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Oncologic Emergencies

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Oncologic Emergencies
Introduction

• Malignancy is 2nd leading cause of death in U.S.
• Now cancer has 52 % 5 year survival overall
• Rx of complications can be life-saving since causative tumor often is curable
• Rx of complications can, at a minimum, improve quality of life
List of Major Emergency Complications of Malignancy

- Upper airway obstruction
- Malignant pericardial tamponade
- Superior vena cava syndrome
- Acute spinal cord compression
- Hypercalcemia
- Hyperviscosity syndrome
- Hyperleukocytic syndrome
- Acute tumor lysis syndrome
- SIADH
- Adrenal insufficiency / crisis
- Thrombocytopenia / hemorrhage
- Immunosuppression / infection
Upper Airway Obstruction by Malignancy

- Causative tumors:
  - Laryngeal ca
  - Thyroid ca
  - Lymphoma
  - Metastatic lung ca
- Retropharyngeal abscess
Upper Airway Obstruction by Malignancy

- Symptoms
  - Voice change
  - Hoarseness
  - Neck fullness
  - Dysphagia
  - Stridor
  - Dyspnea
- Usually progresses & presents subacutely, unless food aspiration, infection, hemorrhage, or inspissated secretions occur
Upper Airway Obstruction by Malignancy

- Diagnosis
  - Lateral soft tissue neck film
  - CXR
  - Fiberoptic laryngoscopy
Tracheal deviation from a substernal goiter
Upper Airway Obstruction by Malignancy

- Treatment
  - Oxygen
  - Racemic epinephrine aerosol (1.0 to 1.5 cc)
  - Helium / oxygen (Heliox) inhalation
  - ? IV steroids or diuretics
  - Intubation over fiberoptic laryngoscope
  - Consider tracheostomy
  - ? emergency radiation Rx
Malignant Pericardial Tamponade

- Causative tumors:
  - Melanoma
  - Hodgkin's lymphoma
  - Acute leukemia
  - Lung ca
  - Breast ca
  - Ovarian ca
- Radiation pericarditis
- Rare to be initial presentation of malignancy
Malignant Pericardial Tamponade

- **Sx and Signs:**
  - Dyspnea / weakness +/- chest pain
  - Hypotension / narrow pulse pressure
  - Friction rub rare
  - Jugular venous distention
  - Muffled (decreased) heart tones
  - Pulsus paradoxicus > 10 mm Hg
  - Low EKG QRS voltage +/- pulsus alternans
  - +/- cardiomegaly on CXR
Malignant Pericardial Tamponade

- **Dx:**
  - Echocardiography
  - Equalization of heart chamber pressures

- **Rx options:**
  - Needle catheter pericardiocentesis
  - Pericardial window under local anesthesia
  - Radiation Rx
  - Pericardiectomy
  - Intrapericardial chemoRx or sclerosis
M mode echocardiogram showing malignant pericardial effusion
M mode echo showing moderate size pericardial effusion (P)
Two dimensional echo in same patient showing pericardial effusion (P)
Superior Vena Cava (SVC) Syndrome

- Causative tumors:
  - Small cell (oat cell) lung ca
  - Squamous cell lung ca
  - Lymphoma
  - Anaplastic mediastinal ca
- SVC thrombosis from indwelling catheter
- Sx are due to SVC compression or occlusion
### SVC Syndrome

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>FREQUENCY (%)</th>
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</thead>
<tbody>
<tr>
<td>Dyspnea</td>
<td>83</td>
</tr>
<tr>
<td>Cough</td>
<td>70</td>
</tr>
<tr>
<td>Orthopnea</td>
<td>64</td>
</tr>
<tr>
<td>Nasal congestion</td>
<td>35</td>
</tr>
<tr>
<td>Hoarseness</td>
<td>35</td>
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<tr>
<td>Stridor</td>
<td>33</td>
</tr>
<tr>
<td>Dizziness</td>
<td>29</td>
</tr>
<tr>
<td>Stupor / coma</td>
<td>20</td>
</tr>
</tbody>
</table>

Other sx: syncope, headache, dysphagia, epistaxis
## SVC Syndrome

<table>
<thead>
<tr>
<th>SIGN</th>
<th>FREQUENCY (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck vein distention</td>
<td>92</td>
</tr>
<tr>
<td>Facial swelling / fullness</td>
<td>86</td>
</tr>
<tr>
<td>Arm vein distention</td>
<td>68</td>
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<tr>
<td>Mentation changes</td>
<td>27</td>
</tr>
<tr>
<td>Tongue edema</td>
<td>24</td>
</tr>
<tr>
<td>Laryngeal edema</td>
<td>24</td>
</tr>
<tr>
<td>Rhinorrhea</td>
<td>18</td>
</tr>
</tbody>
</table>
SVC Syndrome

