

Acute Spinal Cord Compression

**Aranice Gonzalez, MS4
University of Medicine and Health Sciences**

Chief Complaint

“I can’t move my legs”

HPI

65 year-old female patient with PMHx of general chronic back and neck pain, T2DM and cervical stenosis. Patient presented to pain management clinic and underwent a cervical epidural injection. Patient was observed for 1 hour and DC'd home, approximately 2.5 hr after injection, patient had excruciating back pain, right upper extremity weakness, bilateral lower extremity paresthesias and weakness that progressed to paraplegia. Patient presented to the ED via EMS with decreased sensation from T3 level downwards and loss of function of the lower extremities.

Pertinent Medical History

PMHx:

Type 2 Diabetes Mellitus- non insulin dependent

Hyperlipidemia

Ovarian cancer s/p TAH-BSO and chemotherapy (2012)

Cervical spinal stenosis

Whiplash injury to cervical spine (MVA 2012)

PSHx:

Laminectomy at C3-C4, C5-C6

Left wrist fracture repair

Right total knee replacement

Left bunionectomy

Continued

Social Hx:

Married, lives in her house with husband, independent with ADLs

Non smoker, Social drinker, Denies recreational drug use

Retired special education teacher

Travel Hx: Returned from FL 4 days ago

Family Hx:

Mother: deceased age 90, pancreatic cancer

Father: deceased age 95, heart disease

Siblings: 1 sister, healthy; 1 brother, unspecified arthritis

Allergies:

NKDA

Physical exam on admission

Vital Signs	
Blood Pressure	175/123
Heart Rate	115
Resp Rate	20
SpO2	95% RA
Temperature	36.4C (97.5F)

General: Overall well-appearing woman who is laying in her stretcher bed in no acute distress.

HEENT: NC/AT, PERRL, Extraocular movements intact. Moist mucous membranes. Neck supple without lymphadenopathy.

Cardiovascular: Tachycardic rate and regular rhythm. No S3, S4 or murmurs. Bilateral radial and dorsalis pedis pulses 2+ and symmetric.

Respiratory: Non-labored respirations. Lungs clear to auscultation bilaterally. No wheezes, rhonchi or rales.

Abdominal: Abdomen is soft, non-tender. No suprapubic fullness.

Neurological Exam

Mental status: AAOx3, Recalls 3/3 objects after 5 minutes.

Cranial Nerves: II-XII intact.

Motor: Full range of motion and 5/5 strength in muscle groups in bilateral upper extremities. Flaccid paralysis of bilateral lower extremities. Occasional fasciculations in bilateral lower extremities.

Deep Tendon Reflexes: Upper extremities Biceps, Triceps and Brachioradialis 2+ bilaterally. Lower extremities L Patellar 2+, R Patellar 2+; Achilles 0 bilaterally. Babinski sign negative.

Sensory: Intact to light touch in upper extremities. Loss of sensation from T3 dermatome downwards. Vibratory sensation was diminished at the ankles.

Cerebellar: Function was intact on finger-nose-finger testing. Gait was not tested.

Labwork

CBC	
WBC	7.7
Hemoglobin	14.0
Hematocrit	41.7
Platelets	245

Coagulation profile	
PT	10.3
aPTT	27.3
INR	0.96

BMP	
Sodium	136
Potassium	3.4
Chloride	102
Carbon Dioxide	24
BUN	13
Creatinine	0.66

Differential Diagnosis

1. Hematoma
2. Fractured vertebrae
3. Epidural abscess
4. Disk herniation
5. Subluxation of vertebral bodies
6. Spinal Stenosis
7. Metastasis due to underlying malignancy that is extensive enough to causing cord compression

