Seeing is Believing
New trends in therapeutic endoscopy

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Disclosure

• Nothing to disclose except
• I am a father of five
• I am on call
• really
• I am tired
• I do hope to go to the trump rally later today (maybe)
• I am a New England patriots fan
  • My wife is not..
• Nobody pays me to try to sell their stuff....
• PROMISE
Welcome to Lambeau field!
Thank you very much for invitation--WSGNA
Recognize this
PERSPECTIVE>>>
Dick and Elvis!
ERCP
Endoscopic retrograde cholangiopancreatography

• That’s a mouthful...
• Around since the 70’s
• I am second generation
  • Everyone I learned from...learned themselves...
• Initially purely diagnostic test
• Gradually acquired more therapeutic capability
  • Sphincterotomy
  • Stone extraction
  • Stent placement
What are we talking about here...

Pancreatic-biliary anatomy

The barrier...

Ampulla of Vater
Biliary access is paramount.

- Advanced access techniques are required frequently to achieve success.
- Obstacles to successful cannulation of the (intended) duct.
  - A bit of murphy at play.
  - Surgically altered anatomy
    - B-II gastrectomy...
    - much less common now. BIG deal in the 80’s and 90’s (Prilosec was FDA approved in 1989)---game changer
  - Gastric bypass –
    - Extremely challenging
    - Long scopes, minimal equipment, high failure rates.
- Patient anatomy
  - Tumor –
    - Gastric outlet obstruction
Biliary access- how do we get there?

- Patient anatomy
  - Tumor –
    - Gastric outlet obstruction
    - Duodenal obstruction
  - Duodenal diverticulum
  - Fussy papilla.
- Minor papilla
  - Whole another league... THE NFL...
  - Very tortuous anatomy and small access.
- Operator experience
Advanced access techniques

• Pre-cut or needle knife papillotomy
  • Has been described since early days of ERCP,
Great case for inexperienced operators
Sometimes you just have to go.
Free hand needle knife papillotomy
Considerations on placing pancreatic stent

• Two goals with pancreatic stent placement
  • #1 Reduce the risk of post ERCP pancreatitis---Achilles heel of ERCP
  • #2 Increase the chances of a successful procedure what effects #1
    • #3 Keep my blood pressure low.

• Access to Pancreatic duct
• Anatomy that is amenable to stenting
• Operator experience.
• Stent designs
How to reduce risk of post-ERCP pancreatitis

• Don’t do the procedure  
  • Careful patient selection- “diagnostic ERCP is never(well never say never) needed  
  • Alternative modalities (EUS and MRCP)
• Be successful at intended intervention
• Wire guided cannulation  
  • The pancreas is not a light bulb.... So don’t light it up.  
  • Careful where you are putting that wire please....
• Early employment of alternative techniques...  
  • Doing the same thing over and over again....(well you get the idea)  
  • Change something every five minutes and repeat...
How to reduce risk of post-ERCP pancreatitis

• Needle knife access
• EUS access
  • Rendevous
  • EUS directed therapy
• Pancreatic stent placement
• Indomethacin suppository
• Combination?
Pancreatic stent assisted biliary access
RYGB

- What B-2 gastrectomies were to the ERCPist (and team) in the 80’s and 90’s
- Roux-and-Y gastric bypass is the B-2 on steroids in the new millenia...
- It is a long way home from here..
Long limb ERCP

• Challenging
• High failure rates
• Limited capabilities when you arrive.
EUS / ERCP combine to access
EDGE image progression
Now we have a (better)chance!!

Thru the Axxios

Into the duodenum
EDGE

- EUS directed access to the excluded lower stomach in patients with RYGB
  - High risk of stent migration
  - Surgical back up important.
  - Many favorable aspects though.

- Internal EUS-Directed Transgastric ERCP (EDGE): Game Over?
  - maybe
### Surgical assisted ERCP vs EDGE

<table>
<thead>
<tr>
<th>Measure</th>
<th>LA_ERCP(43)</th>
<th>EDGE(29)</th>
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</thead>
<tbody>
<tr>
<td>Success</td>
<td>97%</td>
<td>96%</td>
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<tr>
<td>Avg procedures</td>
<td>1.02</td>
<td>1.2</td>
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<tr>
<td>Adverse events (%)</td>
<td>24</td>
<td>19</td>
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<tr>
<td>Procedure time(min)</td>
<td>184</td>
<td>73</td>
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<tr>
<td>LOS (days)</td>
<td>2.65</td>
<td>0.8</td>
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</table>
Moving target

• Surgeons are changing operations
  • Gastric sleeves

• Innovative approaches continue to show up.

• Let’s move on....
Cholangioscopy

Actually looking in the bile duct..

