



70 Year Old Man with Dysphagia: A Case of Complementary Imaging Modalities

Evan Pankey

HMS III

Radiology BIDMC



Patient RW

- 70 y/o man with hx of myasthenia gravis
- Treated with prednisone, cellcept and mestinon
- Rantidine x2 years as prophylaxis
- 2 month hx of regurgitation shortly after solid foods
- Vague feeling food was “stuck” after he swallowed
- 5 lb weight loss
- 20 pack year smoking hx, quit 20 yrs ago
- No acid reflux or hx of GERD

Sounds like the Esophagus...

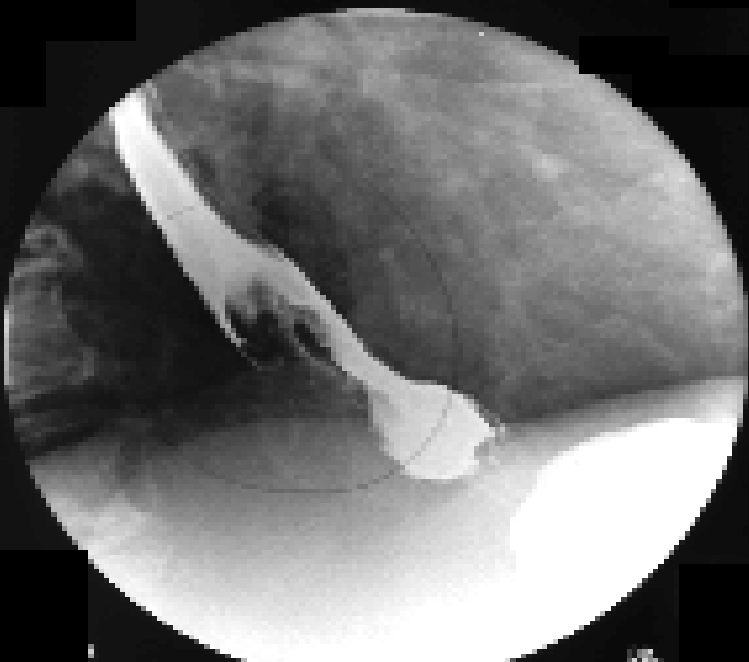




Esophageal Imaging Modalities

- Barium Swallow
- Endoscopy
- Endoscopic Ultrasound (EUS)
- Computed Tomography (CT)
- Positron Emission Tomography (PET)

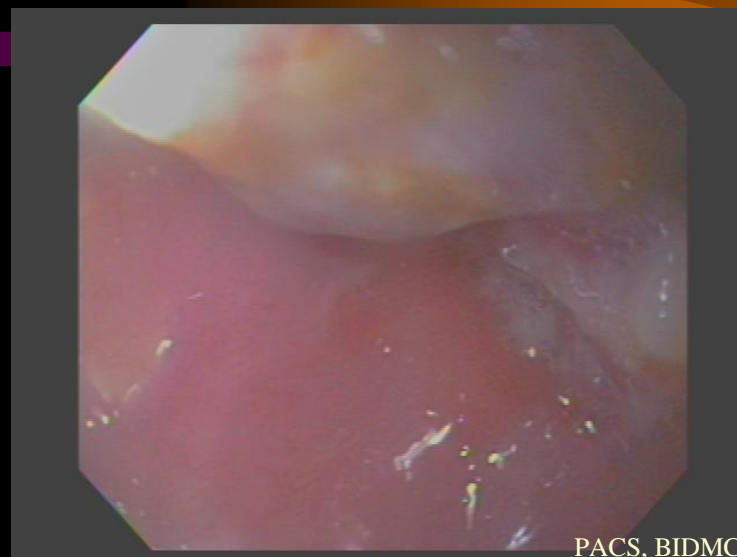
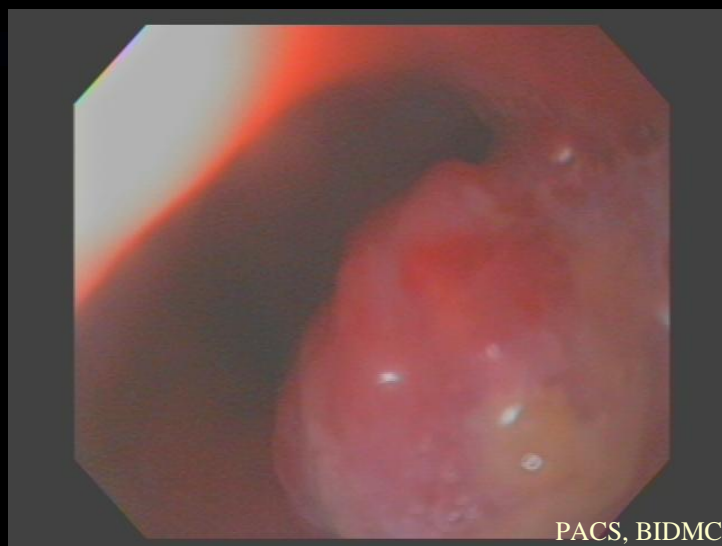
RW Barium Swallow



