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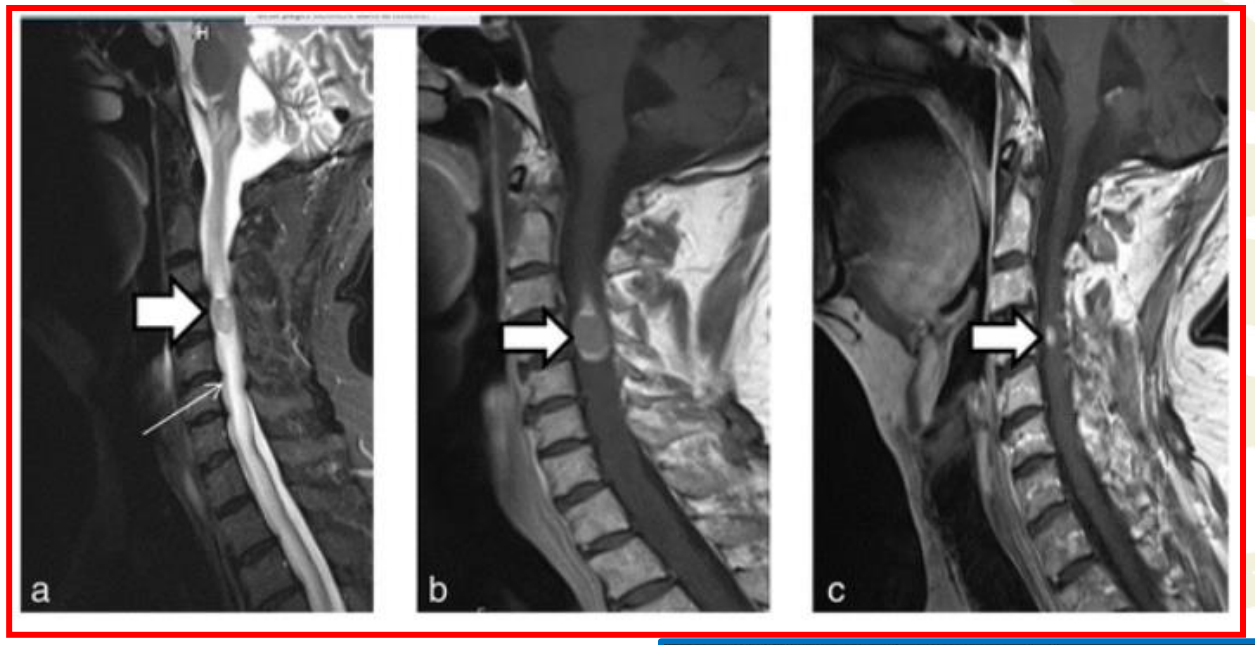
Radiation Oncology Emergencies

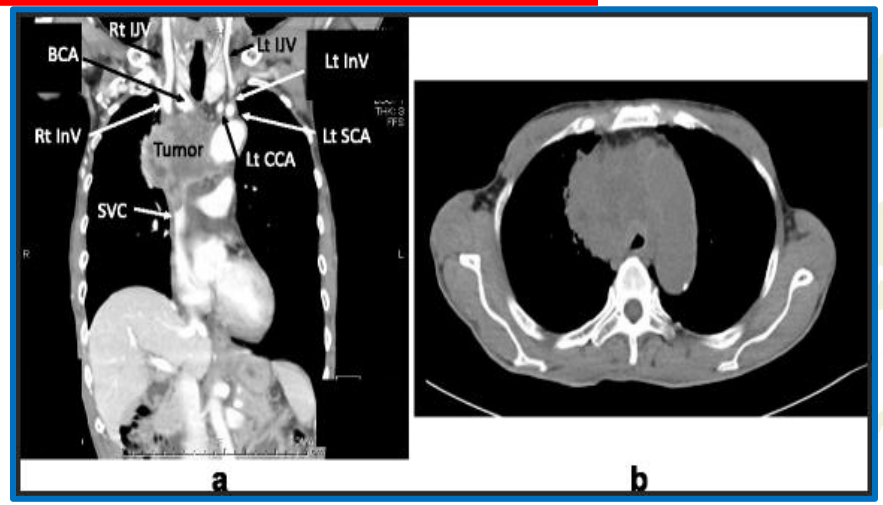
Armando Vera MD
PGY-2

Learning Objectives

- Identify common emergencies that may require immediate radiation therapy, including malignant spinal cord compression, superior vena cava syndrome and brain metastases
- Discuss the inpatient management of patients experiencing oncologic emergencies requiring radiotherapy

Radiation Oncology Emergencies





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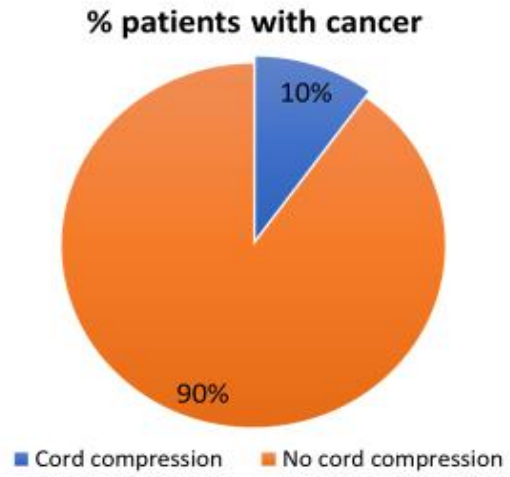
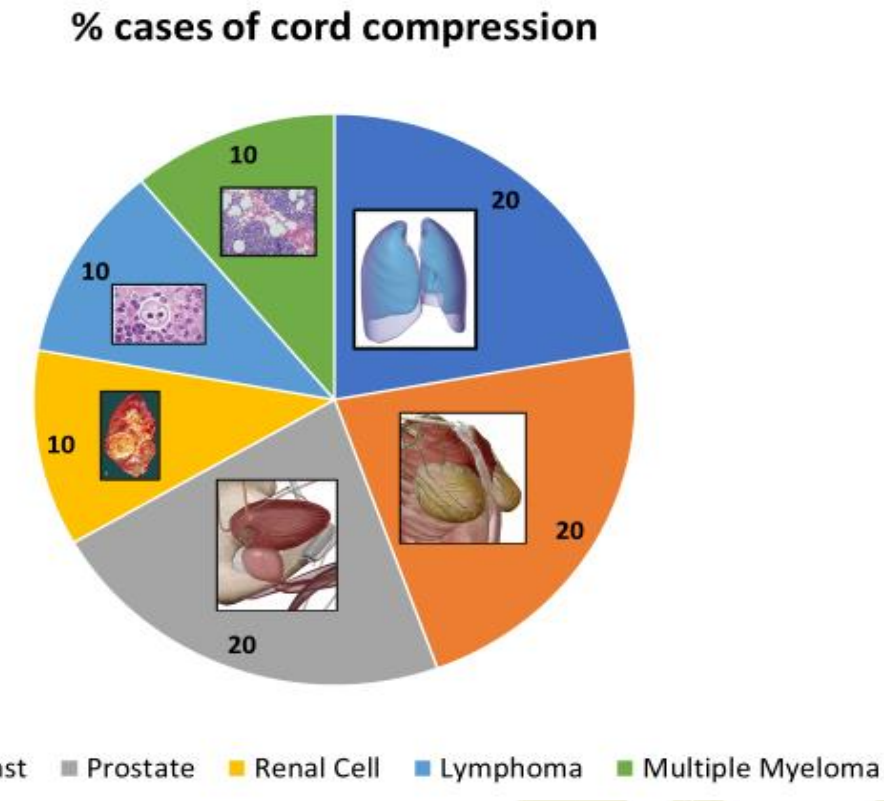
Spinal Cord compression: Epidemiology