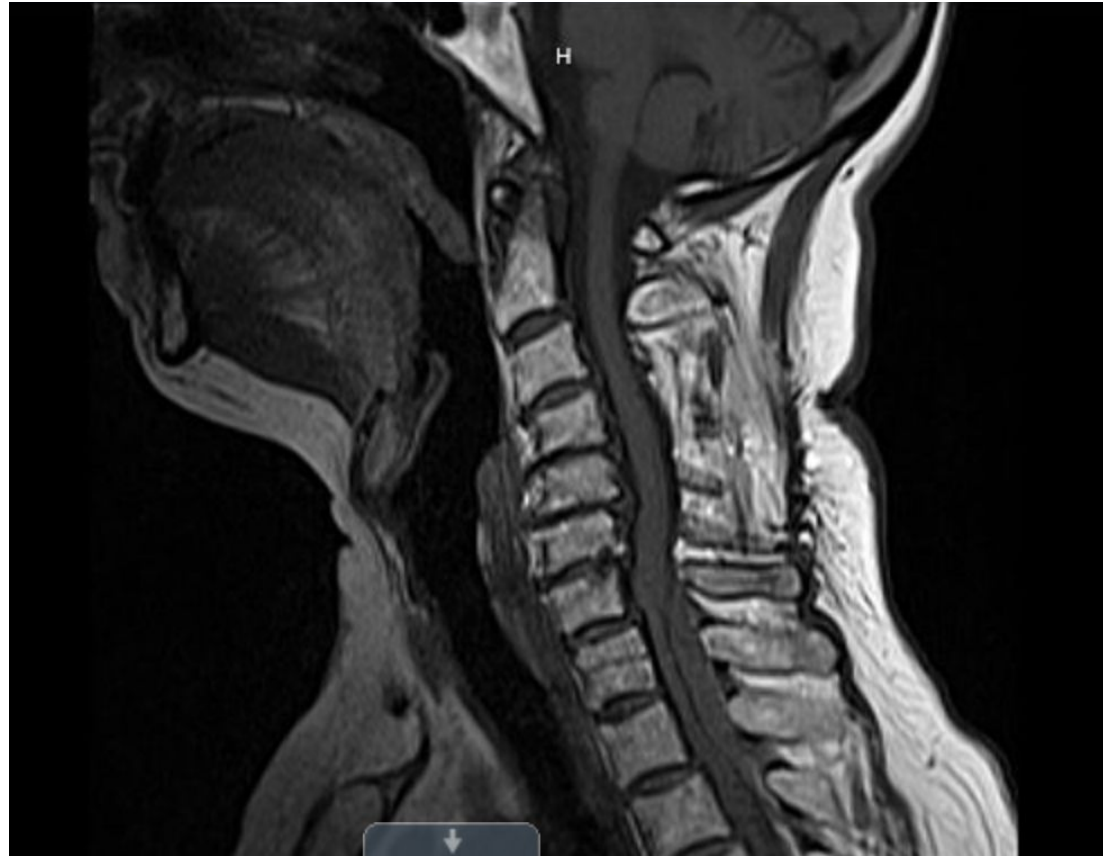
Imaging

Sagittal T1-MRI of cervical spine.

Epidural hematoma visualized at C7-T1 extending to T3-T4.

Maximum thickness posterior to T1 and T2.

Post-surgical changes seen.





Sagittal T2-MRI of cervical spine.
Epidural hematoma visualized C7-T1
extending to thoracic spine T3-T4.



Sagittal T2-MRI of cervical spine. Normal
MRI for purpose of comparison.

Spinal epidural hematoma

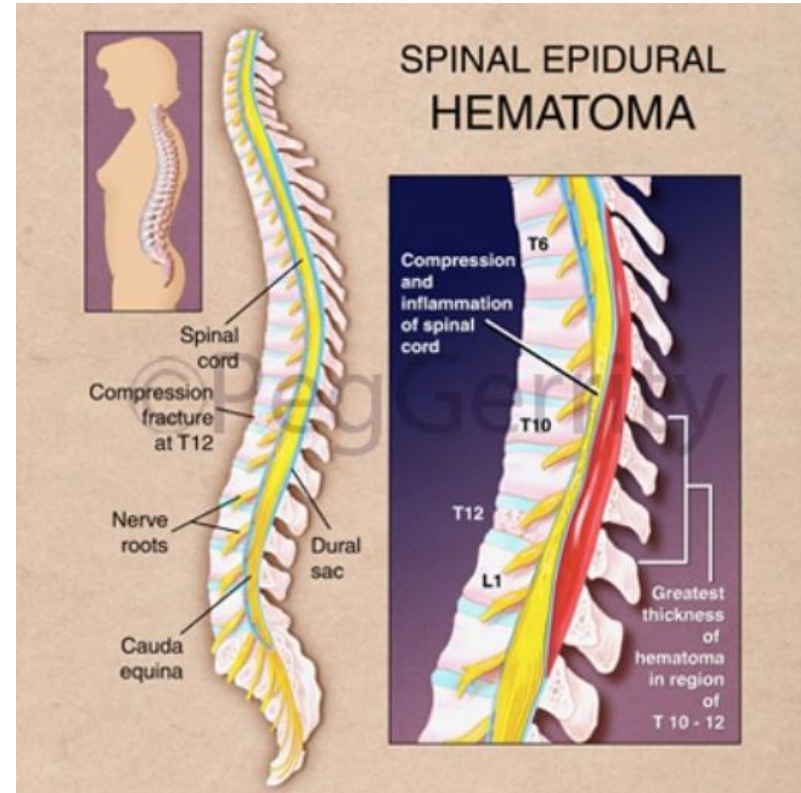
Definition: Collection of blood in the potential space between the dura and the bone, along the spinal canal.

