DISCLAIMER:

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ECHO Nevada emphasizes patient privacy and asks participants to not share ANY Protected Health Information during ECHO clinics.
CANCER EVALUATION AND TREATMENT

- STAGING
- TREATMENT MODALITY
- ENDOSCOPIC ULTRASOUND
  - TECHNOLOGY
  - USES
- FINE NEEDLE ASPIRATION
- NEEDS OF THE PATIENT
- FACILITATORS
- RISKS OF THE PROCEDURE
- CASE EXAMPLES
GASTROINTESTINAL AND PANREATICOBILIARY CANCER

- What can we do to combat it?
- First diagnose what type.
- The second and equally important step is STAGING the cancer.
- Staging determines which treatment modality is likely to give the patient a chance for cure or remission.
TREATMENT MODALITY

- Endoscopic Resection
- Surgical Resection
- Chemotherapy
- Radiation Therapy
- Palliation
- Hospice

- The stage of the cancer ultimately dictates the best treatment modality.
ENDOSCOPIC ULTRASOUND

- Important diagnostic method
  - Better than US, CT, and MRI\(^1\)
- Evaluates and stages a multiplicity of cancers of the GI tract and pancreaticobiliary system.
- Tumor staging in the GI tract is determined by standardized criteria
  - Assessing depth of penetration or size of a tumor
  - Involvement of adjacent lymph nodes
  - Spread of the tumor to distant organs, such as the liver

ENDOSCOPIC ULTRASOUND

- Combination of two diagnostic techniques — endoscopy and ultrasound.
- Marriage of these two techniques,
  - Imaging of the body’s inner wall layers combined
  - Endoscope’s maneuverability
- Accurately stages GI tumor by 95%.
ENDOSCOPIC ULTRASOUND

- Enables the endoscopist to use sound waves to generate an image of the transmural anatomy on a monitor.
- Allows placement of high-frequency transducers close to the intestinal wall and adjacent structures.
ENDOSCOPIC ULTRASOUND

- Procedure generates images
  - Individual layers of the walls of the digestive tract,
  - Underlying blood vessels, lymph nodes, pancreas, liver, gallbladder, and bile ducts
- Relatively noninvasive procedure.
- Manipulates sound waves to view the inside of the body.
- Like an X-ray, but no radiation.
TNM CLASSIFICATION OF CANCER

- Formulated by the American Joint Committee on Cancer
  - T - Tumor
  - N - Node
  - M - Metastasis

- Staging ranges from 0 to 4
- Stage 0 being a precancerous condition
- Stage 4 being metastatic disease
- Stages 1-3 determined by the degree of the T or N
ENDOSCOPIC ULTRASOUND (EUS)
WHY ENDOSCOPIC ULTRASOUND?

Evaluate gut wall

Image and sample beyond...

Liver metastasis
EUS AND FINE NEEDLE ASPIRATION

- Used to biopsy and stage a cancerous lesion
  - In the past, this would require invasive methods (surgical interventions).
- Permits passage of a fine needle down the endoscope
- Under ultrasound guidance, it is passed into a suspicious lymph node or mass.
- Tissue is then aspirated for analysis.
- This type of biopsy is known as a fine-needle aspiration (FNA).
EUS CORE ASPIRATION
FINE NEEDLE ASPIRATION (FNA)
EUS AND FNA

- Combination allows visualization and biopsy of tumors
- Enables us to see beyond the structures that historically limited our view.
  - Which in the past would have required conventional surgery
- Now obtaining results are transformed.
  - Performed on an outpatient basis.
  - Reduced pain and recovery time for the patient.
  - Less invasive diagnostic procedure
  - Considerable cost savings for the institution.
EUS USES

- 30 years of researched effectiveness.
- Stage esophageal, gastric, pancreatic, bile duct, ampullary, rectal, and lung cancers.
- Helps differentiate benign from malignant gastric wall tumors.
- Evaluate inflammatory pancreatic diseases and cysts, gallbladder stones, and liver tumors.
T STAGE - EXAMINING THE LAYERS

(A) Transducer

(B) Mucosa (M)
Muscularis mucosa
Submucosa (SM)
Muscularis propria (MP)
Serosa (S)
(cross-section of stomach wall)
EUS: CANCER STAGING

T1 invades submucosa

T2 invades muscularis

T3 invades adventitia

T4 invades adjacent structure

Probe
Mucosa
Submucosa
Muscularis propria
Aorta
Adventitia

T1 tumor
T2 tumor
T3 tumor
T4 tumor

EUS

Courtesy JHU Website
TNM CANCER STAGING

Esophageal cancer

- T = Depth of tumor invasion
- N = Regional nodes
- M = Distant mets (incl. celiac axis)
ECHOENDOSCOPES

- Three major categories
  - Radial
  - Linear
  - Endoscopic probes

- All use sound waves to image tissue consistency and the interface between tissue planes.
EUS IMAGING METHODS

