ED Approach to Oncological and Chemotherapy emergencies

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Oncological emergency

- Acute life-threatening condition directly or indirectly caused by cancer or its metastases.
- **These can be**
  - Structural
  - Metabolic
  - Hematological
  - Treatment related

Chemotherapy emergency

- Acute, severe condition resulting from the toxic effects of chemotherapy drugs.
- **Arise from**
  - Direct cytotoxicity
  - Immune suppression
  - Systemic reactions to chemotherapy.

Summary of Oncologic Emergencies

Condition	Cancer association	Common presenting signs and symptoms	Consultation considerations
Metabolic			
Tumor lysis syndrome	Hematologic malignancies, particularly acute leukemia, and high-grade lymphomas; solid tumors	Azotemia, hyperphosphatemia, hyperkalemia, hyperuricemia, acute renal failure, hypocalcemia	Oncology, nephrology, palliative care
Hypercalcemia of malignancy	Multiple myeloma; breast cancer; squamous cell carcinoma of the head or neck, lung, kidney, or cervix	Progressive decline in mental function, weakness, anorexia, thirst, constipation, nausea, vomiting, decreased urine output, possible coma	Oncology, endocrinology, nephrology
Syndrome of inappropriate antidiuretic hormone	Small cell lung cancer	Hyponatremia, nausea, vomiting, constipation, muscle weakness	Oncology, nephrology, palliative care
Hematologic			
Febrile neutropenia	Current chemotherapy	Single axillary/oral temperature ≥ 101.3°F (38.5°C) or sustained temperature ≥ 100.4°F (38°C) for one hour, and an absolute neutrophil count < 500 cells per mm^3	Oncology, infectious disease, palliative care
Hyperviscosity syndrome	Waldenström macroglobulinemia (10% to 30%), leukemia, multiple myeloma	Spontaneous bleeding, shortness of breath, neurologic deficits (peripheral neuropathies), "sausage-like" hemorrhagic retinal veins, serum viscosity > 4 cP	Hematology, oncology

Structural			
Superior vena cava syndrome	Lung cancer, lymphoma, metastatic mediastinal tumors or lymph nodes, indwelling venous catheters	Facial edema, cough, dyspnea at rest, hoarseness, chest and shoulder pain, collateral venous circulation (chest wall)	Oncology, cardiothoracic surgery, palliative care
Malignant epidural spinal cord compression	Breast cancer, multiple myeloma, lymphoma, lung and prostate cancers	New-onset back pain (worse when lying down), paraplegia (late presentation)	Oncology, neurosurgery, palliative care
Malignant pericardial effusions	Lung, esophageal, and breast cancers; lymphoma; leukemia; melanoma; infection; treatment complication; autoimmune reaction	Dyspnea, chest pain, or palpitations; pulsus paradoxus; Beck triad (muffled heart sounds, hypotension, increased jugular venous pressure)	Oncology, cardiothoracic surgery, palliative care
Treatment related			
Chemotherapy (extravasations)	Current chemotherapy	Pain, erythema, and swelling that progress to blanching, blistering, discoloration, and necrosis of the skin	Oncology, dermatology, plastic surgery
Gastrointestinal problems	Current cancer treatment	Abdominal pain, nausea, vomiting, diarrhea, constipation, and dehydration; obstruction; bleeding; weight loss; dehydration	Oncology, gastroenterology, general surgery, infectious disease, radiology
Radiation therapy	Current radiation therapy (external, temporary internal, permanent internal, systemic)	Dermatitis, cardiovascular disease, esophagitis, cystitis, sexual dysfunction, depression	Oncology, dermatology, cardiology, gastroenterology, urology/gynecology
Immunotherapy	Current immunotherapy	Vague symptoms, such as flulike illness and rash	Oncology, targeted subspecialty

Metabolic

Common

1. Tumor Lysis syndrome
2. SIADH
3. Hypercalcemia of malignancy

Metabolic- TLS

- **Characterized by**
  - Rapid acute cell lysis
  - Spontaneous vs Rx related (Chemo vs RT vs Biologics)
- **Diagnosis**
  - **Laboratory TLS**: 2 or more of Uric acid>8mg/dl, Potassium>6mEq/L, Phosphate>4.5mg/dl, Calcium<7mg/dl or a 25% change in the same direction.
  - **Clinical TLS**: LTLS and AKI, cardiac arrhythmia/sudden death or seizures

