Hematology/Oncology Pearls

Internal Medicine Board Review 2016

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Adapted from Dr. Halawi

#1: A 23 year old female was found to have microcytic anemia on routine labs

Subjective:
No shortness of breath

Physical exam:
pale conjunctivae, no icterus

Labs:
• Hb 10.5 g/dL, MCV 61, RDW 15
• Iron studies within normal limits
• Hemoglobin electrophoresis: elevated A2 fraction

Which of the following is the most likely diagnosis?

A. Iron deficiency
B. Beta-Thalassemia trait
C. Sickle cell anemia
D. Sideroblastic anemia

#2: A 75 year old female with a 3 month history of numbness and tingling in her feet

Subjective:
+shortness of breath, decreased exercise tolerance

Physical exam:
Vitals WNL, BMI 19.5
Ple conjunctivae, icteric sclerae
Decreased vibratory sense in toes

Labs:
Hb 7.5 g/dL, MCV 105 fL, WBC 2500/µL (normal diff), platelets 70,000/µL
Total bilirubin 5 mg/dL, LDH 1300 U/L
Vitamin B12 165.3 ng/L
Methylmalonic acid and homocysteine levels elevated

Which of the following is the most likely diagnosis?

A. Iron deficiency
B. Beta-Thalassemia trait
C. Sickle cell anemia
D. Sideroblastic anemia

Microcytic Anemia

• MCV less than 80
• Causes:
  Thalassemia (alpha and beta)
  Iron deficiency
  Anemia of chronic disease
  Sideroblastic anemia
Peripheral blood smear

Which of the following is the most appropriate long-term treatment?

A. Oral cobalamin  
B. Oral folate  
C. IM cobalamin  
D. Vitamin B6

Vitamin B12 deficiency

• Most common cause is malabsorption, esp in older patients
• Hypersegmented neutrophils (>five lobes) are highly specific for megaloblastic anemia  
• Labs significant for elevated methylmalonic acid and homocysteine levels, and sometimes hemolysis  
• High-dose oral supplementation (1000 to 2000 micrograms daily)

#3: A 28 year old female found to be thrombocytopenic on routine evaluation

Subjective:
No easy bruisability, no bleeding

Physical exam:
Vitals WNL
No petechiae, no ecchymosis  
No hepatosplenomegaly

Labs:
Hb 12 g/dL  
WBC 6000/µL with a normal differential  
Platelets 19,000/µL

Peripheral Blood Smear
Which of the following is the most appropriate management?

A. Initiate prednisone
B. Platelet transfusions
C. Collect the CBC in a heparin- or citrate-anticoagulated tube and recheck values
D. IVIG
E. Splenectomy

More on thrombocytopenia

- Pseudothrombocytopenia - laboratory artifact and requires no therapy
- ITP on the differential in a patient presenting with isolated thrombocytopenia
- ITP is a diagnosis of exclusion made after ruling out pseudothrombocytopenia and other etiologies for thrombocytopenia (medications and systemic illnesses)
- Steroids, IVIG, and splenectomy

#4: 60 year old Male with pancreatic cancer receiving Gemcitabine

**Subjective:**
+ Fevers

**Physical Exam:**
- T 39.5°C, HR 85, RR 18, BP 110/60
- Confused, no nuchal rigidity
- Lung exam is normal with no adventitious sounds
- No rash

**Labs:**
- Hb 9 g/dL, WBC 2000 /µL, platelets 12,000 /µL
- Cr 2.6 mg/dL

Which of the following should you do next?

A. IVIG
B. Plasma exchange
C. Transfuse platelets
D. Measure ADAMTS13 levels
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Thrombotic Thrombocytopenic Purpura (TTP)

- Classic pentad:
  - Microangiopathic hemolytic anemia
  - Thrombocytopenia
  - Renal injury
  - Neurologic dysfunction (confusion, seizures...)
  - Fever
- Medical emergency

- Associated with ADAMTS13 deficiency
- Increased incidence
  - Certain drugs
    - Mitomycin-C
    - Cyclosporine
    - Quinine
    - Ticlopidine
    - Gemcitabine
  - Pregnancy
  - HIV
  - Post bone marrow transplant
  - Malignancy

#5: A 28 year old woman is admitted to the hospital with PE and DVT

- No recent travel or immobility. She is not pregnant and is not on oral contraceptives
- History of multiple DVTs and abortions in mother and sister
- Physical exam remarkable for left leg swelling
- She was started on enoxaparin and warfarin

Which of the following is the most appropriate thrombophilic screening strategy?

A. Test as soon as warfarin is discontinued
B. Test 2 to 4 weeks after warfarin discontinuation
C. Test during this current hospital admission
D. Test on blood obtained in the Emergency room prior to anticoagulation

Timing Thrombophilia Testing

- NOT in the setting of an acute thrombotic event
- Active thrombosis may alter the level of some proteins
- Warfarin reduces protein C and protein S activity and can rarely increase antithrombin levels to normal
#6: A 55 year old male develops thrombocytopenia

- Initially admitted to the SICU following a motor vehicle accident
- Hospital course complicated by a left femoral DVT for which he was placed on unfractionated heparin
- Platelet count dropped from 250,000 to 70,000 6 days after initiation of UFH

What is your next step?

