Using Case Studies to Learn from Each Other as Primary Care Providers

William Y. Huang, MD
Desencia E. Thomas, MD

January 15, 2019
FCM Grand Rounds

• A few thoughts:
  – Excellent presentations so far
  – We are a learning community:
    • How well do we know everyone in the community?
    • We have much to learn from each other
A Day in the Life of a Primary Care Physician: Being alert to the unusual and diligent in the evaluation

William Y. Huang, MD
Desencia Thomas, MD

January 15, 2019
Disclosures

• The presenters have no financial disclosures
• The cases to be presented occurred years ago (as far back as 2010) when treatment guidelines were different
• The cases were not managed perfectly, but the decision points provide good opportunity for discussion and learning
<table>
<thead>
<tr>
<th>Clinical Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baylor Family Medicine (Kirby or Main)</td>
</tr>
<tr>
<td>Casa de Amigos Health Center</td>
</tr>
<tr>
<td>Gulfgate Health Center</td>
</tr>
<tr>
<td>Martin Luther King Health Center</td>
</tr>
<tr>
<td>Northwest Health Center</td>
</tr>
<tr>
<td>Strawberry Health Center</td>
</tr>
<tr>
<td>Vallbona Health Center</td>
</tr>
<tr>
<td>other</td>
</tr>
</tbody>
</table>
Case presentation: Patient # 1

• A 46-year old female presents with the following:

• **CC/HPI:** 6 week history of progressive swelling of the L leg
  – Some pain in the thigh and calf as swelling has worsened
  – No fever or systemic symptoms
  – No trauma to the leg
Case presentation: Patient # 1

- **PMH**: Diabetes mellitus, but on no medications at the time
- **PSH**:
  - Cesarean section x 1
  - BTL in the past
  - Cholecystectomy, 1987
Case presentation: Patient # 1

• Past OB/Gyn: G6P6A0
  – Sexually active with husband only
  – BTL for contraception
  – LMP 26 days previous x 3 days, normal

• Medications: None at the time

• Allergies: None known

• Social history: no tobacco or alcohol use, lives with husband, works in school cafeteria
Case presentation: Patient # 1

- **Review of systems:**
  - CV: no chest pain
  - Resp: no shortness of breath
  - GU: no dysuria or hematuria
  - GI: no blood in stool

- **Physical exam:**
Case presentation: Patient # 1

• Physical exam, cont.:
  – Neck: Carotid pulses - 2+/-, no bruits; supple with no nodes, no thyroid mass or tenderness
  – Chest: no accessory muscle use; resonant to percussion; clear to auscultation
  – CV: Normal S1 and S2 without S3 or S4. no murmur or gallop
  – Abdomen: Active bowel sounds; no hepatosplenomegaly; no masses or tenderness
  – Extremities: Dorsalis Pedis Pulses 1+/- Posterior Tibial pulses 1+/-.
    [Severe 3-4+ pitting edema involving the entire left lower extremity. (The Right lower extremity was normal in appearance.)]
  – Calf circumference (done a week later)
    • Right = 35 cm
    • Left = 40 cm
What is your differential diagnosis at this point?
What is your differential diagnosis at this point?
Differential diagnosis of unilateral leg edema

- Deep vein thrombosis
- Ruptured medial head of gastrocnemius muscle
- Ruptured Baker’s cyst
- Venous insufficiency
- Cellulitis
- Lymphedema/lymphangiiitis
- Compartment syndrome
- Complex regional pain syndrome type 1 (reflex sympathetic dystrophy)
- Pelvic mass

What do you think is the most likely cause of this woman’s symptoms and signs?

A deep vein thrombosis in her left leg
What is the likelihood that this patient has a deep vein thrombosis?

Clinical prediction rules may help
## Wells score

<table>
<thead>
<tr>
<th>Clinical finding</th>
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<tbody>
<tr>
<td>Active cancer</td>
<td>+1</td>
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<td>Paralysis, paresis or recent immobilization</td>
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<tr>
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<td>+1</td>
</tr>
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<td>+1</td>
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<tr>
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<td>+1</td>
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<tr>
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<td>+1</td>
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Significance of Wells score

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<th>Pretest probability</th>
<th>Frequency of DVT</th>
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<td>0</td>
<td>Low</td>
<td>3.0%</td>
</tr>
<tr>
<td>1-2</td>
<td>Moderate</td>
<td>16.6%</td>
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<td>3-8</td>
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<td>74.6%</td>
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What history or physical findings are most important?

