The High-Risk Oncology Patient

Patients with cancer are frequently at risk for a variety of life-threatening complications. Using a case-based format, the speaker will discuss the evaluation and treatment of the following syndromes: tumor lysis, spinal cord compression, superior vena cava compression, neutropenic fever, and hypercalcemia.

- Discuss pearls and pitfalls in the diagnosis and treatment of tumor lysis syndrome.
- Discuss pearls and pitfalls in the diagnosis and treatment of spinal cord compression.
- Discuss pearls and pitfalls in the diagnosis and treatment of superior vena cava compression.
- Discuss pearls and pitfalls in the diagnosis and treatment of neutropenic fever.
- Discuss pearls and pitfalls in the diagnosis and treatment of hypercalcemia.

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Managing "The "High Risk" Oncology Patient

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So, why is this topic important?

- Malignant Neoplasms → Significant M&M
  - 2nd Leading Cause of Death in U.S.
- Patients present to the ED for evaluation

Our Objectives

- Neutropenic Fever
- Spinal Cord Compression
- Superior Vena Cava Syndrome
- Hypercalcemia
- Tumor Lysis Syndrome
Our Road Map…

- Five Clinical Cases
  - Neutropenic Fever
  - Spinal Cord Compression
  - Superior Vena Cava Syndrome
  - Hypercalcemia
  - Tumor Lysis Syndrome
- Conclusions

Setting the Stage…

- What I am not...
  - A Medical Oncologist
- What we won’t cover...
  - The finer points, the rare birds, etc.
- What I am...
  - An EP → we play “not to lose”
- What we will cover...
  - What we all need to know and remember → err, what we simply can’t afford to miss!

Only 3 Things to Remember…

- Neutropenic Patients:  
  *Atypical presentations of common disease*
- Lower Extremity Neurologic Symptoms:  
  *Image T + L Spine*
- Cancer History + Non-specific Complaints:  
  *Think Calcium!*


You can't get there from here!

Case No. 1
- ID: 45 year old Male with lymphoma
- Presents 10 days post chemotherapy
- Fever to 39°C at home
- Entirely asymptomatic
- Vascular access port in place ("Mediport")

So, What to Do!
- Work-up? Antimicrobials? Disposition?

Our Road Map...
- Neutropenic Fever
- Spinal Cord Compression
- Superior Vena Cava Syndrome
- Hypercalcemia
- Tumor Lysis Syndrome
- Take-Home Points
The Issues…

- What ANC level defines "neutropenia"?
- Who gets antimicrobials?
- Which antimicrobials do we use?
- Who stays and who goes home?

Neutropenic Fever

Definitions

- Fever
  - Single oral temp > 38.3 C
  - Sustained temp > 38 C
- Neutropenia
  - ANC < 1,000 with a predicted decrease to < 500
  - Severe: ANC < 500

The Only Graph In This Presentation!

![Graph: Chance of Infection vs. Absolute Neutrophil Count](Ann Int Med 1966;64:2:328-40)
Neutropenic Fever

Clinical Presentation
- ED: Isolated fever, no organisms recovered, no focus of infection identified in >50% 1,2

- Key Point: Atypical presentation of common dz
  - Pulmonary → absence of infiltrates
  - Urinary → lack of pyuria
  - Skin → subtle erythema
  - Meningitis → absence of "classic" findings


Neutropenic Fever

Diagnosis
- Physical Exam
  - Oral cavity
  - Perianal inspection (avoid DRE)
  - Vascular access portals

- Diagnostic Tests
  - Cultures: urine, blood x 2
  - Chest radiograph

- Key Pitfall: may appear normal despite infection

Treatment
- Febrile Neutropenia = Stat Antibacterials
Neutropenic Fever

Disposition
- **Outpatient**: Selected “lower risk” adult patients
  - S: Clinically very well, next day follow-up
  - O: “Higher” ANC, Temp < 39 C
- **Inpatient**: Everyone else!
- **Pediatric**: Oral antibiotics not recommended

Case No. 1: Conclusion
- 45 year old male with febrile neutropenia
- ED Studies
  - CBC → ANC = 880
  - Cultures (urine, blood – including one from port)
  - CXR → normal
- Discussed with Oncologist
  - Home on cipro + clindamycin (pen-allergic)
  - Next day follow-up
  - Discharged home with family, strict return precautions detailed

The Issues...
- What ANC level defines “neutropenia”?
  - ANC = < 500 cells/mm³ [≤ 1K if en route to 500]
- Who gets antimicrobials?
  - Febrile neutropenia = antibiotic treatment!
- Which antimicrobials do we use?
  - **Outpatient**: cipro + amox/clavulanate (clinda)
  - **Inpatient**: 3⁴/4th ceph, carbapenem + vanco
- Who stays and who goes home?
  - Home: clinically very well, follow-up ensured
Wikipedia: Neutropenic Fever

- Definition: “fever…neutropenia”
- Rx - Who: “empirical antibiotics” for all
- Rx - Which: [link to IDSA guidelines]
- Dispo: “MASCC” risk index [+ calculator]

Case No. 2: Oh, by the way…

- Sign-out = MRI L-spine Pending
  - Abnormal → call neurosurgery
  - Normal → discharge v. admit med service
- So, What to Do!

Our Road Map…

- Neutropenic Fever
- Spinal Cord Compression
- Superior Vena Cava Syndrome
- Hypercalcemia
- Tumor Lysis Syndrome
- Take-Home Points
The Issues…

- When (and what) do I image?
- Who gets steroids?
- Who gets urgent radiation?
- Who goes directly to the OR?

Spinal Cord Compression

A True Emergency
- MSSC = Malignant Spinal Cord Compression
- Key to Prognosis: neurologic status at time of diagnosis

Presentation
- Preceding diagnosis of malignancy: 80%
- Back pain: 90%

Malignancy + Back Pain = MSSC*

spinal cord compression

Diagnosis
- MRI -or- CT myelogram
  - T/L spine (+ C spine, if suggestive sx)

Treatment
- Steroids → moderate (10 mg) vs. high dose (100 mg)
  - High dose: ? improved outcome, more adverse events
- RT → RT alone challenged in recent literature
- Surgery → case-by-case determination
Case No. 2: Conclusion

- 70 year old female
- Normal Exam, but...
- Red Flag: multiple ED visits
- Red Flag: BLE numbness
- Red Flag: difficulty walking
- MRI T-spine added
- Pathology → Multiple Myeloma

The Issues...

- When (and what) do I image?
  - Malignancy + Back Pain = Imaging (T/L ± C spine)

- Who gets steroids?
  - Majority...but not all patients

- Who gets urgent radiation?
  - Recent literature less clear → consult!

- Who goes directly to the OR?
  - Individualized decision → consult!
Wikipedia: SCC

- **ID:** “requires swift dx and treatment”
- **Sx:** “back pain...[+/- neuro findings]”
- **Dx:** “preferably MRI”
- **Rx:** “dex...surgery...radiation therapy”

Case No. 3

- **ID:** 70 year old Male
- **Lung Cancer** – diagnosed one month prior
- **Progressive facial swelling for several days**
- **Mild dyspnea**
- **Symmetric facial edema noted on exam**

**So, What to Do!**
- Imaging? Treatments? Disposition?

*Our Road Map...*

- Neutropenic Fever
- Spinal Cord Compression
- Superior Vena Cava Syndrome
- Hypercalcemia
- Tumor Lysis Syndrome
- Take-Home Points
The Issues...

- Is imaging necessary to make this diagnosis?
- What are the immediate life-threats?
- What are the available treatment options?

SVC Syndrome

Causes
- Malignancy: lung cancer, lymphoma, others
- Non-malignant: infectious, intraluminal

Diagnosis
- Clinical...
- CT (+/- venography)
- MRI

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40</td>
<td>64.5</td>
</tr>
<tr>
<td>≥ 40</td>
<td>64.5</td>
</tr>
</tbody>
</table>

References:
SVC Syndrome

Treatment
- Not necessarily an emergency!
- **Beware**: coma, airway, hemodynamics
- IR → Stenting
- RT, Chemo
- Diuretics, Steroids
- Thrombolysis, Catheter Removal
- Surgery
- *Elevate head of bed!*

Case No. 3: Conclusion

- 70 year old male with facial swelling
- CT venography…
- *Absence of life threats*
- Admitted for initiation of RT, Chemo

The Issues…

- Is imaging necessary to make this diagnosis?
  - Clinical diagnosis, confirmed by CT -or- MRI

- What are the immediate life-threats?
  - Edema → cerebral (coma), laryngeal (airway)
  - Empty right heart → hemodynamic compromise

- What are the available treatment options?
  - For life threats, Most Important = IR Stenting

Wikipedia: SVC Syndrome

- Causes: “obstruction…thrombosis”
- Sx: “dyspnea…facial plethora”
- Dx: “chest x-ray…CT scan”
- Rx: “surgery…steroids…”

Case No. 4

- ID: 44 year old Female
- History of oropharyngeal cancer, recent chemo
- Presents with AMS
- Total Ca²⁺ = 16.0 mg/dL

So, What to Do?

- Treatments? Disposition?

TCa2⁺ = 8.4-10.2
Switching Gears…

Our Road Map…
- Neutropenic Fever
- Spinal Cord Compression
- Superior Vena Cava Syndrome
- Hypercalcemia
- Tumor Lysis Syndrome
- Take-Home Points

The Issues…
- “Corrected” or “ionized” calcium level?
- What are the immediate life-threats?
- What are the available treatment options?
Hypercalcemia

Introduction
- Common; easily "over-looked"
- Potentially life-threatening: ↓QTc, ARF, Coma

Presentation
- Profound hypovolemia
- Impaired intake + Fluid loss
- Non-specific symptoms…

Br Heart J 1993;70:43.

Essential Work-Up
- 12-lead ECG
- Calcium level
  - Total Serum → "corrected" imprecise, unreliable?
  - Assumes ~1/3 bound to albumin (therefore inactive)
  - Malignancy associated with low albumin
  - Correct for low albumin to raise Ca^2+ level
  - Ionized → direct measure of active fraction


Treatments
- Normal Saline → replete volume
- Loop Diuretics → only after above
- Dialysis → RF, CHF, failed pharmacotherapy
- Biphosphonates → blocks bone resorption
  - Pamidronate 60-90 mg IV over 2 hrs
  - Zoledronate 4 mg IV over 15 min
- Calcitonin → rapid onset, short-lived
  - Calcitonin 4-8 IU/Kg IV/SC every 12 hrs
- Others → mithramycin, gallium nitrate
- Corticosteroids → if ↑ vitamin D analogues
Case No. 4: Conclusion

- 44 year old female with hypercalcemia
  - iCa\(^{2+} = 2.29\) mmol/L
  - BUN/creat = 30/1.0
  - Admitted, cardiac tele

- 5 day hospital course...

- ED Treatments
  - NS, IV furosemide, (IV pamidronate)

The Issues...

- “Corrected” or “ionized” calcium level?
  - Corrected total serum imprecise/unreliable

- What are the immediate life-threats?
  - Shortened QTc → Sudden Death
  - Acute Renal Failure, Coma

- What are the available treatment options?
  - ED: saline, lasix, (dialysis)

Wikipedia: Ca\(^{++}\)

- ID: [common cause is]...malignancy
- Sx: “bones, stones, groans...”
- Life Threats: “coma...cardiac arrest”
- Rx: “initial...fluids and diuretics”
( Big Yawn! )

Case No. 5

- ID: 9 year old male
- History of A.L.L.
- Induction of chemo 24 hours ago
- Presents with vomiting, anorexia, lethargy
- $K^+ = 7.1$, BUN/Cr = 29/1.6
- **So, What to Do!**
  - Diagnosis? Treatments? Disposition?

Our Road Map...

- Neutropenic Fever
- Spinal Cord Compression
- Superior Vena Cava Syndrome
- Hypercalcemia
- Tumor Lysis Syndrome
- Take-Home Points
The Issues…

- How do I make this diagnosis?
- What are the immediate life-threats?
- What are the available treatment options?

Tumor Lysis Syndrome

Introduction

- Massive release of intracellular contents
- Present with non-specific symptoms

| Nucleic Acids | 
|--------------|---|
| DNA | Purines |
| K⁺ | Phosphate |
| ↓ | ↓ |
| Arrhythmia | Seizure |
| ↑ | ↓ |

Tumor Lysis Syndrome (TLS)

Diagnosis

- Setting:
  - Rx of aggressive hematologic malignancy
- Critical Study = 12-lead ECG  
  [↑K⁺, ↓Ca²⁺]
Tumor Lysis Syndrome

Treatment

- **Emergency:**
  - Admit
  - Intravenous Fluids
  - Cardiac monitoring
  - Aggressive Rx:
    - ↑ K⁺
    - ↓ Ca²⁺
    - ↑ phosphate

Case No. 5: Conclusion

- 9 year old with TLS
  - Admitted PICU
  - Monitoring:
    - Cardiac telemetry
    - Electrolytes (K⁺, Phos, Ca²⁺)
    - Urine output

The Issues…

- How do I make this diagnosis?
  - Check serum electrolytes
- What are the immediate life-threats?
  - Acute renal failure
  - Arrhythmias (↑K⁺, ↓Ca²⁺)
  - Seizures (↓Ca²⁺)
- What are the available treatment options?
  - IVF & directed treatment of metabolic derangements
Wikipedia: TLS

Tumor lysis syndrome

ID: "metabolic complication…cancer"

Sx: "hyperkalemia, hyperphos…"

Dx: "laboratory" vs. "clinical" TLS

Rx: "targeted…specific metabolic d/o"

Current Status = Overload !!!
Our Road Map…

- Neutropenic Fever
- Spinal Cord Compression
- Superior Vena Cava Syndrome
- Hypercalcemia
- Tumor Lysis Syndrome
- Take-Home Points

Only 3 Things to Remember…

- Neutropenic Patients:
  Atypical presentations of common disease

- Lower Extremity Neurologic Symptoms:
  Image T + L Spine

- Cancer History + Non-specific Complaints:
  Think Calcium!
Thank You!

Your comments are welcomed!

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