Neurologic Complications of Cancer

Dr. Kathryn Giles
MD, MSc, FRCPC
Cambridge Ontario
Faculty/Presenter Disclosure

- **Faculty:** Dr. Kathryn Giles

- **Relationships with commercial interests:**
  - **Grants/Research Support:**
    - Biogen Idec, Genzyme
  - **Speakers Bureau/Honoraria:**
    - Bayer, Biogen Idec, EMDSerono
  - **Consulting Fees:**
    - Biogen Idec, EMDSerono, Genzyme
  - **Other:**
    - none
Disclosure of Commercial Support

- Potential for conflicts of interest:
  - none
Neurological Effects of Cancer

- Direct
  - Primary
  - Metastatic

- Indirect
  - Paraneoplastic
  - Treatment
• **BRAIN**
  - When in hemispheres usually present with seizures, personality or cognitive change, visual change or headache
  - Cerebellar present with raised ICP, balance
  - Brainstem multifocal

• **SPINAL CORD**
  - Cord syndrome
  - Acute/subacute
  - Often bladder and bowel
  - Often painless
  - Usually multiple segments
Neurological Effects of Cancer

- Direct
  - Primary
  - Metastatic
- Indirect
  - Paraneoplastic
  - Treatment
Direct Effects of Metastatic Cancer

Localization

• CNS
  o Brain
  o Spinal Cord

• PNS
  o Root
  o Plexus
  o Nerve
CNS

- Brain
  - Focal Symptoms/Deficit
  - Cognitive/Personality Change
  - Headache
  - Diagnosis
    - CT with contrast
    - MRI
    - CSF (meningeal involvement)
CNS

- Spinal Cord
  - Focal/cord deficit
  - Pain
  - Diagnosis
    - X-ray
    - MRI
PNS

• Root
  o Radicular Symptoms
  o Often multiple
  o +/- Spinal cord
  o Pain
  o Diagnosis
    • MRI
    • EMG
    • CSF
PNS

- **Plexus**
  - Multiple root/nerves
  - Pain
  - Diagnosis
    - MRI + gadolinium
    - EMG
    - CSF
PNS

- **Peripheral Nerve**
  - Rare
  - Usually indirect
Treatment of Secondary Cancer in the Nervous System

• Diagnosis
• Referral
• Pain
  o Narcotics/Opioids
  o Pregabalin (Lyrica)
  o Cannabinoids (Sativex, Cesamet/Nabilone, medical marijauna)
• Treatment of the Tumor
Neurological Effects of Cancer

- Direct
  - Primary
  - Metastatic

- Indirect
  - Paraneoplastic
  - Treatment
Paraneoplastic Syndromes

- Immune mediated/onconeural antigens
- Cytotoxic T-cell responses (CD8+/CD4+)
- Precede tumor diagnosis in 60%
- Check CSF + blood for antibody (Anti-Hu, Anti-Ri, Anti-Yo)
- Occult neoplasm presumed
Paraneoplastic Syndromes

- Most common in:
  - SCLC
  - Breast
  - Ovary
  - Neuroblastoma
  - Plasma cell tumors
- Acute/subacute onset
- Blood/CSF/MRI/PET
Paraneoplastic Syndromes in CNS

- Cerebellar degeneration
  - SCLC, Breast, Ovary, Lymphoma
  - Anti-Yo

- Encephalomyelitis (Limbic encephalitis)
  - Lung
  - Anti-Hu

- Opsoclonus – Myoclonus
  - Neuroblastoma, SCLC, Breast
  - Anti-Hu, Anti-Ri
Paraneoplastic Syndromes in PNS

- Sensory neuronopathy (dorsal root ganglion)
  - Lung
  - Anti-Hu

- Subacute or chronic sensorimotor peripheral neuropathy
  - Plasma cell dyscrasias, B-cell lymphoma
Paraneoplastic Syndromes of the Neuromuscular Junction

- Lambert-Eaton myasthenic syndrome
  - Fatigue, weakness, myalgia, paresthesias
  - Cholinergic dysautonomia – dry mouth
  - Characteristic EMG
  - SCLC
  - Anti – VGCC
  - Treat with 3,4-diaminopyridine
Paraneoplastic Syndromes of Muscle

• Dermatomyositis
  o Subacute muscle weakness, elevated CK
  o dysphagia
  o Skin changes
  o Breast, lung, ovarian, gastric
  o Anti-Jo

• Acute Necrotizing Myopathy
  o Solid tumors
Paraneoplastic Syndromes

Treatment

• Steroids
• IVIg
• Plasma Exchange
• Treatment of underlying tumor
Indirect

Paraneoplastic

Treatment

Chemo

Radiation
Chemotherapy

- Neuropathy
- Encephalopathy
- Acute cerebellar syndrome/ataxia
- Myelopathy
- Cerebral Vasculopathy
Radiation

• Brain
  o Acute (hours to days)
    • ↑ ICP
    • vasogenic edema
  o Early Delayed (weeks)
    • Diffuse (somnolence), or focal
    • demyelination
  o Delayed (months to years)
    • Diffuse (dementia), or focal
    • glial and vascular destruction
Radiation

- **Spinal Cord**
  - Early delayed (weeks)
    - L’hermittes sign
    - demyelination
  - Delayed (months to years)
    - Necrosis
    - MND
    - Arachnoiditis
    - Glial and vascular destruction
Radiation

- Cranial Nerves
  - Visual loss (retina, optic nerve, central artery occlusion)
  - Hearing loss (radiation otitis)
  - 12th nerve (hypoglossal)
Radiation

- Plexopathy (brachial/lumbosacral)
  - Delayed
  - Fibrosis
  - No pain
Radiation

- Radiogenic tumours
- Vascular abnormalities
- Endocrinopathies
Summary

• Neurologic complications of cancer are common
• Think of them
• Refer
QUESTIONS?