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<tr>
<th>Clinical finding</th>
<th>Likelihood ratio +</th>
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<tr>
<td>High Wells score</td>
<td>5.20</td>
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### Modified Wells score

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<td>Previous DVT (<em>new item</em>)</td>
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Case presentation: Patient # 1

• What is the likelihood our patient has a deep vein thrombosis?
  – High
• What will you do next?
Available tests to evaluate for Deep Vein Thrombosis

<table>
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<tbody>
<tr>
<td>D-Dimer blood test (all)</td>
<td>91.0%</td>
<td>94.0%</td>
<td>55.0%</td>
</tr>
<tr>
<td>Venous Duplex Doppler ultrasound</td>
<td>92.1%</td>
<td>96.5%</td>
<td>94.0%</td>
</tr>
<tr>
<td>Impedance plethysmography</td>
<td>75.0%</td>
<td>88.0%</td>
<td>90.0%</td>
</tr>
<tr>
<td>CT venogram</td>
<td>95.9%</td>
<td></td>
<td>95.2%</td>
</tr>
<tr>
<td>MR venogram</td>
<td>91.5%</td>
<td>93.9%</td>
<td>94.8%</td>
</tr>
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Proximal versus Distal DVT

• Proximal DVT’s are clinically significant
  – more likely to cause a symptomatic or silent pulmonary embolus\(^1,2\)

• Isolated distal DVT’s are less significant\(^3\):
  – “Isolated distal DVT’s are uncommon in symptomatic patients”
  – “Proximal extension of distal DVT more than a week after presentation is unusual.”
  – “Isolated nonextending distal DVT is of minor clinical importance”

Available tests to evaluate for Deep Vein Thrombosis

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## Available tests to evaluate for DVT

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<thead>
<tr>
<th>Test</th>
<th>Appropriateness category</th>
<th>Relative Radiation Level</th>
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<tbody>
<tr>
<td>Venous ultrasound (duplex Doppler)</td>
<td>Usually Appropriate</td>
<td></td>
</tr>
<tr>
<td>CT venogram</td>
<td>May Be Appropriate</td>
<td>☢☢☢</td>
</tr>
<tr>
<td>MR venogram without and with contrast</td>
<td>May Be Appropriate</td>
<td></td>
</tr>
<tr>
<td>MR venogram without contrast</td>
<td>May Be Appropriate</td>
<td></td>
</tr>
<tr>
<td>Catheter venogram</td>
<td>Usually Not Appropriate</td>
<td>☢☢☢</td>
</tr>
</tbody>
</table>

What test would you like to perform?
What test would you like to perform first?

- D-Dimer blood test
- Venous Doppler duplex ultrasound
- Impedance plethysmography
- CT venogram
- MR venogram
What test would you like to perform first?

- D-Dimer blood test
- Venous Doppler
- Duplex ultrasound
- Impedance plethysmography
- CT venogram
- MR venogram
What test would you like to perform first?

- D-Dimer blood test
- *Venous Doppler duplex ultrasound*
- Impedance plethysmography
- CT venogram
- MR venogram
Use of Wells score to guide testing

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<th>Pretest probability</th>
<th>Recommended action</th>
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<tr>
<td>Low</td>
<td>D-dimer, follow with venous ultrasound if positive</td>
</tr>
<tr>
<td>Moderate</td>
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Lower extremity venous duplex doppler ultrasound

• Components
  – B-mode scan: 2-dimensional image of vein
  – Doppler image: demonstrates blood flow

• An important finding is the compressibility of the veins
  – Full compressibility of a vein indicates no thrombus
  – The lack of full compressibility indicates a thrombosis

• Can be done at the bedside

Case presentation: Patient # 1

• Additional information
  – A venous duplex doppler of the Left lower extremity 5 weeks previous when she presented to the EC at the onset of the leg swelling: “No evidence of deep venous thrombosis above the left calf.”
Sensitivity and specificity of a lower extremity venous duplex doppler ultrasound

