Oncologic Emergencies
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## 2014 OCN Test Blueprint Content Areas

<table>
<thead>
<tr>
<th>Content Area</th>
<th>Percentage of 2013 Test</th>
<th># of Scored Questions*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Promotion, Screening &amp; Early Detection</td>
<td>6%</td>
<td>9</td>
</tr>
<tr>
<td>Scientific Basis for Practice</td>
<td>9%</td>
<td>13</td>
</tr>
<tr>
<td>Treatment Modalities</td>
<td>16%</td>
<td>23</td>
</tr>
<tr>
<td>Symptom Management</td>
<td>22%</td>
<td>32</td>
</tr>
<tr>
<td>Psychosocial Dimensions of Care</td>
<td>8%</td>
<td>12</td>
</tr>
<tr>
<td>Oncologic Emergencies</td>
<td>12%</td>
<td>17</td>
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<tr>
<td>Survivorship</td>
<td>8%</td>
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<tr>
<td>Palliative &amp; End of Life Care</td>
<td>11%</td>
<td>16</td>
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<tr>
<td>Professional Performance</td>
<td>8%</td>
<td>12</td>
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*To determine the number of scored items from each subject area, multiply the percentage by 145.

Objectives

- Identify patients at risk for oncologic emergencies
- Review pathophysiology of event
- Recognize associated signs and symptoms
- Assessment
- Interpret diagnostic evaluation and appropriate interventions
- Review management across the continuum of care
- Patient and family education
Oncologic Emergencies

<table>
<thead>
<tr>
<th>Metabolic Emergencies</th>
<th>Structural Emergencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Disseminated Intravascular Coagulation (DIC)</td>
<td>• Bleeding and Thrombosis</td>
</tr>
<tr>
<td>• Hypercalcemia</td>
<td>• Cardiac Tamponade</td>
</tr>
<tr>
<td>• Hypersensitivity (HSR)</td>
<td>• Increased Intracranial Pressure</td>
</tr>
<tr>
<td>• Sepsis and Septic Shock</td>
<td>• Malignant Pleural Effusion</td>
</tr>
<tr>
<td>• Syndrome of Inappropriate Secretion of Antidiuretic</td>
<td>• Spinal Cord Compression</td>
</tr>
<tr>
<td>Hormone (SIADH)</td>
<td>• Superior Vena Cava Syndrome</td>
</tr>
<tr>
<td>• Tumor Lysis Syndrome (TLS)</td>
<td></td>
</tr>
</tbody>
</table>
Definition

• Life Threatening medical emergencies caused by cancer or the treatment of the cancer
• Usually occurs initially when disease first manifest or late the disease trajectory
Disseminated Intravascular Coagulation
Disseminated Intravascular Coagulation (DIC)

- Precipitated by underlying pathologic condition
- Coagulation disorder
  - Widespread intravascular thrombosis
    - Organ damage and failure
  - Simultaneous consumption of platelets/coagulation factors
    - Hemorrhage
Incidence/Risk

- Severe sepsis
- Trauma
- Obstetric conditions
- Acute Promyelocytic Leukemia (APL)
- Mucin-secreting adenocarcinomas
  - Prostate
  - Lung
  - Breast
Pathophysiology

- In DIC the balance between clot formation (thrombosis) and clot dissolution (fibrinolysis) is disrupted
- Procoagulation activation
- Fibrinolytic activation
- Inhibitor consumption
- Cytokine release
- Cellular activation
- Biochemical evidence of end organ damage
Clinical Manifestations

- Clinical S/S of bleeding and thrombosis
  - Silent and undetected
  - Acute and severe
- Signs are dependent of etiology

- Petechiae
- Purpura
- Hematomas
- Cyanosis
- Wound bleeding
- Blood oozing (severe case)
Evaluation/Diagnostic Tests

- No one test
- Clinical evidence of known condition associated with DIC
  - Low/rapidly decreasing platelets
  - Prolonged coagulation
  - Low coagulation factors/inhibitors in plasma
  - Increased fibrin formation/degradation markers
    - D-dimer
Treatment Modalities

• Treat underlying disorder
• Supportive therapies
  ▫ Blood component replacement therapy
  ▫ Restore anticoagulation and inhibit fibrinolysis
• Therapy will be based on clinical and lab findings
Nursing Management

- Careful physical assessment
  - Subtle signs of bleeding or thrombosis
- Close monitoring
  - Vital signs
  - Oxygenation
  - Fluid status
  - Lab results
- Blood products

- Patient education
  - Prevention
  - Recognition
  - Report bleeding and thrombosis
- Early recognition and treatment initiation may improve patient outcomes
Patient and Family Education

- Monitor for and report signs of bleeding
- Prevent or minimize risk of bleeding
  - Avoid
    - Sharp objects/razors
    - Operating heavy equipment
    - Contact sports
    - Strenuous activities
- Minimize effects of thrombosis and increase circulation
  - Avoid
    - Tight/restrictive clothing
    - Crossing legs
  - Compression stockings
  - Elevate legs
  - Wiggle toes/rotate ankles
Review

- Sepsis is a common cause of disseminated intravascular coagulation (DIC). Which of the following most accurately describes how sepsis causes DIC?
  
a. Sepsis causes viruses to thrive, and viruses cause DIC  
b. Endotoxins released from bacteria activate the coagulation cascade  
c. Sepsis and bleeding occur simultaneously in patients who are immunosuppressed  
d. Antiangiogenesis factors are released during periods of sepsis, which leads to DIC
Hypercalcemia of Malignancy
Hypercalcemia of Malignancy