- Distinguishes wall defects, mass and motility pathologies
- En face & Lateral views
- Filling defect with narrowing of distal lumen
- Appearance of an eroded mass
- Slight hiatal hernia



RW Endoscopy



- 5cm infiltrative, fungating and ulcerated mass
- Non-bleeding
- Malignant appearance
- Located in the lower third of the esophagus from 36 to 41 cm
- Lesion caused a partial obstruction of the lumen



Differential for Esophageal Tumors

- **Mural Masses**

- **Benign**

- Duplication cyst
- Fibrovascular polyp
- Granular cell tumor
- Leiomyoma

- **Malignant**

- Leiomyosarcoma
- Lymphoma
- Kaposi's sarcoma,
- Metastatic disease

- **Mucosal Masses**

- **Benign**

- Papilloma
- Adenoma

- **Malignant**

- SQUAMOUS CELL CARCINOMA
- Spindle cell carcinoma
- ADENOCARCINOMA
- Lymphoma



Squamous Cell vs Adenocarcinoma

Squamous Cell

- Male:Female 3:1
- Black:White 6:1
- Location: Middle
- Risk: EtOH & Smoking

Adenocarcinoma

- Male:Female 7:1
- Black:White 1:4
- Location: Distal
- Risk: Barrett's Esophagus

Both

Incidence of 6000 per yr respectively²

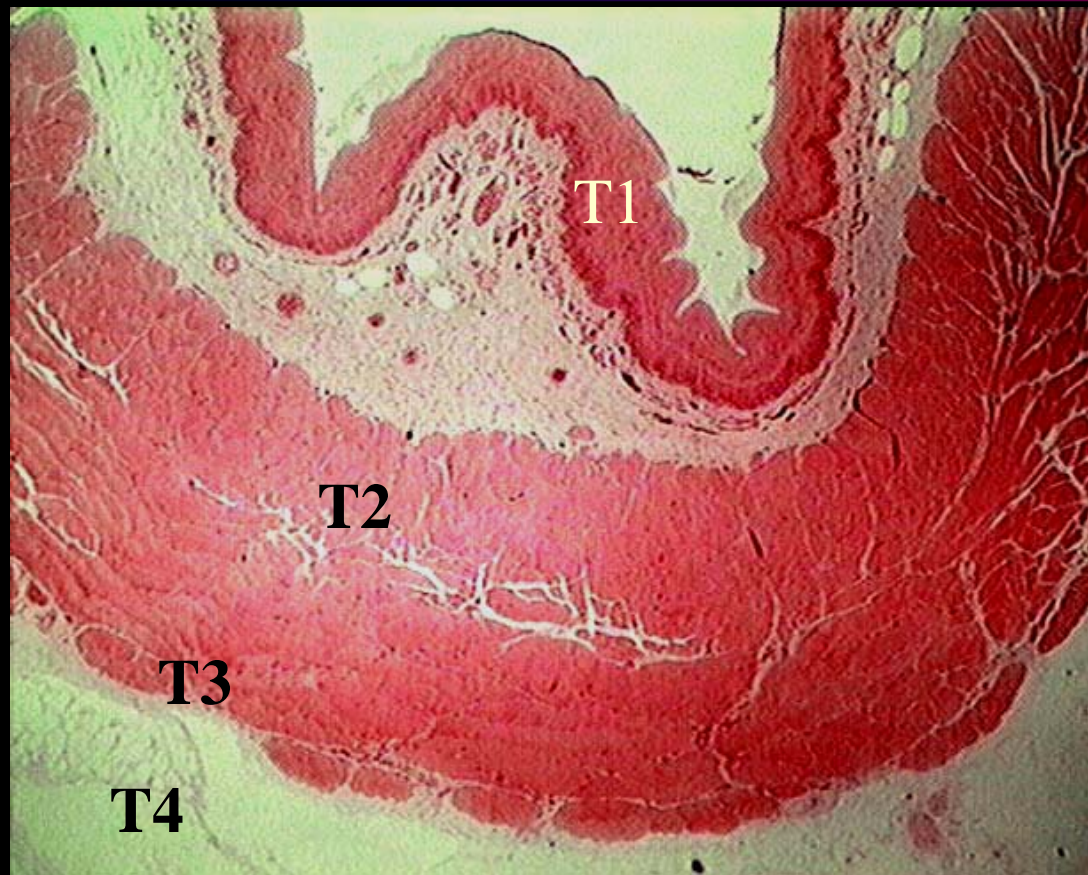


Esophageal Adenocarcinoma

- Thought to originate from esophageal metaplasia and dysplasia
- Highly associated radiographic findings:²
 - Hiatal hernia (80%)
 - Reflux (48%)
 - Stricture (20%)
- Average age of onset 60
- Average 5 year survival rate is 25%