Risk stratification

High risk	Intermediate risk	Low risk
ALL/AML (WBC>100)	AML/ALL (WBC 25-100)	Hodgkins lymphoma
ALL with LDH>2*ULN	AML with LDH>2*ULN	Indolent NHL
High grade lymphoma with LDH>ULN or bulky disease >10cm	CML	ALCL
Intermediate risk with elevated baseline K, PO4 or Cr	CLL WBC>50	Other high grade lymphoma with normal LDH
	Leukemia/lymphoma with renal derangement	CML chronic phase
		Multiple myeloma

Clinical manifestations

- **GI symptoms**: Nausea, vomiting
- **CNS**: Somnolence, tetany, syncope, seizures and sudden death
- **GUS**: Hematuria, flank pain, oliguria/anuria, oedema and fluid overload with hypertension, azotemia, acidosis.
- **CVS**: Arrythmias, congestive heart failure.
- **MSS**: Muscle cramps.

Investigation of a patient with TLS

1. Complete Blood count
2. Renal function test
3. Electrolytes: Simple vs Extended
4. Uric acid levels
5. LDH
6. ECG
7. Further Malignancy Diagnostic testing

Treatment of TLS

1. Avoid nephrotoxic drugs
2. IV fluids: 100-150mls/kg/day
3. Correction of hyperkalemia
4. Correction of hypocalcemia: Only if symptomatic
5. Correction of hyperuricemia: Rasburicase
6. Correction of hyperphosphatemia
7. Dialysis

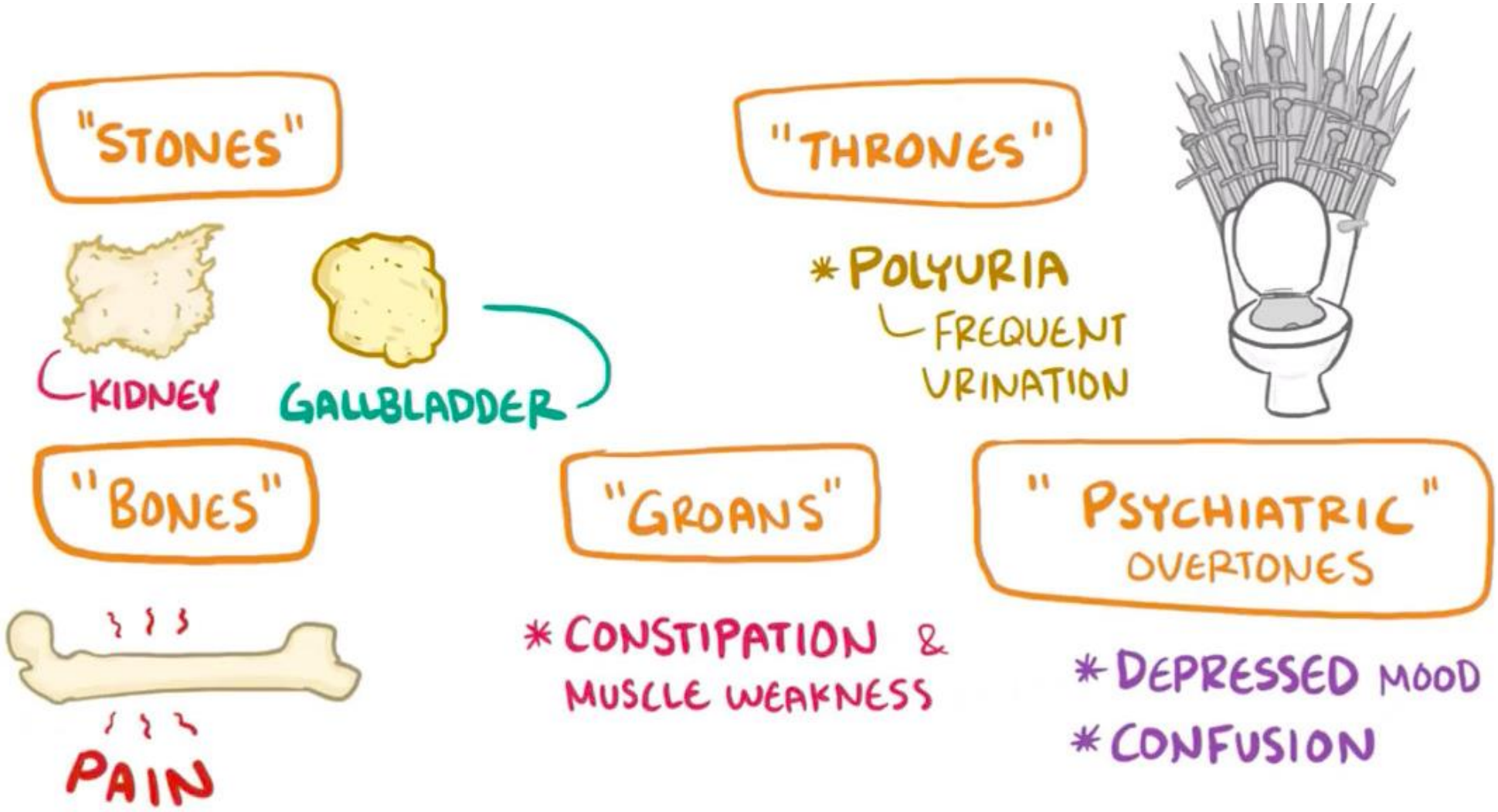
Prevention

1. **Risk stratification**
    1. Low/intermediate/high
2. **Hydration**
    1. 100-150mls/kg/day with urine out put of 2-3mls/kg/hr
3. **Medications**
    1. Allopurinol (300mg/day max dose is 800mg/day)
    2. Febuxostat: 80mg/day

Metabolic- Hypercalcemia

- 10% to 30% of patients with cancer
- Serum calcium level of more than 10.5 mg per dL (2.63 mmol per L).
- **Malignancies**
  - Multiple myeloma
  - Breast cancer
  - SCC (head and neck)

Look out for


"STONES"
KIDNEY
GALLBLADDER
"THRONES"
* POLYURIA
└ FREQUENT URINATION
"BONES"
PAIN
"GROANS"
* CONSTIPATION & MUSCLE WEAKNESS
" PSYCHIATRIC " OVERTONES
* DEPRESSED MOOD
* CONFUSION

Mgt: Hypercalcemia of Malignancy

1. Fluid therapy until euvolemia(2-4L/day)
2. Carefull diuresis with Lasix (40-80mg/daily)
3. Zolendronic acid 4mg slow iv(15mins): CI if eGFR<35mls/min/1.732m2
4. Denosumab 60-120mg, safe in renal impairment
5. Calcitonin 4-8IU/kg
6. Steroids 8-16mg/day D1-D3

Metabolic: SIADH

- **Common in**
  - SCLC
  - SCC head and neck
  - Chemotherapy agents
    - Vinca alkaloids
    - Platinum's
    - Alkylating agents
- **Presentation**
  - Gastrointestinal
  - Neurologic: BOV, Altered mental state, Babinski sign.
  - Constitutional symptoms

Metabolic: SIADH Rx

- **Rx**
  - Fluid restriction (limit to 500 to 1,000 mL per day)
  - Slow correction
  - Hypertonic saline
  - Tolvaptan
  - Oral Sodium chloride
  - Rx offending agent

Hematological

1. Neutropenic sepsis
2. Hyperviscosity

Hematological: Neutropenic Sepsis

- Sepsis + Neutropenia
- **Diagnosis**
  - ANC<500 or predicted decline to <500 in 48hrs
  - **Signs of sepsis**
    - Fevers >38°C
    - Hypothermia < 36°C
    - Tachycardia
    - Hypotension
    - Organ dysfunction

Neutropenic sepsis

- 80%: Arise from endogenous flora
- Source identified in 30%
- **Risk factors for specific types based on underlying malignancy**
  - Abnormal antibody production in CLL, functional asplenia: encapsulated organisms- *Strep pneum.,hemophilus influenzae, Neisseria meningitidus, capnocytophaga canimorsus*
  - T cell defects e.g lymphoma: intracelluar pathogens- *Listeria monocytogenes, Salmonella, Mycobacterium, Cryptococcus*
  - High dose steroids: *Pneumocystis carinii*

Neutropenic Fever: Approach

- Culture and sensitivity
- Broad spectrum antibiotics(PISA, Cefepime, Vancomycin)
- Imaging symptoms and clinical examination
- GROWTH FACTOR support
  - Filgastrin(Pegexaleted vs Non pegexalated)
- Tripple therapy
- Consider catheter removal
- Consults: Infectious disease physician

Hyperviscosity Syndrome

- **Common in**
  - Waldenström macroglobulinemia (10% to 30%)
  - Multiple myeloma, Lymphoplasmatic lymphoma
  - **Acute leukemia with hyperleukocytosis (>100,000/microliter)**
- Suspect: Symptoms and evidence of paraprotein secreting hematological malignancy
- Symptoms
  - CNS; Headache, dizziness, seizures, impaired hearing, tinnitus, BOV,
  - R/S: DIB
  - GUS: Renal impairment, priapism

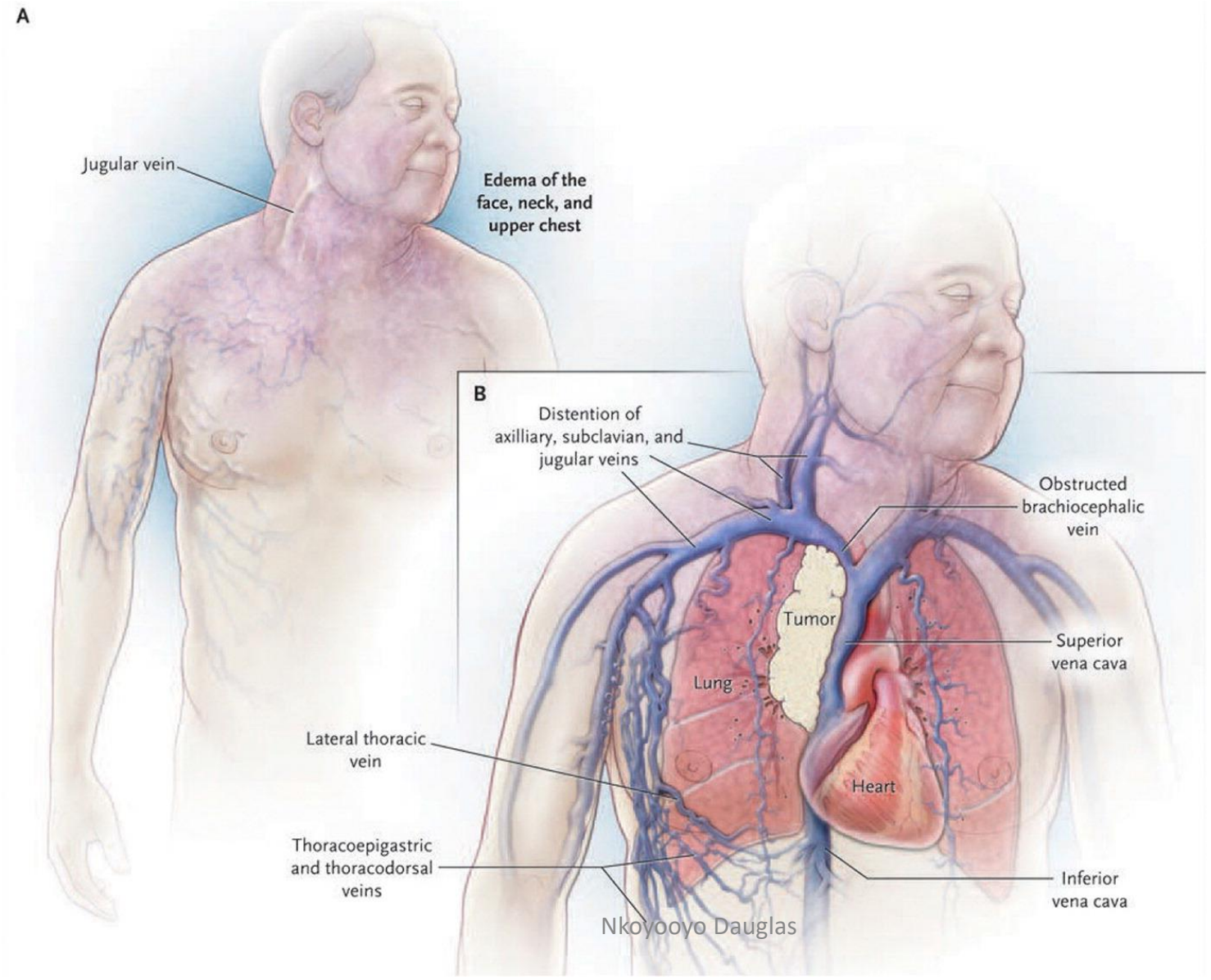
Hyperviscosity Syndrome

- **Dx**: Serum viscosity of more than 4
- **Treatment**
    - Hydration
    - correct electrolyte imbalance
    - Plasmapheresis/partial exchange transfusion, cytoreduction
    - Chemotherapy
    - VTE prophylaxis
    - Targeted chemotherapy.

Structural

1. Superior venacava syndrome
2. Spinal cord compression
3. Malignant Pleural effusion
4. Malignant Pericardial effusion
5. Increased intracranial pressure

Structural: Superior venacava syndrome



Structural: Superior venacava syndrome