- Para-neoplastic syndrome
  - Elevated serum calcium
- Complex metabolic disorder
- Develops as consequence
  - Pathologic destruction of bone
  - Mediated by factors released by malignant cells
Incidence/Risk

- Reported in 10 – 30% of patients with cancer
- May be the presenting element of cancer
- Most common malignancies
  - Breast
  - Lung
  - Multiple Myeloma
Pathophysiology

- Excessive increase in osteoclastic activity
- Elevated renal absorption of calcium
- Parathyroid hormone related protein
  - Released by solid tumor
  - Secreted by cancer cells
    - Humoral
    - 80% of total incidence
Other Mediators of Bone Destruction

- Bone destruction through both direct and indirect actions
  - Parathyroid hormone
  - Cytokines
  - Growth factors
Clinical Manifestations

- Multiple and non-specific
- Lethargy
- Confusion
- Anorexia
- Nausea
- Constipation
- Polyuria
- Polydipsia
# Evaluation/Diagnostic tests

<table>
<thead>
<tr>
<th>Lab draws</th>
<th>Other Diagnostics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>EKG changes</td>
</tr>
<tr>
<td>Albumin</td>
<td>Appropriate radiographic imaging tests</td>
</tr>
<tr>
<td>Ionized calcium</td>
<td></td>
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<tr>
<td>BUN</td>
<td></td>
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<tr>
<td>Serum creatinine</td>
<td></td>
</tr>
<tr>
<td>Phosphorus</td>
<td></td>
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<tr>
<td>Magnesium</td>
<td></td>
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<tr>
<td>Potassium</td>
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</tr>
</tbody>
</table>
Interpretation of Serum Calcium

Normal Serum Calcium
- Calcium serum
  - 8.5-10.5 mg/dL
- Calcium ionized serum
  - 4.5 – 5.6 mg/dL

Hypercalcemia
- Mild
  - Serum calcium 10.5 – 12 mg/dL
- Moderate
  - Serum calcium 12 – 14 mg/dL
- Critical
  - Serum calcium 14 mg/dL or greater
Treatment Modalities

• Controlling the malignancy is the most effective treatment
  ▫ Hydration
  ▫ Calcitonin
  ▫ Bisphosphonates
Nursing Management

• Assess for
  ▫ Mental status changes
  ▫ Renal
  ▫ GI
  ▫ Cardiac dysfunction

• Manage fluid and electrolyte imbalances
• Safety and comfort measures
• Evaluate treatment effectiveness and side effects
• Prevention education and emotional support
Patient and Family Education

- Prevent, recognize, and manage S/S
- Adequate hydration
- Safe weight-bearing activities
- Conditions that contribute to fluid loss and exacerbate dehydration
- Nonspecific symptoms
  - Anorexia
  - Nausea
  - Constipation
  - Lethargy
- Manage pain
- Fall prevention
- Close observation of confused or restless patients
- Careful movement and transfers of bedbound patients
- Prescribed medications only
- Surveillance and protective actions
Review

Which of these statements is not true in regards to hypercalcemia in malignancy?

a. It is a rare complication
b. Early manifestation of the syndrome are insidious, including fatigue, muscle weakness, and depression, and easily overlooked as manifestations of the disease
c. Biphosphonates are frequently used in the treatment of malignancy induced hypercalcemia because of their ability to interfere with osteoclastic activity
d. A complication of malignancy induced hypercalcemia includes sudden decreased GFR and acute kidney failure, neuropsychiatric disturbances
Hypersensitivity Reactions
Hypersensitivity Reactions (HSR)

- Localized and mild
- Generalized and moderate to severe
- Life-threatening

- Anaphylactic reactions
  - Mediated by release of Ig-E from immune system

- Anaphylactoid reactions
  - Not mediated by Ig-E
  - Release of cytokines
Incidence/Risk

- Triggered by
  - Therapeutic agent
  - Diluent
  - Solution
- General incidence is 5%
  - Some agents much higher
- Cancer therapies have potential to cause HSRs

- Chemotherapy and biotherapy
  - High doses of high risk agents
  - IV administration of high risk agents
  - Agents derived from bacteria and L-asparaginase
- Crude preparations of agents
  - Phase 1 studies
- Preexisting allergies
- Previous exposure to agent
- Failure to administer pre-medications
# Pathophysiology

## Anaphylactic Reactions
- An antigen is recognized as foreign
- The body forms antibodies as part of an adaptive immune response
- The most common antibody or immunoglobulin formed during an allergic reaction is Ig-E
- Ig-E promotes histamine release from mast cells and basophils

## Anaphylactoid Reactions
- Immune response to a foreign antigen causes T lymphocytes to stimulate cytokines release
- Cytokines: proteins that coordinate immune/inflammatory responses
  - Interleukines
  - Interferons
  - Tumor necrosis factors
- Fever, chills, headache, nausea, fatigue, and hypertension
Preadministration Guidelines

• Baseline vital signs
• Review allergy history
• Administer pre-medications
  ▫ Antipyretic
  ▫ Histamine blocker (H1 and H2)
  ▫ Corticosteroid
• Ensure emergency medications available prior to treatment
• Reportable S/S patient education
• Perform intradermal skin test if recommended
Clinical Manifestations

- Chest tightness
- Bronchospasm/wheezing
- Hypotension
- Tachycardia
- Pain
- Urticaria/rash
- Itching
- Angioedema
- Abdominal cramping, diarrhea, nausea, or vomiting
- Feeling of impending doom