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Case presentation: Patient # 1

• Additional information
  – A venous duplex doppler of the Left lower extremity *5 weeks previous* when she presented to the EC at the onset of the leg swelling: “*No evidence of deep venous thrombosis above the left calf.*”
  – How does this affect your differential diagnosis?
  – Now what will you do?
Case presentation: Patient # 1

- Options for further testing of suspected DVT if initial ultrasound is normal
  - Diagnostic options include:
    - D-dimer\(^1,2\)
    - Repeat ultrasound after one week\(^1,2\)
    - Other studies such as a venogram\(^2\)


Case presentation: Patient # 1

• Venous duplex doppler # 2 was performed the day after the clinic visit
  – “No evidence of deep venous thrombosis above the left calf.”
Sensitivity and specificity of a lower extremity venous duplex doppler ultrasound

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Case presentation: Patient # 1

• Venous duplex doppler # 2 was performed the day after the clinic visit
  – “No evidence of deep venous thrombosis above the left calf.”

• How does this affect your differential diagnosis?

• What will you do now?

• Is there anything else you need to think about?
How does this affect your differential diagnosis?
Differential diagnosis of unilateral leg edema

- Deep vein thrombosis
- Ruptured medial head of gastrocnemius muscle
- Ruptured Baker’s cyst
- Venous insufficiency
- Cellulitis
- Lymphedema/lymphangiitis
- Compartment syndrome
- Complex regional pain syndrome type 1 (reflex sympathetic dystrophy)
- Pelvic mass

Case presentation: Patient # 1

- Anything else you would do on the first visit?
  - An abdominal exam at the initial clinic visit revealed no masses
  - A pelvic exam was also done on the initial visit and revealed left adnexal fullness, but no definite mass
  - Due to the concern for a intra-abdominal mass obstructing venous or lymphatic return, a CT abdomen/pelvis was done the following week
Case presentation: Patient # 1

• Official report of the CT scan abdomen/pelvis:
  – L adnexal cysts which “may represent ovarian neoplasm”
  – Vaginal cuff thickening which “may represent vaginal neoplasm”
  – “Soft tissue mass encasing infrarenal abdominal aorta may represent confluence of adenopathy from metastatic disease versus lymphoma. Left inguinal and left pelvic wall wall adenopathy.”
  – Questionable thrombus within the left iliac vein. Repeat left lower extremity DVT study may be indicated if the clinical picture is worse.
At this point, patient was admitted to the hospital for further management
Case presentation: Patient # 1

- Problem list:
  - Possible L iliac vein thrombosis
  - L adnexal mass, possible ovarian neoplasm
  - Vaginal thickening, possible vaginal neoplasm
  - Mass surrounding infrarenal aorta
Case presentation: Patient # 1

- A third venous duplex doppler of the Left lower extremity was performed in the hospital.
  - This time it showed “Deep venous thrombosis within the left common femoral vein and thrombus within the left greater saphenous vein.”
Case presentation: Patient # 1

• Updated problem list:
  – Deep vein thrombosis, left common femoral vein and left greater saphenous vein
  – Left adnexal mass, possible ovarian neoplasm
  – Vaginal thickening, possible vaginal neoplasm
  – Mass surrounding infrarenal aorta
What are risk factors for a deep vein thrombosis?
Who is at high risk for deep vein thrombosis?

- Inherited hypercoagulability states
  - Factor V Leiden mutation
  - Prothrombin gene mutation
  - Protein C deficiency
  - Protein S deficiency
  - Antithrombin deficiency
Who is at high risk for deep vein thrombosis?

- Hospital patients
  - Major surgery
    - Orthopedic, Neurosurgical, vascular, cancer
  - Cancer
    - Lung, Pancreas, Colorectal, Kidney, prostate
  - Congestive heart failure
  - COPD
  - Chronic kidney disease, esp, nephrotic syndrome

Who is at high risk for deep vein thrombosis?