- **Common in: Ca lung, Lung mets, Lymphoma and mediastinal tumors**
- **Symptoms**.
  - Dyspnea, cough, stridor, Facial swelling, blurred vision, Hoarseness, tongue swelling
- **Signs**
  - Jugular venous distension, Upper limb edema, Cyanosis, chemosis, syncope, altered mental state, Pemberton sign

Superior venacava syndrome

- **Imaging:** CXR, CT, MRI, Venography
- **Management**
- Elevation of the head, Oxygen therapy
- Glucocorticoids; Dexamethasone 24mg OD, with a PPI
- Anxiolytics/Morphine.
- Diuretics, to reduce swelling.
- Chemo vs RT

Mgt of SVC

- **Radiotherapy**
  - For radiosensitive Ca like Lymphomas, SCLC, NSCLC
- **Chemotherapy**
  - Chemosensitive tumors like NHL, Germ cell tumors, SCLC

Structural: Spinal cord compression

- **Spinal cord compression (SCC)** Neurological deficit secondary to compression of the spinal cord by tumors

Etiology

1. **Primary Tumors**: Ependymoma, astrocytoma.
2. **Metastatic Tumors**: Breast, prostate, lung cancer.
3. **Vertebral Collapse**: Multiple myeloma, Bone tumors
4. **Extramedullary Tumors**: Meningioma, Schwannoma.

Clinical features

1. Pain

2. **Motor Deficits**

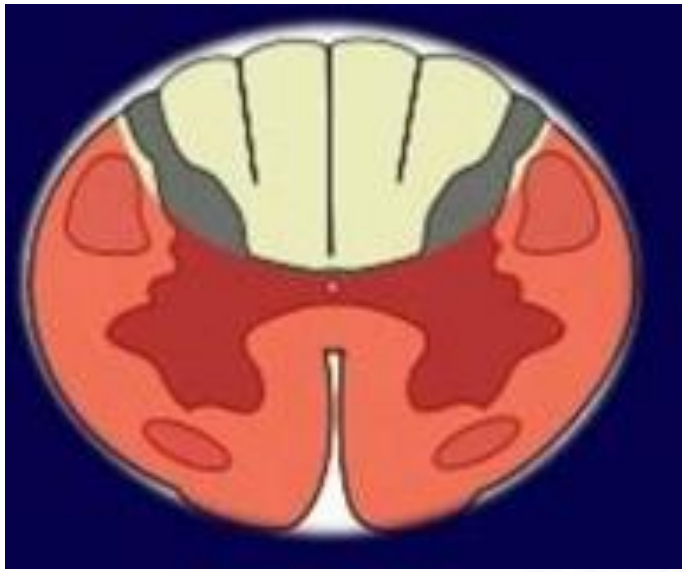
3. **Sensory Deficits**

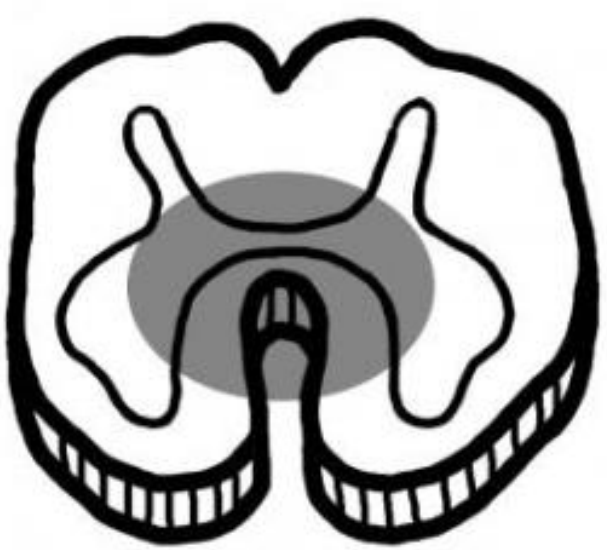
4. **Autonomic Dysfunction**: Sexual dysfunction, bladder and bowel dysfunction