- Anaphylactic/anaphylactoid differ in origin
  - Clinical symptoms same
- More likely to occur with 2\textsuperscript{nd} dose
  - Can occur with the 1\textsuperscript{st}
- 5-10 minutes of initiation
- Quicker onset=greater severity
- Delayed reactions occur 10-12 hours after
- Symptoms range from itching at injection site to systemic shock
Evaluation/Diagnostic Tests

• Based on signs and symptoms
Treatment Modalities

- Dependent upon severity/cause
  - Acetaminophen
  - Antihistamines
  - Corticosteroids
  - Epinephrine
# Nursing Management

## Infusion Reaction
- Stop infusion
- Perform accurate assessment
- Vital signs
- Remain with patient
- Administer rescue medication
- Symptom management
- Call MD for re-challenge order
- Symptoms may re-occur

## Cytokine Release
- Monoclonal antibodies most likely
- Stop infusion
- Administer histamine blocker
- Wait period
- Restart at slower rate with MD order
Patient and Family Education

- Prior to administration
  - Possibility of reaction
  - Reportable symptoms
- After therapy
  - Risk of delayed reaction
  - Reportable symptoms
  - Who to call
Review

• What are the three most important nursing interventions when you first recognize an infusion reaction?
Sepsis and Septic Shock
Sepsis and Septic Shock

• Result of overwhelming infection which body fails to provide adequate immune response
  ▫ Bacterial
  ▫ Viral
  ▫ Fungal
Incidence/Risk

- Hematologic malignancies 66.4/1,000
- Solid tumors 7.6/1,000
  - One in four hospitalized patients die from sepsis each year
  - Risk higher in patients with malignancies compared to other causes
  - Severe sepsis more frequent occurrence in patients with hematologic malignancies

- Cytopenia
- Malignancy with related immunosuppression
- Age < 1 year / > 65 years
- Loss of skin/mucosal integrity
- Long ICU stay
- Indwelling devices
- Diabetes
- Renal, hepatic, cardiovascular, pulmonary disease
Pathophysiology

- Systemic response
  - Infection
  - Endotoxins
  - Exotoxins
- Toxins activate
  - Coagulation cascade
  - Complementary systems
- Complement systems release vasoactive mediators
### Clinical Manifestations

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Hemodynamic Instability</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Oral temp &gt; 100.4 °F</td>
<td>• Fever/chills</td>
</tr>
<tr>
<td>▫ Note patients can be hypothermic</td>
<td>• Tachycardia/Tachypnea</td>
</tr>
<tr>
<td>• HR &gt; 90</td>
<td>• Mental status change</td>
</tr>
<tr>
<td>• RR &gt; 20/min</td>
<td>• Persistent hypotension despite vigorous fluid resuscitation</td>
</tr>
<tr>
<td>• WBCs &gt; 12,000 or &lt; 4,000 with &gt; 10% bands</td>
<td></td>
</tr>
</tbody>
</table>
## Evaluation/Diagnostic Tests

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital Signs</td>
<td>Pan culture</td>
</tr>
<tr>
<td>CNS assessment</td>
<td>Blood</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Urine</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>Stool</td>
</tr>
<tr>
<td>GI</td>
<td>Sputum</td>
</tr>
<tr>
<td>Renal</td>
<td>Radiology tests as indicated</td>
</tr>
<tr>
<td>Hepatic</td>
<td></td>
</tr>
<tr>
<td>Skin</td>
<td></td>
</tr>
</tbody>
</table>
Treatment Modalities

- Prompt IV antibiotics within one hour of recognition
- Early/adequate
- Fluid resuscitation
  - Large volumes (6-20 L) rapid IV infusion
- Central IV access
- Restore circulation
  - Delay increases mortality/morbidity
- Tight Glycemic control
- ICU transfer
Nursing Management

• Fever
  ▫ Identify quickly
  ▫ Assess most common sites, often asymptomatic
  ▫ Cultures to verify source of infection

• Immunosuppression
  ▫ High index of suspicion
  ▫ Meticulous nursing care
  ▫ Minimize progression from infection to sepsis or septic shock
Possible Complications

- Multiple Organ Dysfunction
- DIC
- Acute Lung Injury/ARDS
- Renal Failure
- Death
Patient and Family Education

- Prevent infection
- Turn, cough, deep breathe
- Ambulate
- Adequate nutrition
  - High calorie/high protein
  - Enteral/parenteral

- Potential ICU transfer
- Consultation
  - Infectious disease
  - Cardiologist
  - Pulmonologist
  - Intensivist
Review/Case Study

**Situation**
- Mr. Winston is a 76 yo male admitted with stage IIIB Non-Small Cell Lung Cancer
- Emaciated, with 20 pound weight loss over last 3 months
- Long term history of ETOH abuse and COPD
- Recently quit smoking after a 60 pack year history
- On Paciltaxel/Carboplatin
- Comes into Infusion Center for routine f/u on day 10

**Assessment**
- States not feeling well
- Cannot get warm since morning
- Confused
- Not usual perky self
- Skin is pale and clammy
- Vital Signs
  - T 38.2
  - HR 125
  - RR 24
  - BP 88/49
- Labs show
  - WBC 1.2
  - ANC 0.34
## Case Study

### Treatment

- Admission to medical/surgical unit
  - Blood Cultures
  - IV Hydration
  - Frequent VS
  - IV antibiotics

### Evaluation

- Mr. Winston becomes more hypotensive and less responsive
- RRT is called
- ICU transfer
Case Study

• ICU treatment includes
  ▫ Central Line placement
  ▫ Rapid IV fluid resuscitation
  ▫ Foley
  ▫ Labs and ABGs
Syndrome of Inappropriate Anti-Diuretic Hormone

headache
impaired vision
sweating
dizziness
fast heartbeat
hunger
shaking
irritability
anxiety
weakness/fatigue
Syndrome of Inappropriate Anti-Diuretic Hormone (SIADH)