- Trauma
  - Head injuries
  - Pelvic fractures
  - Femoral fractures
  - Tibial fractures

Bauer KA, Lip GYH, Overview for the causes of deep vein thrombosis. UpToDate Online September 5, 2018.
Who is at high risk for deep vein thrombosis?

- Patients with prolonged immobilization
- Patients with prolonged travel esp. air travel
- Myeloproliferative disorders
- Chronic liver disease

Bauer KA, Lip GYH, Overview for the causes of deep vein thrombosis. UpToDate Online September 5, 2018.
Who is at high risk for deep vein thrombosis?

• Hyperviscosity
• Hyperhomocysteinemia
• Anti-phospholipid antibodies (including anti-cardiolipin antibodies and lupus anticoagulant)

Bauer KA, Lip GYH, Overview for the causes of deep vein thrombosis. UpToDate Online September 5, 2018.
Who is at high risk for deep vein thrombosis?

• Current or recent hospitalization
• Use of medications
  – Estrogen (Oral contraceptives or hormone replacement treatment)
  – Testosterone
  – Tamoxifen

Bauer KA, Lip GYH, Overview for the causes of deep vein thrombosis. UpToDate Online September 5, 2018.
And don’t forget... the association with CV risk factors

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<tr>
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<th>RR ratio</th>
<th>95% CI</th>
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<tr>
<td>Obesity</td>
<td>2.33</td>
<td>1.68 – 3.24</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.51</td>
<td>1.23 – 1.85</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>1.42</td>
<td>1.12 – 1.77</td>
</tr>
<tr>
<td>Smoking</td>
<td>1.18</td>
<td>0.95 – 1.46</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>1.16</td>
<td>0.67 – 2.02</td>
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And don’t forget... family history

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<tr>
<td>1 first-degree relative</td>
<td>2.2</td>
<td>1.9 – 2.6</td>
</tr>
<tr>
<td>&gt; 1 first-degree relative</td>
<td>3.9</td>
<td>2.7 – 5.7</td>
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Bezemer ID; van der Meer FJ; Eijkenboom JC; Rosendaal FR; Doggen CJ. The value of family history as a risk indicator for venous thrombosis. Arch Intern Med. 2009 Mar 23;169(6):610-5.
Risk factors for venous thrombosis in the community

- Advancing age
- Cancer
- Previous venous thrombosis
- Pregnancy
- Trauma
- Frailty/immobility
- Recent hospitalization
- Recent surgery
- Recent infection

# Case presentation: Patient # 1

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<td>Left adnexal mass, possible ovarian neoplasm</td>
<td>Pelvic ultrasound, Gynecology consult</td>
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<td>Discharged on anticoagulants <em>(more discussion to follow)</em></td>
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<tr>
<td>Left adnexal mass, possible ovarian neoplasm</td>
<td>Pelvic ultrasound, Gynecology consult</td>
<td>1) U/S suggests hemorrhagic cyst</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Gyn recommends outpatient followup</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) <em>Eventually had Left salpingo-oophorectomy 4 months later</em> showing benign pathology</td>
</tr>
<tr>
<td>Vaginal thickening, possible vaginal neoplasm</td>
<td>Pelvic ultrasound, Gynecology consult</td>
<td>Not seen on ultrasound or pelvic exam. Gyn recommends observation</td>
</tr>
<tr>
<td>Mass surrounding infrarenal aorta</td>
<td>Interventional radiology consult for biopsy</td>
<td>FNA done in hospital, patient discharged with results pending</td>
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Case presentation: Patient # 1
A more simplified problem list

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Case presentation: Patient # 1

- At the time of hospital discharge, how will you treat the patient’s deep vein thrombosis?
  - Continue low molecular weight heparin (LMWH) and start warfarin. Followup with clinical pharmacist and discontinue LWMH when INR is therapeutic
  - Stop LMWH and start a Direct-acting oral anticoagulant (DOAC) such as rivaroxaban
  - Stop LMWH and start aspirin
  - Continue LMWH alone for now
At the time of hospital discharge, how will you treat the patient's deep vein thrombosis?

