      - Dalteparin (n = 136)
        - DVT – 21%, Proximal 4%,
      - Placebo (n = 136)
        - DVT – 28%. Proximal 3%

- Surgically repaired tibia, fibula, and ankle fractures
  - Selby R. et. Al. JOT 2015
    - (130: dalteparin; 128: placebo)
    - Incidence of CIVTE in the dalteparin and placebo groups was 1.5% and 2.3%
    - No fatal pulmonary emboli or major bleeding

Anticoagulation has real risks

  - 785 patients - no prophylaxis
    - Total complications - 2.2%
    - Death rate from thromboembolic disease - 0.0%
    - Total death rate - 0.2%
  - 957 patients - 6 weeks of low-dose warfarin
    - Total complications - 4.7%
    - Death rate from thromboembolic disease of 0.0%
    - Total death rate of 0.1%
    - 1 death - massive gastrointestinal bleeding
    - Twice the infection rate

So Now We Know That We Do Not Need Aggressive Drugs In most Patients - Do We Need Anything?
What Are The “Other Less Aggressive But Effective” Methods

  - Ankle fractures both operative and nonop. Tx. (randomized)
  - With compression socks
    - Better functional scores
    - Nonsignificant decreased risk of DVT

Compression Socks?

  - Ankle fractures both operative and nonop. Tx. (randomized)
  - With compression socks
    - Better functional scores
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Summary of the Available Literature

- Movement is good!!!
  - Of course hip and knee
  - Gentle Ankle pumps in the cast or boot
  - Toe Movement
  - Increased Blood flow
  - Lower blood viscosity
  - Less thigh and calf swelling

- But
  - Keene DJ, et. Al, J Orth Spots Phys Ther, 2014
  - Early ankle movement versus immobilization after ankle fractures - meta-analysis.
    - Less VTE
    - More Infections, fixation failure, and reoperation

- Active ankle movements after lower limb surgery
**Mobilizing Alone Is Not Enough**

- Craik JD, et al., FAI 2015
- Normal venous blood flow only with full weight bearing in below-knee casts or walking boots
- Most patients are at limited weight bearing

**Aspirin - Similar Prophylaxis in (Low Risk Patients) and Lower Risk of Bleeding**

- Brown GA, J Arthroplasty, 2009
- Pooled analysis of 14 randomized controlled trials
- VTE rates - not significantly different vs. vitamin K antagonists (LMWH), and pentasaccharides. Lower bleeding risk
- Bozic KJ, et al., J Arthroplasty. 2010
- 93,840 pts. TKA (55%) - warfarin, (40%) - injectables, (5%) - aspirin.
- Aspirin - lower or similar odds for thromboembolism
- No differences in risk of bleeding, infection, or mortality after adjustment.

**Sequential Compression Devices are a Viable Alternative**

- 121 pts. THA or TKA
- Miniature, mobile, battery-operated SCD plus low-dose aspirin vs. Lovenox Lower rate of all DVTs
Aggressive Anticoagulants are NO BETTER than SCD’s

No Benefit
- 30,000 total knee arthroplasty
- 19 studies, 19,441 patients, 373 deaths, metaanalysis
- 99,441 patients; 373 deaths, metaanalysis
- Colwell CW Jr., Surg Technol Int. 2014
- Mobile SCD with or without aspirin Vs. warfarin, enoxaparin, rivaroxaban, and dabigatran

No Benefit and Higher Risk
- Sharrock NE, et al., CORR 2008
- Twenty studies 1998 to 2007 THR and TKR
- Aggressive drugs - higher all-cause mortality rate

In Summary: What I do:
- Written education
- Sign a form stating that they have received this information and have had their questions answered
- Informed decision making process
- Individualized Treatment
- All pts are instructed to walk and move joints immediately
- Low Risk patients - Frequent use of Portable SCD’s and Aspirin (not for forefoot)
- High risk patients - (multiple risk factors) aggressive pharmacologic prophylaxis

Thank You
What is the risk of VTE in our patients?

  - 1200 pts. tibial, fibular, or ankle fracture (treated nonoperatively) or a patellar or foot fracture (treated operatively or conservatively).
  - 82% - cast
  - 7 - symptomatic VTE
  - 0 - Fatal PE

- Zheng X. et al. FAI 2016
  - Foot and Ankle Fractures
  - 814 patients
  - NO symptomatic VTE
  - Incidence of asymptomatic postoperative deep vein thrombosis (DVT) was 0.98% in the LMWH group and 2.01% in the placebo group without significant difference.

- Calder JD, et al. KSSTA. 2016
  - Meta-analysis - (VTE) in foot and ankle surgery
  - 43,381 pts. clinical - incidence with and without chemoprophylaxis was 0.6% and 1%
  - 1666 pts. radiological - incidence with and without chemoprophylaxis was 12.5% and 10.5%
  - Achilles tendon rupture - clinical - 7%, radiological - ???

- Ahmad J, et al. FAS. 2017
  - 2774 patients foot/ankle surgery
  - VTE - 0.79%
  - 14 infrapopliteal DVT, 1 suprapopliteal DVT
  - 7 PE

- Hamilton, et al., FAS 2011 June
  - 33,500 elective foot and ankle surgeries per year in UK
  - Incidence of DVT (0.4%), PE (0.1%), and fatal PE (0.02%)
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- CDC
  - Venous thromboembolism prevention
  - Oral contraceptives
  - Intrauterine devices
  - Hormonal replacement therapy
  - Pelvic surgery or trauma
  - Inflammatory bowel disease
  - Infection
  - Cancer
  - Total hip or knee replacement
  - Major surgery
  - Malignancy
  - Congestive heart failure

So What Do The Experts Say

What Do Surgeons Do Currently ???
How Do Surgeons Address VTE Prophylaxis - Surveys

Gadgil A, Thomas RH. FAI. 2007

- American and British foot and ankle surgeons
- 19% - routine use of thromboprophylaxis
- postoperative patient, immobilized and nonweightbearing.

Shah K1, et. Al. Foot Ankle Spec. 2015

- Active AOFAS members
- Ankle fusion - Scenarios:
  - No risk factors - 57% "No prophylaxis"
  - Patient with history of PE - 97.5% prophylaxis
  - Patient on BCP - 61.3% of respondents, some type of thromboprophylaxis.
  - aspirin, 49% and low-molecular-weight heparin, 47%

Is the Cast the Problem?

Saragas NP, et. Al. Foot Ankle Surg. 2014

- 120 - below knee NWB cast for at least 4 weeks
- Bk: Below surgery allowed to weightbear.
- No thromboprophylaxis
- Doppler between 2 and 6 weeks postoperatively.
- 5.09% incidence of VTE (0.9% pulmonary embolism) overall
  Only in cast group: 8.46%

Rethinking our protocols

- Do we need casts?
- Do we need to restrict movement?
- Do we need to restrict weight bearing?