Evaluation of SVC Syndrome

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Index Patient

• Patient is a 30-year-old woman who has a several month history of ‘attacks’
  – Describes bouts of dyspnea
  – Chest pain that she describes as ‘palpitations’
  – Gets worse when she lays down
  – Claims that her face has gotten larger

• Physical exam
  – Plethoric face
  – Distended neck veins, no masses
  – Systolic murmur that does not radiate
What is SVC Syndrome?

• Described by William Hunter in 1757
• Results from obstruction of SVC in two ways
  – External Compression
  – Internal Invasion
    • Neoplastic (~80-90%)
      – Lung CA (~70-80%), mediastinal masses, metastasis
    • Benign
      – Thombosis, fibrosing mediastinitis, syphilitic aneurysm
      – Iatrogenic from catheters, pacers, hemodialysis
• Rare manifestation of neoplasm
  – 5-10% of Lung CA, 2-5% of Lymphoma
Anatomy of the SVC

- SVC is 7 cm
- Begins at level of first rib at sternum
- Forms superior and posterior wall of right atrium
Lateral Anatomy

- Part of the middle mediastinum
- Azygous vein arches over right bronchus
- Right Phrenic, Vagus and sympathetic trunk nerves in vicinity
  - Horner's syndrome is very similar, just that the nerve is invaded or compressed first!

Adapted Image  www.dnaillustrations.com/body/anat5.html
Lung CA Causing SVC Syndrome

Images http://www.vh.org/adult/provider/radiology/LungTumors/ParaneoplasticProcesses/Text/SVCRadiology.html
Superior Vena Cavogram

- SVC is obstructed at level of the innominate
- Right subclavian is obstructed as well
- Notice the collaterals
Collateralization

- In long-standing SVC syndrome there is collateralization of vessels
  - Azygous
  - Internal mammary
  - Lateral thoracic
  - Paraspinous
  - Esophageal veins

Images http://www.vh.org/adult/provider/radiology/LungTumors/ParaneoplasticProcesses/Text/SVCRadiology.html
Superior Vena Cava Stenting

- IR can introduce catheter into vein in the arm
- Ballon angioplasty can open up the stenosis place a stent

Our patient....

- Initial CXR showed a mass
- What other study have been performed?

THE LATERAL!
Our patient....

- Trachea slightly deviated
- Widened Mediastinum

Based on history and symptoms, the patient went to CT
What to do now?

- CT showed an anterior mediastinal mass

- Four T’s!
  - Thyroid
  - Thymoma
  - Teratoma
  - Terrible lymphoma

Pressure on PA caused systolic murmur!
Other findings?

Collaterals!
Trans-Thoracic Needle Biopsy

• Indications
  – Evaluation of solitary pulmonary nodule
  – Confirm metastatic lung disease
  – Diagnose mediastinal mass
  – Diagnose pleural thickening
  – Sampling of suspected infectious lesion/abscess
  – Stage lung cancer or extrathoracic malignancy

From Klein, Interventional Chest Radiology
Trans-Thoracic Needle Biopsy

• Contraindications
  – Bleeding diathesis; INR>1.3, PLT<50,000
  – Inability of patient to cooperate
    • Cannot lie still
    • Cannot lie in prone or decubitus position
    • Have to be able to hold breath
  – Contralateral pneumonectomy
  – Bulla or severe emphysema or vascular structure in biopsy path

From Klein, Interventional Chest Radiology
CT Guided Biopsy

- While in the ED, she was sent to CT guided biopsy

- A wire grid is placed over the patient in the region of interest
  - Grid lines are oriented longitudinally
  - CT cross section determines latitude position and depth
Longitudinal Wire Grid is used to determine the insertion site of the needle
The needle is advanced into the mass and a piece is aspirated into the bore.
Path Findings

- Binucelated Cell
  - “Owl’s Eyes”
- CD15+, CD30+
- Reed-Sternberg

HODGKINS

http://www.lymphome.de/InfoLymphome/HodgkinLymphome/HaeufigkeitUndUrsache.jsp
Staging Workup

- CT of Chest, Abd, Pelvis
- Currently PET is used to Stage
  - Replaced laparotomy and Bone Marrow Biopsy
  - Can measure disease response with serial scans
- FDG goes to areas of increased metabolic activity
Cross Sectional PET

Hard to ascertain anatomy in PET images!
Cross Sectional PET

- New PET-CT machines overlay anatomy automatically
- Radiologist has to determine whether uptake is tumor!
Our Patient

• PET image showed uptake in bone marrow
  – Stage III-IV disease

• The patient is now being treated with ABVD
  – doxorubicin, bleomycin, vinblastine, dacarbazine
  – 60-70% cure rate

• Symptoms of SVC syndrome melted away with chemotherapy
  – Her baseline anxiety played a role in her presentation
Summary

• Superior Vena Cava Syndrome is rare but important diagnosis

• Radiology is essential in making diagnosis
  – CXR and Chest CT
  – CT guided biopsy
  – PET imaging
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