Oncologic emergencies place patients at a high risk for complications. The oncology nursing team is often the first to recognize signs and initiate the therapeutic response. Get the latest updates in assessment, diagnosis, treatment, and nursing considerations of various oncologic emergencies and walk away with knowledge of practice standards, care tools, and strategies for implementing practice changes to improve patient outcomes.

**Target Audience:** Registered Nurses

**Level of Content:** Intermediate

**Speaker:**
Martha Lassiter, MSN, AOCNS®, BMTCN™
ABMT Clinical Nurse Specialist
Duke University ABMT Program
Durham, NC

**Full Disclosure:**
Nothing to Disclose

**Speaker:**
Juanita Madison, RN
Oncology Nurse Educator
Catholic Health Initiatives Franciscan Health
Tacoma, WA

**Full Disclosure:**
Nothing to Disclose

**Objectives:**
At the end of this session, participants will be able to:
1. Identify the causes and symptoms of malignant spinal cord compression.
2. Describe the treatment of malignant spinal cord compression to develop a nursing plan of care for patients with this oncologic emergency.
3. Define the risk factors and symptoms of tumor lysis syndrome.
4. Explain the treatment of tumor lysis syndrome to effectively care for patients at risk for or experiencing this syndrome.

**Bibliography:**


Metastatic Spinal Cord Compression (MSCC)

- Compression of the spinal cord and/or cauda equina
- Caused by pathological vertebral collapse and/or direct tumor expansion
- May result in partial or complete loss of neurological function

Epidemiology

- Most cases (77%) diagnosed in patients with known history of cancer
- 23% present with MSCC as first presentation of malignancy
- Most common location in spine:
  - Thoracic (69%)
  - Lumbosacral (29%)
  - Cervical (10%)

Cancers Associated with MSCC

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Cancer Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most Common</td>
<td>Breast (15% - 20%)</td>
</tr>
<tr>
<td></td>
<td>Lung (15% - 20%)</td>
</tr>
<tr>
<td></td>
<td>Prostate (15% - 20%)</td>
</tr>
<tr>
<td></td>
<td>Multiple Myeloma (10% - 15%)</td>
</tr>
<tr>
<td></td>
<td>Unknown primary (10%)</td>
</tr>
<tr>
<td>Less Common</td>
<td>GI malignancies</td>
</tr>
<tr>
<td></td>
<td>Soft Tissue sarcoma</td>
</tr>
<tr>
<td>Uncommon</td>
<td>Melanoma</td>
</tr>
<tr>
<td></td>
<td>Uterine</td>
</tr>
<tr>
<td></td>
<td>Cervical cancers</td>
</tr>
<tr>
<td>Rare</td>
<td>Head and neck cancer</td>
</tr>
<tr>
<td></td>
<td>Brain cancer</td>
</tr>
<tr>
<td></td>
<td>Pancreatic cancer</td>
</tr>
</tbody>
</table>

Prognostic Indicators

<table>
<thead>
<tr>
<th>Good Prognosis</th>
<th>Poor Prognosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast cancer as the primary site</td>
<td>Lung or melanoma primary</td>
</tr>
<tr>
<td>Solitary or few spinal metastases</td>
<td>Multiple spinal metastases</td>
</tr>
<tr>
<td>Ability to walk aided or unaided</td>
<td>Visceral metastases</td>
</tr>
<tr>
<td>Minimal neurological impairment</td>
<td>Unable to walk</td>
</tr>
<tr>
<td>No previous radiotherapy</td>
<td>Severe weakness</td>
</tr>
<tr>
<td></td>
<td>Recurrence after radiotherapy</td>
</tr>
</tbody>
</table>

Clinical Presentation: Back Pain

- Most common presenting symptom
- Occurs in 90% of patients
- Precedes other signs and symptoms (e.g. neurological) by weeks to months
  - Median time from onset of pain to diagnosis of spinal cord compression: 2 months


National Institute for Health and Care Excellence, 2014

National Institute for Health and Care Excellence, 2008

Levack et al, 2002; McLinton & Hutchison, 2006; Giglio & Gilbert, 2010; Lewis, Haddicksee, & Meyronen, 2011
Clinical Presentation: Back Pain Characteristics

- Local (near site of compression)
- Radicular (distributed along dermatomes)
- Referred (in a non-radicular distribution)
- May be a combination of all 3 types

Levack et al, 2002; McLinton & Hutchinson, 2006; Giglio & Gilbert, 2010; Lewis, Hendrickson, & Moynihan, 2011

