ESOPHAGEAL CANCER

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Case presentation

- 56 year old male who presented with 1 week history of dysphagia
- Unable to tolerate solids but able to tolerate soft diet and liquids
- PMHx: Denies
- PSHx: L humeral ORIF
- Meds: None
Case presentation

- Social Hx
  - 40 pack year smoking history
  - Alcohol abuse (1 pint of vodka per day/10 years)
- Review of systems:
  - 10 pound weight loss over 2 weeks
- Physical exam:
  - Cachetic
  - No diffuse lymphadenopathy
Case Presentation

- CT chest 6/12/09
  - Marked thickening of the middle third of the esophagus with distension of the esophagus proximal to this point
  - R hilar lymph node approximately 10 mm
- EGD 6/16/09
  - Large ulcerated, circumferential, partially obstructing mass at 28 cm from the gums, extending for approximately 6 cm
  - Stomach and duodenum were unremarkable
  - Unable to pass adult scope due to stricture
- Pathology
  - Moderately differentiated squamous cell carcinoma
Case Presentation

- Barium swallow 6/15/2009
  - Infiltrating lesion mid thoracic esophagus approximately 9 cm in length extending just below carina
  - Tight stricture at central portion of the lesion, <5mm at most narrow point
Case Presentation

- PET SCAN 6/19/09
  - Neoplastic range metabolic FDG uptake in middle third of the esophagus (SUV 16.4)
- Pulmonary Function tests
  - FEV1 - 66% of normal
  - ABG – 7.42/42/93/27/98%/3.1
Surgery

- Procedure 6/25/09
  - Bronchoscopy
  - Laparotomy
  - Splenectomy
  - Pyloroplasty
  - Feeding jejunostomy
  - Right thoracotomy
  - Esophagectomy
  - Left neck exploration
  - Cervical esophagogastric anastamosis
Pathology

- 4 x 2.5 cm fungating mass invading muscular wall
- Moderately differentiated squamous cell carcinoma
- Negative margins
- 8 lymph nodes negative for tumor
- Stage T2NOMx
Postoperative Course

- POD # 4: Remained mechanically ventilated, febrile to 102. Bilateral pleural effusions
- POD # 5: Septic shock. Febrile to 103.5
- POD # 5: CT chest/abdomen/pelvis
  - Bilateral pneumonia
  - No evidence of abscess in abdomen/pelvis
PostOperative Course

- Sputum culture from POD # 5: Hemophilus parainfluenzae
- POD # 6: Barium swallow: No evidence of leak
Postoperative Course

- Sputum culture from POD # 5: Hemophilus parainfluenzae
- POD # 6: Barium swallow: No evidence of leak
- POD # 18: Tracheostomy
- POD # 29: Bradycardia progressing to full cardiac arrest. ACLS protocol performed for 10 minutes then patient was resuscitated. Responsive to painful stimuli
Postoperative Course

- POD # 29: Pt witnessed to have seizure activity after the code. Head CT showed no acute pathology
- POD # 35: Repeat head CT: Diffuse axonal injury
- Neurology consulted. EEG performed showing no correlation between disorganized movements therefore no evidence of seizure activity
- Unable to control movements with benzodiazapenes, clonopin or depakote
- POD # 67: Discharge to skilled nursing facility
QUESTIONS?
Epidemiology

- Incidence in the United States is 20 per 100,000
- Worldwide incidence: 160 per 100,000
- 2008: ~14,300 deaths
- 2 major histological types:
  - Squamous cell carcinoma
  - Adenocarcinoma
SQUAMOUS CELL CARCINOMA
- 70% found in upper & middle 1/3rd of esophagus
- Most common form of esophageal cancer worldwide
- Risk factors
  - Smoking
  - Alcohol
  - Food additives eg nitrosamines (smoked food)

ADENOCARCINOMA
- Distal 1/3rd and at the GE junction
- Most common subtype in the US and Western world
- Risk factors
  - Barrett’s esophagus
  - GERD
  - Obesity
Presentation

- Asymptomatic
- Dysphagia especially to solids (60% of the lumen must be occluded)
- Retrosternal pain
- Decreased parenteral intake
- Weight loss
- Hoarseness
- Aspiration pneumonia
Diagnosis

- **Esophagram**
  - Recommended for any patient presenting with dysphagia
  - Differentiate intramural vs intraluminal lesions
  - Differentiate intrinsic vs extrinsic compression
- **Endoscopy**
  - Visualize the lesion
  - Location
  - Biopsy
Staging

2 Classification systems exist:

- **TNM system**
  - T – tumor depth
  - N – Involvement of regional lymph nodes
  - M – Disease to nonregional lymph nodes & distant sites

- **WNM system** (Ellis system)
  - W – Wall penetration
  - N – number of positive lymph nodes
  - M – Distant disease
TNM staging

HGD  T₁ intramucosal  T₂  T₃  T₄

Epithelium  Basement membrane  Lamina propria  Muscularis mucosa  Submucosa

Muscularis propria  Periesophagea tissue

Aorta

Comparison of TNM & WNM staging systems

Staging: CT

- Chest/Abdomen/Pelvis
  - Length of the tumor
  - Esophageal thickness and thickness of the stomach
  - Regional lymph node status
  - Distant metastasis
Staging: PET scan

- Uptake of fluorodeoxyglucose
- Evaluate primary mass, regional lymph nodes and distant disease
- Detection of metastatic disease: Sensitivity 88 %, Specificity 93 %
- Rizk et al 2006 examined if SUV levels can predict survival after esophagectomy. Pts with SUV < 4.5 more likely to have early stage disease and less lymph node involvement. Overall survival better than in high SUV group
Overall survival of all patients based on maximum SUV

- Conclusion
  - PET SUV could predict clinical/pathologic stage and overall survival in pts with esophageal cancer

Rizk et al Preoperative 18[F]-fluorodeoxyglucose positron emission tomography standardized uptake values predict survival after esophageal adenocarcinoma resection
Ann Thorac Surg 2006: 81 (3) 1076 - 81
Staging: Endoscopic Ultrasound

- Determine depth of tumor
- Status of regional lymph nodes
  - Able to biopsy regional lymph nodes
- Disadvantage:
  - Tends to overstage T status
  - Understage N status
- Zuccaro et al 2006 compared EUS staging vs pathology after esophagectomy in 266 patients. T2 tumors only identified correctly in 42% of patients by EUS, 54% of cases they were overstaged as T3
MANAGEMENT OF CARCINOMA OF THE ESOPHAGUS

Barium swallow, endoscopy → Tumor staging (CT chest/abdomen, PET, EUS) → Clinical evaluation

Late disease or significant comorbidity
- Distant organ metastasis
- Cardiac, pulmonary, renal, or hepatic failure

→ Chemoradiation

Early disease
Tumor confined to the mucosa (T1)

→ Transhiatal/ minimally invasive esophagectomy

→ NO

→ Chemoradiation

→ N1

→ N≤5

→ Transhiatal esophagectomy

Intermediate disease
Tumor into the wall (T2)

→ En bloc resection

→ NO

→ Treatment Failure or Recurrence

→ N0

→ N≥5

→ Stent

Advanced disease
Tumor through the wall (T3)

→ Chemoradiation

→ N1

→ Airway fistula

Unresectable proximal or bleeding tumor

→ Laser ablative therapy

→ Local recurrence

Unresectable tumor

→ Stent

Distant metastases

→ Chemotherapy

Severe debility
Advanced disease

Supportive care

Local recurrence
No metastases
Complete excision possible

Palliative surgery

Unresectable proximal or bleeding tumor

Laser ablative therapy

Airway fistula
Unresectable tumor
Local recurrence

Distant metastases
No local recurrence

Chemotherapy
History of esophageal resection

- Czerny 1877 – 1st esophageal resection. Cervical tumor
- Torek 1911 – Resection of thoracic esophagus. Pt had cervical esophagostomy & gastrostomy. External rubber tube connected the 2. Pt lived for 10 years
- Turner 1933 – Transhiatal esophagectomy
- Oshawa 1933 – Thoracic resection with anastomosis
- Ivor Lewis 1946 – Described Ivor Lewis esophagectomy
Surgical Therapy