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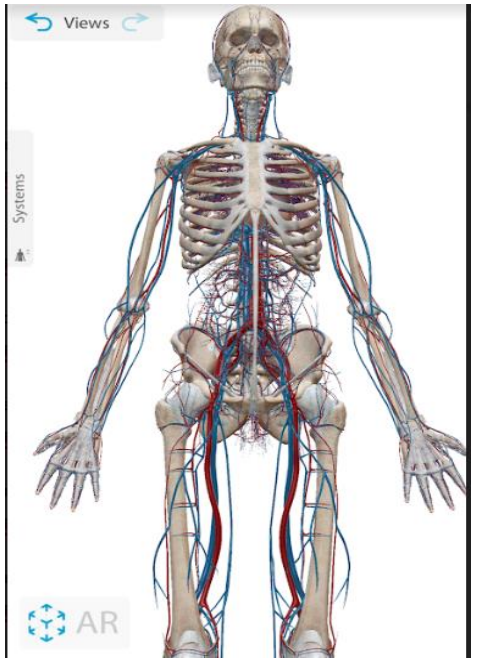
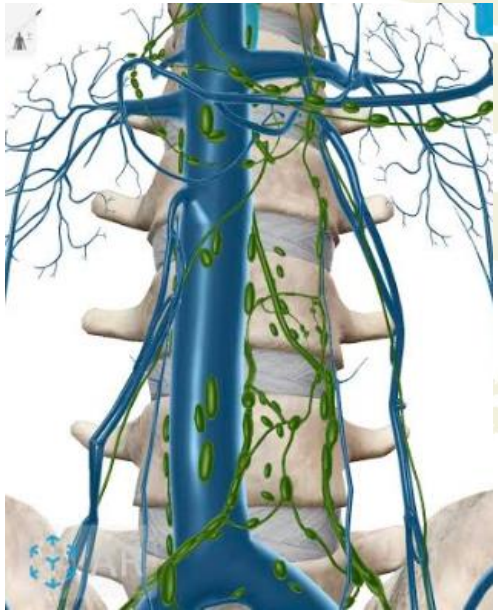
Patterns of spread





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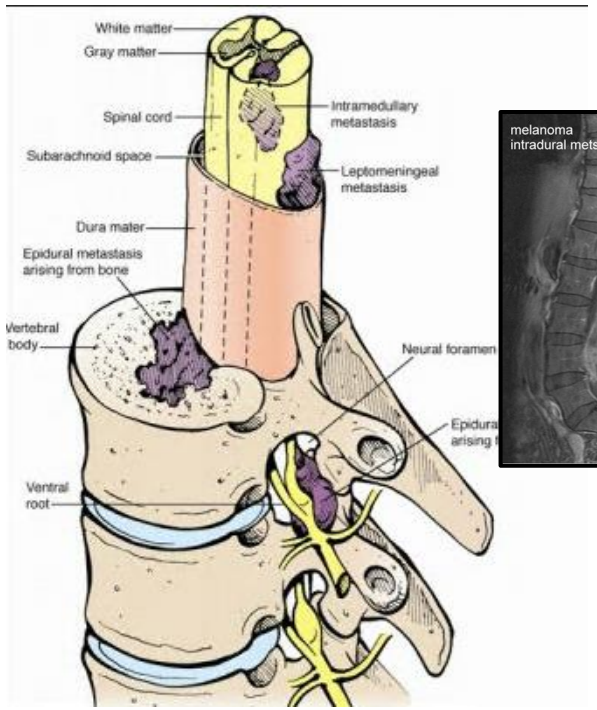
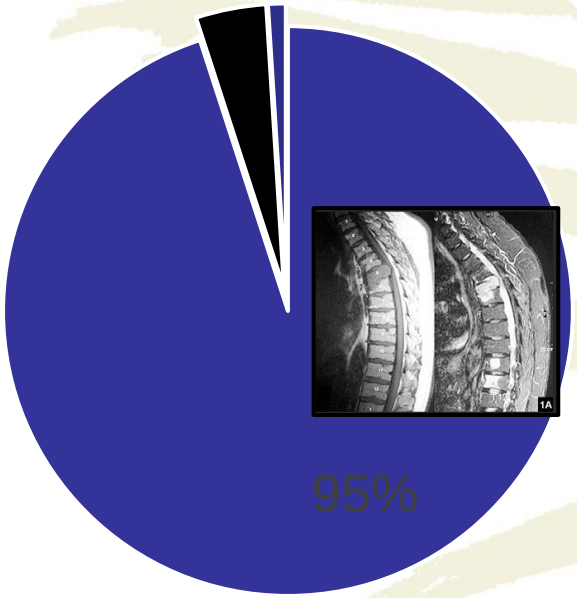
% site of origin





■ epidural ■ intradural, extramedullary ■ intramedullary

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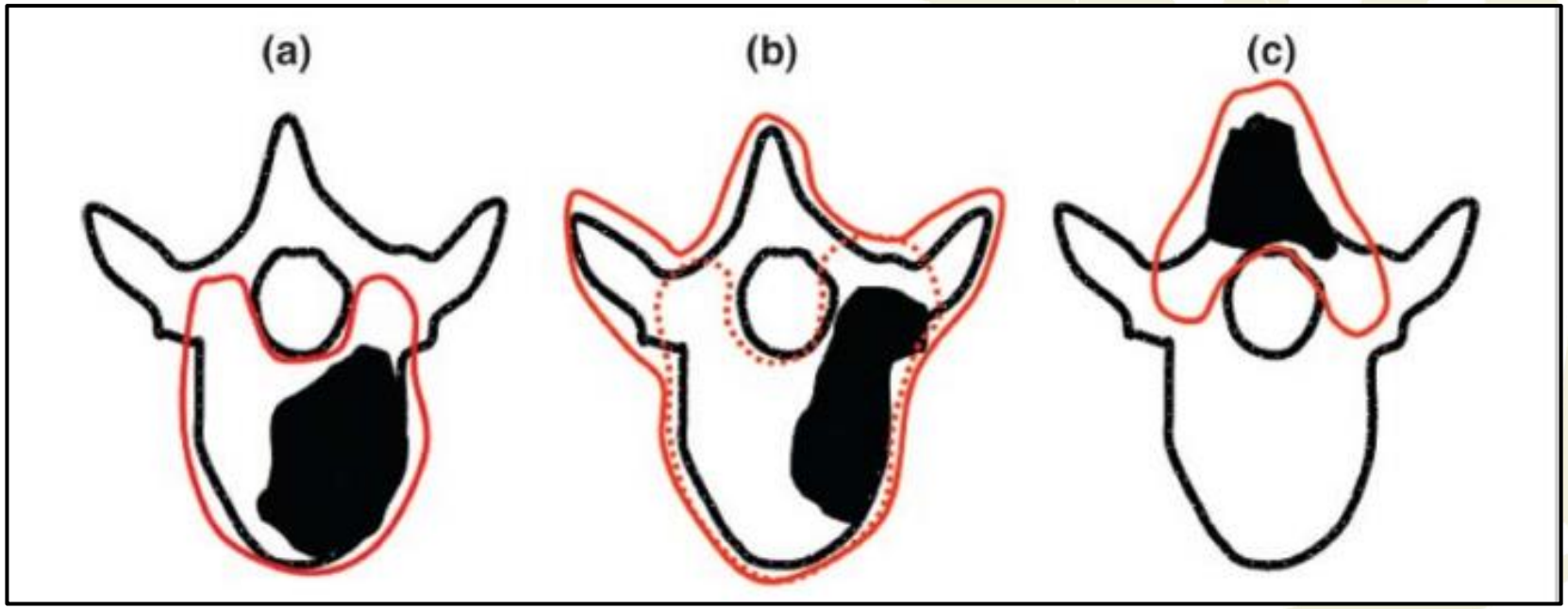
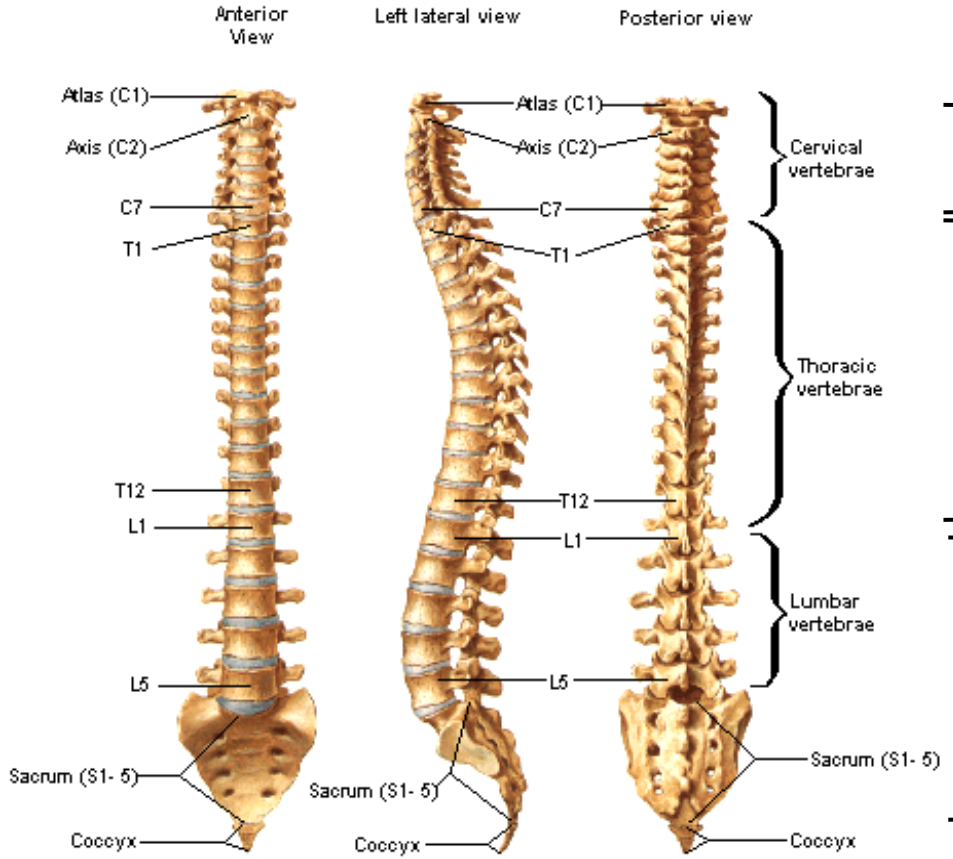