Considered a **surgical emergency** due to the significant bleeding that can lead to spinal cord damage/compression leading to neurological injury and deficit.

Etiology: Iatrogenic
Traumatic
Spontaneous

Risk factors

1. Anticoagulation
2. Trauma/Localized trauma
3. Thrombocytopenia, bleeding disorders
4. Vascular malformations



Clinical features of acute spinal cord compression

Depending on the level and size of the hematoma, exam findings may include...

- Sudden onset of severe back pain
- Unilateral or bilateral weakness below affected level that can progress to paralysis
- Alterations to DTRs
 - Limbs may be areflexic and flaccid with progression to hyperreflexia
- Sphincter dysfunction leading to urinary/bowel urgency, incontinence or retention
- Loss or reduction of all sensation below the affected level
- Babinski signs and hyperreflexia are usually not evident in acute cases, but may develop with progression of the disease

Diagnositics

Magnetic Resonance Imaging (**MRI**) is the **gold standard** imaging modality

Imaging should be of the whole spine, even in patients with localized signs

Superior to CT as it can visualize the extent of the hematoma more readily and signs of any ischemia due to compression, if present

Helps in determining the age of the hematoma

Within 24 hrs: isointense in comparison to cord on T1, hyperintense on T2

After 24: hyperintense in both T1 and T2

Chronic: hypointense on both T1 and T2

Computed Tomography (**CT**) may also be used if MRI is not available or if there is any contraindication

May give false-negative results if the hematoma has similar densities as surrounding structures.

Labwork: Elevated INR, prolonged aPTT, platelet dysfunction or thrombocytopenia

Management

Immediate neurosurgical consultation

Any delays may lead to permanent neurological damage

Urgent surgical decompression is the **treatment of choice** for spinal epidural hematomas causing acute compromise of the cord

Laminectomy followed by evacuation of hematoma and coagulation of any active bleeding is performed

Reversal of anticoagulation

Intravenous steroids for anti-inflammatory effects

Physical and Occupational Therapy

Injury to the cervical spine causes the most serious of the neurological disabilities like tetraplegia and respiratory failure.