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<th>Option</th>
<th>Treatment</th>
</tr>
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<tr>
<td>A</td>
<td>Continue low molecular weight heparin (LMWH) and start warfarin. Discontinue LMWH when INR is therapeutic</td>
</tr>
<tr>
<td>B</td>
<td>Stop LMWH and start a direct acting oral anticoagulant (DOAC) such as rivaroxaban</td>
</tr>
<tr>
<td>C</td>
<td>Stop LMWH and start aspirin</td>
</tr>
<tr>
<td>D</td>
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Case presentation: Patient # 1

At the time of hospital discharge, how will you treat the patient’s deep vein thrombosis?

– Continue low molecular weight heparin (LMWH) and start warfarin. Followup with clinical pharmacist and discontinue LWMH when INR is therapeutic
– Stop LMWH and start a Direct-acting oral anticoagulant (DOAC) such as rivaroxaban
– Stop LMWH and start aspirin
– *Continue LMWH alone for now*
Case presentation: Patient # 1

• The patient was discharged on LMWH alone
  – (due to the possibility of cancer)

Case presentation: Patient # 1

<table>
<thead>
<tr>
<th>Treatment for patients with DVT and cancer</th>
<th>Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2008 ACCP guidelines</strong>¹</td>
<td>“We recommend LMWH for the first 3 to 6 months of long-term anticoagulant therapy.”</td>
</tr>
<tr>
<td><strong>2016 ACCP guidelines</strong>²</td>
<td>“As long-term (first 3 months) anticoagulant therapy, we suggest LMWH over VKA therapy, dabigatran, rivaroxaban, apixaban or edoxaban.”</td>
</tr>
</tbody>
</table>
Case presentation: Patient # 1

• Initial FNA result
  – “Retroperitoneal mass, image guided deep fine needle aspiration and cell block:
    Specimen satisfactory for evaluation but limited by: **Scant cellularity**
    **Indeterminate**
    **Recommend further evaluation**”

• Now what will you do?
Case presentation: Patient # 1

- Core biopsy done 4 weeks later:
  - “Para-aortic Mass, deep fine needle aspiration (A) and core biopsy (B):
    Specimen satisfactory for evaluation
    **Negative for malignancy**

Comment

The core biopsy shows dense fibrosis and scattered chronic inflammatory cells. These inflammatory cells show positive staining for CD3 and some for CD20 and negative staining for pancytokeratin. These histological findings are typical of **idiopathic retroperitoneal fibrosis** if these cores are representative of the overall lesion.”
Case presentation: Patient # 1
A more simplified problem list

<table>
<thead>
<tr>
<th>Problem List</th>
<th>Plan</th>
<th>Outcome</th>
</tr>
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<tbody>
<tr>
<td>Deep vein thrombosis</td>
<td>Start therapeutic dose of low-molecular weight heparin</td>
<td>Discharged on anticoagulants <em>(more discussion to follow)</em></td>
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<tr>
<td>Mass surrounding infrarenal aorta: <em>Retroperitoneal fibrosis</em></td>
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<td></td>
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Case presentation: Patient # 1

• Now that cancer was ruled out, the patient was started on LMWH and transition to warfarin (a vitamin K antagonist) until her INR was therapeutic.
**DVT Treatment guidelines**

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<th>Treatment for patients with DVT and transient risk factor</th>
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# DVT treatment guidelines

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<td>2016 ACCP guidelines&lt;sup&gt;2&lt;/sup&gt;</td>
<td>“Direct oral anticoagulants (DOAC’s) (dabigatran, rivaroxaban, apixaban, or edoxaban are preferred over vitamin K antagonist (VKA) therapy (Warfarin)” for DVT and no cancer</td>
<td>All DOAC’s over VKA therapy (Grade 2B)</td>
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<td>Treatment for 3 months</td>
<td>Duration of treatment (Grade 1B)</td>
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## Case presentation: Patient # 1
### A more simplified problem list

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<td>How do we treat this?</td>
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Retroperitoneal fibrosis: Brief comments

• Fibro-inflammatory tissue which surrounds the abdominal aorta, iliac vessels and retroperitoneal structures including the ureter

• Idiopathic versus secondary

Vaglio A et al. Retroperitoneal fibrosis. The Lancet 2006;357(9506):241-251
Retroperitoneal fibrosis: Brief comments