Seeing is better

Standard ERCP is equivalent to a barium enema vs a colonoscopy
If I see it then who knows...maybe something good might happen...
Stone gone Awry
Gallstone Ileus
65 y/o Female with large bowel obstruction

Large obstructing Gallstone

Laser fragmentation
Stone starting to fragment
Laser fragmentation of stone video
Stone clearance
Duodenoscope assisted cholangiopancreatoscopy (DACP)

• Initial technology was limited to larger channel duodenoscope (Mother scope) with a smaller caliber choledochoscope (baby scope)
  • Limited by
    • Expense (Capital)
    • Requires 2 biliary endoscopists
    • Fragile, high rate of breakage/repair.

• These draw backs limited the adoption and diffusion of this technology
Looking in the bile duct has been around for a long time

**Cholangioscopy**

- Allows direct and optical contrast based (NBI) visualization of the biliary tree
- Particularly useful for assessing strictures and treating large stones and confirming their complete removal
- Role in assessing post-OLT biliary strictures???
- Can perform biopsies, laser or electrohydraulic lithotripsy, and even ablation

**Mother Daughter Cholangioscopy**

- Requires 2 operators
- Fragile “Daughter” endoscope
- Only 1 degree of freedom
- Small working channel
- Some versions without working channels or are fiber optic
ERCP with Fluoroscopically Guided Biopsy

**Conclusions:** Endobiliary sampling is technically difficult and has a limited sensitivity for the diagnosis of malignant biliary stenosis.

<table>
<thead>
<tr>
<th>AUTHOR/YR</th>
<th>PATIENTS</th>
<th>SENSITIVITY (%)</th>
<th>SPECIFICITY (%)</th>
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<tbody>
<tr>
<td>Ponchon, 1995</td>
<td>128</td>
<td>43%</td>
<td>97%</td>
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<tr>
<td>Schoefl, 1997</td>
<td>103</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Jailwala, 2000</td>
<td>133</td>
<td>37%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>364</td>
<td><strong>48%</strong></td>
<td><strong>99%</strong></td>
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</table>
SpyGlass® System Components
Now Available at ABMC
SpyGlass® Direct Visualization System Advanced Technology

• SpyGlass Direct Visualization Probe
  • 0.77 mm (0.035”) outside diameter with 70° degree field of view
  • 365 cm overall length
  • One image bundle surrounded by light fibers

• SpyBite® Biopsy Forceps
  • Required minimum working channel of 1.2 mm
  • Working length of the biopsy forceps is 286 cm
  • Jaw outer diameter is 1 mm (4 mm when open)
SpyGlass® System Features

- Single-operator system
- Four-way steering capability
- Independent irrigation channels
- Diagnostic and therapeutic capabilities
- Single-use components for reliable, consistent performance
- Daily accessibility to technology
Mother daughter re-invented

Set up much easier

Single operator...HUGE
More than 100 publications or abstracts have been presented on the clinical utility of the SpyGlass System.

A 297 patient global registry concluded:

- Cholangioscopy using the SpyGlass System is safe and achieves a high rate (88%) of procedural success.
- Direct visualization improves the accuracy of cholangiographic findings when used in conjunction with ERCP.
- Direct visualization has good diagnostic predictive value in patients with biliary obstructive symptoms of indeterminate origin.
- Cholangioscopy-guided bile duct biopsy provides specimens adequate for histology in the majority (89%) of cases.
- Cholangioscopy has clinical utility for lithotripsy of difficult biliary stones.
Video spy----I like (or don’t like) what I see
Spyglass, patient with recurrent biliary obstruction {video}
Cholangiopancreatoscopy

- Direct visualization of the biliary and pancreatic ducts may have advantages over conventional fluoroscopic imaging in cases related to:
  - Choledocholithiasis/pancreatic stones
  - Biliary strictures
  - Mucosal irregularity attributed to primary duct tumors
  - Villous tumors of the biliary epithelium

Duodenoscope-Assisted Cholangiopancreatoscopy
Gastrointest Endosc 1999;50:943-945
Cholangioscopy vs. Conventional bxs

- GIE Feb 2012- Draganov et al
  - 26 pts.-
  - Compared – w/ sequential sampling technique
    - brush cytology
    - mini-forceps
    - standard forceps
<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Neg pred. value</th>
<th>Accuracy</th>
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<tr>
<td>Cytology</td>
<td>5.8</td>
<td>100</td>
<td>36</td>
<td>38.5</td>
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<tr>
<td>Standard Forceps</td>
<td>29.4</td>
<td>100</td>
<td>42.8</td>
<td>53.9</td>
</tr>
<tr>
<td>Mini forcep (spyglass)</td>
<td>76.5</td>
<td>100</td>
<td>69.2</td>
<td>84.6</td>
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</table>
Draganov et al

• Conclusion
  • Cholangioscopy has significantly higher accuracy as compared to ERCP directed biliary cytology and biopsy.
Let’s move on again

