Understanding Risks of DVT/PE in Foot and Ankle Surgery

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DVT prophylaxis

- Balancing the risk between the prevention of DVT / PE and increased bleeding.

Position statements

- American College of Chest Physicians
  - 2012 Chest

"We suggest no prophylaxis … in patients with isolated lower-leg injuries requiring leg immobilization."

Position statements

- American Orthopedic Foot and Ankle Society, 2013
  - "There is currently insufficient data … to recommend for or against routine VTED prophylaxis…."

Position statements

- International consensus panel
  - 2013 Int Angiol

"Current available data…suggest that routine LMWH prophylaxis should be considered for isolated limb trauma in the absence of contraindications."

Duration of prophylaxis – "…until the patient is weight bearing."

Position statements

- American College of Foot and Ankle Surgeons, 2015
  - "Current evidence argues against the routine use of chemical prophylaxis for VTED in foot and ankle surgery or in injuries requiring immobilization."

Incidence of VTE in foot /ankle surgery

- Confounded by numerous study factors
  - Definition of VTE – symptomatic or not
  - Anatomic location – leg vs. thigh
  - Diagnostic modalities
  - Time elapsed from event to evaluation

Fractures below knee – DVT incidence

• Solis, Saxby	3.5%
• Patil, et.al.	5%
• Shibuya, et.al.	0.28% DVT
	0.21% PE
• Selby	0.6%

Testroote, et.al., 2014

- Meta-analysis of 6 RCT with leg immobilization
- 1490 patients, 750 receiving LMWH
- Incidence of DVT 4.3 – 40% in the control group
- Symptomatic DVT 2.5%
- Proximal DVT was rare
- Use of LMWH significantly reduces VTE when immobilization is required.

Saragas, et. al., 2014

- 216 patients
- 130 patients BK cast for minimum 4 weeks
- 88 patients with HAV surgery weight bearing postop
- Ultrasound evaluation between 2-6 weeks

Saragas, et. al., 2014

- Incidence of thrombosis
  - Weight bearing 0%
  - Cast 8.46%

- DVT usually developed after 30 days

Recommended prophylaxis until weight bearing

Chapelle, et. al., Arthroscopy, 2014

- Meta-analysis
- All randomized trials using LMWH with transient reduced mobility in non major orthopedic surgery
- 14 studies - 4,726 patients
- Weighted rate of VTE – 2.9%
- 68% reduction of major VTE with LMWH

My personal evolution

- 70+ year old male
- ORIF calcaneal fracture
- 2 weeks Lovenox
- Cast / NWB 12 weeks
- DVT/PE at 13 weeks

My personal evolution

- 18 year old obese female
- Gastroc recession / NC fusion
- Placed on birth control pills by GYN periop
- 2 weeks postop – Pulmonary embolism

My personal evolution

- 26 year old active male
- Delayed primary repair lateral ankle ligaments
- Pain in calf at 3 weeks
- DVT

Position statement

- American Orthopedic Foot and Ankle Society, 2013
  - "We do recommend, however, that patients be assessed preoperatively for VTED risk."
  - "Exactly what constitutes sufficient risk, … remains undetermined."

Position statement

- American College of Foot and Ankle Surgeons, 2015
  - "…foot and ankle surgeons should attempt to stratify patients and develop a prophylaxis plan for those at high risk of VTED."
  - "Exactly what constitutes sufficient risk to warrant chemical prophylaxis is not clear."

Risk Stratification

- Caprini survey
- L-Trip Cast score
- ACFAS clinical model

Caprini score – risk assessment

Illinois State Medical Society

Are You at Risk for DVT?

FOR PATIENTS Complete this risk assessment tool to find out.

Be CLOT Aware — Know Your Caprini Score And Save Your Life

❑ Male
❑ Female

Name _____ Today's Date _____

Only your doctor can determine if you are at risk for Deep Vein Thrombosis (DVT), a blood clot that forms in one of the deep veins of your legs. A review of your personal history and current health may determine if you are at risk for developing this condition. Take a moment to complete this form for yourself (or complete it for a loved one). Then be sure to talk with your doctor about your risk for DVT and what you can do to help protect against it. Your doctor may want to keep a copy in your file for future reference.

Directions:

1. Check all statements that apply to you.
2. Enter the number of points for each of your checked statements in the space at right.
3. Add up all points to reach your total DVT Risk Score.

Then, share your completed form with your doctor.