Esophageal Cancer Staging



Paul B. Bell, Jr. & Barbara Safiejko-Mrocza
The University of Oklahoma

- Tumor
 - T1 mucosal infiltration
 - T2 extension to muscularis
 - T3 extension to adventitia
 - T4 extension to adjacent tissue
- Nodes N0 N1
- Metastasis M0 M1



RW Esophageal Ultrasound



- EUS is very sensitive for local staging
- Radial echoendoscope at 5 MHz.
- A hypoechoic region extended through muscularis into the adventitia.
- Consistent with a T3 lesion.
- No invasion into adjacent organs
- No paraesophageal or celiac axis adenopathy noted



CT (+/-)

- Normally excellent for anatomy
- Difficult to image adenocarcinoma by CT because of pseudomass at the esophageal insertion into the stomach
- Limitation in detecting nodes/mets smaller than slice separation
- Density of involved areas may not be increased enough for detection
- Difficult to differentiate tumor from reactive tissue, edema and scarring

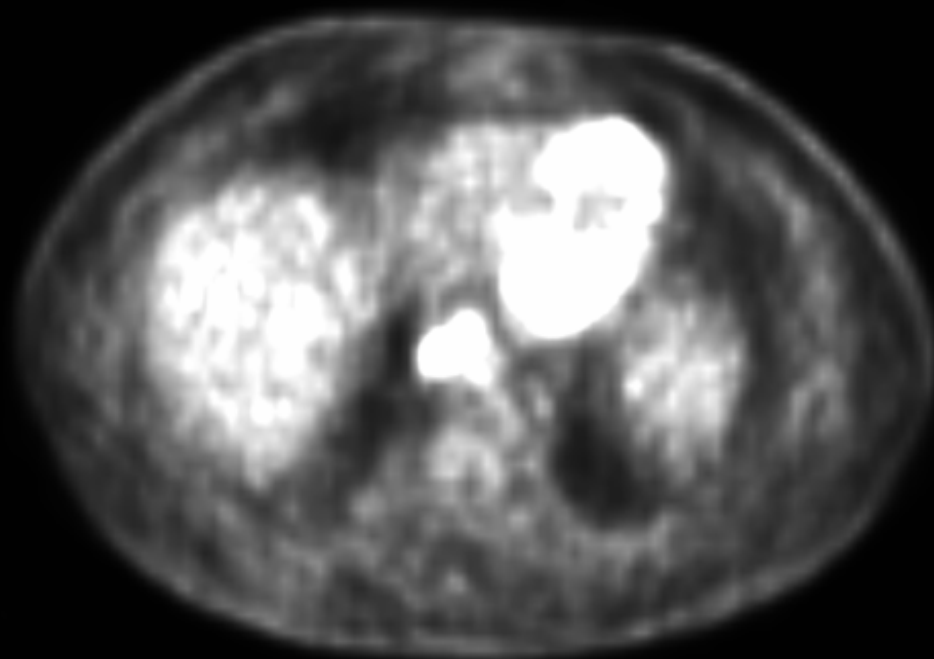


PET(+/-)

- F^{18} -FDG is sensitive for metabolic active areas, but detection maybe obscured in metabolic active tissue
- More sensitive than CT
- Lacks anatomic detail for localization
- Expensive, but recently covered by Medicare



RW PET and CT



PACS, BIDMC



PACS, BIDMC

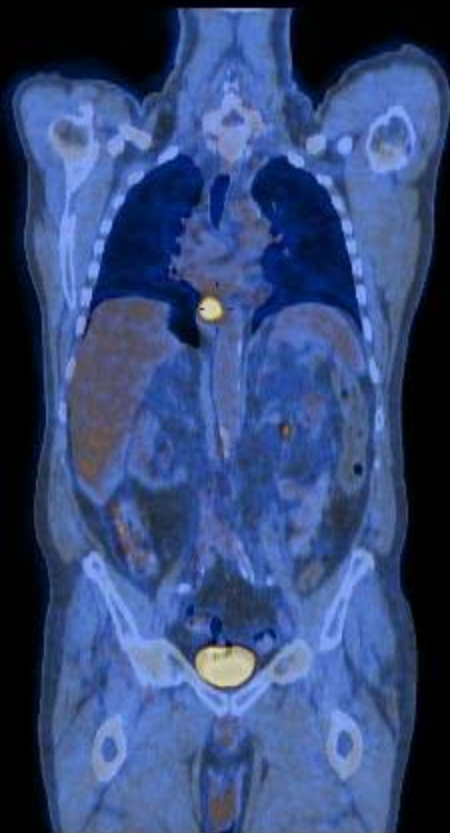


Better Together...