- Malignant tumor secretes antidiuretic hormone
  - Does not respond to normal homeostatic regulating mechanisms
- Kidneys retain water
  - Results in dilutional serum hyponatremia
  - Concentrated urine
Incidence/Risk

- 1 – 2 % of cancer patients
- Small cell lung cancer
- Related to variety of malignant and nonmalignant conditions
  - Medications
    - Antidepressants
    - Antibiotics
  - Infections
  - Head trauma
Normal Physiology of Water Regulation

- 45%-65% of body weight is water
- Intracellular
  - 40% of body weight
- Extracellular
  - 20% of body weight
- Regulation by
  - ADH
  - Thirst
  - Renal activity
Pathophysiology

- Inappropriate secretion of ADH
  - Normal source
    - Hypothalamus
  - Consequence of dysregulation
  - From cancer cells
- Hyponatremia
  - Secondary to SIADH
    - Paraneoplastic syndrome
    - Complication of therapy
- Water excess rather than sodium loss
- Ectopic secretion of ADH from tumor
- Elevated circulating ADH
- Reabsorption of water
- Concentrated urine
- Plasma volume expands
- Dilutional serum hyponatremia
- Water moves inside cells
- Cerebral edema
Clinical Manifestations

**Early**
- Asymptomatic or nonspecific confused with treatment side effects
  - Mild hyponatremia
  - Fatigue/weakness
  - N/V, anorexia, thirst, diarrhea
  - Headaches, lethargy, confusion, irritability
  - Decreased urine output
  - Myalgias/muscle cramping

**Late**
- Central nervous system
  - Weakness
  - Mental changes
  - Neurologic alterations
    - Seizure
    - Coma
    - Death
Evaluation/Diagnostic tests

- Serum electrolytes
- Serum osmolality
- Urine osmolality
Treatment Modalities

- Treatment of underlying cause
- Fluid restriction
- Hypertonic saline IV
- Medication
  - Demeclocycline
  - Vaptans
Nursing Management

- IV infusions
- Fluid restriction
- Medications
- High-sodium diet
- Safety
  - Prevent injuries r/t neurologic alterations
  - Seizure precautions
- Emotional and supportive care
Patient and Family Education

- Symptom recognition
- Treatment plans
- Prompt reporting
- Fluid restrictions
- Monitor I/O
- Daily weights
- High sodium foods
- Medications
Review

• Identify three early signs and symptoms of SIADH
Tumor Lysis Syndrome
Tumor Lysis Syndrome (TLS)

- Destruction (lysis) large numbers of tumor cells following cytotoxic therapies
- Releases potassium, phosphorus, and uric acid into systemic circulation
Incidence/Risk

- High tumor burden
- Rapidly proliferating cells
  - Leukemia
  - Non-Hodgkin lymphoma (aggressive)
- Early in treatment
  - High WBC
  - High tumor burden
Pathophysiology

- Rapid breakdown of cells in response to anticancer treatment
- Intracellular contents released into circulation
- Body unable to maintain normal homeostasis because of excess cellular by-products
- Metabolic imbalances and multisystem organ dysfunction may result
Clinical Manifestations

• Asymptomatic initially
• Blood chemistries
  ▫ Hyperphosphatemia
  ▫ Hypocalemia
  ▫ Hyperuricemia
  ▫ Hyperkalemia
• Nonspecific manifestations
Metabolic Imbalances

Hyperphosphatemia: Increased phosphorus

- Release of intracellular phosphorus > kidneys clear
- Malignant cells contain phosphorus > normal cells
- Assess for
  - Nausea, vomiting, diarrhea
  - Lethargy
  - Seizures

Hypocalcemia: Decreased Calcium

- Increased phosphorus in bloodstream
  - Binds with calcium
  - Serum calcium levels drop rapidly
- Calcium-phosphate precipitates in renal tubules/soft tissues
- Assess for
  - Agitation
  - Severe muscle cramping
  - Twitching, tetany
  - Cardiac arrhythmias
Metabolic Imbalances

**Hyperuricemia: Increased Uric Acid**
- Nucleic acids released into bloodstream
  - Converted into uric acid
- Crystal precipitates in distal renal tubules
  - Decreased renal function
- Acute renal failure
- Assess for
  - Nausea, vomiting, diarrhea, anorexia
  - Hematuria, flank pain, cloudy urine, sediment in urine
  - Fluid overload, oliguria

**Hyperkalemia: Increased Potassium**
- Intracellular potassium > kidneys can clear
- Life-threatening arrhythmias
- Assess for
  - Nausea, vomiting, diarrhea, anorexia
  - Muscle weakness, cramps, parasthesias
  - Arrhythmias, EKG changes
Evaluation/Diagnostic Tests

- CBC
- CMP
- BUN
- Creatinine

- Calcium
  - Total/ionized
- Phosphorous
- Uric acid
- LDH
- UA
Treatment Modalities

• Frequent labs
• Hydration
  ▫ Fluid overload
    • Accurate I/O
    • Weights
    • Breath sounds/rales
• Diuresis

• Medication prophylaxis
  ▫ Allopurinol/ rasburicase
• Urine alkalinization
  ▫ Sodium bicarbonate
    ▫ Urine pH
• Specific metabolic disturbances
Nursing Management

• Hyperkalemia
  ▫ Polystyrene sulfonate
  ▫ IV calcium
  ▫ Dextrose/insulin
  ▫ Dietary restrictions