- Modified McKeown/Triincisional Technique
- Transhiatal Esophagectomy
- Ivor-Lewis Esophagectomy
- En Bloc Resection
- Left thoracoabdominal approach
Transhiatal Esophagectomy

- Better surgical option for patients with poor pulmonary function i.e. FEV₁ < 800
- Contraindications:
  - Severe CAD or valvular disease
  - Bulky tumors of midesophagus difficult to dissect
Transhiatal Esophagectomy
Transhiatal Esophagectomy
Transhiatal Esophagectomy
Transhiatal Esophagectomy

ACS Principles & Practice of Surgery 2009
Modified McKeown/Triincisional Technique

- Combination of Ivor-Lewis and transhiatal approaches
- Useful for tumors at any level of the esophagus
- Consists of:
  - Laparotomy with construction of gastric neoesophagus
  - Right thoracotomy
  - Cervical anastomosis
Ivor Lewis Esophagectomy

- Contraindications
  - Tumors in upper 1/3rd of esophagus
  - Long segment Barrett’s esophagus with extension into cervical esophagus

- Technique
  - Laparotomy
  - R thoracotomy
  - Anastomosis is made in the chest
Ivor-Lewis Esophagectomy

ACS Principles & Practice of Surgery 2009
Ivor Lewis Esophagectomy

Stomach and Esophagus Approximated with Single Stitch

Gastrostomy Made with Electrocautery for Technique with Stapled Anastomosis

ACS Principles & Practice of Surgery 2009
En Bloc Resection

- Advocated by some surgeons as there are some studies which show removal of lymph nodes improves survival
- Technique
  - Triincisional
  - Ligation of azygos, hemiazygos, intercostal veins
  - Removal of mediastinal lymph nodes
  - Excision of rim of diaphragm
  - Removal of paracardial, left gastric, portal, common hepatic, celiac, splenic lymph nodes
  - Cervical esophagogastric anastomosis
Complications of Esophagectomy

- Mortality
  - Historically 15 – 40 %
  - Experienced centers: 3 – 4 %
  - Advances in ICU care have improved mortality significantly
- Anastomotic leak
  - Ivor-Lewis: Mediastinitis
  - Cervical leaks can be drained
Complications of Esophagectomy

- Anastomotic Stricture
- Recurrent Laryngeal Nerve Injury
- Respiratory
  - Incidence reported 2 – 47 %
- Hemorrhage
- Delayed emptying of the conduit
Chemotherapy & Radiation

- Radiation as a sole therapy mainly for poor surgical candidates or those in need of palliation
- RTOG 85-01 study
  - Randomized control trial over 5 years
  - Radiation (64 Gy) vs radiation (50 Gy) plus chemotherapy (cisplatin, fluorouracil)
  - T1-3No – 1Mo
  - At 5 years, survival for combination therapy group was 26 % vs 0 % for radiation alone
Does chemotherapy followed by surgery offer any benefit?

- American Intergroup 0113 trial
  - Randomized control study
  - Compared surgery alone vs preoperative chemotherapy followed by surgery
  - No significant difference between 2 groups in terms of survival
- Meta-analyses have shown a some survival benefit to preoperative chemotherapy
What is the role of chemoradiation?

- 2 most important prognostic factors:
  - Tumor invasion
  - Lymph node metastasis
- T stage
  - Chemoradiotherapy for T2 lesions or above (some surgeons advocate en bloc resection has as good results as chemoradiotherapy for T2 lesions)
  - Chemoradiotherapy for any evidence of lymph node disease
Conclusion

- Improvements in surgical critical care, resection technique and multimodal therapy have improved the survival of esophageal cancer.
- Surgery remains a crucial element in the treatment of the disease.
- Current studies show that lymph node status and depth of tumor invasion are the most important prognostic factors.
References

- Townsend: Sabiston Textbook of Surgery: 18th Edition