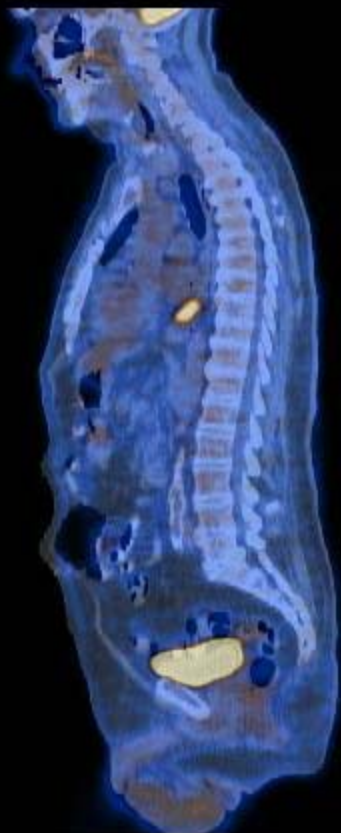
- Integrated PET CT better than PET or CT alone
- Accuracy in Staging¹
 - CT: 63%
 - PET: 64%
 - Side by Side PET CT: 74%
 - Integrated PET/CT: 84%
- Distal esophageal mass medial to the heart is noted
- Standard Uptake Value = 9
- No other abnormally enhancing areas



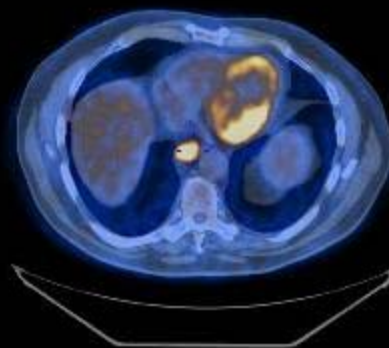
RW Integrated PET CT



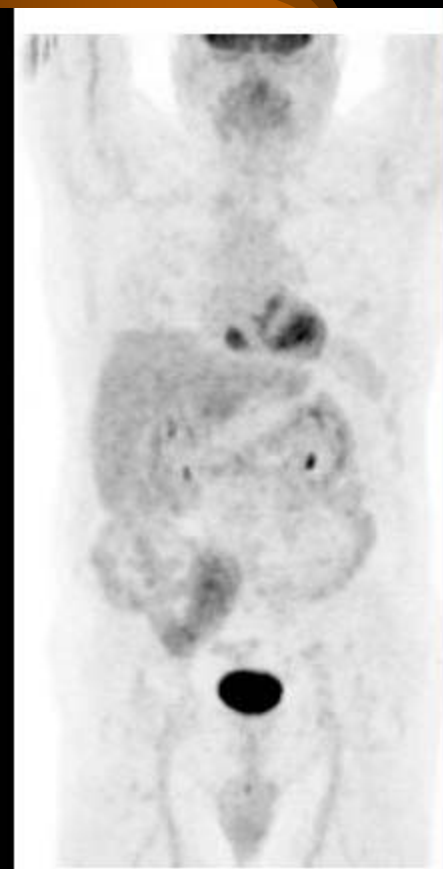
Coronal



Sagittal



Axial





What happened to RW?

- Staged as T3N0M0
- 11/04: Preoperative chemo and radiation therapy
- 2/05: Successful minimally invasive thorascopy/laparascopy esophagogastrectomy
- 2/05- Now: Extended recovery due to right hemidiaphragm paralysis secondary to phrenic nerve damage



Summary

- Full evaluation of esophageal cancer requires several imaging modalities
- Barium- mass, wall deformities, motility
- Endoscopy- characterize lesions and biopsy
- EUS- staging of primary mass T/N
- PET and CT- distant staging each with (+/-)
- Integrated PET CT- simultaneous metabolism and anatomy with most accurate N/M staging



References

1. Coleman R E, Dominique D, Guiberteau M J et al., “Concurrent PET/CT with an integrated imaging system: intersociety dialogue from the joint working group of the American College of Radiology, the the Society of Nuclear Medicine and the Society of Computed Body Tomography and Magnetic Resonance” *Journal of Nuclear Medicine* 2005 46(7): 1225-1239.
2. Saltzman, J R, “Diagnosis and staging of esophageal cancer” *UpToDate* www.uptodate.com accessed Sept 16 2005.
3. Westerterp M, Hendrik L van Wetreenen et al., “Esophageal cancer: CT, endoscopic US, and FDG PET for assessment of response to neoadjuvant therapy- systemic review” *Radiology* 20005 236:841-851.



Acknowledgements

- Atif Zaheer, MD
- Anthony Parker, MD PhD
- Gillian Lieberman, MD
- Pamela Lepkowski
- Larry Barbaras