Posterior Mediastinal Masses

Marc LaFonte
PGY 5
SUNY Downstate
Case Presentation

- 78F admitted with progressive exertional dyspnea 3 months, new onset orthopnea
  - No dysphagia, weight change, pain, cough
- PSH: thyroidectomy (2001), left nephrectomy, cholecystectomy
- PMH: hypothyroidism, HTN, morbid obesity, osteoporosis
Case Presentation

- Social: 2 pack year smoking
- Family: negative
- Normal Pap/mammogram (2015)
- Colonoscopy benign polyps (2014)
Physical Exam

- T 97.8° F  BP 124/58  HR 80  RR 18
- Gen: AAOx3, NAD
- HEENT: well healed thyroidectomy scar, no palpable masses, no lymphadenopathy, no tracheal deviation
- Lungs: clear bilaterally
- CVS: normal S1/S2, no S3, S4, MRG
I THINK I'D MAKE

CHOICE CUTS
Imaging

- **CT chest**
  - 4.4 x 4.3 x 6.6 cm posterior mediastinal mass, partially calcified (possible extension from left thyroid)
  - Mass effect on trachea and esophagus
  - 3 mm RLL nodule

- **CT abdomen/pelvis**
  - 4.8 x 4.5 x 4.6 cm heterogeneous segment 6 liver mass
Further Workup

- CEA 1.2
- CA 19-9 33 U/ml
- Calcitonin < 2 pg/ml
- CA 125 35 U/ml
- Thyroxine: 9, T3: 132, TSH 0.3
- **Thyroglobulin: 2,250 IU/ml**
- EUS biopsy:

IR biopsy:

Numerous hepatocytes and inflammatory cells.
Scanty biliary epithelium.
Note: Few of the hepatocytes show nuclear atypia, but not high grade.

Intact liver fragments show one cell thick cords.
Thus criteria for the diagnosis of hepatocellular carcinoma are not present.
OR

- R posterolateral thoracotomy 3rd IC space
- Identify/preserve R vagus and phrenic nerve
- Ligate azygos vein
- Develop plane between trachea and esophagus
- Enucleation of mass
Post-operative Course

- POD#1-2 Extubated, chest tubes removed
- POD#3-4 diet
- POD#5-7 refused (then accepted) rehab
According to the article, which of the following biochemical markers is positively associated with intrathoracic thyroid malignancy?

A) Calcitonin

B) High thyroglobulin

C) Low thyroglobulin

D) High TSH

E) Low TSH
According to the article, which of the following biochemical markers is positively associated with intrathoracic thyroid malignancy?

A) Calcitonin
B) High thyroglobulin
C) Low thyroglobulin
D) High TSH
E) Low TSH
<table>
<thead>
<tr>
<th>Part Description(s)</th>
<th>Final Diagnosis</th>
<th>Date Signed Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posterior mediastinal mass</td>
<td>Posterior mediastinal mass, excision:</td>
<td>2/3/2016 14:54</td>
</tr>
<tr>
<td></td>
<td>- Nodular goiter (50.0 gm) with fibrosis, chronic inflammation and calcification.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- No tumor present.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- One parathyroid gland identified.</td>
<td></td>
</tr>
<tr>
<td>Note: This patient has history of remote thyroidectomy (indication not known), and hypothyroidism prior to this surgery.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

{ No Procedures/Addenda Entered }
Questions?
Posterior Mediastinal Masses

- Epidemiology adults vs. children
- Clinical manifestations
- Specific presentations and diagnostic tools
- Treatments
- Summary
Posterior Mediastinum

Anatomical Borders

Lateral: Mediastinal pleura

Anterior: Pericardium

Posterior: T5-T12 vertebrae

Roof: Imaginary line from sternal angle and T4

Floor: Diaphragm
Which of the following is **NOT** part of the posterior mediastinum

A) Azygos vein

B) Thoracic duct

C) Aortic arch

D) Descending aorta

E) Esophagus
Which of the following is NOT part of the posterior mediastinum

A) Azygos vein
B) Thoracic duct
C) Aortic arch
D) Descending aorta
E) Esophagus
Posterior Mediastinum Anatomy

- Descending aorta
- Azygos vein
- Thoracic duct
- Esophagus
- Sympathetic chain
Posterior Mediastinum Anatomy

- Descending Aorta
Posterior Mediastinum Anatomy

- Azygos system of veins
Posterior Mediastinum Anatomy

- Thoracic duct
Posterior Mediastinum Anatomy

• Esophagus
Posterior Mediastinum Anatomy

- Sympathetic chain
Which of the following is the most common posterior mediastinal tumor in adults?

A) Schwannoma

B) Neurofibroma

C) Ganglioneuroma

D) Ganglioneuroblastoma

E) Pheochromocytoma
Which of the following is the most common posterior mediastinal tumor in adults?

A) Schwannoma

B) Neurofibroma

C) Ganglioneuroma

D) Ganglioneuroblastoma

E) Pheochromocytoma
Which of the following is the most common posterior mediastinal tumor in children?

