STAGING of ESOPHAGEAL CANCER: ROLE OF CT and PET

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I do not have any relevant financial relationship with any commercial company.
ESOPHAGEAL CANCER

- Sixth leading cause of cancer death worldwide
- One of the deadliest tumors
- Over 50% unresectable at diagnosis
WHAT’S NEW?

Changing tumor types
Staging: CT, PET
Neck nodes: new importance
ESOPHAGEAL CANCER

- United States: ↑ incidence:
  20% increase over 30 years

- Changing histology
  1975: 75% Squamous-cell Ca
  2003: More Adeno than SCCa
INCIDENCE

Dramatic increase of adeno Ca

Last 30 years: ↑ 350-800%
ETIOLOGY

- Squamous cell carcinoma:
  - Smoking
  - Alcohol

- Adenocarcinoma of esophagus:
  - Barrett’s esophagus
  - Reflux, hiatal hernia
  - Obesity
BARRETT’S ESOPHAGUS

- Columnar cell metaplasia replaces squamous cell lining
- 5% lifetime risk of Adenocarcinoma
ADENOCARDINOMA OF ESOPHAGUS

- Rare in 1970: 1/100,000
- White males: 2000
  - US: 5/100,000
  - Australia & UK: 8/100,000
- Annual ↑ incidence: ~ 1-% year
ADENOCARCINOMA OF ESOPHAGUS

- Male dominant: 2:1 to 12:1
- Age peak: 50 – 60 years old
- Middle or upper socioeconomic groups
- 52% are university graduates
ADENOCARCINOMA

- Gastric adenocarcinoma: dramatic ↓ incidence
- Esophageal adenocarcinoma: dramatic ↑ incidence
ESOPHAGEAL WALL

- Different from rest of GI tract
- Lacks outer serosal layer; therefore, earlier local spread
OF TEN ADVANCED DISEASE

AT TIME OF DIAGNOSIS

- 24% confined to primary site
- 29% lymph nodes or local invasion
- 30% already metastasized
- 17% staging unknown

SEER NCI 2006
NEOADJUVANT CHEMOTHERAPY

Improved survival vs. Surgery alone
Median survival: 16.8 vs. 13.3 months
2-year survival: 43 vs. 34%

Lancet 2002
LOCAL INVASION

CT: 50 – 70% accuracy
EUS: 70 – 80% accuracy
CT: ESOPHAGEAL CANCER

- Good for local invasion?
- Good for lung and liver mets
- No good for lymphadenopathy
LYMPHATICS

Dye injected into esophageal wall
- May fill nodes all levels
- Frequent long channels ie nodal mets a long distance from primary tumor
- Frequently drains into thoracic duct; therefore, early hematogenous mets

Riquet: Surg Rad Anat 1993
Nodes: long axis

Tumor free 5.1mm
Tumor positive 6.7mm
All nodes 91% < 10mm
No correlation size and nodal mets
LYMPH NODE STAGING

EUS guided fine needle aspiration:

Sensitivity: 93%
Specificity: 100%

Gastrointes Endosc 2001
Meta-Analysis: PET STAGING ESOPHAGEAL CANCER

- 12 studies met criteria
- Loco-regional nodes
  - Sensitivity: 51%
  - Specificity: 84%
- Distant metastases
  - Sensitivity: 67%
  - Specificity: 97%
STAGING
ESOPHAGEAL CA

- CT first test:
  if no metastases, then
- Positron emission tomography
  if no metastases, then
- Endoscopic ultrasound:
PET/CT STAGING

Limitations: Nodal staging

- Small nodes
- Nodes adjacent to tumor

Variable results in literature
STAGE IV DISEASE

PET: Increased detection mets

3 combined studies:
21.6% increase in metastases detected
FDG-PET

- Esophageal cancer n= 61
- Pre-op CT, EUS, PET
- PET: 20% pts avoided “unnecessary surgery”
- Improved survival, likely from avoiding unnecessary surgery

J Gastrointest Surg 2005
PET DETECTED METS

- Not seen on CT
- CT chest and abdomen
- 17% of patients
PET DETECTED METS NOT ON CT

- Cervical lymph nodes 38%
- Bone metastases 23%
- Hepatic metastases 15%

Imdahl Lang Arch Surg 2004
NECK NODES

One third patients: neck nodes found during esophagectomy for “curable” cancer of thoracic esophagus

NYU: J Thorac Cardiovasc Surg 1997
NECK NODES

Nodal metastases equal frequency:

Neck nodes

Mediastinal nodes

NYU 1997
NECK NODES

The higher the cancer
The more likely neck nodes:

- Cervical esophageal ca: 80%
- Upper 1/3 mediastinum: 52%
- Middle 1/3 mediastinum: 29%
- Lower 1/3 mediastinum: 9%
Neck Node

80%
52%
29%
9%

Primary
NECK SONOGRAPHY

- Nodes of interest: 3 cm deep
- Use 7.5-10 MHz transducer
- "Big node": over 5 mm
- Short / long ratio:
  S/L: over 50 %
SONOGRAPHY

n = 80

Sensitivity: 88%
Specificity: 59%
Accuracy: 78%

Natsugoe: J Surg Onc 2002
TAKE HOME POINTS

Dramatic increase in Adenocarcinoma

- Barrett’s, middle class, obese

CT first staging test

- Distant metastases

Guide further testing
TAKE HOME POINTS

PET/CT: if CT is indeterminate or Θ for metastases
EUS with fine needle aspiration
Reserve if PET & CT negative
Best for lymph node staging
Best for degree of wall invasion
CONTROVERSIES

- Neck US routinely?
- Neck CT routinely?