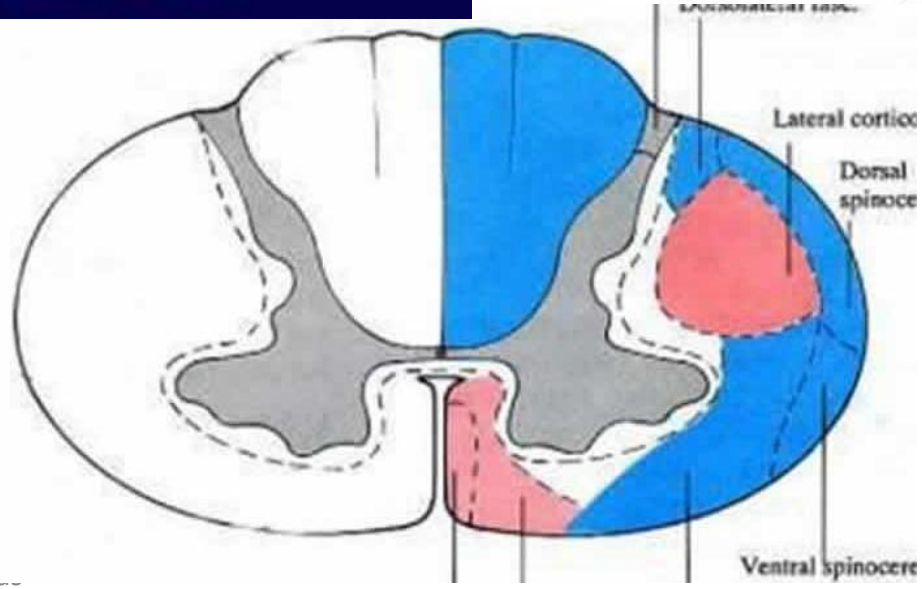
5. **Reflex Changes**: Hyperreflexia and positive Babinski

Spinal Cord Syndromes

- **Brown-Séquard Syndrome**
- **Central Cord Syndrome**
- **Anterior Cord Syndrome.**
- Conus Medullaris syndrome
- Cauda Equina syndrome