• Hyperphosphototemia
  ▫ Phosphate-binding agents
  ▫ Oral aluminum-containing antacids

• Hypocalcemia
  ▫ No treatment unless symptomatic

• Dialysis for acute renal failure
Patient and Family Education

- Fluid intake
- Measuring and recording intake and output
- Medications
- S/S to report
Review

- Tumor Lysis Syndrome (TLS) is a complication of cancer therapy. TLS occurs most commonly in tumors that are:
  a. Large and rapidly dividing
  b. Slow growing and radiosensitive
  c. Small and rapidly dividing
  d. Slow growing and chemo sensitive
Bleeding and Thrombosis
**Bleeding and Thrombosis**

<table>
<thead>
<tr>
<th>Bleeding</th>
<th>Venous Thromboembolism (VTE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduction in platelets</td>
<td>• Deep vein thrombosis (DVT)</td>
</tr>
<tr>
<td>• Alteration in clotting factors</td>
<td>• Pulmonary embolism (PE)</td>
</tr>
<tr>
<td>• Paraneoplastic syndrome</td>
<td></td>
</tr>
<tr>
<td>• Infection</td>
<td></td>
</tr>
<tr>
<td>• Hepatic problems</td>
<td></td>
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<tr>
<td>• Or a combination of all these factors</td>
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</tbody>
</table>

- Deep vein thrombosis (DVT)
- Pulmonary embolism (PE)
Incidence

- Bleeding can occur with any type cancer
  - Advanced cancer
  - Hematologic malignancies
- Annual incidents of VTE 5X greater in cancer patients
## Risk

<table>
<thead>
<tr>
<th>Bleeding</th>
<th>VTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Antineoplastic therapies</td>
<td>• Cancer</td>
</tr>
<tr>
<td>• Radiation therapy</td>
<td>• Patient related</td>
</tr>
<tr>
<td>• Steroids</td>
<td>▫ Advanced age</td>
</tr>
<tr>
<td>• Tumor growth</td>
<td>▫ Female</td>
</tr>
<tr>
<td>• Infection</td>
<td>▫ Obesity</td>
</tr>
<tr>
<td>• DIC</td>
<td>• Disease related</td>
</tr>
<tr>
<td>• Liver disease</td>
<td>▫ Leukemia/NHL</td>
</tr>
<tr>
<td>• Medication-induced platelet</td>
<td>▫ Recent surgery</td>
</tr>
<tr>
<td>dysfunction</td>
<td>• Treatment related</td>
</tr>
<tr>
<td></td>
<td>▫ Antiangiogenesis agents</td>
</tr>
<tr>
<td></td>
<td>▫ RBC transfusion</td>
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</tbody>
</table>
Pathophysiology

**Bleeding**
- Hemostasis
  - Coagulation/fibrinolysis
- Alteration in platelet count/function
- Activation of coagulation cascade
- Disruption in vascular integrity
- Effects of antineoplastics
- Thrombocytopenia
- Clotting factor deficiencies

**VTE**
- Virchow Triad
  - Blood flow
  - Vessel integrity
  - Blood components
Clinical Manifestations

**Signs of Bleeding**
- Petechiae
- Ecchymoses
- Bruising
- Epistaxis
- Hemoptysis
- Hematemesis
- Melena
- Hematuria
- Vaginal bleeding

**Signs of VTE**
- DVT
  - Unilateral swelling of limb
  - Edema
  - Warmth
  - Localized pain
  - Vein dilation
  - Limb color changes
- PE
  - Dyspnea
  - Pleuritic pain
  - Tachypnea
  - Apprehension
  - Tachycardia
Evaluation/Diagnostic Tests

- **Bleeding**
  - CBC
    - Hemoglobin
    - Platelets
  - Coagulation tests

- **DVT**
  - D-dimer
  - Venous duplex US
  - CT scan

- **PE**
  - CT pulmonary angiogram
  - Ventilation/perfusion

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<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Points</th>
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<tbody>
<tr>
<td>Clinical symptoms of DVT</td>
<td>3</td>
</tr>
<tr>
<td>Other diagnosis less likely than PE</td>
<td>3</td>
</tr>
<tr>
<td>Heart rate greater than 100 beats per minute</td>
<td>1.5</td>
</tr>
<tr>
<td>Immobilization or surgery within past 4 weeks</td>
<td>1.5</td>
</tr>
<tr>
<td>Previous DVT or PE</td>
<td>1.5</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>1</td>
</tr>
<tr>
<td>Malignancy</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total points</strong></td>
<td></td>
</tr>
</tbody>
</table>
# Treatment Modalities

## Bleeding
- Transfusions
- Vitamin K therapy
- Vasopressive hormones
- Mechanical measures

## VTE
- Low-molecular-weight heparin (LMWH)
- Unfractionated heparin (UFH)
- Factor Xa inhibitors
- Mechanical prophylaxis for at-risk nonambulatory hospitalized patients

Therapy with LMWH or vitamin K antagonists may continue indefinitely for patients with active cancer.
# Nursing Management

<table>
<thead>
<tr>
<th>Bleeding</th>
<th>VTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recognition of early S/S</td>
<td>• Recognition of early S/S</td>
</tr>
<tr>
<td>• Bleeding precautions for at</td>
<td>• Nursing measures for prevention in at risk and hospitalized patients</td>
</tr>
<tr>
<td>risk patients</td>
<td>• Most preventable cause of death in hospitalized patients</td>
</tr>
</tbody>
</table>
## Patient and Family Education