• Secondary causes:
  – Drugs (*including methysergide, ergotamine, bromocriptine, hydralazine, β blockers*)
  – Malignancy (*lymphomas, sarcomas, CA of colon, prostate, breast or stomach*)
  – Infections (*tuberculosis, histoplasmosis, actinomycosis*)
  – Radiotherapy (*for seminoma, colon CA, pancreatic CA*)
  – Surgery (*lymphadenectomy, colectomy, hysterectomy, aortic aneurysctomy*)
  – Other (*amyloidosis*)

• Can be associated with autoimmune diseases (*thyroiditis, vasculitis, rheumatoid arthritis, systemic lupus erythematosis*)

Vaglio A et al. Retroperitoneal fibrosis. The Lancet 2006;357(9506):241-251
Retroperitoneal fibrosis: Brief comments

• Treatment
  – If secondary, treat the cause
  – Surgery if needed to relieve any obstruction
  – If idiopathic:
    • Prednisone 40-60 mg per day
    • Other immunosuppressants can be used

Vaglio A et al. Retroperitoneal fibrosis. The Lancet 2006;357(9506):241-251
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<td>Start Prednisone 60 mg po q day</td>
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Case presentation: Patient # 1

• 2 months after starting Prednisone 60 mg per day, a repeat CT scan was obtained
Case presentation: Patient # 1

• 2 months after starting Prednisone 60 mg per day, the official CT scan report:
  – “Interval decrease in the retroperitoneal soft tissue encasing the aorta”

• Adjustments in management plan:
  – Started to taper and decrease prednisone dosage
  – Anticoagulation with warfarin continued
# Case presentation: Patient # 1

A more simplified problem list

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<td>Mass surrounding infrarenal aorta: <em>Retroperitoneal fibrosis</em></td>
<td>Prednisone 60 mg per day</td>
<td>Mass decreasing in size</td>
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Case presentation: Patient #1

• 5 months after starting prednisone
  – “Minimal residual soft tissue surrounding the infrarenal abdominal aorta, which is unchanged to slightly decreased from 11/10. No new adenopathy or soft tissue mass in the retroperitoneum.”
  – Adjustments in management plan:
    • Discontinued anticoagulants (used for 7 months)
    • Prednisone tapered down to 5 mg per day
  – Patient eventually lost to followup, but was doing well at the last visit
Patient # 2
Case presentation: Patient # 2

• 51 y/o male presented for a routine chronic illness visit but also with the following complaint:

• **CC/HPI:** L arm swelling x 1 day
  – Lifted some heavy material a few days previously
  – Now with left upper extremity swelling
  – No fever or systemic signs
Case presentation: Patient # 2

• **PMH**
  – Hypertension, well-controlled
  – Hypercholesterolemia, controlled
  – Non-ischemic cardiomyopathy (EF<20%)
  – Admitted one month earlier for diuresis due to fluid overload, currently doing well without shortness of breath

• **PSH**
  – S/P AICD placement two months earlier
Case presentation: Patient # 2

• **Soc Hx**
  – Quit smoking 7 years ago

• **ROS**
  – no chest pain or shortness of breath

• **Physical exam:**
  – Vitals signs: BP 118/80, Pulse 58, RR 20, T 97.7 F
  – Patient in NAD
Case presentation: Patient # 2

- **Physical exam, cont:**
  - Neck: No JVD at 30 degrees
  - Chest: clear to auscultation
    - His AICD is visible in the left anterior chest
  - CV: no murmur or gallop
Case presentation: Patient # 2

• Physical exam, cont:
  – Ext:
    • normal pulses and no edema in lower extremities
    • *Left upper extremity with diffuse swelling of upper arm, forearm and hand*
    • No redness or warmth of LUE, but slight tenderness in spots
    • Radial pulse and Ulnar pulse present in the left arm with normal capillary refill in the fingertips
What is your differential diagnosis?
Case presentation: Patient # 2

- Superficial thrombophlebitis
- Deep vein thrombosis
- Lymphedema
- ? Muscular tear
What do you think is the most likely diagnosis?