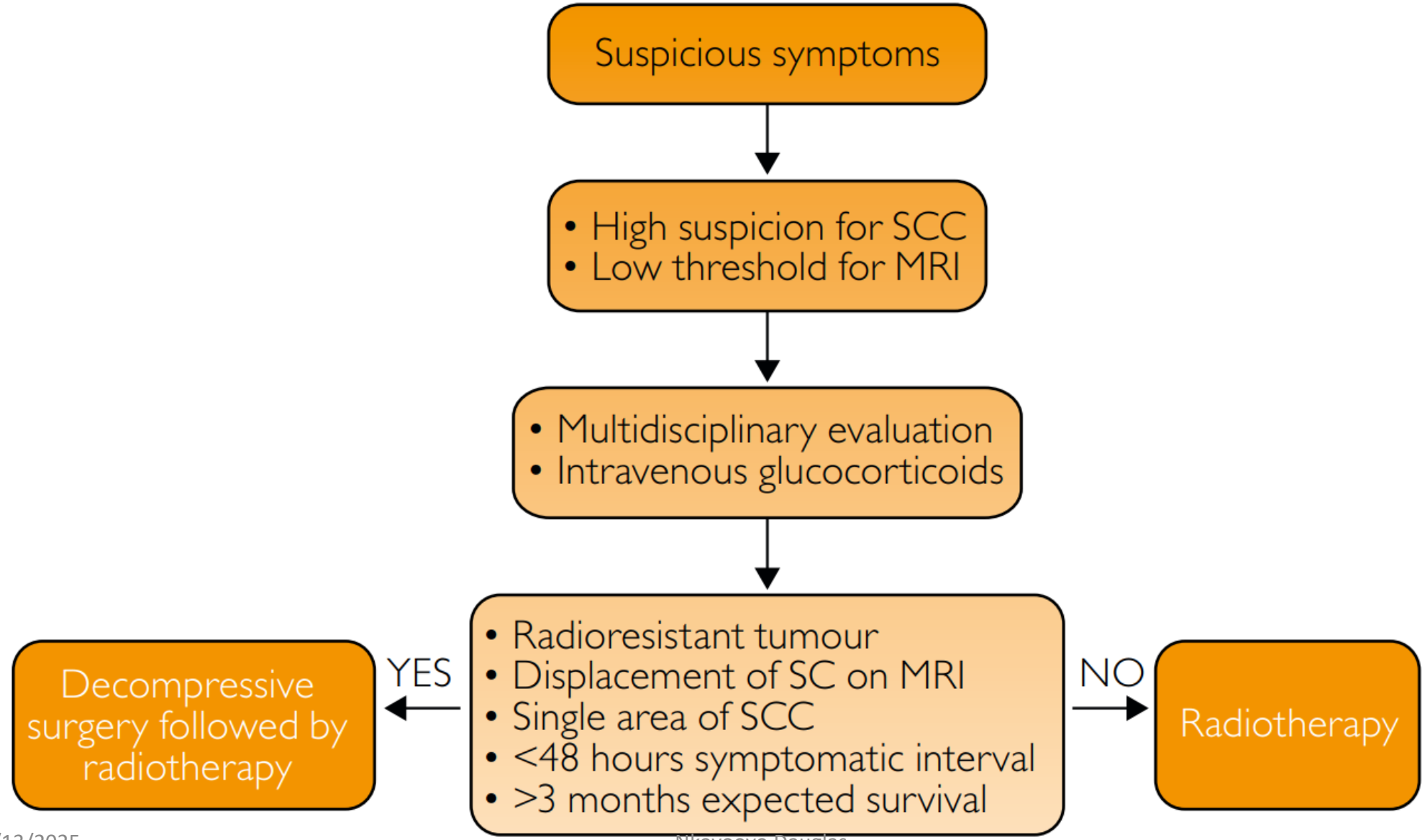
Evaluation

1. Clinical examination
2. Imaging: CT scan, MRI is the modality of choice

Management

1. **Catheter, Pain mgt, Emotional support**
2. **Glucocorticoids (GCs)**
    a. IV 24/32mg stat, then 16mg OD D1-3
3. **Radiotherapy** (external beam radiation therapy [EBRT])
4. **Decompressive surgery**

Flow chart


Suspicious symptoms
• High suspicion for SCC
• Low threshold for MRI
• Multidisciplinary evaluation
• Intravenous glucocorticoids
• Radioresistant tumour
• Displacement of SC on MRI
• Single area of SCC
• <48 hours symptomatic interval
• >3 months expected survival
YES
Decompressive surgery followed by radiotherapy
NO
Radiotherapy

Chemotherapy emergencies

- Neutropenic sepsis
- TLS
- Gastrointestinal
- Extravasation Injuries Secondary To Chemotherapy

Gastro-intestinal

- GI: 17% of acute presentations in cancer
- **Attribution**
  - Opioid
  - Immunologic therapy.
- **Symptoms:**
  - Abdominal pain, nausea, vomiting, diarrhea
  - Constipation, and dehydration wth, and bile acid malabsorption often develop after chemotherapy.[36]

Gastro-intestinal

- **Stabilization includes**
  - Fluid resuscitation
  - Antiemetics and antidiarrheals
  - Laxatives
  - BBC
  - Mucositis regimen: Honey, Nystatin, Metronidazole, Lignocaine, Hydrocortisone
  - Probiotics

EXTRAVASATION INJURIES

- Chemo-infusion accidentally leaks
- Signs and symptoms
  - Pain at the infusion site
  - Swelling
  - Erythema
  - Blisters

EXTRAVASATION INJURIES

- **Treatment**
  - Cold or warm compress
  - Pain mgt
  - Stop infusion
  - **Antidote**
    - **Dexrazoxane** for doxorubicin
    - **Hyaluronidase** for vinca alkaloids