### Bleeding Precautions
- Environmental check
- Lotion
- Paper tape
- Nonpetroleum lip protectant
- Soft toothbrush
- Avoid hot/spicy foods
- Avoid alcohol
- Avoid vigorous nose blowing
- Moisturize nose

### DVT at risk patients
- Ambulation early and often
- Incentive spirometer
- Compression devices
- Avoid coagulation interfering meds
- Hydration
- Stretch every hour when confined
- Assess extremities for pain, erythema, size discrepancy daily
Review/Case Study

- 71 year old male
  - Hormonal therapy for prostate cancer
- Presents to ED
  - Acute-onset chest discomfort
  - Dyspnea
  - Lower extremity edema
- Labs
  - Normal cardiac biomarkers
- ECG
  - Sinus tachycardia
- CXR
  - Normal
- Chest CT with contrast
  - Multiple PEs
- Lower extremity venous ultrasonography
  - Left femoral vein thrombus
- Should a D-dimer blood test have been ordered before the chest CT?
Cardiac Tamponade

- Normal heart
- Pericardial effusion

Pericardium
Buildup of fluid

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Cardiac Tamponade

- Pericardial pressure > 30 mm Hg
  - Fluid accumulation (effusion) in the pericardial sac
- Pressure on chambers inhibits inflow of blood to ventricles
  - Reduces cardiac output
- 50–80 mL of accumulation
- Untreated
  - Cardiovascular collapse
  - Shock
  - Death
# Incidence/Risk

<table>
<thead>
<tr>
<th>Disease</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary malignancy</td>
<td>• History of radiation to the chest</td>
</tr>
<tr>
<td>▫ Malignant mesothelioma</td>
<td>• Chemotherapy</td>
</tr>
<tr>
<td>▫ Histiocytoma</td>
<td>▫ Doxorubicin</td>
</tr>
<tr>
<td>▫ Rhabdomyosarcoma</td>
<td>▫ Daunorubicin</td>
</tr>
<tr>
<td>▫ Angiosarcoma</td>
<td>▫ Cyclophosphamid</td>
</tr>
<tr>
<td>Pericardial effusions</td>
<td>• Biotherapy</td>
</tr>
<tr>
<td>▫ Present in 5%–50% of all malignancies</td>
<td>▫ Interferon</td>
</tr>
<tr>
<td>▫ Thoracic cancers</td>
<td>▫ Interleukin</td>
</tr>
<tr>
<td>• Lung</td>
<td>▫ Colony-stimulating factors</td>
</tr>
<tr>
<td>• Breast</td>
<td></td>
</tr>
<tr>
<td>• Lymphoma</td>
<td></td>
</tr>
</tbody>
</table>
Pathophysiology

Normal
- Pericardium is a sac-like membrane surrounding heart and great vessels
- Stabilizes heart muscle
- Maintains
  - Equality of end-diastolic pressures in ventricles
  - Uniform stretch of cardiac muscle fibers
  - Normal cardiac shape

Pathological
- Obstruction of venous and lymphatic drainage of heart
- Cancer cells stimulate pericardium to produce fluid
- Invasive tumors bleed into pericardial space
- Slow volume increase
  - Asymptomatic until critical point
- Rapid volume increase
  - Hemodynamic collapse
<table>
<thead>
<tr>
<th>Early</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Asymptomatic</td>
<td>• Dull chest pain/heaviness</td>
</tr>
<tr>
<td>• Mimics heart failure</td>
<td>• Increasing dyspnea/“air hunger”</td>
</tr>
<tr>
<td>▫ Jugular venous distention (JVD)</td>
<td>• Tripod positioning</td>
</tr>
<tr>
<td>▫ Peripheral edema</td>
<td>• Nonproductive cough</td>
</tr>
<tr>
<td>▫ Hepatomegaly</td>
<td>• Anxiety, agitation, mental status change</td>
</tr>
<tr>
<td>▫ Abdominal distention</td>
<td>• Cold sweats</td>
</tr>
<tr>
<td>▫ Increased diastolic pressure</td>
<td>• Confusion</td>
</tr>
<tr>
<td>▫ Tachycardia</td>
<td>• Hiccoughs, dysphagia, hoarse voice</td>
</tr>
<tr>
<td>▫ Fatigue, dyspnea, orthopnea</td>
<td></td>
</tr>
</tbody>
</table>
## Evaluation/Diagnostic Tests

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Diagnostic</th>
</tr>
</thead>
<tbody>
<tr>
<td>• JVD (non-pulsating)</td>
<td>• Chest x-ray</td>
</tr>
<tr>
<td>• Weak pulses and tachycardia</td>
<td>• EKG changes</td>
</tr>
<tr>
<td>• Muffled heart sounds/friction rub</td>
<td>• CT/MRI</td>
</tr>
<tr>
<td>• Downward/left shift of PMI</td>
<td>• Transesophageal echocardiogram</td>
</tr>
<tr>
<td>• Hypotension/narrow pulse pressure</td>
<td>• Pericardiocentesis</td>
</tr>
<tr>
<td>• Oliguria</td>
<td></td>
</tr>
<tr>
<td>• Pulsus paradoxus (late sign)</td>
<td></td>
</tr>
</tbody>
</table>
Treatment Modalities

**Pericardiocentesis**
- Immediate removal of fluid
- Complications (10%–25%)
  - Puncture of cardiac muscle/artery
  - Air emboli
  - Dysrhythmia
  - Infection/abscess
  - Vagal response
  - Bradycardia

**Further Treatment**
- Control reaccumulation of fluid
  - Permanent pericardium catheter drain
  - Pericardiocentesis with sclerosis
  - Pericardial window
  - Pericardiectomy
Additional Therapies