Add 1 point for each of the following statements that apply now or within the past month:

- ❑ Age 41– 60 years ____
- ❑ Minor surgery (less than 45 minutes) is planned ____
- ❑ Past major surgery (more than 45 minutes) within the last month ____
- ❑ Visible varicose veins ____
- ❑ A history of Inflammatory Bowel Disease (IBD) (for example, Crohn's disease or ulcerative colitis) ____
- ❑ Swollen legs (current) ____
- ❑ Overweight or obese (Body Mass Index above 25) ____
- ❑ Heart attack ____
- ❑ Congestive heart failure ____

Add 2 points for each of the following statements that apply:

- ❑ Age 61–74 years ____
- ❑ Current or past malignancies (excluding skin cancer, but not melanoma) ____
- ❑ Planned major surgery lasting longer than 45 minutes (including laparoscopic and arthroscopic) ____
- ❑ Non-removable plaster cast or mold that has kept you from moving your leg within the last month ____
- ❑ Tube in blood vessel in neck or chest that delivers blood or medicine directly to heart within the last month (also called central venous access, PICC line, or port) ____
- ❑ Confined to a bed for 72 hours or more ____

Add 3 points for each of the following statements that apply:

- ❑ Age 75 or over ____
- ❑ History of blood clots, either Deep Vein Thrombosis (DVT) or Pulmonary Embolism (PE) ____
- ❑ Family history of blood clots (thrombosis) ____
- ❑ Personal or family history of positive blood test indicating an increased risk of blood clotting

1 point

- Age 41-60 years
- BMI > 25
- Edema
- Varicose veins
- Oral contraceptive
- Hormonal therapy
- Bed rest < 72 hours
- Inflammatory bowel disease
- Past major surgery in the month
- MI / CHF
- Lung disease
- Pregnancy / post partum

2 points

- Age 61 – 74 years
- Cast < 1 month
- Bed rest > 72 hours
- Arthroscopy
- Laparoscopy
- General surgery > 45 minutes
- Current / past malignancies
- PICC / Central line

3 points

- Age 75 or more
- Prior history DVT / PE
- Family history of DVT / PE
- Clotting factor aberrations
- Lupus anticoagulants
- Anticardiolipin antibiodies

5 points

- Fracture of hip, pelvis, leg
- Elective arthroplasty – hip / knee
- Polytrauma
- Stroke in previous month
- Acute spinal cord injury in previous month

Caprini score rating totals

- Score 0-1: Low risk
- Score 2: Moderate risk
- Score 3-4: High risk
- Score 5 or more: Highest risk

L-TriP Cast Score

- Goal: to develop a clinical prediction tool for DVT in patients with casts

- Comparison of patients with DVT and controls

L-TriP(cast) Score Based On The Clinical Risk Prediction Model

Environmental Predictor Variable	Point Variable
Age ≥ 35 and < 55 y	2
Age ≥ 55 y	3
Male sex	1
Current use of oral contraceptives	4
Cancer within the past 5 y	3
Pregnancy or puerperium	3
BMI ≥ 25 and < 35 kg/m^2	1
BMI ≥ kg/m^2	2
Pneumonia	3
Family history of VTE (first-degree relative)	2
Comorbidity (rheumatoid arthritis, chronic kidney disease, COPD, multiple sclerosis)	1
Hospital admission within the past 3 mo	2
Bedridden within the past 3 mo	2
Surgery within the past 3 mo	2
Superficial vein thrombosis	3
Plaster cast: lower leg	4

Nemeth B, Adrichem RA, Hylckama VA, Bucciarelli P, Martinelli I, Baglin T, et al. Venous thrombosis risk after cast immobilization of the lower extremity: derivation and validation of a clinical prediction score, L-TRiP (cast), in three population-based case-control studies. PLoS Med 2015 Nov 10:e1001899.

CASE 1

	Caprini	L-TriP
• 45 year old	1	2
• obese patient	1	1
• Lapidus bunionectomy (cast)	2	4
	4 - high risk	7 (9)

Case 2

- 24 year old female
- Ankle reconstruction (cast)
- Birth control pills

	Caprini	L-TriP
	0	0
	2	4
	1	4
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	3 – High risk	8 (9)

CASE 3

	Caprini	L-TriP
• 65 year old male	2	2 + 1
• Repair TPD (cast)	2	4
• Varicose veins	1	3
	5 - highest risk	11 (9)

ACFAS risk assessment

- 1 or more primary risk factors
- Careful consideration of secondary risk factors and severity
  - Individually seldom sufficient to justify use of chemical prophylaxis
- Clinicians should consider a multimodal approach

ACFAS Risk Factors For Venous Thromboembolism

Patient Specific	Treatment Specific	Surgery/Injury Specific
Primary		
Personal history of VTED	Immobilization > 4wks	
Hypercoagulability		
Active/recent (<6 mo) cancer		
Secondary		
Advanced age (> 60)	Non-weightbearing	Achilles tendon rupture‡
Obesity (BMI > 30)	Hospitalization	Ankle fracture‡
Family history of VTED	Bed rest	Total ankle replacement
OCP or HRT use†		Hindfoot arthrodesis
Varicose veins		General anesthesia
Diabetes mellitus or > 1 comorbidity		
Severe foot/ankle injury		

† Consider also if patient is a current smoker, as this may further VTED risk.