A. Continue heparin as long as no bleeding occurs
B. Discontinue heparin and start a direct thrombin inhibitor such as argatroban
C. Replace unfractionated heparin with low molecular weight heparin
D. Discontinue heparin and hold any anticoagulation since platelets are low

Heparin Induced Thrombocytopenia (HIT)

- Higher incidence with UFH than LMWH
- 4T score (Thrombocytopenia, Timing, Thrombosis, other causes)
- Screen with antigen assay, confirm with functional testing (SRA)
- Stop heparin (UFH or LMWH) and start direct thrombin inhibitor (argatroban) if moderate to high clinical probability
- Start warfarin once platelets recover

#7: Identify the findings indicated in this smear

- A. Target Cells
- B. burr cells
- C. Auer Rods
- D. Howell-Jolly Bodies
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#8: A 45-year-old man with APL receiving chemotherapy

Subjective:
+ Worsening shortness of breath and leg edema

Physical exam:
T 38.2 °C, BP 105/55, HR 110, RR 18, O2 sat 91%, +6.2 kg since admission
No JVD, +sinus tachycardia
Bilateral crackles up till ½ lung fields
+ 2 pitting edema extending to the knees

Labs and imaging:
Hb 8.5 g/dL, WBC 192,000/µL, platelets 32,000/µL, Cr 3.1 mg/dL
Chest radiograph: diffuse interstitial infiltrates and bilateral pleural effusions

Which of the following is the most likely diagnosis?

A. ATRA (all-transretinoic acid) induced differentiation syndrome
B. Heart failure
C. Pneumonia
D. Nephrotic syndrome

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ATRA-induced differentiation syndrome

- Occurs in up to 25% of patients with acute promyelocytic leukemia (APL) who receive ATRA or arsenic trioxide during induction therapy
- Due to release of cytokines from differentiating promyelocytes leading to a capillary leak syndrome
- Typical presentation includes fever, hypotension, dyspnea, and weight gain
- Early recognition of this syndrome and administration of steroid therapy are key

#9: 45 year old male with progressive fatigue and abdominal pain

Physical Exam
Significant for splenomegaly

Labs
WBC 110,000/µL
Hb 8.6 g/dL
Platelets 540,000/µL
Uric Acid 11.0

The Heme/Onc consult service indicates a high suspicion for a myeloproliferative disorder, specifically chronic myelogenous leukemia (CML)
What is the most appropriate next test?
A. Flow cytometric analysis of the peripheral blood
B. Fluorescence in situ hybridization assay for t(9;22)
C. Heterophile antibody test
D. JAK2 mutation analysis

Chronic Myelogenous Leukemia (CML)
• Tyrosine kinase inhibitors are 1st line therapy (such as Imatinib or Gleevec)
• JAK2 gene mutation can help distinguish CML from other myeloproliferative disorders:
  o Polycythemia rubra vera
  o Essential thrombocythemia
  o Idiopathic myelofibrosis

#10: A 48 year old female receiving a packed red blood cell transfusion
Subjective:
+ Shortness of breath, fevers, and chills

Physical exam:
T 38.6°C, BP 110/62 mm Hg, HR 111, RR 20
Ox sat 90% on 4L/min of nasal cannula
No jugular venous distention or peripheral edema
Sinus tachycardia, no S3 or S4, no murmurs
Lung exam reveals diffuse crackles

Labs and imaging:
Hb 8.5 g/dL, WBC 8600/µL, platelets 152,000/µL
Chest radiograph: diffuse bilateral infiltrates
Electrocardiogram: sinus tachycardia, no ST or T wave changes

Which of the following is the most likely diagnosis?
A. Acute hemolytic transfusion reaction
B. Febrile nonhemolytic transfusion reaction
C. Transfusion-related acute lung injury
D. Transfusion-associated circulatory overload

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Transfusion Related Acute Lung Injury (TRALI)
- Reaction caused by antileukocyte antibodies in the donor blood product directed against recipient leukocytes
- Usually occurs during or within 6 hours of a transfusion with any blood product
- Treatment is supportive therapy
- Other transfusion related reactions:
  - Acute hemolytic transfusion reactions (ABO incompatibility): hypotension + DIC early in transfusion, clerical error
  - Febrile nonhemolytic transfusion reactions: occur commonly during transfusion and are also characterized by fever
  - Transfusion-associated circulatory overload: due to volume overload secondary to transfusions

Therapy should include all of the following except:
A. Lumpectomy and radiation therapy
B. Chemotherapy
C. Trastuzumab
D. Aromatase inhibitor

Breast Cancer Essentials
- Favorable prognostic variables
  - ER/PR positivity, small tumor size, low pathologic grade
- Poor prognostic variables
  - Large tumor size, lymph node involvement, ER/PR negativity, overexpression of HER2/neu
- Endocrine therapy for ER/PR positive tumors (tamoxifen, aromatase inhibitors)
- Trastuzumab for HER2/neu positive tumors

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#11: 65 year old female recently diagnosed with breast cancer
A breast mass is resected. Pertinent pathology findings are as follows:
- Infiltrative ductal carcinoma
- Largest dimension 3.5 cm
- ER/PR (+)
- HER2/Neu (-)

#12: A 72 year old male with hematuria
Subjective:
- Hematuria throughout micturition
- No dysuria or frequency
- He has atrial fibrillation on warfarin
Physical exam:
- Vital signs within normal limits
- Rectal exam with diffusely enlarged prostate without nodularity or tenderness
 Labs:
- INR 2.5
- Urinalysis: significant for >50 RBC without WBC, casts, or dysmorphic erythrocytes
Which of the following is the most appropriate next step in the evaluation of this patient?

A. Cystoscopy  
B. Prostate-specific antigen testing  
C. CT scan of the abdomen and pelvis  
D. Urine cytology

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Bladder cancer

- Consider bladder cancer in older person with a history of cigarette smoking and painless gross hematuria  
- Bladder cancer commonly presents with bleeding, typically throughout micturition  
- Bladder cancer is usually diagnosed by **cystoscopy and biopsy**  
- Less commonly, renal cancer presents with gross bleeding  
- Patients with prostate cancer may experience obstructive symptoms such as hesitancy and nocturia, but they rarely have bleeding

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#13: A 56 year old female with cough and weight loss

**Subjective:**  
+ weight loss and shortness of breath  
She is a non-smoker

**Physical exam:**  
Vitals WNL  
No lymphadenopathy  
Lung exam significant for decreased breath sounds in the right upper lung field

**Significant work-up:**  
CXR and CT chest: large peripheral right lung mass  
Biopsy: adenocarcinoma of the lungs

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Which of the following is the most appropriate next step?

A. Open biopsy  
B. CT-guided biopsy of the liver  
C. Epidermal growth factor receptor (EGFR) mutation tumor analysis  
D. Serum chromogranin A measurement

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A. Open biopsy  
B. CT-guided biopsy of the liver  
C. **Epidermal growth factor receptor (EGFR) mutation tumor analysis**  
D. Serum chromogranin A measurement
**Adenocarcinoma of the lungs and EGFR**
- Women, no or limited smoking history, East Asian descent
- Patients with EGFR gene mutation can benefit from targeted therapy (erlotinib, gefitinib)
- Longer median survival than those treated with standard chemotherapeutic agents

**46 year old male with neuropathic pain**
- History of small cell lung cancer, metastasized to spinal cord, L3 lesion with spinal canal narrowing s/p chemoradiation
- Complains of numbness and tingling
- No relief with gabapentin 600mg tid, hydrocodone/acetaminophen 10/325mg every 6 hours as needed

**#14 All of the following are appropriate analgesic treatments for neuropathic pain except:**
- A. desipramine
- B. lorazepam
- C. topical lidocaine
- D. venlafaxine

**Neuropathic Pain**
- Abnormal somatosensory processing in peripheral or central nervous system
- May respond to opioids alone but often adjuvants are required
- TCA (amitriptyline, desipramine), SSRI (citalopram, paroxetine), anticonvulsants (gabapentin, pregabalin, topiramate)
- Others (venlafaxine, bupropion, duloxetine)

**#15 48 year old male with pain**
- Pancreatic cancer – 9/10 abdominal pain radiating to back
- Morphine sulfate ER increased to from 90mg to 120mg po q12h 2 weeks ago, MSIR 15mg q4h prn continued at same dose, bowel regimen continued
- Pain poorly relieved with prn dose, taking atc
- Tox screen negative for illicit drug use
- Creatinine 2.3
What would you do to manage cancer pain?

• A. continue long acting morphine and increase short acting dose
• B. increase long acting and immediate release morphine
• C. opioid rotation – discontinue morphine and start oxycodone
• D. initiate lidoderm patch for back pain

Cancer Pain

• Use long acting opioids in addition to short acting
  o PRN dose = first calculate total oral morphine equivalent (OME)
  o Take 5-10% of OME and dose q4h prn
• Morphine’s active neurotoxic metabolite- morphine-3-glucuronide: Avoid in patients with renal or liver insufficiency
• Add adjuvant analgesic to wean off opioids
• Intervventional pain
• Prescribe bowel regimen with opioids

#16: Drug/Toxicity associations

Bleomycin Pulmonary fibrosis
Trastuzumab Cardiomyopathy
Doxorubicin Cardiomyopathy
Cisplatin Neuropathy
Cyclophosphamide Hemorrhagic cystitis

#17: Pathogen/malignancy associations

Epstein Barr virus Burkitt’s lymphoma
Hepatitis B and C Hepatocellular carcinoma
Human Herpesvirus 8 Kaposi’s sarcoma and Castleman’s disease
HPV 16 and 18 Cervical and anal cancer
Helicobacter Pylori Gastric MALT

Thank you

Questions?