Deep vein thrombosis of the upper extremity
Deep vein thrombosis of the upper extremities

- Primary spontaneous
- Catheter-related
Deep vein thrombosis of the upper extremities

- Primary spontaneous
  - Younger age
  - Healthy, muscular male
  - Strenuous activity with arms
  - Repetitive movements including hyperabduction
  - Thoracic outlet anatomic abnormalities
  - Thrombophilia

Goshima K. Primary (spontaneous) upper extremity deep vein thrombosis. UpToDate online. November 2, 2017.
Deep vein thrombosis of the upper extremities

• Catheter related
  – PICC (peripherally inserted central catheters)
  – Central venous catheters
  – Pacemaker leads or defibrillator leads

Mintz A, Levy MS. Upper Extremity Vein Thrombosis. Latest in Cardiology, American College of Cardiology website, November 6, 2017

How can we predict the probability of a deep vein thrombosis of the upper extremity?
Clinical prediction score for upper extremity deep vein thrombosis

<table>
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<tr>
<th>Condition</th>
<th>Points</th>
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Case presentation: Patient # 2

• What will be the initial test you perform on this patient with a suspected upper extremity DVT?
  – “US (compression with either Doppler or color Doppler) over other initial tests, including highly sensitive D-dimer or venography (Grade 2C)”
  – How accurate is this test in identifying an upper extremity DVT?

Case presentation: Patient # 2

<table>
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<tr>
<th>Upper extremity DVT</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression ultrasound</td>
<td>97%</td>
<td>96%</td>
</tr>
<tr>
<td>Doppler ultrasound</td>
<td>84%</td>
<td>94%</td>
</tr>
<tr>
<td>Compression and Doppler ultrasound</td>
<td>91%</td>
<td>93%</td>
</tr>
</tbody>
</table>

# Available tests to evaluate upper extremity swelling

<table>
<thead>
<tr>
<th>Test</th>
<th>Appropriateness category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venous ultrasound (duplex Doppler)</td>
<td>Usually Appropriate</td>
<td></td>
</tr>
<tr>
<td>Chest x ray</td>
<td>Usually Appropriate</td>
<td>☢</td>
</tr>
<tr>
<td>MR venogram without and with IV contrast</td>
<td>Usually Appropriate</td>
<td>☢☢☢</td>
</tr>
<tr>
<td>Upper extremity venogram</td>
<td>Usually Appropriate</td>
<td>☢☢☢</td>
</tr>
<tr>
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<td>Usually Appropriate</td>
<td>☢☢☢☢</td>
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<tr>
<td>CT venogram with IV contrast</td>
<td>Usually Appropriate</td>
<td>☢☢☢☢☢</td>
</tr>
<tr>
<td>Radionuclide venogram upper extremity and chest</td>
<td>Usually Not Appropriate</td>
<td>☢☢☢</td>
</tr>
</tbody>
</table>

Case presentation: Patient # 2

• Venous ultrasound of the Left Upper extremity performed on the day of the clinic visit:
  – “No evidence of venous thrombosis of the left upper extremity, internal jugular or subclavian veins”
Now what will you do?
Case presentation: Patient # 2

• Now what will you do?
  – I phoned the patient and recommended that he go to the Emergency Center
  – I also phoned one of the EC physicians
    • ?? CT venogram or other study as the next study
Case presentation: Patient # 2

• Evaluation in the emergency center
  – CT chest: "Limited evaluation for left upper extremity DVT secondary to contrast timing. No evidence of SVC obstruction."
  – Repeat venous ultrasound while in the EC: "Partially occlusive thrombus of the left axillary vein."

• The patient was started on LMWH and transitioned to warfarin and currently doing well on warfarin alone
How long should we continue anticoagulation in patient # 2?
Case presentation: Patient # 2

• “9.3.4. In patients who have UEDVT that is associated with a central venous catheter that is not removed, we recommend that anticoagulation is continued as long as the central venous catheter remains over stopping after 3 months of treatment (Grade 2C).”
Conclusion

• **Lessons learned:**
  – Evidence-based guidelines are very useful, but clinical acumen is also important
  – If your patient has a high pretest probability for a deep vein thrombosis (DVT), diligently pursue the diagnosis with multiple tests if needed
  – In addition to treating the DVT, consider the cause of the deep vein thrombosis
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