A) Schwannoma

B) Neurofibroma

C) Ganglioneuroma

D) Ganglioneuroblastoma

E) Pheochromocytoma
Which of the following is the most common posterior mediastinal tumor in children?

A) Schwannoma

B) Neurofibroma

C) Ganglioneuroma

D) Ganglioneuroblastoma

E) Pheochromocytoma
**Epidemiology**

**Posterior Mediastinal Masses**

- **Adults:** 25% posterior, 25% malignant
- **Children:** 50% posterior
- **Adult:** 75% Schwannomas
- **Children:** Ganglioneuroma

---

**TABLE 1: Common mediastinal masses and their usual locations**

<table>
<thead>
<tr>
<th>Anterior</th>
<th>Middle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thymoma</td>
<td>Bronchogenic cyst</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>Lymphoma</td>
</tr>
<tr>
<td>Substernal thyroid goiter</td>
<td>Pericardial cyst</td>
</tr>
<tr>
<td>Parathyroid adenoma</td>
<td>Neuroenteric cyst</td>
</tr>
<tr>
<td>Germ cell tumor</td>
<td></td>
</tr>
</tbody>
</table>
Clinical Manifestations Posterior Mediastinal Masses

- 2/3 asymptomatic
- 1/3 symptomatic
  - MC chest pain, dyspnea, cough
  - Malignant > benign
- Dysphagia
- Infection
- Hormone/biochemical
Diagnosis of Posterior Mediastinal Masses

- CXR (PA/left lateral)
- Diaphragm fluoroscopy (sniff test)
- *CT chest with contrast*
  - +/- MRI to enhance
- Hormones and biologic markers
- Histology
Neurogenic Tumors

• Originate from sympathetic ganglia, intercostal nerves, and paraganglia cells

• Peak incidence adults, mostly benign
  • Higher prevalence children, greater chance of malignancy
Schwannoma

• Most common
  • 3-5\textsuperscript{th} decade
  • M=W

• Usually spinal nerve root (sheath)

• Defined capsule, grow slow
  • Often asymptomatic

• Symptomatic
  • Pancoast syndrome
  • 10\% spinal column
CXR
Diaphragm Fluoroscopy
Schwannoma CT
Schwannoma MRI
Schwannoma Surgical Principles

- Intra-spinal component removed first
  - Posterior laminectomy

- Follow with transthoracic approach
Neuroblastoma

- Sympathetic nervous system
  - 24 catecholamine once mass found

- 10-20% mediastinum

- Most diagnosed prior to 4 years old
  - Aggressive, symptomatic
  - MYCN gene (Chromosome 11)

- Diagnose with CT/MRI
  - +/- MIBG
Neuroblastoma Staging

- **Stage I**: removable tumor, (-) LN
- **Stage IIA**: incomplete removal, (-) LN
- **Stage IIB**: complete/incomplete removal, (+) LN
- **Stage 3**: incomplete removal, local spread, (+) LN
- **Stage 4**: incomplete removal, distant spread, (+) LN
Neuroblastoma Treatment

- Stage I: Excise
- Stage II: Excise and RT
- Stage III and IV: Debulk, Chemo/RT
  - Planned second look for residual disease
Ganglioneuroblastoma

- Sympathetic chain origin
- Benign
- Childhood
- CT/MRI
  - Well encapsulated, homogeneous
  - Cystic degeneration
- Treatment: Excision
According to Dr. Hammill’s lecture, what percentage of pheochromocytomas are in the mediastinum?

A) 0.1%
B) 2%
C) 5%
D) 20%
E) Trumpoma
According to Dr. Hammill’s lecture, what percentage of pheochromocytomas are in the mediastinum?

A) 0.1%

B) 2%

C) 5%

D) 20%

E) Trumpoma
Paraganglioma

- Neural crest cells
- 1% of mediastinal tumors, 2% of pheochromocytomas
  - MC Paravertebral sulcus
- Urine catecholamines
- Diagnosed best with CT and MIBG scintigraphy
- Treatment: surgical resection
  - Cardiopulmonary bypass when middle mediastinum
Thyroid tumors

- Usually substernal extension goiter
  - Connective tissue band with cervical gland
  - Approach via cervical incision

- 1% totally intrathoracic thyroid tumors
  - Heterotrophic thyroid tissue
  - Blood supply from thoracic vessels

- Tracheal/esophageal compression
Summary

Posterior Mediastinal Masses

- “DATES”

- Mostly asymptomatic
  - chest pain, dyspnea, cough

- 25% adults, 25% malignant

- Neuroblastoma vs. Ganglioneuroblastoma

- Paraganglioma = extra-adrenal pheochromocytoma

- Thyroid tumors extremely rare
  - Intrathoracic vs. substernal goiter
References

- Mastery of Cardiothoracic Surgery 3rd ed
- Schwartz’s Principles of Surgery 10th ed
- Sabiston 19th ed
- Cameron Current Surgical Therapy 11th ed