<table>
<thead>
<tr>
<th>MSCC Signs and Symptoms</th>
<th>Early Signs</th>
<th>Advanced Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pain in the thoracic or cervical spine</td>
<td>Neurological symptoms including radicular pain, any limb weakness, difficulty in walking, sensory loss</td>
</tr>
<tr>
<td></td>
<td>Progressive lumbar spinal pain</td>
<td>Loss of coordination, paresthesia</td>
</tr>
<tr>
<td></td>
<td>Severe unremitting lower spinal pain</td>
<td>Bladder or bowel dysfunction</td>
</tr>
<tr>
<td></td>
<td>Significant change in nature of long-standing pain</td>
<td>Neurologic signs of spinal cord or cauda equina compression</td>
</tr>
<tr>
<td></td>
<td>Spinal pain aggravated by straining (e.g. at stool, when coughing or sneezing)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Localized spinal tenderness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nocturnal spinal pain preventing sleep</td>
<td></td>
</tr>
</tbody>
</table>

Levack et al, 2002; McLinton & Hutchinson, 2006; Giglio & Gilbert, 2010; Lewis, Hendrickson, & Moynihan, 2011

Progression of Symptoms

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Signs &amp; Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>Pain</td>
</tr>
<tr>
<td></td>
<td>Motor weakness or gait changes</td>
</tr>
<tr>
<td></td>
<td>Sensory Loss (numbness, tingling, sensory changes)</td>
</tr>
<tr>
<td></td>
<td>Constipation and/or bladder retention</td>
</tr>
<tr>
<td>Late</td>
<td>Bowel and/or bladder incontinence</td>
</tr>
<tr>
<td></td>
<td>Paralysis</td>
</tr>
</tbody>
</table>

National Institute for Health and Care Excellence, 2008; Levack et al, 2002

Diagnostic Tests

- MRI
  - Gold standard for diagnosis
  - Accurate, sensitive, and specific diagnostic for malignant spinal cord compression
- Other diagnostic tests
  - Spinal x-rays
  - CT scan
  - Bone scan and/or PET scan
- Histology of primary tumor

National Institute for Health and Care Excellence, 2008; Lobilaw et al, 2005

Overall Treatment Goals

- Control of pain
- Prevention of spinal collapse and/or paralysis
- Prolongation of survival
- Palliation of residual symptoms

National Institute for Health and Care Excellence, 2008

Collaborative Management

- Corticosteroids
- Surgery
- Radiation therapy
- Chemotherapy
- Symptomatic & rehabilitative therapy
  - Pain management
  - Constipation
  - Spinal instability
  - Psychological and social distress

Corticosteroids

- Use of high-dose steroids controversial
- NICE Guidelines: dexamethasone (unless contraindicated)
  - Loading dose: 16 mg as soon as possible after assessment
  - During treatment planning & prior to surgery or radiation therapy: short course of 16 mg daily
  - Post-surgery or post-start of radiotherapy: gradually reduce dose over 5 – 7 days
- Monitor blood glucose levels
- Antacids or proton pump inhibitors (PPI’s)


Surgery

- Primary purposes
  - Preserve or recover neurological function
  - Maintain functional independence
  - Achieve highest possible quality of life
- May include separately or in combination:
  - Spinal cord decompression: avert or treat MSCC
  - Spinal column stabilization: treat mechanical pain or bone instability
- Resection/reconstruction of spinal column
- Controversy over sequence of surgery versus other definitive therapy (radiotherapy)


Traditional Indications for First-Line Surgery

- Rapidly progressing paraplegia
- Spinal instability
- Pathologic fracture with dislocation of bone fragments
- Circumferential epidural tumor
- Biopsy for histologic diagnosis
- Intractable pain
- Recurrence after prior radiotherapy
- Radio resistant tumors
- Life expectancy of < 3 months

Kaplan, 2013

Surgical Techniques

- Laminectomy (no longer typically performed)
- Anterior vertebral body resection with stabilization
- Vertebroplasty
- Kyphoplasty

Kaplan, 2013

Radiation Therapy

- First-line treatment in asymptomatic MSCC
  - Dose of 30 Gy administered in 10 fractions is most widely used regimen in North America
- Combined with surgery (multimodal therapy)
- Radiation therapy alone
  - Pain relief may not be achieved for up to two weeks
  - Does not correct spinal instability or prevent vertebral body collapse


Chemotherapy

- Acute management of MSCC
  - Rarely used
  - Response to treatment slow & unpredictable
- In combination with radiation therapy for chemo-sensitive tumors
  - Hodgkin disease
  - Non-Hodgkin lymphoma
  - Neuroblastoma
  - Germ cell tumors
  - Breast cancer

Sun & Nemeck, 2009
Nursing Management

• Early recognition & detection
• Pain management
• Mobility and safety
• Bowel and bladder function
• Skin Care
• Rehabilitation & palliative care

Kuylen, 2011; National Institute for Care and Health Excellence, 2008

Early Recognition & Detection

• Inform patients/caregivers at high risk of developing bone metastases, patients at risk of bone metastases, or cancer patients with spinal pain about symptoms of MSCC.
• Provide written information re: symptoms and what to do if they develop symptoms
• NICE – guidelines provides an example of patient handout

National Institute for Care and Health Excellence, 2008

Early Recognition & Detection

• High index of suspicion in cancer patients with pain:
  – Localization in cervical or thoracic spine
  – Progressive discomfort
  – Severe unremitting pain
  – Pain aggravated by activities that increase pressure within the spinal canal (coughing, sneezing, defecating)

National Institute for Care and Health Excellence, 2008

Pain Management

• Baseline and ongoing pain assessment
  – Quality, intensity, location, pattern (local/radiating), and interventions that increase or decrease pain
• Implement analgesia regimen immediately on presentation of MSCC
  – Opioid naive patients:
    • Mild to moderate pain: NSAIDS or acetaminophen
    • If pain unrelieved or worsens: short-acting opioids
  – Opioid tolerant patients experiencing breakthrough:
    • Titrate current medications until acceptable pain level

National Comprehensive Cancer Network, 2012

Pain Management

• Neuropathic pain related to tumor involvement of spinal nerve roots or peripheral nerves typically does not respond to opioids.
• Anticonvulsants, antidepressants, corticosteroids for treatment of neuropathic pain.

National Comprehensive Cancer Network, 2012

Mobilization and Safety

• Gap in evidence base to inform guidelines and clinical-decision making re: mobilization
• Positioning, mobilization, & bracing interventions are discussed and recommended within literature.
• Recommendations controversial, contradicting, and lack evidence.

### Mobilization: NICE Guidelines

- Flat bed rest until MRI carried out and reviewed
- If no signs of neurological or bone instability on assessment, gradually sit from supine to 60 degrees in stages over a period of 4 hours
- Monitor closely for signs of instability including increased pain or neurological symptoms (if occur, return to a position where symptoms cease)

National Institute for Health Care and Excellence, 2008

### Mobilization: NICE Guidelines

- If sitting position achieved, move to sitting unsupported, transfers and mobilization with close assessment of symptoms
- If signs of instability and not a surgical candidate, bracing may be required

National Institute for Health Care and Excellence, 2008

### Bowel and Bladder Function

- Most common autonomic dysfunction: inability to fully empty bladder
- May result in:
  - Urinary retention
  - Bladder distention
  - Chronic urinary tract infection
- Intermittent or indwelling urinary catheterization may be required

Flaherty, 2011

### Constipation

- Autonomic dysfunction results in constipation caused by:
  - Loss of voluntary and reflex constriction of the anal sphincter
  - Loss of perineal sensation
- Constipation may progress to fecal impaction, loss of sphincter control, to stool incontinence
- Assess abdomen (inspect, auscultate, palpate, and percuss) for distention, bowel tones

Abraham, 2004

### Bowel and Bladder Management: NICE Guidelines

- Assess bowel and bladder dysfunction in all patients with MSCC on initial presentation and begin plan of care.
- Monitor daily for changes in bowel or bladder function patients who are continent and without urinary retention or disturbed bowel function

National Institute for Health Care and Excellence, 2008

### Additional Nursing Measures

- Skin care
- Thrombo-prophylaxis
- Maintaining circulatory & respiratory function
- Rehabilitation and palliative care

National Institute for Health Care and Excellence, 2008; Abraham, 2004
**Summary**

- MSCC is a true oncologic emergency
- Early diagnosis and treatment may prevent irreversible neurologic damage
- Nursing management priorities include:
  - Pain Management
  - Mobilization & safety
  - Bladder & bowel function
  - Maintenance of function
  - Rehabilitation

**Diseases associated with TLS**

- **Common**
  - Clinically aggressive NHL
  - ALL
  - Burkitt’s lymphoma/leukemia
- **Less common**
  - Clinically aggressive anaplastic LCL
  - T-cell or B-cell ALL
  - AML
  - CLL
  - Plasma cell disorders
  - Rarely solid tumors

**Clinical symptoms of TLS**

- N/V/D
- Edema
- Fluid overload
- SOB
- CHF
- Cardiac dysrhythmias
- Seizures
- Muscle cramps
- Syncope
- Sudden death

- **Labs**
  - Elevated K⁺
  - Elevated uric acid
  - Elevated PO4³⁻
  - Low Ca²⁺

**Tumor Lysis Syndrome**

Martha Lassiter, RN, MSN, AOCNS, BMTCN
Duke University Division of Cellular Therapy

**Principles of chemotherapy**

- Chemotherapy kills fast growing cells
- Generally regimens are cell cycle specific agents
- Rapid cell lysis
  - Release of cellular metabolites that overwhelm the normal renal excretory and cellular buffering mechanism
  - Rapid release of intracellular potassium through the nephrons, precipitates acute kidney injury
  - Hyperuricemia, hyperkalemia, hyperphosphatemia, hypocalcemia, uremia

Cairo M, Bishop M. British Journal of Haematology, 127, 3–11, 2004

**Patients you might not think of as high risk**

- **121 patients with MM**
  - Bortezomib regimen
  - 5 developed TLS
    - BM involvement 69-93%
    - 3 hyperurecemia
    - 3 elevated creatinine
    - All had low PS
    - 4 over the age of 60
    - MM risk < 1% versus 4%

Wang et al. CJON, February 2015
### Medical Management

**Low Risk**
- Hydration
- Lab monitoring

**Intermediate Risk**
- Hydration
- Loop diuretic

**High Risk**
- Hydration
- Rasburicase

### Medical Management

**Prevention**
- Hydration
  - 24-48 hours prior to treatment for as long as 72 hours post treatment
  - Caution in the elderly
- Diuretics
- Allopurinol
  - 600-900 mg daily 1-2 days prior to therapy
- Rasburicase
  - If Allopurinol is unsuccessful

Maloney and Denno, CJON 2011, Vol. 15, Number 6

### Medical Management

**Treatment**
- Management of electrolyte imbalances
  - Titrate to serum levels
- Dialysis if not possible to correct
  - K > 7.0
  - Uric acid > 10.0
  - PO4 > 10.0
  - Increasing BUN and creatinine
- Primary goal is preservation of renal function

### Rasburicase vs Allopurinol

**2009 FDA approval**
- Randomized Study N= 275
  - Rasburicase x 5 days
  - Rasburicase day 1-3 followed by allopurinol day 3-5
  - Allopurinol x 5 days
    - Arm A Uric acid response 87%
    - Arm C Uric acid response 66%
    - No difference in Arm B and Arm C
    - No difference in incidence of TLS in the arms

www.cancer.gov/cancertopics/druginfo

### Toxicity

**Rasburicase**
- Peripheral edema
- Vomiting
- Hyperbilirubinemia
- Sepsis
- Fluid overload

**Allopurinol**
- Joint pain
- Joint stiffness
- Rash

www.cancer.gov/cancertopics/druginfo

### Single vs Daily dosing

**Meta-analysis**
- 10 studies reviewed
- 269 subjects
  - Response rate not significantly different
  - Compared to allopurinol significant
  - More cost savings in single dose patients

Journal of Clinical Pharmacy and Therapeutics, 2013, 38, 301-306
Medical Management

- Urine alkalization
  - Commonly with sodium Bicarbonate or acetazolamide
  - Controversial
    - No efficacy data
    - May promote calcium phosphatase deposition in kidney, heart
    - Hyperphosphatemia
    - Only indicated for metabolic acidosis
    - No consensus

Conger JD et al. J Clin Invest, 1977

Nursing Strategies

- Cardiac monitoring
- Identify and initiate preventive measures
  - Hydration
  - Frequent lab review
- Know signs and symptoms of electrolyte imbalances
- Be aware of patient’s renal function
- Prompt supportive care
- Educate and support your patient and caregiver
- Administer TLS preventive medications as ordered

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Outpatient Management

- More intense therapies in alternative settings
  - Protocols
    - Patient risk identification
    - Lab vs Clinical
    - Standard preventive measures
    - Standard patient and caregiver education
    - Standard treatment measures

Mackiewicz, CJON, Volume 16, Number 2, 2012

Nursing Strategies

- Know your hospital SOP
- Stay up to date
  - CJON
  - ONF
  - Your clinical pharmacist
  - Your CNS/Nurse educator

Saturday, April 25