‡ Includes operative and nonoperative management.

Fleischer AE, Abicht BP, Baker JR, Boffeli TJ, Jupiter DC, Schade VL. American College of Foot and Ankle Surgeons clinical consensus statement: risk, prevention, and diagnosis of venous thromboembolism disease in foot and ankle surgery and injuries requiring immobilization. J Foot Ankle Surg 2015;54:497-507.

Special considerations

- Achilles ruptures
  - 6 studies with an incidence of DVT 0.43 to 34%
  - Makhdom, et.al., JFAS, 2013
    - Incidence of symptomatic DVT was 23.4% in patients undergoing surgery

Options for chemical prophylaxis

- Low molecular weight heparin
- Warfarin
- New oral agents – Factor X inhibitors
  – Thrombin inhibitor

Low molecular weight heparin

- Lovenox (enoxaparin)
- Arixtra (fondaparinux)
- Fragmin (dalteparin)

- Subcutaneous injection
- No lab monitoring
- Now generic
- Risk of thrombocytopenia

New oral anticoagulants (NOAC)

- Factor Xa inhibitors
  - Xarelto
  - Eliquis
- Direct thrombin inhibitor
  - Pradaxa

Downsides to NOAC

- Cost
  - Discount coupons

- No active reversal agents for Xarelto, Eliquis
  - Adexanet alfa completed phase III clinial trials
  - Praxbind now approved for reversal of Pradaxa

Considerations with NOAC

- No aspirin, NSAIDs, Plavix
- GI bleeding more common with Xarelto and Pradaxa (Eliquis favored)

Potential drug interactions

- Verapamil, amiodarone
- Sporonox, Ketoconazole, Diflucan
- Norvir, Kaletra, Crixivan
- Dilantin, Phenobarbital, Carbamazepine
- Rifampin
- St. John’s Wort

Why not warfarin?

- Inexpensive
- Increased bleeding potential compared to NOAC
- Need for monitoring
- More potential drug interactions
- Affected by diet

Complications of prophylaxis

- Bleeding complications

  -Confounding factors in assessment of risk

  -Initiation of therapy

  -Dosage

  -Definitions

  Testroote – 8% minor events

  Lower than other studies

Primary complication of prophylaxis

- Bleeding complications
- Major
  - Death
  - Bleeding into a critical organ
  - Bleed associated with 2g/dl drop in Hgb or transfusion of 2 units
  - Bleed requiring reoperation

Assessing bleeding complications in studies

- Dose of medication
- Timing of dose
- Medication related?
- Nature of the surgery
- Xarelto
  - 10 to 40 mg
- Preop vs. postop
- Bleeding evident before or after dosing

Bleeding vs. length of prophylaxis

- Major orthopedic surgery
  - LMWH (Lovenox)
  - 10 – 14 days vs. 35 days
  - ↓ risk of DVT, no ↑ risk of major bleeding
- LMWH vs. warfarin
  - Substantial increased risk of major bleeding with warfarin over extended intervals

Alternative prophylaxis

- Aspirin?
- Compression pumps
- Exercises
- Confers no protection

Compression devices

- “Limited data suggest that concurrent use of anticoagulation with IPCD may lower the risk of VTE compared to anticoagulation alone…”

Pavon, et.al., 2015

VA Evidence-based Synthesis Program Reports

Exercises

- Weightbearing significantly reduces risk
- Calf muscle pump

- Hickey, et.al., 2014 Foot Ankle Inter
  - Active dorsiflexion/plantarflexion of toes, ankle
  - Maximum velocity at popliteal vein 75% of normal

My personal practice

- Risk assessment of patients over age 18 with casts
- Discussion of risks
- Xarelto 10 mg QD
- Knee/toe exercises if feasible
- Problems
  - Increased swelling
  - Two patients with increased menstrual bleeding, one with nose bleed

Points to take home

- Literature to support either approach to prophylaxis
- European approach – more aggressive
- Newest terminology – “risk assessment”
  “risk stratification”

- Ask the question!

57 year old female

- Fracture 5th metatarsal 1 day prior
- No significant PMH
- No medications
- Normal BMI

- Family history!

Points to take home

- Prophylaxis does not eliminate risk of VTE
  - The benefits are relative and not absolute
  - Testroote – 6 RCT
    - Incidence of symptomatic DVT reduced from 2.5% to 0.3%

Point to take home

- VTE appears to develop later as opposed to sooner below the knee
  - More common presentation is after 30 days
  - Exception may be found in achilles ruptures

Points to take home

- Overall risk of DVT is low in most patients
- Risk assessment is recommended by all organizations
- Threshold for risk varies depending on the assessment tool
- Have the discussion with your patients

Go to
forum.podiatricsuccess.com
to continue the discussion and
ask questions