Vertebral Column



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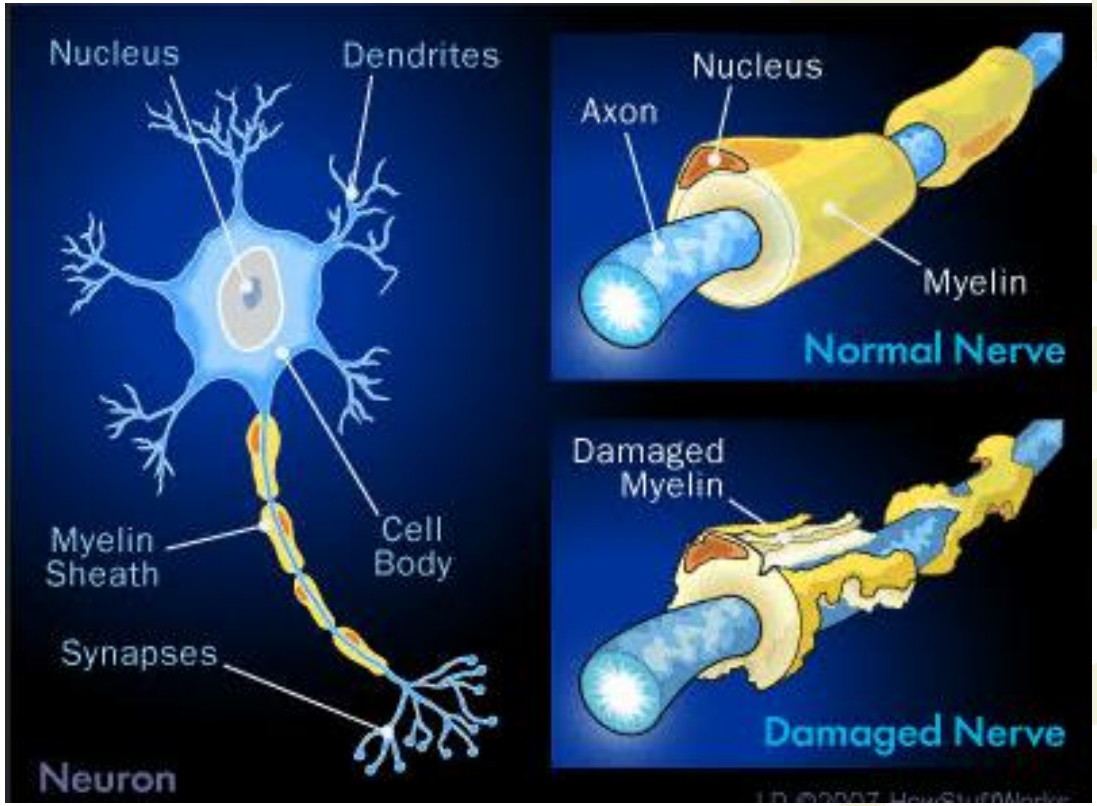
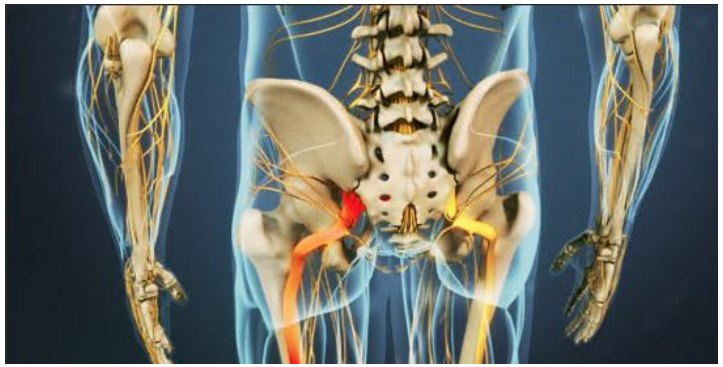
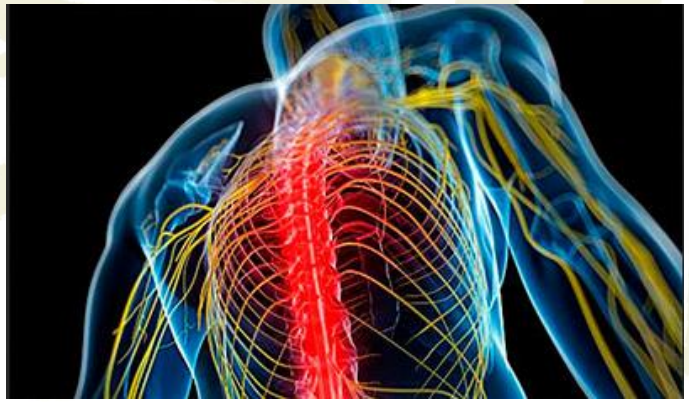
Pathophysiology



Presentation





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Workup

- H&P
- DRE
- Evaluation of sensation to determine level of the lesion
- Pain
- Prior cancer management to include prior RT
- Screening MRI of the full cervical/thoracic/lumbar (C/T/L) spine

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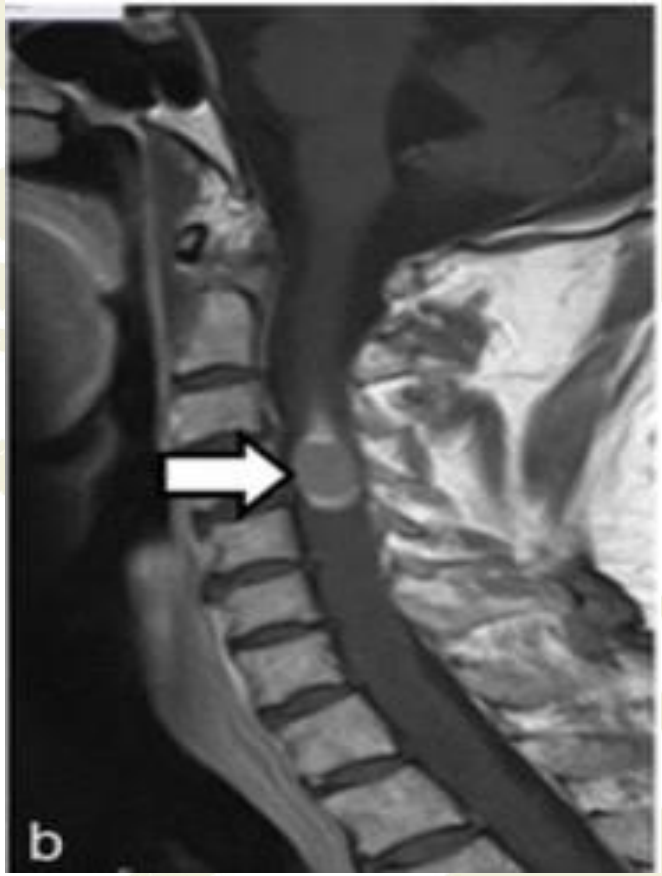
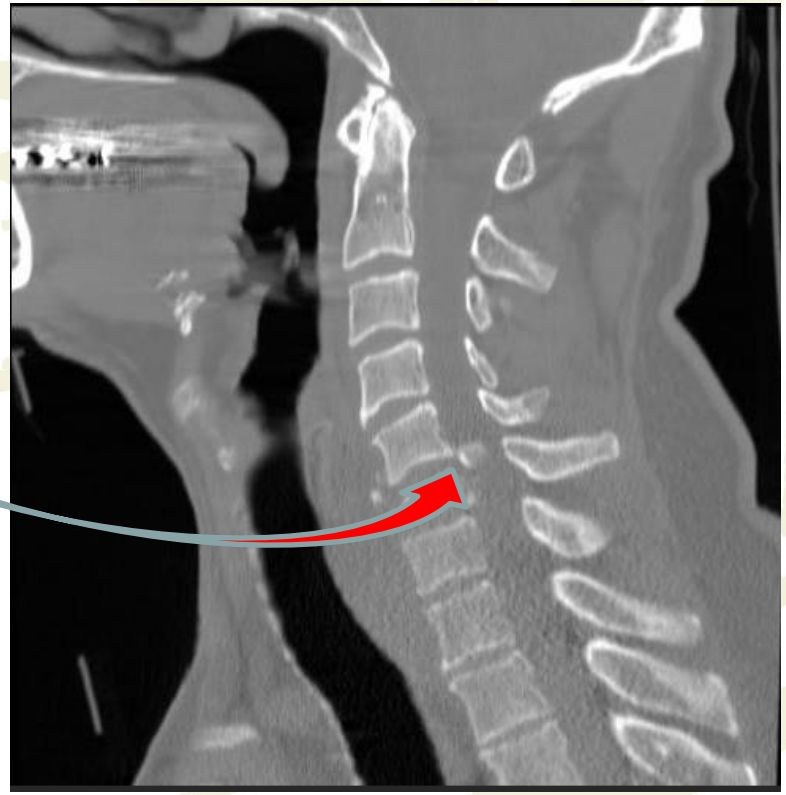