- Radiation therapy
- Chemotherapy
- Glucocorticoids
- IV fluids
- Diuretics
Nursing Management

- Early identification of risk and manifestation
- Assist with positioning and activities
- Oxygen
- Manage pain
- Manage anxiety
- Ongoing regular assessments
- Prepare for procedures
Patient and Family Education

- S/S of recurrence/prompt reporting
- Office visits to monitor status
- Adequate hydration/nutrition
- Scheduled rest
- Decrease anxiety
- Catheter care/maintenance, home health referral
- Prognosis based referrals
Review

- Which of the following is a clinical sign of neoplastic cardiac tamponade?
  a. Bradycardia
  b. Vasodilation
  c. Increased central venous pressure
  d. Hypertension
Increased Intracranial Pressure
Increased Intracranial Pressure

• The cranium encloses brain tissue, blood, and cerebrospinal fluid in a fine balance
• Alteration of these elements or additional components causes compression within the brain and pressure-induced dysfunction of normal brain function
Incidence

**Common Causes**
- Primary brain tumor
- Metastatic brain tumor
  - Lung
  - Breast
  - Renal
  - Melanoma

**Other Etiologies**
- Poor cerebrospinal fluid circulation
- Infectious invasion
  - Brain
  - Meninges
- Intracranial bleeding
Risk

- Primary brain tumors
- Metastatic brain lesions
- Meningeal cancers
- Intracranial bleeding
- Infections
- Obstruction of flow of cerebrospinal fluid
- Ommaya reservoir complications
Normal Brain Physiology

- **Intracranial volume**
  - Brain tissue (80%)
  - CSF (10%)

- Autoregulatory mechanisms maintain the cerebral blood flow over varied blood pressure parameters by altering the diameters of the cerebral blood vessels
Pathophysiology

- Skull fixed volume
- Tumor mass or increase in CSF volume
  - Decrease in another intracranial compartment
    - Vasogenic edema
    - Cytotoxic edema
- Herniation of the brain
  - Central herniation
  - Uncal herniation
Clinical Manifestations

- Altered mental status
- Nausea
- Headache
- Hypertension
- Bradycardia

- Focal neurologic deficits
  - Reflect the specific area of brain compression
    - Sensory changes
    - Motor deficits
    - Plegias
Evaluation/Diagnostic Tests

- Head CT
- Brain MRI
- Lumbar puncture for suspected meningitis
  - After CT rules out hemorrhage
Treatment Modalities

• Reducing fluid in the brain
  ▫ Osmotic diuretic
  ▫ Corticosteroids
• Hyperventilation
  ▫ Cerebral vasoconstriction
• Surgery
  ▫ Debulk tumor
• Radiation
• Direct intrathecal injection of medications
Nursing Management

- Neuro checks
- Minimize ICP
  - Head of bed elevation
  - Airway protection
  - Support neurologic deficits
- Corticosteroids decrease cerebral edema
- Dexamethasone 1st choice
  - Nausea
  - Vomiting
  - Photophobia
- Prednisolone for prolonged therapy
- Positioning and range of motion
- Seizure prophylaxis
- Glucose and IV fluids
Patient and Family Education

- Neurologic deficits/cognitive function
- Vary according to disease trajectory point
- Medication
- Mobility
- Communication
Review

• You are caring for a patient who was diagnosed with metastatic lung cancer. The patient now has brain metastasis that was discovered after having an MRI earlier in the day. While completing your assessment, the patient begins complaining of a severe headache and nausea. The family states that he has had trouble remembering things and has exhibited some personality changes over the past two days. You notify the physician of the changes in the patient’s condition. Which of the following interventions do you expect to see ordered by the physician?

  a. Lumbar puncture
  b. Stat dose of IV dexamethasone
  c. CT scan of the chest and abdomen
  d. P.O. anticonvulsant q 6 hours
Malignant Pleural Effusions
Malignant Pleural Effusion

- Abnormal collection of fluid in pleural space
- Can lead to
  - Respiratory distress
  - Respiratory arrest
  - Cardiac arrest
Incidence/Risk

- Estimated to occur in 50% of cancer patients
- Most common
  - Lung
  - Breast
  - Non-Hodgkin’s Lymphoma
  - Hodgkin’s Lymphoma

- Associated malignancy
- Treatment of primary tumor
- Radiation
  - Mediastinum
  - Chest
- Chemotherapy agents
Pathophysiology

- **Pleura**
  - Maintains homeostasis
  - Responds to injury or inflammation

- **Pleural space**
  - 5-15 ml of fluid normal
  - Lubricant

- **Equilibrium of fluid movement**
  - Capillary permeability
  - Hydrostatic pressure
  - Colloidal osmotic pressure
  - Negative intrapleural pressure
  - Lymphatic drainage

- **Pleural Effusion**
  - Increased hydrostatic or decreased oncotic pressures
  - Abnormal capillary permeability
  - Decreased lymphatic clearance
Clinical Manifestations

- Dyspnea
- Cough
- Pleritic-type chest pain
- Orthopnea
- Paroxysmal nocturnal dyspnea
- Anxiety
- Fear of suffocation
Evaluation/Diagnostic Tests

- Chest x-ray
- CT scan
- Ultrasound for guided thoracentesis
Treatment Modalities

• Thoracentesis
  ▫ Diagnostic
  ▫ Therapeutic
• Chest tube
• Pleurodesis
  ▫ Obliterate pleural space with sclerosing agent
• Tunneled pleural catheter
• Pleuroperitoneal shunt
  ▫ Rarely used
Nursing Management

