Spinal Epidural Abscess

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History of Present Illness

- The patient is a 43-year-old female with a history of IV drug use who was transferred to BIDMC with a two day history of ascending paralysis and sensory loss.
- Neurologic symptoms were preceded by one week of neck pain that radiated to her shoulders and migrated down her back.
Patient’s History

- PMH: C-section
- Meds: None
- Allergies: Keflex
- SH: Married with three children. 60 pack year smoking history. Drinks 10-15 alcoholic beverages per week. IV drug abuse (cocaine last time 10 days prior to admission).
- FH: CAD
Physical Exam

- Vitals: T: 98.6 BP: 112/68 HR: 80 RR: 18 O2: 95%
- Gen: Ill-appearing
- HEENT: MMM
- Neck: no LAD, no bruits, spine not tender to palpation, significant pain with neck motion.
- CV: RRR, normal S1+S1, no murmurs, rubs or gallops
- Resp: CTAB
- GI: Soft, non-tender, non-distended, + bowel sounds
- GU: 1400 cc residual urine noted at OSH
- Extremities: no clubbing, cyanosis, or edema. Multiple scars from IV drug use. Strong pulses throughout.
- Rectal: Guaiac negative, decreased rectal tone.
Neurologic Exam

- Mental Status: No deficits
- Cranial Nerves: II-XII tested and intact
- Motor (consistent with a lesion around C7/C8):
  - Normal bulk throughout
    - normal tone in UEs, flaccid tone in LEs
    - strength 0/5 in LEs
    - Strength 4/5 in deltoids and triceps
    - Strength 3/5 in biceps, wrist flexors and extensors
    - Strength 0/5 in finger flexors and extensors
- Sensory: Loss of all modalities at approximately C7/C8
- Reflexes: brisk throughout, toes mute with triple flexion bilaterally

*Findings highly suspicious for a spinal cord lesion!*
Labs on Admission

- Chem 7: normal
- WBC: 20 (at OSH)
- ESR: 60
- CRP: 140.8
- Urine toxicology: positive for cocaine

Concerning for infection!
Imaging of the Spinal Cord

- MRI with intravenous contrast is the modality of choice for patients with suspected spinal cord lesions.
  - Allows visualization of the spinal cord, subarachnoid space, and surrounding structures.
  - Allows differentiation between compressive and non-compressive etiologies which is critical for patient management.
- CT with intrathecal contrast is an acceptable alternative if MRI is not available or there are contraindications.
- Plain films are not sensitive for spinal cord lesions
- If neither imaging modality is available the patient should be transferred to a treatment center where they can be performed.

Normal Cervical Spine MRI: Sagittal

Brainstem
Vertebral Body
Disc
CSF
Spinal Cord
Spinous Process

Sagittal T2 weighted image
PACS BIDMC
Normal Cervical Spine MRI: Axial

Axial T2 weighted image

Vertebral Body
Nerve Root
Spinal Cord

Vertebral Artery
CSF
Patient’s MRI on Admission: T1

Prevertebral area of hypointensity on T1 weighted image

Distortion of spinal cord by material that is hypointense on T1

DDX: Dark on T1
Acute Hematoma
Fluid
Neoplasm
Patient’s MRI on Admission: T2

Prevertebral collection is hyperintense on T2

DDX: Bright on T2
- Chronic Hematoma
- Fat
- Neoplasm
- Fluid

Areas of T2 hyperintensity surrounding the spinal cord

Sagittal T2 Weighted Image

PACS BIDMC
Patient’s MRI on Admission: STIR

Areas of hyperintensity are still seen on STIR images which have removed signal from fat.
Patient’s MRI on Admission:

T1 with Contrast

Diffuse contrast enhancement of the prevertebral soft tissues with a central area of non-enhancement.

Peripheral enhancement of multiple areas within the cervical and thoracic epidural space.

