Vesalius SCALpel™: Esophagus (see also: esophageal folios)

Anatomy/physiology

upper 1/3 straited, lower 2/3 smooth muscle
LN drainage:
  upper: paratracheal, supraclavicular
  lower: subcarinal, inferior pulmonary lig., occasionally to abdominal nodes
  abdominal: superior gastric, celiac, supraclavicular
LES press > 6mm, length > 2cm: less promotes reflux
  decreased pressure: ETOH, nicotine, chocolate, fat
  increased pressure: protein
reflux: normal < 7% of day, > 26% with Barrett’s

Motility disorders

normal esophageal motility
  progressive peristaltic waves in body of esophagus
    12mm proximal amplitude, 30mm distal
  resting LES pressure > 6mm Hg, relaxation with arrival or peristaltic wave
fluoroscopic evidence of disordered motility is indication for manometry
manometric identification of LES for positioning of pH probe

achalasia
  most common of esophageal motility disorders
  progressive loss of ganglion cells (autoimmune destruction?)
  70% of patients with scleroderma have esophageal involvement
  replacement of smooth muscle with fibrosis
  aperistalsis and tonic contraction of LES after swallowing
  early symptoms: heartburn (47%), mild dysphagia, chest pain
  late: increasing dysphagia, chest pain, wt loss, regurgitation of undigested food (esp after meals and lying down)
    solids then liquids (esophagus accommodates: dysphagia, wt. loss late signs)
    pts. augment swallowing: raising arms, straighten back, stand, jump
  air swallowing: pumps up esophagus, increases pressure, weakens wall, dilates
  LES spasm, bird-beak (smooth tapering v tumor/pseudoachalasia; more rapid hx with tumor)
  disordered or no contractions on manometry, no relaxation LES
  scope: inflammation, candida, taper, exclude Ca
  10% incidence Ca @ 20y
  drugs: bridge to surgery
    amyl nitrate, sublingual NTG, theophylline, Ca++ channel blockers
    relax LES, help 30% of pts; tachyphylaxis decreases effectiveness
  botox:
    85% effectiveness relaxing LES, transient, 50% recurrence 6mo-1y

6 April 2009
terminal axons regrow, new synapses
less success with retreatment
use for pts who are not surgical candidates
cases tissue reaction which predisposes to perforation at surgery
balloon dilatation to 3-4cm, 90% effective, 70% recurrence at 1y, repeat 1-2X
rapid relapse predicts less success with subsequent dilatations
disrupts distal esophageal muscle; OK before surgery
success and completeness increases w size of balloon to 4cm max
1-2% perforation risk with each dilatation
  pain; get gastrografin, if neg follow w barium
  if perf. immediate surgery, close perf, do myotomy, buttress w partial wrap
(Toupe, Dor)

Heller myotomy
now done mostly laparoscopically, 95% excellent response
6-7cm on esophagus, 2cm onto stomach
can do intraop scope, balloon to better visualize lower esophagus
addition of fundoplication reduces reflux 9X; more likely if done abdominally than
thoracoscopically
associated with increased incidence of squamous Ca mid esophagus even after surgical
treatment
monitor (only esophageal motility disorder associated with cancer)

diffuse esophageal spasm/nutcracker esophagus
  multiple areas of circular muscle spasm, dysphagia
  long myotomy

scleroderma
  inadequate esophageal motility without increased LES pressure

**Mucosal disorders**

**GERD**
20% incidence in general pop, 55% in obese (bariatric surgery for morbidly obese as
effective as fundoplication to treat GERD)
mucosal damage -> Barrett’s -> cancer progression
chronic, mimics other diseases (Gb)
evaluate: atypical symptoms (dysphagia, swallowing disorders), failure of medical Rx,
treatment longer than 10y, hi dose drug Rx, multiple drugs
  scope, 24h pH monitor, manometry, Ba study, gastric emptying (<5%)
progressive medical management: lo dose H2 blocker -> hi dose -> multiple -> PPI
surgery: alternative to medical therapy or failure of med Rx (especially young pt who
  needs more than minor medication
  if less than 30mm peak LES pressure, do partial wrap over large bougie
recent technique of endoscopic plication (for GERD, not for Barretts)
Barrett’s
found in 10% of patients with GERD
10% of Barretts progress to adenocarcinoma
long (greater or less than 3cm) and short segment
intestinal metaplasia at or above the GE jct; incompletely understood
medical treatment (PPI) equivalent to surgery; won’t progress if control GERD
lo grade: 1-2% cancer risk per year, screen/scope yearly for dysplasia
hi grade: 7% risk per year, screen Q3mo if focal
multifocal or mucosal irregularity requires intervention
non-surgical ablation:
  multipolar electrocoagulation (MPEC), 1% stricture
  argon plasma coagulation (APC) (causes dessication), perforation risk
photodynamic (PDT):
  5-aminolevulinic acid (5ALA) dye sensitizer of rapidly proliferating cells
  laser causes O₂-mediated cytotoxicity/mucosal destruction
  incomplete
  36% stricture rate
  PDT + omeprazole decreases progression to carcinoma from 28 to 13%
  with hi grade
Endoscopic mucosal resection, piecemeal, risks stricture, perforation
cryoaablation, YAG additional modalities
esophagectomy in medically fit with hi grade dysplasia