• Less common signs:
  • Facial plethora / telangiectasia
  • Supraclavicular palpable mass
  • Horner's syndrome
  • Papilledema
  • If present, represents a true emergency
Patient with SVC Syndrome
Another patient with SVC Syndrome
SVC Syndrome from small cell lung cancer
SVC Syndrome from lung adenocarcinoma
SVC Syndrome

• Diagnosis
  • CXR abnormal in 84%
  • Confirm with (one of):
    • Chest CT with contrast
    • MRI
    • Contrast venography
    • Tc99m radionuclide venography
Anaplastic cancer of the mediastinum causing SVC Syndrome
Mediastinal widening and pulmonary venous obstruction from lung cancer
Chest computed tomography showing right sided mediastinal lung cancer compressing the contrast filled SVC
Another CT cut of the same patient showing tumor compression of the SVC
Figure 2—Right hilar mass producing SVC obstruction (A). Venogram (B) shows extrinsic compression of the SVC.
X-ray studies. In roughly half of patients with superior vena cava syndrome due to solid tumors, an X-ray reveals a mediastinal or pulmonary mass, such as the right hilar mediastinal mass demonstrated.

Radionuclide venography in a patient with superior vena cava syndrome can demonstrate obstruction in the central circulation, but unlike C.T. scanning, it does not identify the cause. In this instance, the venographic findings are consistent with a superior vena cava syndrome.
37 year old male who presented with sudden onset of venous stasis, hoarseness, and hemoptysis
Chest X-ray of same patient who proved to have squamous cell cancer of the lung blocking the left subclavian vein.
SVC Syndrome

- Treatment:
  - Keep in head-up position
  - IV steroids
  - IV diuretics
  - ? anticoagulants or thrombolytics
  - Emergent mediastinal radiation Rx
  - Remove central IV catheter if present
Acute Spinal Cord Compression

- Causative tumors:
  - Breast ca
  - Lung ca
  - Prostate ca
  - Lymphomas
  - Multiple myeloma
  - Renal cell ca
  - Sarcomas
- Epidural abscess / hematoma
- 18,000 cases per year in U.S.
Acute Spinal Cord Compression

- Symptoms:
  - Localized back pain +/- tenderness
  - May be absent with lymphomas
  - Paraparesis / paraplegia
  - Distal sensory deficits
  - Urinary incontinence
Acute Spinal Cord Compression

- Cervical, thoracic, or lumbar spine films: 85% abnormal
  - May not be needed if CT or MRI planned anyway
- Radionuclide bone scan
  - Sensitivity > 90% except for multiple myeloma
- Spine CT with contrast
- MRI
- Myelography
- NOTE: any studies done should be in emergent time frame & with early involvement of consultant
MRI scan showing multiple myeloma destroying the C6 vertebra and surrounding the spinal cord
40 year old male who presented with neck pain; he had a metastatic hypernephroma which destroyed the odontoid
Myelogram showing breast cancer metastasis pressing on the L5 nerve root, and also pushing the thecal sac posteriorly at L4
T1 MRI of same patient showing compression of the L5 nerve root
Acute Spinal Cord Compression

Treatment
- Spine immobilization
- Foley catheter
- ? IV steroids / diuretic / mannitol
- Emergent decompressive laminectomy or radiation Rx
Hypercalcemia of Malignancy

- Causative tumors
  - Metastatic breast, lung, or prostate cancer
  - Multiple myeloma
  - Non-Hodgkin's lymphoma
  - Adult T-cell lymphoma / leukemia
  - Renal cell cancer
  - Head & neck squamous cell cancer
Malignancy Hypercalcemia

- Symptoms
  - Vague malaise / weakness
  - Polydipsia
  - Lethargy / confusion
  - Constipation
  - Vomiting
  - Back pain
  - Can have coma or seizures
Malignancy Hypercalcemia

- **Diagnosis**
  - Total & ionized serum calcium
  - Serum albumin sometimes helpful
  - EKG shows short QT interval
  - May show low voltage, long PR
  - Discrete skeletal lesions not demonstrable in 30% of patients
- Serum levels > 12 mg % dangerous
EKG showing short QT interval (0.28 seconds) in a patient with a serum calcium of 14 mg/dl
Malignancy Hypercalcemia
Treatment

- IV hydration with normal saline
- Diuresis with IV furosemide
  - Only after fluid loading; avoid thiazides
- IV steroids
- Etidronate (7.5 mg/kg/day IV for 3 days)
- Mithramycin (15 to 25 mcg/kg/day IV x 3 days)
- Radiation Rx to tumor site(s)
- Rarely may need hemodialysis
Considerations for Use of Etidronate (Didronel) for Rx of Malignant Hypercalcemia

• Acts mainly to reduce bone resorption
• Mainly excreted renally
• Causes some degree of hyperphosphatemia
• Should be withheld if creatinine > 5 mg %
• Dose (must be diluted in 250 cc NS) :
  • 7.5 mg/kg/day IV for 3 days
  • Dose should be given over 2 hours
• Followup Rx with oral tablets
  • 20 mg/kg/day for 30 days
Use of Mithramycin (Plicamycin) for Rx of Malignancy Hypercalcemia

- Acts as antineoplastic agent
- Method of action on hypercalcemia not known
- Main complication is bleeding
- GI side effects common
- Can cause thrombocytopenia
- Most useful as second agent for cases not responsive to etidronate
Hyperviscosity Syndrome

- Basic cause is elevation of serum proteins producing sludging & reduction in microcirculatory perfusion
- Serum viscosity is normally 1.4 to 1.8 times that of water
- Symptoms develop at viscosity > 5
Hyperviscosity Syndrome

- Causative tumors
  - Multiple myeloma
  - Waldenstrom's macroglobulinemia
  - Chronic myelocytic leukemia
Hyperviscosity Syndrome

Symptoms

- Fatigue / malaise
- Headache
- Anorexia
- Somnolence
- If microthromboses occur:
  - Deafness
  - Visual deficits
  - Seizures
Hyperviscosity Syndrome
Diagnosis

- Anemia
- Rouleaux formation on peripheral blood smear
- Retinal hemorrhages / exudates
- "Sausage-link" appearance of retinal vessels
- Factitious hyponatremia (due to H2O displacement)
- Measurement of serum viscosity & serum protein electrophoresis (SPEP) confirm Dx
Hyperviscosity Syndrome Treatment

- If comatose:
  - Emergent 2 unit phlebotomy & saline infusion
- Rehydration with IV saline
- Emergency plasmapheresis
- If patient has CML & massive leucocytosis: leukopheresis & concurrent chemoRx
Hyperleukocytic Syndrome

• Usually occurs in new onset acute myelocytic leukemia
• Can occur in CML with blast crisis
• WBC > 100 k in AML is dangerous
• WBC > 250 k in CML is dangerous
• Myeloblasts invade & damage vessel walls, esp. in brain & lung
• Serum analyses show pseudohypoxia, pseudohyperkalemia, & pseudohypoglycemia
Hyperleukocytic Syndrome

- **Symptoms**
  - Marked dyspnea
  - Headache, confusion

- **Signs**
  - Hypoxia
  - Diffuse lung infiltrates
  - Neuro deficits
Hyperleukocytic Syndrome

Treatment

- Temporizing with leukopheresis
- Load with allopurinol (600 mg/M2)
- Then give hydroxyurea 3 to 5 gm/M2
- Brain radiation Rx for CNS leukostasis
- Definitive chemoRx once WBC decreased
Acute Tumor Lysis Syndrome

- Usually occurs 6 to 72 hours after initiation of chemoRx or radiation Rx
- Due to rapid release of cell contents into bloodstream
- Most common tumor causes:
  - Leukemias (with high WBC counts)
  - Lymphomas
  - Small cell ca
  - Metastatic adenoca
Acute Tumor Lysis Syndrome

Etiologic Factors

• Large tumor burden
• High growth fraction
• High preRx serum LDH or uric acid
• Preexisting renal insufficiency
Acute Tumor Lysis Syndrome

- Main life-threatening problems:
  - Hyperkalemia
  - Hyperuricemia (causes uric acid nephropathy)
  - Hyperphosphatemia with secondary hypocalcemia
- Can result in acute renal failure & arrhythmias
Acute Tumor Lysis Syndrome Treatment

- Stop the chemoRx
- Aggressive IV hydration / diuresis
- +/- alkalinize urine to pH 7
  - Decreases urate but may worsen hypocalcemic tetany
- CaCl2, NaHCO3, glucose / insulin, kayexalate for hyperkalemia
- Emergency hemodialysis
  - If K > 6, urate > 10, creat. > 10, or unable to tolerate diuresis
- Can use allopurinol for prevention
Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH)

- **Causative tumors:**
  - Small cell lung ca most common (ectopic ADH)
  - Pancreatic ca
  - Bowel ca
  - Thymus ca
  - Prostate ca
  - Lymphosarcoma
  - Any brain tumor
- **Vincristine or cyclophosphamide**
- **Other meds (narcotics, phenothiazines, etc.)**
SIADH
Symptoms