Sagittal T1 with gadolinium contrast enhancement
DDX: Extradural Lesions on MRI

- Disk Herniation*
- Tumors (primary and metastatic)*
  - Tumors causing compression are most commonly extensions of vertebral metastases
- Fracture fragment or dislocation from trauma*
- Epidural Hematoma*
- Epidural Abscess*
- Lipomatosis (obesity, steroid therapy, Cushings)
- Spinal Stenosis/Osteophyte formation
- Arachnoid Cyst

*These lesions are associated with acute/subacute paraplegia

(Reeder & Felson’s Gamuts in Radiology 4th ed)
Summary of our Patient’s MRI Findings

T1: Hypointense
T2: Hyperintense
STIR: Hyperintense
T1 with contrast: Rim-enhancement

Classic pattern of findings for a spinal epidural abscess!
MRI of Spinal Infection

- Infectious processes within the spine are characterized by:
  - bone destruction, particularly of the vertebral end-plates
  - obliteration of the normal epidural and paraspinal fat and tissue planes
  - narrowing of the disk space
  - presence of an inflammatory mass or abscess
- Infected tissues typically have signals consistent with more “watery” content and are hypointense on T1, hyperintense on T2, and enhance with contrast.
- Inflammatory masses will either show uniform contrast enhancement (phlegmon) or peripheral enhancement (abscess).

Patient’s MRI on Admission: T1 with Contrast

Anterior Abscess

Epidural Abscess wraps around the spinal cord in the region of C7/T1

Posterior Abscess
Patient’s MRI on Admission: Axial Images

Area of T2 hyperintensity within the thoracic spinal cord

Peripheral enhancement of epidural abscess and small spinal cord abscess

Axial T2 Weighted Image

Axial T1 Weighted Image with Contrast
Spinal Epidural Abscess

• Clinical Manifestations
  – Fever
  – Malaise
  – Back Pain
  – Radiculopathy/paresis
  – Bladder/Bowel dysfunction
  – Plegia
  – Sepsis/Mental Status Change

(Am Fam Physician. 2002 Apr 1;65(7):1341-6)
Spinal Epidural Abscess

• Risk Factors
  – Immunodeficiency
    • AIDS
    • Alcoholism
    • Chronic Renal Failure
    • Diabetes Mellitus
    • Malignancy
  – Intravenous Drug Use
  – Spinal procedure or Surgery
  – Spinal Trauma

(Am Fam Physician. 2002 Apr 1;65(7):1341-6)
Spinal Epidural Abscess

• Pathogenesis
  – Extension of a focal pyogenic infection to the epidural space
    • Osteomyelitis
    • Decubitus ulcer
    • Iatrogenic complication
  – Direct hematogenous seeding

• Microbiology
  – Staphylococcus aureus accounts for 2/3 of cases but they can be caused by many other pathogens.

• Diagnosis
  – Requires a high degree of clinical suspicion and prompt imaging!

(Am Fam Physician. 2002 Apr 1;65(7):1341-6)
Spinal Epidural Abscess

• Treatment
  – Antibiotics
  – Surgical Decompression vs. Percutaneous Drainage
    • Little evidence that either approach is more successful.

• Prognosis
  – Degree of recovery after surgery is related to the duration of the neurologic deficits.

(J Emerg Med 2004; 26:285)
Companion Patient 1: Percutaneous Aspiration

Sagittal T1 weighted image with contrast of a different patient with vertebral osteomyelitis, discitis and a lumbar epidural abscess.

Fluoroscopic guided aspiration of L3-L4 disc space.
Patient’s Hospital Course

• Started on broad antibiotic coverage in the ED
• Taken to the operating room emergently
  – Anterior cervical discectomy/fusion (C5-C7)
  – Posterior laminectomies at C5-C7 and T1-T5
  – Incision and drainage of anterior and posterior abscess components
Patient’s Hospital Course

• POD0: Blood cultures and wound culture grew staphylococcus aureus and she was switched to nafcillin.

• POD1-2: Intubated and sedated in SICU. When weaned from sedation she showed no improvement in physical exam.

• POD3: Failed trial of extubation

• POD7: Spine imaging repeated
Patient’s Post-operative MRI: T2

Extensive edema within spinal cord from cervicomedullary junction extending below field of image

Sagittal T2 weighted image

PACS BIDMC
Patient’s Post-operative MRI: T1

Extensive enhancement within the spinal cord extending from the cervicomedullary junction to the upper thoracic region with focal intrinsic area of low signal consistent with a spinal cord abscess.
Patient’s Post-operative MRI: T1 with Contrast

T1 weighted images with contrast
PACS BIDMC
Patient’s Hospital Course

• POD14: Patient received PEG and Tracheostomy
• POD18: Transferred to rehab.

• Discharge Diagnoses
  – MSSA epidural and intramedullary abscesses
  – Paraplegia
References

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