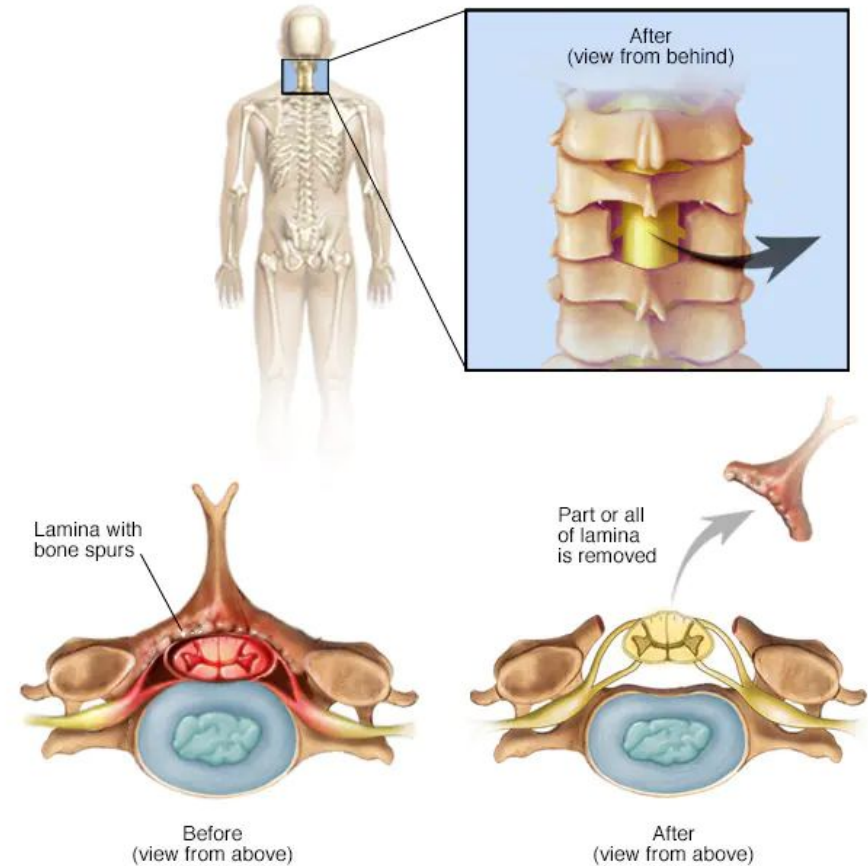
Cervical and thoracic epidural hematomas are more likely to be symptomatic given that there is less space available when compared to the greater space for volume compensation in the lumbar region and cauda equina.

The operative interval, the time between clinical onset and surgical treatment, is considered one of the most important determining factors that can influence the outcome in patients.

Prognosis also depends on pre-operative neurological status and duration of dysfunction. Therefore, prognosis is worse when there is delay.

Laminectomy

- Removal of the dorsal part of the involved vertebra (lamina)
- Enlarges the spinal canal to relieve pressure on the spinal cord or nerves



Neurological exam after surgical decompression

Mental status: Patient was alert and oriented. Recalled 3/3 words after 5 minutes.

Cranial nerves: II-XII were intact.

Motor: Strength ½ in iliopsoas and quadriceps bilaterally. ¾ right triceps. 5/5 left triceps, biceps and deltoid muscles.

Deep tendon reflexes: Achilles deep tendon reflexes were absent bilaterally. Patellar, brachioradialis, bicep, tricep were ¼ bilaterally. Bilateral Babinski sign positive.

Sensory: Pinprick sensation was intact over chest, abdomen and all 4 extremities. Vibratory sensation diminished at the ankles.

Cerebellar: Intact on finger-nose-finger testing.

Rehab Management

Improve patient's function and strive to maintain health and quality of life while preparing to return to their usual activities.

Provide the patient and their families education on spinal cord injuries

Physical and occupational therapy to increase strength, maintain joint flexibility and improve mobilization

Preventing further injuries

Implement the use of medications for associated side effects eg. pain, spasticity, depression

Assist patients with equipment like wheelchairs or any other adaptive equipment

References

Ropper AE, Ropper AH. Acute Spinal Cord Compression. Longo DL, ed. *New England Journal of Medicine*. 2017;376(14):1358-1369. doi:<https://doi.org/10.1056/nejmra1516539>

Patel K, Chopra P, Upadhyayula S. Epidural Steroid Injections. PubMed. Published 2021. <https://www.ncbi.nlm.nih.gov/books/NBK470189/>

Nam KH, Choi CH, Yang MS, Kang DW. Spinal Epidural Hematoma after Pain Control Procedure. *Journal of Korean Neurosurgical Society*. 2010;48(3):281-284. doi:<https://doi.org/10.3340/jkns.2010.48.3.281>

Figueroa J, DeVine JG. Spontaneous spinal epidural hematoma: literature review. *Journal of Spine Surgery*. 2017;3(1):58-63. doi:<https://doi.org/10.21037/jss.2017.02.04>

Fukui MB, Swarnkar AS, Williams RL. Acute Spontaneous Spinal Epidural Hematomas. *American Journal of Neuroradiology*. 1999;20(7):1365-1372. Accessed April 13, 2023. <https://www.ajnr.org/content/20/7/1365>

Thank you!