- Altered mental status
  - Lethargy
  - Confusion
- Anorexia, nausea, vomiting
- Peripheral edema
- If severe, coma or seizures
SIADH
Diagnosis

- Normal renal, thyroid, adrenal, & cardiac function
- Absence of diuretic Rx
- Euvolemia or hypervolemia
- Hyponatremia with less than maximally dilute urine
- Excessive urine Na excretion (> 30 meq/liter)
SIADH Treatment

- Serum Na > 125 usually not require Rx
- Fluid restriction only, if mild
- Furosemide with NS bolus (increases free water clearance)
- Hypertonic saline (3 %) only needed for:
  - seizures
  - coma
  - cardiovascular compromise
- Only correct at about 1 meq/liter/hour (if too fast can cause central pontine myelinolysis)
- Seizure control with benzodiazepines
Malignancy - Caused Adrenal Crisis

- Causative tumors:
  - Melanoma
  - Lung ca
  - Breast ca
  - Renal & other retroperitoneal ca's
- Withdrawl of chronic steroid Rx
- Infection of adrenals
- Adrenal hemorrhage
- Aminoglutethamide chemoRx
Malignancy - Caused Adrenal Crisis

• Symptoms
  • weakness, lethargy
  • thirst

• Signs
  • Dehydration
  • Hypotension
  • Hyponatremia, hyperkalemia, hypoglycemia, azotemia, +/- eosinophilia
Malignancy - Caused Adrenal Crisis

- Diagnosis
  - Serum electrolytes, BUN
  - Serum cortisol (draw prior to Rx)
  - Computed tomography of retroperitoneum (+/- MRI)
- Start Rx prior to full workup
Malignancy - Caused Adrenal Crisis

Treatment

• IV fluid bolus (NS)
• IV steroids (at least 300 mg equivalents of hydrocortisone per day initially)
• +/- calcium, NaHCO3, glucose / insulin for hyperkalemia
• IV glucose
• Evaluate for source of infection
• Maintain steroid coverage
Hemorrhagic Syndromes in Malignancy *

- Thrombocytopenia
- Disseminated intravascular coagulation (DIC)
- Decreased clotting factors
- Primary fibrinolysis
- Platelet dysfunction
- Vascular defects
- Circulating anticoagulants

(* in decreasing order of probability)
Mechanisms of Thrombocytopenia in Malignancy

- ChemoRx
- Radiation Rx
- Bone marrow tumor infiltration
- Hypersplenism
- DIC
- Infection - induced
- ITP
Thrombocytopenia in Malignancy

- Avoid all NSAID's
- Spontaneous bleeds can occur if platelets < 10 K
- Platelet transfusion indications:
  - count < 5000
  - Any CNS bleed (even if count > 10 k)
  - Avoid in consumptive states
  - Use HLA matched single donor platelets if sensitized
Malignancy - Related DIC

- Possible with any tumor but usually due to:
  - acute leukemia (esp. promyelocytic)
  - pancreas ca
  - prostate ca
- Can be acute or chronic
  - Acute: ↓ platelets, ↑ PT, PTT, FDP, ↓ fibrinogen
  - Rx with platelets & clotting factors
  - May need tumor debulking
  - Chronic: lab results may be near normal; Rx intravascular thrombosis with heparin
Malignancy - Related Primary Fibrinolysis

- Some tumors cause spontaneous fibrinolytic activity:
  - Sarcomas
  - Breast ca
  - Colon ca
  - Gastric ca
  - Thyroid ca
- Show increased FDP's
- Rx with epsilon aminocaproic acid
Treatment-Related Bleeding Disorders in Malignancy

- Due to specific chemoRx agents:
  - Plicamycin: thrombocytopenia, DIC
  - L-asparaginase: hypofibrinogenemia
  - Mitomycin: microangiopathic hemolytic anemia
  - Actinomycin D: vitamin K antagonist
  - Daunorubicin: primary fibrinolysis
- Initiation of DIC by cytotoxic effects
Malignancy - Related Immunosuppression / Infection

- Causative tumors
  - Almost all
  - Also due to chemoRx or radiation Rx directly
- If fever & neutrophil plus band count is < 500 per mm3, presume serious infection present
  - Most common source is endogenous microbes
  - Rx with antipseudomonal med plus 3rd generation cephalosporin +/- amphotericin
Oncologic Emergencies

Summary

• Have low threshold for workup of vague symptoms in the cancer patient
• Consider direct effects of meds
• Treat complications aggressively if primary tumor still treatable
• Have prearranged referral arrangements for special emergent Rx's