CT

Retropulsed fragments



Treatment overview

- Modalities used to treat SC compression: steroids, Sg, and RT (in select cases chemo is used for chemosensitive tumors).
- For initial management of cord compression:
  - Dexamethasone
  - Pain control
  - Consult neurosurgery or orthopedics (spine)
  - Chemotherapy – sensitive tumors

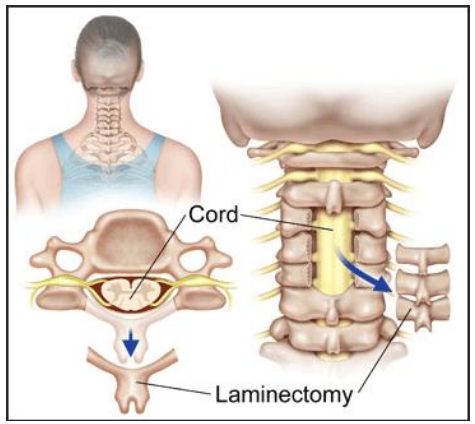
Surgery

- The two primary goals of surgery in patients with neoplastic epidural SCC are:
  - Preservation or restoration of mechanical stability
  - Circumferential decompression of the spinal cord

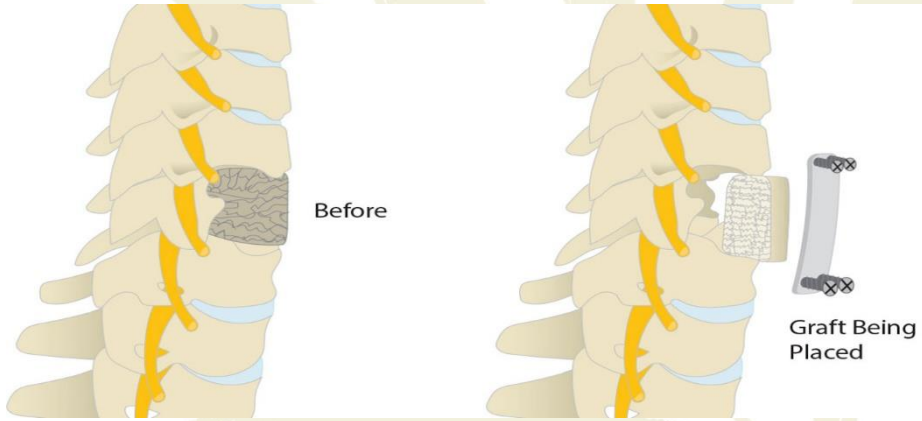
Surgical Management

- Corpectomy
- Laminectomy
- Separation Surgery
- Vertebroplasy
- Kyphoplasty

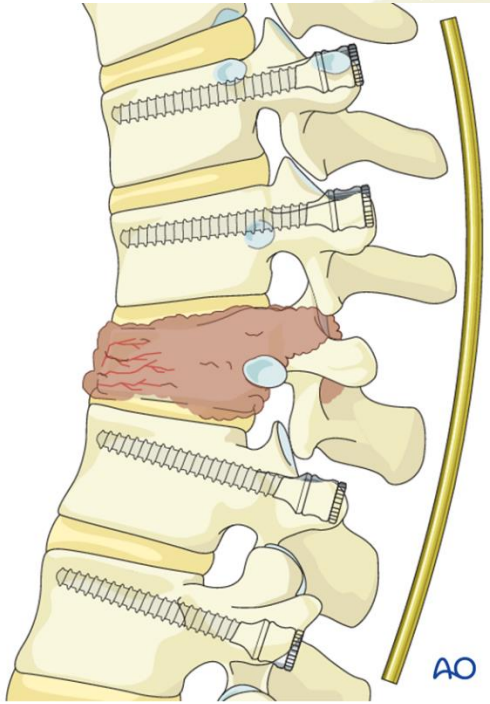
Surgery - Indications



Laminectomy



Corpectomy



Separation surgery

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Surgery - Indications

- MRI with cord compression in a single area and a life expectancy >3 mos
- Radioresistant tumor followed by→ RT
- Additional indications for surgery:
  - previous RT
  - Dz progression despite RT
  - unknown primary tumor (therapeutic and diagnostic)
  - paraplegia <24 hrs (NCCN 2020 Guidelines, used to be <48 hrs)

Radiotherapy (cont.)

- Cord compression pts who should be treated with RT alone:
  - Life expectancy <3 mos
  - No spinal instability or bony compression
  - Multilevel involvement
  - Radiosensitive tumor
    - Lymphomas
    - Leukemias
    - germ cell tumors
    - multiple myeloma

RT toxicities in Tx of Spinal cord compression

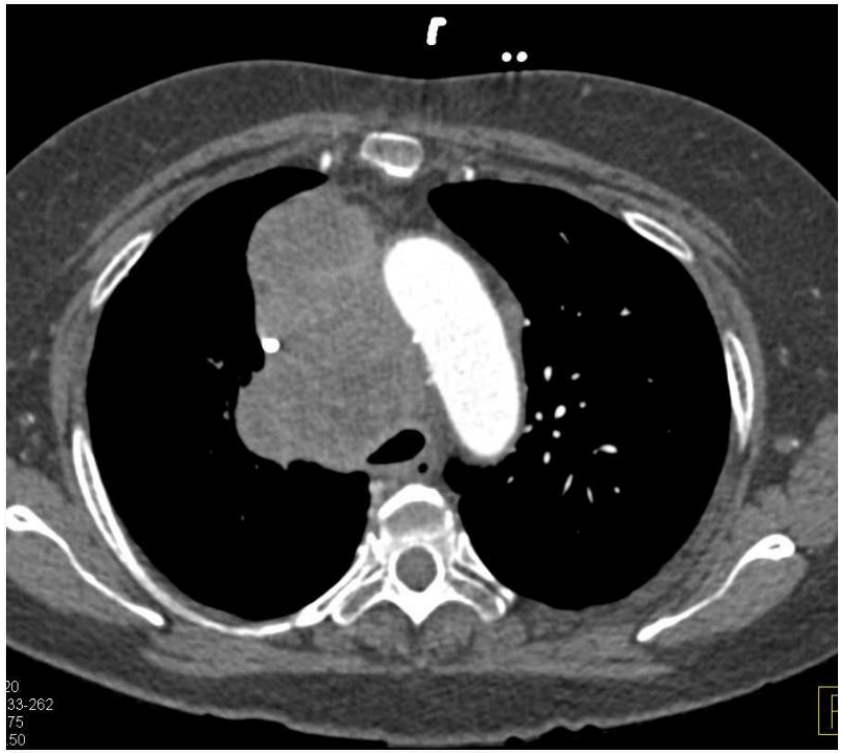
- Potential toxicities of RT for cord compression:
  - Odynophagia
  - Globus
  - Esophagitis
  - Nausea
  - Diarrhea
  - Myelosuppression
  - Rare SC injury

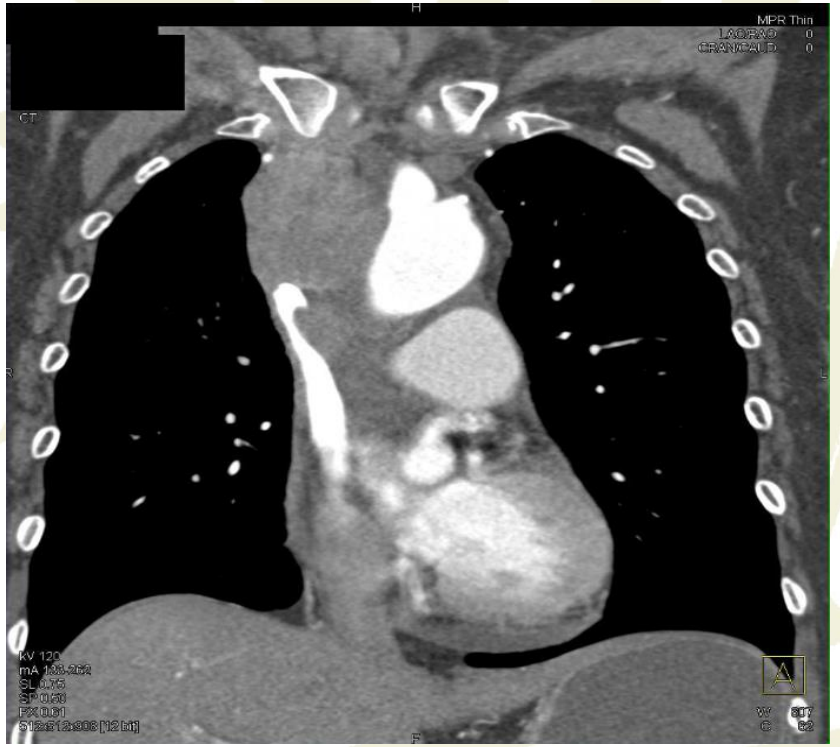
Superior Vena Cava Syndrome

- Cough.
- Face or neck swelling.
- Feeling of fullness in your upper body.
- Swelling in your arms and hands.
- Shortness of breath (dyspnea).
- Other signs sometimes include:
- Blueish skin (cyanosis).
- Chest pain.
- Coughing up blood.
- Faster breathing.
- Hoarse voice or difficulty speaking.
- Horner's syndrome, symptoms on one side of your face (sagging eyelid, lack of sweat, one smaller pupil).
- Trouble swallowing.
- Visibly swollen veins in your upper body.

Superior Vena Cava Syndrome

- The collateral system of SVC is formed by:
- Vertebral
- Azygos
- Mammary
- Lat thoracic
- Paraspinous
- Esophageal vessels.
- The right subcostal and right ascending lumbar veins coalesce to form the azygos vein.





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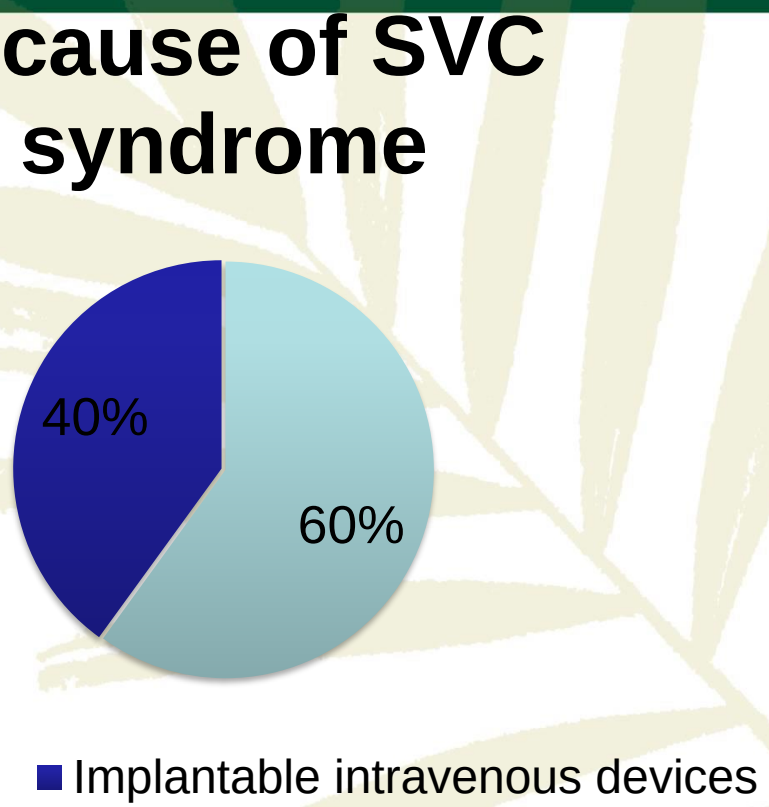
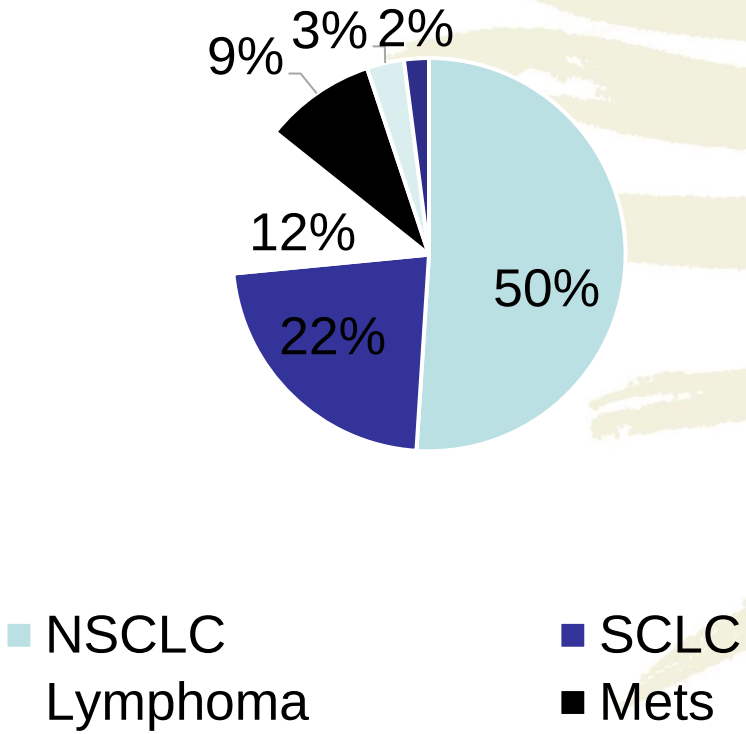
- Malignancy previously accounted for 90% of cases
  - with increased use of implantable intravenous devices (i.e., central venous catheters, pacemaker leads), this has decreased.
- Benign Causes of SVC Syndrome
  - 1. Catheter-induced thrombosis
  - 2. Chronic mediastinitis
  - 3. Retrosternal goiter
  - 4. CHF
  - 5. Aortic aneurysm

(McCurdy M et al., Crit Care Med 2012)



Cancer associated w/SVC syndrome



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Presentation

- Pts with SVC syndrome may have Sx over days to wks but usually present within 1 mo of onset.
- Most pts presenting with SVC syndrome do not have a prior cancer Dx.
- SVC syndrome may cause airway obstruction and cerebral edema; however, severe Sx are uncommon, and life-threatening Sx are rare.