• Other imaging modalities out there...
Introduction

• Detecting early stage or precancerous lesions are more challenging
  • Small size
  • Lack of distinction from surrounding tissue

• Advanced technologies currently available.
  • Multi-detector CT scan- “64 slice”
  • High resolution endoscopy
  • Endoscopic ultrasound
  • Wireless endoscopy
Introduction

- Early detection/accurate staging of GI cancers is increasingly important
  - Early detection impacts long term survival
  - Less invasive alternatives becoming more widely available
Introduction

• Early detection has gained wider interest
  • parallel research of various technologies currently available
  • improve the sensitivity and overall accuracy of cancer staging.
Introduction

• Advances in therapeutic endoscopy is opening the door to minimally invasive techniques to remove larger and more advanced neoplasia of the GI tract.
  • LASER
  • Photodynamic therapy- early esophageal cancer
  • Radiofrequency ablation- Barrett’s esophagus
  • Cryotherapy- esophageal cancer
  • EMR (endoscopic mucosal resection)- colon polyps/esophageal/gastric lesions
  • ESD (endoscopic submucosal dissection)- New frontier.
    • Next generation of interventionalist- “Resectionist”
Third space endoscopy

• No longer do we see the intestinal wall as a barrier
• It is now being viewed as an entry portal.

• POEM (per-oral endoscopic myotomy)- achalasia
  • G-POEM- gastroparesis
  • Z-POEM- Zenker’s diverticulum treatment
Chromoendoscopy (magnification)

- Sharma et al (N=80) Magnification ×115
  - Stain: indigo carmine - Barrett’s esophagus
    - Ridged/villous Sensitivity 97%, specificity 76% of ridge/villous pattern for IM
    - Circular pattern - Sensitivity 100% of irregular/distorted pattern for HGD
Gastric metaplasia
Narrow Band imaging

• Potential benefits
  • By identifying abnormal vessel pattern can detect dysplastic early invasive cancers.
NBI imaging
Potential use of OCT (Optical Coherence Tomography)

• Differentiate adenomas from hyperplastic polyps
• Clinical benefits,
  • Accurately identify non-neoplastic lesions
    • Avoiding the risk/cost of removal
New OCT prototype
Normal colon wall
OCT- Colon

• In an ex-vivo study,
• real-time endoscopic OCT(EOCT)
• correlates with mucosal and submucosal histology.
• An “optical biopsy”
Video Capsule Endoscopy
“The final frontier”
Introduction

- Many diseases primarily affect the small bowel
  - Crohn’s
  - Celiac sprue
  - Benign tumors (i.e. lipoma, leiomyoma)
  - Malignant tumors- (i.e. lymphoma, adenocarcinoma)
  - Mucosal abnormalities (i.e. NSAID ulcer, angioectasia)
Introduction-Symptoms

- Weight loss
- Abdominal pain
- Diarrhea
- Acute/chronic blood loss anemia
Evaluation of patients with suspected small bowel disease

• History
  • Medication use, particularly over the counter NSAID’s
  • Family history of Crohn’s disease
  • Extent and duration of weight loss, diarrhea, bleeding
  • Signs/symptoms of small bowel obstruction
    • Cramping, distention, vomiting.
Evaluation of patients with suspected small bowel disease

• Exam
  • Signs of blood loss anemia, pallor, hypotension, melena, hemoccult stool.
  • Palpable abdominal mass.
  • Lymphadenopathy
Evaluation of patients with suspected small bowel disease

- Laboratory testing
  - CBC, complete metabolic profile
  - Iron profile
  - Celiac testing (commercial panels available including gene testing)*
  - IBD antibody panel (commercially available panel)*

* in appropriately selected patients
Case #1

• EC is a 69 y/o wf with h/o iron deficiency anemia. Admitted with symptomatic anemia transfused placed on iron supplementation

• PmHx- DM, COPD, HTN

• Prior studies
  • Colonoscopy 6 mos earlier, small polyps diverticulosis
  • EGD – HH with erosions
  • SBFT performed.- Normal exam

• Video capsule endoscopy performed
Capsule study- Jejunum
Case presentation

• History
  • FA is a 69 y/o WM. Fatigue,
  • Hgb 9.3 MCV 67.5, plts nl., INR normal. Heme positive stool
  • 2 years of iron deficiency anemia. Responsive to iron replacement.
  • EGD X2 negative
  • Colonoscopy X2 negative

• Exam
  • Healthy appearing male NAD
  • Abdomen benign
History continued

• Small bowel capsule endoscopy requested by primary care physician.
Capsule Endoscopy
Capsule endoscopy- cancer detection
What’s next
I can only imagine...
Conclusion

• Imaging and intervention intersect into patient outcomes
• Seeing things differently and in better ways allows us to imagine new solutions to old problems (and new ones).
Thank you ....see you after lunch!!
Thank you

GO!  

PACK!