Deciphering Thymic Lesions
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I have no disclosures.

How do you discern…?
- Thymic cysts from solid lesions
- Normal thymus and thymic hyperplasia from thymic tumors
- Thymoma from lymphoma

… and why is it important?

Recent Research
(Ackman JB et al. Eur J Radiology)
- Surgical, pathologic, and radiologic review of 160 consecutive thymectomy cases (2006-2012)
- Benign thymectomy rate of 20% (fist sternotomy)
  - 53% thymic cysts
  - 38% thymic hyperplasia
  - 9% reactive, atrophic tissue
Recent Research
(Ackman JB et al, Eur J Radiology)

- Surgical, pathologic, and radiologic review of 160 consecutive thymectomy cases
- Non-therapeutic thymectomy rate of 44% (22-68% at other institutions)
  (clinically unnecessary thymectomy)

- Composition
  - 54% lymphoma
  - 24% thymic bed cysts
  - 17% thymic hyperplasia
  - 3% reactive
  - 1% atrophic

Non-therapeutic thymectomy rate

Why?

Misinterpretation of these lesions as thymomas on chest CT

We examined the CT features of thymoma, lymphoma, thymic hyperplasia, and thymic cysts to ascertain the significant differentiating features of these lesions.

Improved ability to discern these entities from each other could significantly reduce the unnecessary thymectomy rate and its associated morbidity and health care cost.
ROI = 27 HU

ROI = 61 HU

Thymic Cyst

- Congenital or Acquired
- May be stand-alone or associated with thymic hyperplasia and thymic neoplasms
If a thymic lesion on CT is:

- Round, oval, or saccular ("Hot water bottle")
- Well-circumscribed
- Homogeneous in attenuation
- $\leq 60$ HU (hemorrhagic or proteinaceous content)
  - (or even 97 HU)
- IT MAY BE A THYMIC CYST, even if it has enlarged

CONSIDER THYMIC MRI to distinguish between a cystic and solid lesion and ascertain lesion complexity

Fluctuating thymic cyst (size and attenuation)
52 y.o. woman with h/o hypothyroidism and new pleuritic chest pain

ROI = 12

Multilocular thymic cyst
Pre-3D Ultrafast GRE fat sat T1
Post-3D Ultrafast GRE fat sat T1, Sag, 3 min
Post-3D Ultrafast GRE fat sat T1, 5 min
Multilocular thymic cyst and thymic hyperplasia

Chest CT without IV contrast
Thymic hyperplasia (proven at thymectomy)

Chest CT with IV contrast
Thymic hyperplasia (proven at thymectomy)
64 year-old woman with Graves disease

Chest CT with IV contrast

64 year-old woman with Graves disease

In-phase T1

Opposed-phase T1

CSR = Chemical shift ratio ROI placement

CSR = 136/246

CSR = 291/242

CSR = 0.5

Diagnosis = Thymic hyperplasia

If a thymic lesion on CT is:

- Bipyramidal, Bilobed, Quadrilateral, or Triangular
- Well-defined
- With or without Gross fatty intercalation or “marbling”

CONSIDER THYMIC MRI

Use caution
No test is perfect!

21 y.o. woman with arrhythmia & “anterior mediastinal mass” on outside CT
Thymectomy revealed histologically normal thymus!


Sex difference in thymic appearance

- 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


Thymoma

*Type A*
If a thymic lesion on CT is:

- Well-circumscribed
- Round or oval
- Off-midline

CONSIDER THYMOMA however…

IF homogeneous in attenuation, rule out thymic cyst first with MRI, instead of proceeding directly to thymectomy

Also…

- IF debating between thymoma and lymphoma, consider MRI to assess time-to-peak (t2p) enhancement (if early t2p, thymoma is more likely)*
  - low grade thymoma — 1.3 min. mean t2p
  - high grade thymoma — 2.5 min. mean t2p
  - lymphoma — 3.2 min. mean t2p

Lymphoma
primary mediastinal large B cell at thymectomy

If thymic mass is:
• Lobulated, Multinodular, and/or Amorphous
• especially if associated
• Lymphadenopathy
• Mass effect
• Pericardial involvement

FAVOR LYMPHOMA over thymoma and suggest more limited forms of diagnostic intervention

* Caveat: more advanced thymomas can resemble lymphoma

Low-risk versus high-risk thymomas and thymic carcinoma

• Recent research suggests that DWI with apparent diffusion coefficient (ADC) assessment can help distinguish low-risk from high-risk thymomas

Cut-off ADC value of 1.25 mm²/sec

Abdel Razek et al., Radiology, 2014
**Lymphoma (Hodgkin)**

Just when you think you have figured it all out...

Don’t forget that advanced thymomas may resemble lymphoma!
Advanced thymoma (Thymoma type B2, B3)

Advanced thymoma (Thymoma type B3)

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

Thymic carcinoma
**Conclusion**

- Recognition of the differentiating features between common thymic lesions on CT may lead to better triage of patients to non-invasive and less invasive means of diagnostic intervention than thymectomy

- May reduce unnecessary thymectomy rate, its associated morbidity, and health care costs

**References**


