MRI of Mediastinal Masses
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Why Mediastinal MRI?
- Higher soft tissue contrast than CT
- No radiation exposure

Why Mediastinal MRI?
- Lesion characterization
  - Cystic versus solid, fibrous, proteinaceous, hemorrhagic, grossly or microscopically fatty
  - Relationship to adjacent neurovascular and bony structures
  - Enhancement pattern
  - Presence of restricted diffusion

More Specific Uses
- Thymic evaluation (cyst vs. solid, chem shift MR)
- Screening for lymphadenopathy
- Screening for paragangliomas (SDHD\(^1\) mutation)
- Follow-up of probably benign lesions without radiation exposure

\(^{SDHD} = \text{Succinate dehydrogenase complex, subunit D, integral membrane protein}\)

Anterior Mediastinal Masses
- Thymus
- Thyroid
- Germ cell tumor
- Lymphoma
- Lung cancer
- Hemangioma
- Lymphangioma
- Pericardial cyst (or fat pad)
- Other

ANTERIOR MEDIASTINUM
Thymic masses

53 y.o. woman s/lp lumpectomy and chemo-XRT for breast cancer 7 years prior.

Pre-contrast (VIBE) Post-contrast (VIBE)
Pre-contrast (VIBE) Post-contrast (VIBE)

2 years later, in 2013

Thymic hyperplasia with simple thymic cyst
Chemical Shift MR

- Helps distinguish normal/hyperplastic thymus from thymic tumors/lymphoma in adults
- In- and out-of-phase imaging (Iwatsuki & Takahashi, Radiology, 2007)

\[ \text{CSR} = \frac{\text{OP SI THYMUS}}{\text{OP SI PARASPINAL M.}} \]
\[ \frac{\text{IP SI THYMUS}}{\text{IP SI PARASPINAL M.}} \]

- IP = in-phase
- OP = opposed-phase
- SI = signal intensity as measured by ROI
- CSR of 0.5-0.7 = normal/hyperplastic
- CSR of 0.9-1.0 = tumor, in most cases

21 y.o. woman with arrhythmia & “anterior mediastinal mass” on outside CT

Thymectomy revealed histologically normal thymus!

Recent Thymic Research

- Statistically significant sex difference in normal thymic appearance between young men and women
- Thymus of young women (compared to men)
  - higher attenuation (p < .0001)
  - fuller, more quadrilateral shape (p < .0001)
- May increase likelihood of misinterpretation of normal thymus as a mass in young women

61 y.o. woman with left anterior pleuritic chest pain

Thymic cyst

Use caution
Thymic carcinoma

Cystic thymoma

67 year-old woman, incidental finding on CXR

This slide is courtesy of Melissa L. Rosado de Christenson, MD, FACR
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Thymoma Type AB

Lymphoma

Chest CT with IV contrast

Pre-contrast (LAVA), 20 s

Post-contrast (LAVA), 1 min

Post-contrast (LAVA), 5 min

Thymoma Type AB

In-phase T1

Out-of-phase T1

Double IR T1

Double IR T2

Post-contrast (VIBE), 1 minute

Post-contrast (VIBE), 3 minute

Post-contrast (VIBE), 5 minute
29 year-old pregnant woman with Hodgkin’s Lymphoma

Thyroid

Axial In-Phase T1
Axial In-Phase T1
Double IR T2
Double IR T2

Post-LAVA Fat Sat T1, 20 sec
Post-LAVA Fat Sat T1, 20 sec
Post-LAVA Fat Sat T1, 5 min
Post-LAVA Fat Sat T1, 5 min

Post-LAVA Fat Sat T1, 20 sec
Post-LAVA Fat Sat T1, 20 sec
Post-LAVA Fat Sat T1, 5 min
Post-LAVA Fat Sat T1, 5 min
Metastatic papillary thyroid cancer
(to mediastinum and a right level IV cervical lymph node)

**MIDDLE MEDIASTINUM**

Middle Mediastinal Masses
- Foregut duplication cyst
- Esophageal mass
- Hemangioma
- Lymphangioma
- Hilar pseudomass on CXR
- Other

**Foregut duplication cyst**
Foregut duplication cyst (likely Esophageal)

Esophageal mass

63 y.o. woman with breast cancer

Leiomyoma (endoscopic FNA results also supportive)

Hemangioma
Chest CT with IV Contrast

Axial In-Phase T1

Axial Double IR T2

Coronal HASTE T2

Axial Pre-Contrast

Axial Post-Contrast, 20 sec

Axial Post-Contrast, 1 min

Axial Post-Contrast, 5 min

Hemangioma

Middle mediastinal pseudomass

Prominent hilum in a young woman
Hilar pseudomass
Prominent but normal PA in a young woman

POSTERIOR MEDIASTINUM

Posterior Mediastinal Masses
- Foregut duplication cyst
- Neurogenic tumor
- Confounder: Posterior mediastinal or Pleural?
- Other

Ganglioneuroma

55 year-old woman with cough and recent pneumonia
Chest CT with IV contrast

ROI = 38 HU

Double IR T2

Pre-contrast (VIBE) Post-contrast (VIBE) 20 s

Post-contrast (VIBE) 1 min

Post-contrast (VIBE) 5 min

Ganglioneuroma

Nerve sheath tumors

Neurofibroma
Multiple neurofibromas with target sign

Schwannoma
Schwannoma (solid)

Tandem schwannomas
(cystic and solid)

Confounder

60 yo f/w lesion incidentally found on Abd CT to f/u longstanding pancreatic cyst

Outside Chest CT with IV Contrast
Complex intrapleural bronchogenic cyst

Why Mediastinal MRI?

- Increase diagnostic specificity
- More accurately place lesion in a compartment, sometimes changing dx completely
- Change surgical approach and offer more precise roadmap
- Spare patient unnecessary diagnostic intervention and unnecessary radiation
- Reassure patient re: benignity

References