Symptoms

- 1. Face and neck swelling (The most common Sx of SVC syndrome is facial swelling)
- 2. Upper Extremity swelling
- 3. Cough/stridor
- 4. Dyspnea
- 5. Dilated chest veins (collateral blood flow)

(Rice T et al., Medicine 2006)

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Physical Exam

Pemberton's Sign

Pilcz' Sign

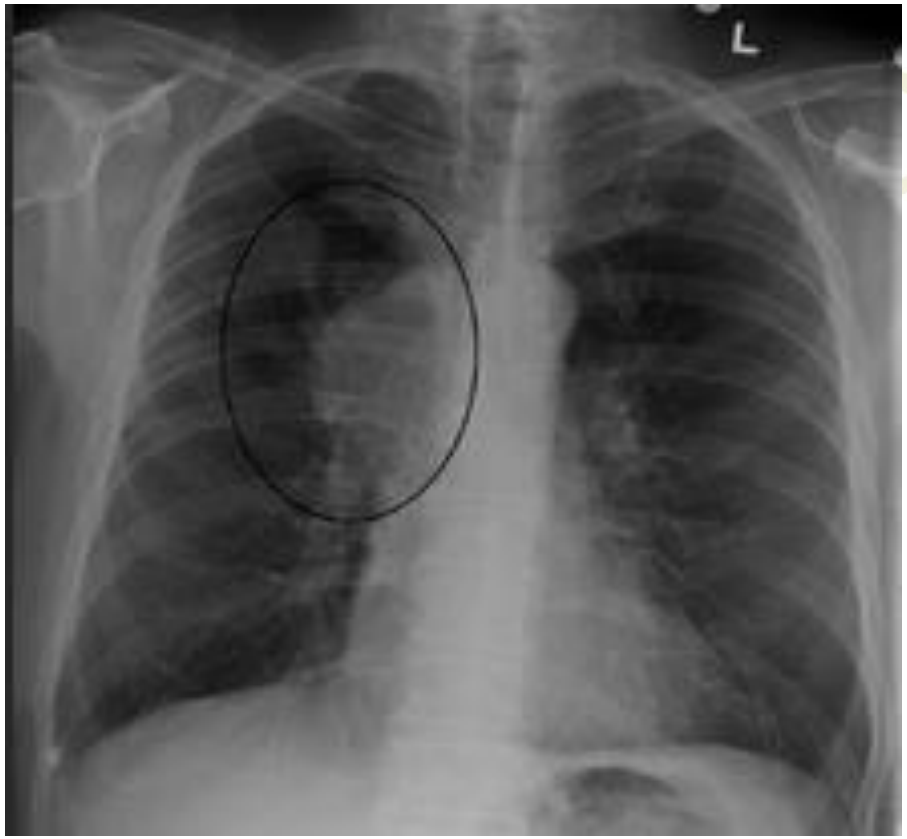
Piskacek's Sign

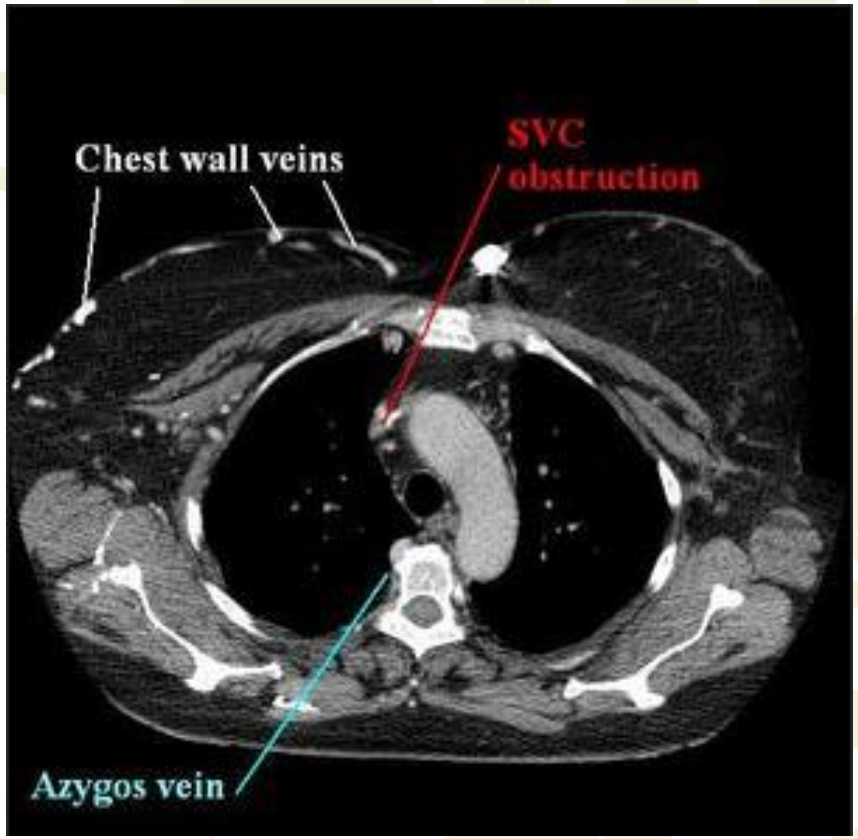
Pastia's Sign

Workup

- H&P
- Assessment of respiratory status
- CXR and/or CT chest with contrast (best to visualize the extent of blockage)
- Determination of the best Bx route if Dx is unknown
  - Methods to obtain tissue Dx in SVC syndrome:
    - 1. Sputum cytology
    - 2. Bx of palpable LNs
    - 3. Bronchoscopy
    - 4. Mediastinoscopy
    - 5. Video-assisted thoracoscopic Sg (VATS)
- Labs (AFP, LDH, β-HCG)
- BM aspirate and Bx

Findings on imaging





Prognosis

- The prognosis in SVC syndrome depends on the underlying cause rather than the presence of the syndrome itself.
- MS is about 6 mos. for cancer-induced SVC syndrome.
- However, based on etiology, many will survive longer or even be cured.

RT prior to histologic diagnosis?

- RT may obscure the histologic Dx and should be deferred until diagnostic Bx is obtained in SVC syndrome.
- However, empiric Tx may be considered in the setting of airway obstruction or cerebral edema.

Treatment

- 1st – obtain diagnosis
- Treatment options: RT, chemo, Sg, and stents
- Supportive measures:
  - Elevation of head of bed and supplemental oxygen.
  - Diuretics can be used for cerebral edema.
  - Remove indwelling catheter if SVC syndrome due to thrombosis.

(McCurdy M et al., Crit Care Med 2012)

Radiation		Stent		Chemotherapy	
Advantages	*Disadvantages*	*Advantages*	*Disadvantages*	*Advantages*	*Disadvantages*
Noninvasive intervention	Symptom relief in 7–15 d	Rapid relief of symptoms usually within 24–72 h	Invasive intervention	Noninvasive intervention	Symptom relief in 7–15 d
Treats underlying malignancy	May compromise a tissue diagnosis if not yet obtained	Does not compromise a tissue diagnosis	Bleeding complications	Treats underlying malignancy	May compromise a tissue diagnosis if not yet obtained
—	May initially worsen symptoms due to inflammation	Allows option for further treatment with chemotherapy, radiation, or combined-modality therapy	Increased risk of thrombosis due to foreign object	Does not require specialized equipment	Patient may be too sick to tolerate chemotherapy
—	—	—	Does not treat the underlying malignancy	Ability to be administered in ICU	Hematologic and other toxicity

Abbreviation: ICU, intensive care unit.

Superior Vena Cava Syndrome

Jonathan F. Wan, BASc, MD, FRCPC[a,b,*],
Andrea Bezjak, MD, MSc, FRCPC[a]

Hematol Oncol Clin N Am 24 (2010) 501–513
doi:10.1016/j.hoc.2010.03.003 hemonc.theclinics.com

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Steroids, chemo and vascular stents

- Steroids
- Chemotherapy - > is the Tx of choice in SVC syndrome caused by lymphoma, germ cell tumors, and SCLC.
- The most rapid method to manage SVC thrombosis is by intraluminal stenting.
- →Vascular surgery
- Anticoagulation therapy used for pts with SVC syndrome presenting with thrombosis unless contraindications are present.

Radiation Therapy

- Dose
  - Urgent
    - 7.5 Gy in 3 fractions to 12 Gy in 3 fractions for symptom alleviation
    - Then, 1.8 – 2.0 Gy/fraction to definitive dose (if curable), based on histology
  - Palliation only
    - 10 Gy in 1 fraction
    - 30 Gy in 10 fractions
- Fields should include gross disease and adjacent lymph nodes, adjusting as symptoms improve
- Overall response rate ~60%
- Responses seen usually in 7-15 days, but as early as 72 hours
- 20% of patients have no response at all

When does SVC Syndrome require emergent treatment?

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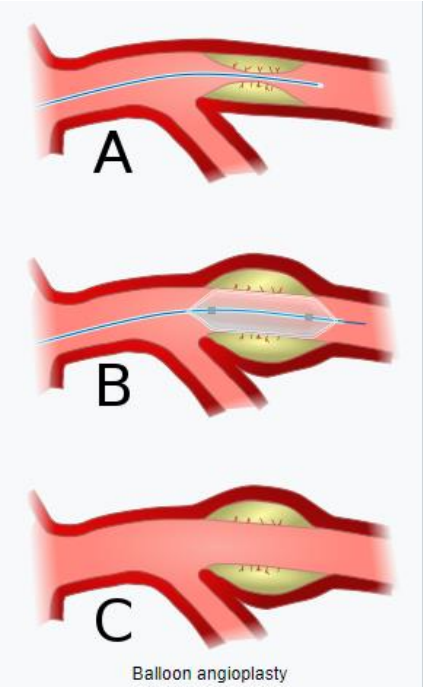
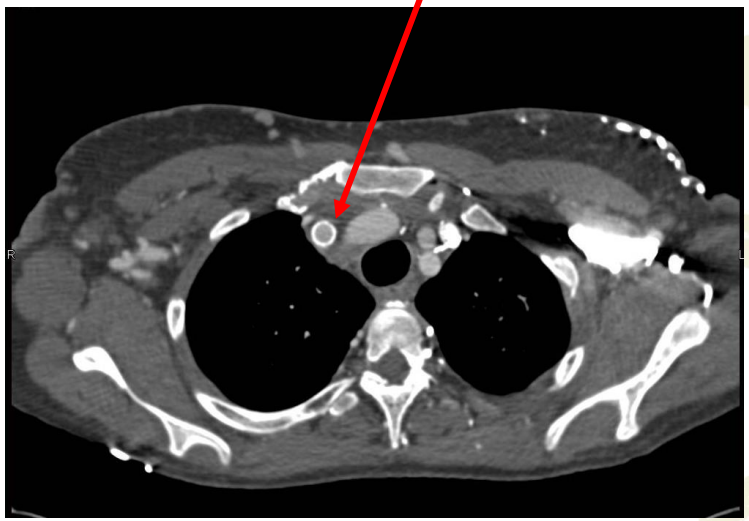
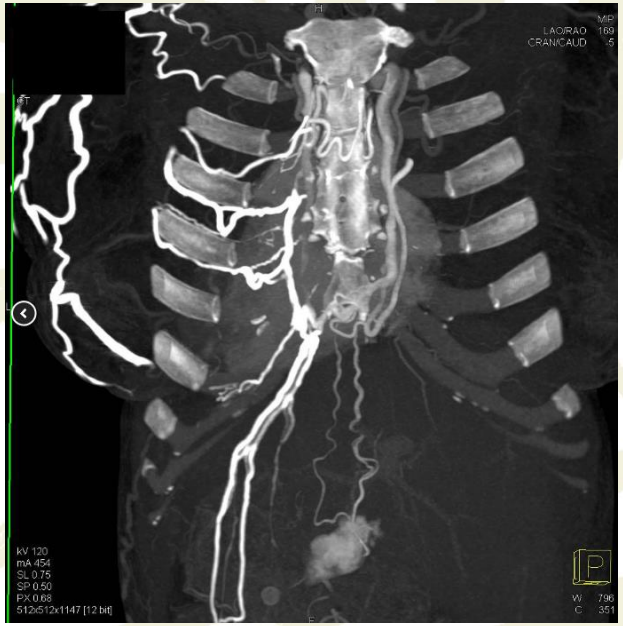
Endovascular stenting w/ angioplasty



Balloon angioplasty

SVC stent





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Thank you

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