Radial Sector Scanning

5, 7.5, 12 & 20 Mhz

Curved Linear Array

5 & 7.5 Mhz Color Flow Doppler
THE NEEDS OF THE PATIENT

- EUS is like an upper endoscopy
  - Typically takes longer
- Preparation is the same
  - NPO after midnight
  - Continue medications for hypertension, cardiac disease, pain, or seizures in the morning with a sip of water.
- IV sedation/propofol/general anesthesia
- Family member to drive home.
THE NEEDS OF THE PATIENT

- Bloodwork drawn for coagulation studies; CBC, PT, INR.
- Blood thinners must be held for 5 days for FNA.
  - Warfarin (Coumadin), Heparin, Enoxaparin (Lovenox), Clopidogrel (Plavix), Aspirin and aspirin-type products.
- This is especially important during FNA.
THE RISKS AND DRAWBACKS

- EUS is a relatively safe procedure and well tolerated by most patients.
- Primary risks:
  - Reaction to the sedating medication, which could cause reactions ranging from nausea and vomiting to a rash and hives.
  - IV may infiltrate and cause local swelling and pain at the site of insertion, interfering with safe and appropriate sedation levels.
- For patients having an EUS without an FNA
  - complications occur about one in 2,000 (0.05%) cases
- Most significant complication is perforation of the esophagus or the stomach.
THE RISKS AND DRAWBACKS

- Complications are rare,
  - May occur more often with FNA, but are still rare (0.5% to 1%)

- Bleeding:
  - When passing the FNA needle into the targeted tissue.

- Infection:
  - More likely with aspiration of a cystic lesion.

- Pancreatitis:
  - Even more rare and typically after a large biopsy of the pancreas.
RECENT ADVANCES

- EUS has become the most accurate means of staging GI, retroperitoneal, and mediastinal malignancies in recent years.
- Primarily used as a passive imaging device in the past, it’s now evolving into an interventional technique as well.
- A dramatic evolution in endoscopic design has occurred, which provides both high-quality ultrasound imaging and allows for EUS-guided needle biopsy.
- This has expanded the scope of the technique, most notably to the pancreas and the extrahepatic biliary system.
RECENT ADVANCES

- Increased use of FNA for obtaining specimens for cytology and tissue diagnosis,
  - Primarily in the diagnosis and staging of pancreatic cancer
  - In the nodal staging of gastrointestinal and pulmonary malignancies.
- Therapeutic EUS is based primarily upon precise endoscopic needle placement under EUS guidance.
- Therapeutic EUS can be used for pseudocyst drainage, the injection of botulinum toxin in the treatment of achalasia (an esophageal motility disorder), and celiac nerve block.
Frank Fahey is admitted to the ED with dark urine, prutitus, and jaundice.
CT scan shows a large pancreatic mass causing biliary track obstruction.
Mr. Fahey reports a 20 lb weight loss in past 5 months.
Currently, he is able to eat and drink without nausea or vomiting.
Mr. Fahey is admitted to the hospital to expedite his clinical workup.
What diagnostic exam would most accurately evaluate Mr. Fahey’s pancreatic mass?

A. EUS with FNA
B. CT scan
C. PET scan
D. MRI
What diagnostic exam would most accurately evaluate Mr. Fahey’s pancreatic mass?

A. EUS with FNA
B. CT scan
C. PET scan
D. MR

**ANSWER:** A. EUS with FNA has been found to be superior to CT scan, MRI, and PET scan in the diagnosis of pancreatic cancer. With the added benefit of obtaining pathology for diagnosis.
What bloodwork will Mr. Fahey require before his exam?

A. None
B. PT/PTT
C. Bleeding time
D. Comprehensive panel
What bloodwork will Mr. Fahey require before his exam?

A. None
B. PT/PTT
C. Bleeding time
D. Comprehensive panel

ANSWER: B. As there is a chance for potential bleeding during the FNA, coagulation studies are required.
QUESTION 3

What type of scope will be used for Mr. Fahey’s procedure?

A. Radial echoendoscope
B. Gastroscope
C. Duodenoscope
D. Linear array echoendoscope
What type of scope will be used for Mr. Fahey’s procedure?

A. Radial echoendoscope
B. Gastroscope
C. Duodenoscope
D. Linear array echoendoscope

ANSWER: D. The linear array echoendoscope has an ultrasound probe at its tip, and images are obtained along a plane parallel to the endoscope axis. It has a channel that allows for the passage of a needle for FNA. Doppler US capability is present supplying guidance to prevent vascular structures from being injured by the needle during an FNA.
What is the most significant complication of an EUS?
A. Pancreatitis
B. Perforation
C. Bleeding
D. Shock
QUESTION 4

- What is the most significant complication of an EUS?
  - A. Pancreatitis
  - B. Perforation
  - C. Bleeding
  - D. Shock

- ANSWER: A. The most significant complication of an EUS is perforation of the esophagus or the stomach, which can occur during endoscopic manipulation of the echoendoscope.
THANK YOU