- Frequent assessment
- Coordination of care
- Maintain optimal pulmonary status
- Medications
- Tubes/devices
- Education
- Comfort care/emotional support
- Discharge planning
Patient and Family Education

- Recognize S/S of recurrence
- F/U
- Pursed lip breathing
- Diaphragmatic breathing
- Alteration of breathing rhythm
- Adequate hydration/nutrition
- Scheduled rest periods
- Decrease anxiety
- Smoking cessation
- Catheter care/maintenance
- Home health referral
- Short-/long-term care
- Hospice referral
- Prognosis
- Coping skills assessment
- Emotional support
- Appropriate referrals
Review/Case Study

- 65 year old married woman
- History of right breast cancer
- Diagnosed/treated 10 years ago
- In past several weeks
  - New nonproductive cough
  - Fatigued
  - Short of breath with activity

- Assessment
  - Absence breath sounds in lower half of right lung
  - Dullness on percussion
  - Heart sounds normal
  - No pedal edema
  - Pulse ox 91% RA

- CXR
  - Lateral, antero-posterior, decubitus
    - Right sided pleural effusion
Case Study

- Thoracentesis for diagnosis
  - Positive for breast cancer
- Indwelling pleural catheter placed
  - Drained 3X a week for 10 weeks by spouse
  - Catheter pulled when only producing 75 ml at a time

- Six months later
  - Hospice
  - Died peacefully at home
Spinal Cord Compression
Spinal Cord Compression

- When tumor invades or extends into epidural space
- Or pathologically collapsed vertebral bone fragments impinge on spinal cord
Incidence/Risk

• Associated mostly with solid tumors that metastasize to bone
  ▫ Breast 15-20%
  ▫ Lung    15-20%
  ▫ Prostate 15-20%
  ▫ Multiple Myeloma 10-15%
Pathophysiology

- Growing tumor mass expands into epidural space
  - Compresses spinal cord
  - Surrounding epidural venous plexus
- Mechanical destruction of spinal cord
  - Tumor erodes and collapses vertebral body
  - Displaces bone fragments into epidural space
- Direct extension of tumor or paraspinal lymph node into epidural space
  - Without destruction of bone
  - Least common
Clinical Manifestations

- Back Pain
- Motor weakness
- Sensory loss
- Autonomic dysfunction
  - Bowel
  - Bladder
- Paraplegia
Evaluation/Diagnostic Tests

- MRI
  - Entire spine
  - Immediately
Treatment Modalities

- Corticosteroids
- Decompressive surgery
- Spinal stabilization
- Radiation therapy
Nursing Management

- Care coordination
  - Pain relief
  - Prevent injury
  - Prevent neurologic damage
  - Mobility
  - Safety
  - Bowel/bladder management

- Prepare
  - Treatment
  - Surgery

- Rehabilitation
  - Maximize function
  - Mobility

- Education
- Emotional support
- Discharge planning
Patient and Family Education

- Recognize S/S
- Prompt reporting
- Back pain
- Sensory changes
- Lower extremities
- Treatment modalities
- Pain management
- Medication
- F/U

- Safety
- Mobility
- Pressure ulcer prevention
- Skin inspection
- Positioning
- Turning
- Safe transferring
- Skin-protecting products
- Pressure-reducing support surfaces
Review

• What are the top three cancers associated with risk for Metastatic Spinal Cord Compression?
Superior Vena Cava Syndrome
Superior Vena Cava Syndrome

- Tumor compresses/invades
  - Or thrombus develops
- Obstructs blood return from head and upper body
  - Syndrome of venous congestion
- Cardiac output reduced
  - Decreased blood return to heart
Incidence/Risk

- Chest malignancies near the SVC or surrounding lymph nodes
  - Lung Cancer
  - Lymphomas
  - Breast Cancer
  - Metastatic tumors
  - Vena caval catheters
Pathophysiology

Superior Vena Cava (SVC)

- Thin walls
- Low pressure
- Collapses easily
- Enclosed in rigid anatomic compartment
- Multiple lymph node chains

Causes

- Extrinsic mass
- Direct tumor invasion
- Thrombus around central venous catheter
- Thrombus within SVC
Clinical Manifestations

- Dyspnea
  - Congestion
  - Low Cardiac Output
  - Edema of upper body
    - Face
    - Neck
    - Chest
  - Edema in right arm
  - Worse in morning

- Engorged veins
  - Chest
  - Right arm

- Dysphagia

- Headache

- Sensorium changes

- Reduced cardiac output
  - Skin mottling
  - Diminished pulses
  - Oliguria
Evaluation/Diagnostic Tests

- Chest CT with contrast
  - Tumor location
  - Level of invasion
  - Presence of thrombus
Treatment Modalities

• Radiosensitive tumors
  ▫ Immediate bolus dose radiation
    • Hodgkin lymphoma
    • Non-small cell lung cancer
• Chemotherapy-sensitive tumors
  ▫ Immediate chemotherapy
    • High-grade lymphoma
    • Small cell lung cancer
    • Testicular cancer
• Cena caval clots
  ▫ Thrombolytics
  ▫ Anticoagulants
• Palliative
  ▫ Vena caval stent
  ▫ Graft
Nursing Management

- Airway protection
- Cardiovascular support
- Comfort measures
- Positioning

- Avoid IV lines
  - Chest
  - Hands
- B/P on right
  - Falsely elevated
  - Profound difference
Patient and Family Education

- Support
- Diagnosis
- Symptoms
- Treatment

- Discharge planning
- S/S of recurrence
- Prompt reporting
- Symptom management
- Emotional support
Review

- What are the most common malignancies associated with SVC syndrome?
References

References


References

References