Neoplasm
  benign: cyst, leiomyoma, fibroma, myxofibroma, fibrolipoma
    remove if symptomatic; if asymptomatic consider malignant potential risk v
    benefit surgery; most are operated on
  malignant: squamous, adeno, sarcoma
  symptoms: dysphagia of solids progressing to liquids
    odynophagia: retrosternal pain on swallowing, 2nd most common symptom
  squamous
    no longer the most common in US
    blacks 5X Caucasian (squamous)
    60% N+ at Dx
    alcohol, smoking risk factors
    usually upper to mid, radiosensitive
  adeno
    rapidly increasing frequency
    associated with Barrett’s
    radioresistant
  T stage: 1 lamina propria or submucosa, 2 invades muscle, 3 through adventitia, 4 into adjacent structures
  stage    survival
  I (T1)    85%    rare to find except if screening for Barretts
  IIA (T2,3)    35%

6 April 2009
IIB (T2 or N1) 35%
III (T3,4) 15%
IV (metastasis) 0
overall 20% cure rate all stages
chemotherapy alone poor response, but sensitizes for RT
CT/RT 30-50% complete clinical response as induction/neoadjuvant Rx
radiotherapy
squamous sensitive: 50-60 Gy for cure, 5% 5y when used alone
surgery:
for Barretts or T1 lesion resection alone
T2 (into muscularis propria, N0M0): neoadjuvant radiotherapy, post op chemorad no added benefit
T3 (periesophageal fat), T4 (adjacent organs)
> 5 nodes positive correlates with systemic spread
goal of neoadjuvant is to reduce disease in the bed of surgical resection
complete pathological response improves survival (59% 3y survival)
distant mets: surgery not indicated; chemo +/- radiation; stent
liver met resection no survival advantage v colon cancer
resection with stomach pull up or interposition if stomach not usable
anastomosis in chest or neck: leak in neck less morbid than chest
neoadjuvant chemoradiation
85% resection rate
25-30% complete pathological response
average survival 29mo (v 14 mo without, double)
57% 2y, 34% 5y survival selected pts
complete pathological responders 60% 5y
if residual tumor, 34%
sarcoma
large polypoid mass
no benefit chemoradiation
epidermal (carcinosarcoma), leiomyoSA, fibroSA, rhabdoSA
only treatment is surgery
tylosis: autosomal dominant, hyperkeratosis palms and soles
only genetic disorder associated with esophageal cancer
95% incidence of esophageal cancer with tylosis

Injury
caustic/chemical (acid or alkalai)
no attempt at neutralizing: exothermic reaction causes more damage
examine mouth and upper esophagus (may be little evidence, short contact)
acid: stomach contact time longer than esophagus, risk of gastric perforation, later gastric outlet obstruction
associated with squamous cancer, 5% incidence at 6y
early endoscopy to identify necrosis; small caliber scope
H2 blocker/PPI
antibiotics, steroids?
most adult cases psychiatric
feeding tube, TPN
no early surgery
most heal with stricture, alkali more likely to produce esophageal stricture
increased risk for esophageal carcinoma
usually long stricture not amenable to dilatation
late surgery with colon interposition (injured stomach cannot be used for conduit)
cancer secondary to caustic burn more favorable than sporadic
perforation
75% iatrogenic (from therapeutic esophagoscopy), 20% mortality
20% barotrauma: Mallory-Weiss (tear), Boerhaave (rupture, usually L chest)
5% trauma, other (infection)
non-operative management well defined selected group
    contained leak documented on gastrografin then Ba
    hemodynamically stable
    NPO, 7-10d antibiotics
    parenteral nutrition
    Ba study no leak -> feed
surgery
    primary repair if early, good tissue, minimal inflammation, mild edema,
    no malignancy
    mucosa, 2 layer muscle repair
    buttress: low use fundus, chest pleural or intercostal flap
    primary repair decreases mortality by 50-70%
late: drainage alone, T-tube, exclusion/diversion, esophagectomy alternatives
    24h delay 40% mortality

Anatomic abnormalities

diverticula
    Zenkers: pulsion, regurgitate undigested food, mostly at night, aspiration
    small: cricomyotomy alone
    large: excise, staple (endoscopic staple)
    mid-esophageal: traction, granulomatous mediastinal disease; simple excision
    epiphrenic: distal 1/3, pulsion, rarely symptomatic; Rx diverticulectomy with long myotomy to relieve pressure area

hiatus hernia
    50% sliding (type I), age > 50 (50% of people > 50 have)
paraesophageal
    type II: EG junction normal location, fundus in chest
    type III: EG jct and fundus in chest (phreno-esophageal ligament disrupted)
    type IV: abdominal organ also in chest
danger: gastric volvulus, gangrene
elective repair: 1% mortality, emergency repair: 20% mort.
elderly, multiple medical problems
asymptomatic low risk of incarceration, symptomatic, hi risk
operate on all, must excise sac

esophageal web: Plummer-Vinson (sideropenic dysphagia)
cervical esophageal dysphasia + iron deficiencty anemia
older edentulous women
atrophic oral mucosa, glossitis, brittle spoon-shaped nails
premalignant: 10% squamous oral, hypopharynx, esophagus
Rx: esophageal dilatation, break web, treat iron deficiency

Shatzki ring
distal esophagus at squamocolumnar jct
indicates hiatus hernia, not necessarily GERD
differentiate from stricture caused by GERD
periodic dilatation effective when not GERD related
treat GERD if present

esophageal varices
33% of patients with cirrhosis and varices bleed
Endoscopic banding more effective than sclerosis, reduces risk of first bleed
endoscopic Rx of bleed 90% successful
beta blockade decreases bleeding frequency
TIPS for poor operative candidate or possible transplant candidate (does not disrupt
extrahepatic vasculature)
octreotide (somatostatin analog) 50mic. bolus -> 50/h X 24 decreases splanchinc
blood flow -> decreased variceal pressure

References: