

# **BILE DUCT STRICTURES**

**Grace H. Elta, MD**  
**Professor Emeritus**  
**University of Michigan**



# BILE DUCT STRICTURES

## ■ Benign

- Post-operative
- Primary sclerosing cholangitis
- Post-transplant
- Chronic pancreatitis

## ■ Malignant

- Pancreatic/Ampullary cancer
- Cholangiocarcinoma
- Metastatic cancers
- Lymphoma



MICHIGAN MEDICINE  
UNIVERSITY OF MICHIGAN

Division of Gastroenterology & Hepatology

# BILIARY IMAGING

- **Transcutaneous US or CT:**
  - Often the first studies obtained in a patient with jaundice
  - May demonstrate dilation with or w/o a stricture or mass
- **MRCP**
  - Offers more detail
  - Features of malignancy: stricture length >10 mm, irregular margins, shouldering
  - Cholangiocarcinoma diagnosis: 77-86% sensitive; 63-98% specific



# BILIARY IMAGING

- Endoscopic ultrasound
  - Used when other imaging is inconclusive
- EUS-FNA for extra-hepatic cholangiocarcinoma
  - 77% sensitive, 53-89% specific
  - FNA avoided at many centers if patient is a transplant candidate due to fear of seeding

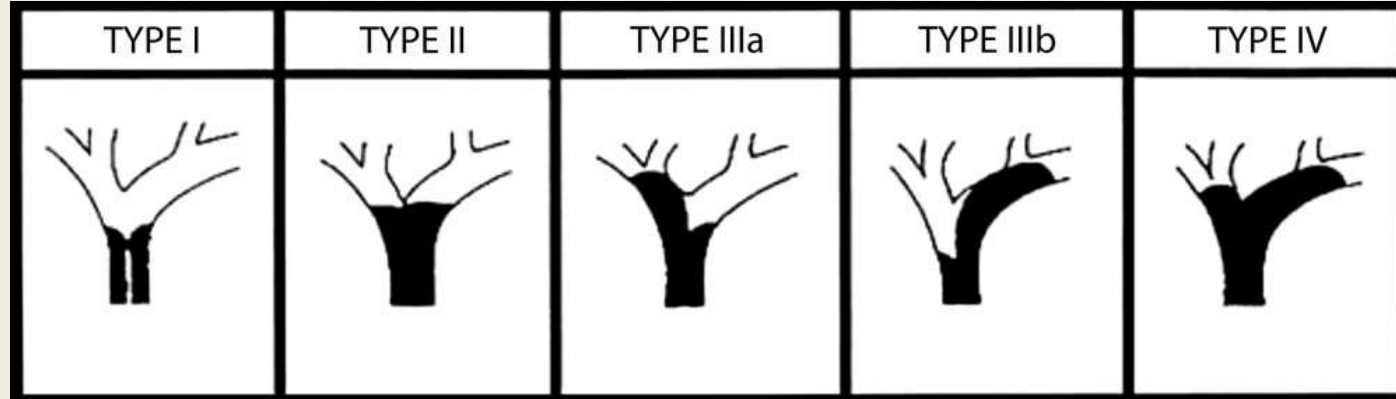


# WHAT IS THE ROLE OF ERCP?

- **Tissue Confirmation with Brush and Biopsy**
  - Disappointing sensitivity: 18-60%
- **Allows Cholangioscopy**
  - Directed biopsy
  - Visual appearance may suggest malignancy; although prior stenting may alter this
- **Allows Intra-ductal US**
  - Does not help with tissue acquisition
- **Allows palliative stenting in non-surgical candidates**



# CHOLANGIOCARCINOMA BISMUTH CLASSIFICATION



**Bismuth 1 in good surgical candidate: Consider surgery**

**Bismuth 2-5 in good surgical candidate: Consider transplant**

## ERCP FOR STENTING IN POOR SURGICAL CANDIDATES

- MRCP prior to ERCP helps determine best areas to stent:  
“volumetric liver assessment”
- Avoid injection of contrast into areas that will not be stented to avoid cholangitis
- SEMS provide better drainage and require less procedures than plastic stents
- Open mesh uncovered metal stents best for hilar strictures
  - Bilateral stents with either side by side or stent within a stent
  - Also allows future percutaneous approach if needed



# INDETERMINATE BILIARY STRICTURES: TISSUE ACQUISITION METHODS

- Brush cytology alone: 30% sensitivity
- FISH: increases cytology sensitivity by 20%\*
- Multimodal tissue (brush + biopsy): 60-70%
  - Standard biopsy forceps after ES
- Methionyl-tRNA synthetase 1 immunofluorescence (MARS1 IF): Accuracy=94.5% in study of 240 pts\*\*
- DNA methylation markers: Accuracy 91%\*\*\*
- EUS-FNA: 77% S, NPV: 29%
  - Contra-indicated due to seeding in extra-pancreatic strictures



# WHAT IS THE VALUE OF SPYGLASS CHOLANGIOSCOPY?

## ■ Pros:

- Single operator, Two dials, wire guided
- Channel for both water irrigation and device
- Reported accuracy of visualization: up to 89%\*
- Allows directed biopsy

## ■ Cons:

- Small biopsy forceps, less sensitive than cytology plus FISH in one study\*\*
- Increases risk of cholangitis\*\*\*

# INDETERMINATE BILIARY STRICTURES: IMAGING METHODS

- Cholangioscopic appearance
  - Blinded viewer accuracy: 45% \*
  - Mendoza criteria: diagnostic accuracy 77% \*\*
  - 2<sup>nd</sup> Blinded viewer study: 74% sensitive, 46% specific \*\*\*
- Intra-ductal US non-blinded accuracy
  - 71% in PSC; 90% in non-PSC
- Problem: no tissue

\*Sethi GIE 2012 \*\*Kahaleh GIE 2021 \*\*\*Stassen GIE 2021

# CONFOCAL LASER ENDOMICROSCOPY

- Cholangioflex probes: real time microscopic images
- More accurate than ERCP tissue sampling in one study\*
- Multicenter study in PSC dominant strictures:\*\*
  - Sensitivity for cancer: 85.7%; specificity: 73%
  - Did not perform well in CBD or left hepatic duct locations
- Problems with pCLE:
  - Underpowered studies
  - Only fair to poor inter-observer agreement
  - Tissue diagnosis still required to start therapy

# INTRA-HEPATIC BILIARY STRICTURES

- Serum CA 19-9: Sensitivity 42%, Specificity 90%
- Segmental Right lobe strictures: consider post-cholecystectomy
- Benign vs. Malignant:
  - Mainstay is MRCP Imaging
  - Refer to Liver cancer center
  - Serial MRCPs in Indeterminate Strictures: q 3, 6 or 12 months
- If Unreachable by ERCP in non-operative candidate: EUS FNA or transcutaneous biopsy options



# **ENDOSCOPIC RX FOR BENIGN BILIARY STRICTURES: RANK ORDER OF SUCCESS**

## **1. Primary sclerosing cholangitis**

- Stricture Rx delays transplantation; No effect mortality**
- Balloon dilation; usually no stent**

## **2. Post-transplant**

- Anastomosis, donor duct, or SOD**
- Stent-free patency: 73-90%**

## **3. Post-operative**

## **4. Chronic pancreatitis**

# RARE CAUSES OF BENIGN BILIARY STRICTURES

- Autoimmune cholangiopathy / pancreatitis: type I (66-85% + IgG4) & type II (rare + IgG4)
- Choledochol cysts
- ? Previous stone disease
- Sphincter of Oddi stenosis – not high-grade obstruction



# LONG PSC STRICTURE

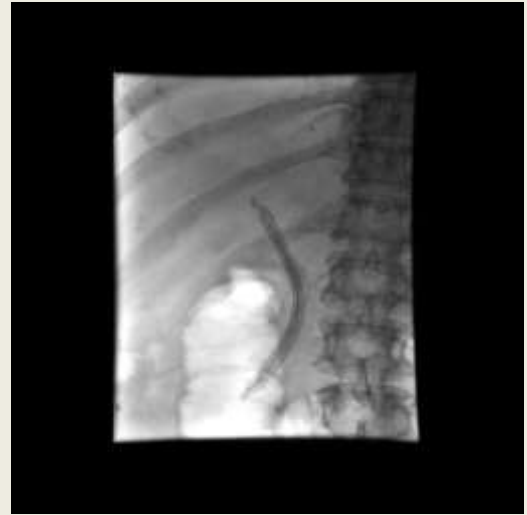
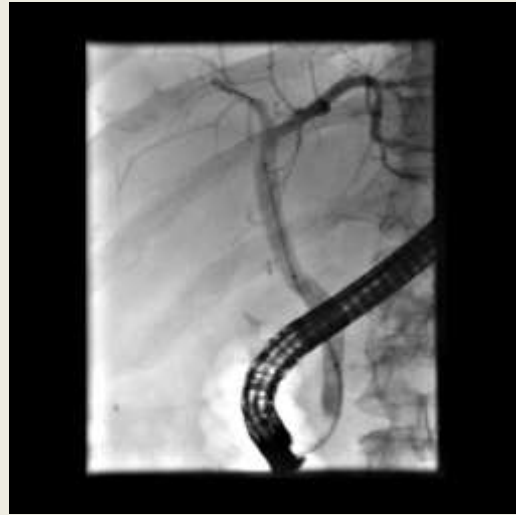
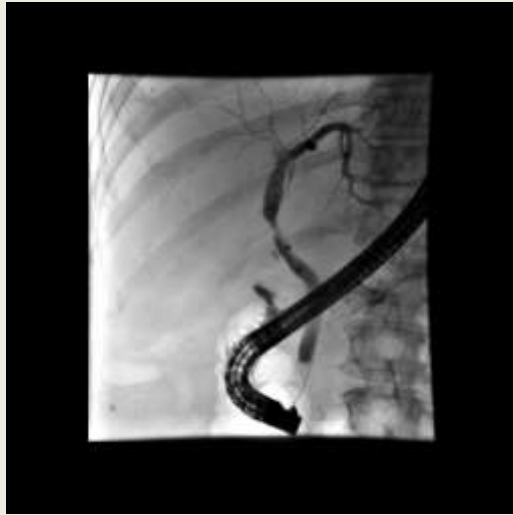


## 3 MONTH FOLLOW-UP





# POST-TRANSPLANT STRICTURE



- Dilation, then multiple 10F stents: 87% long term patency\*
- FCSEMs useful in recalcitrant cases

# POST-CHOLECYSTECTOMY STRICTURE

- Cholecystectomy often complicated
- Symptoms within 2 yrs of surgery
- Short stricture in CHD typical
- Post-op stricture treatment:
  - Roux-hepaticojejunostomy
    - Morbidity: 10-20%; mortality: 2-3%
    - Stricture recurrence: 20-25%
- Endoscopic: dilation & stenting

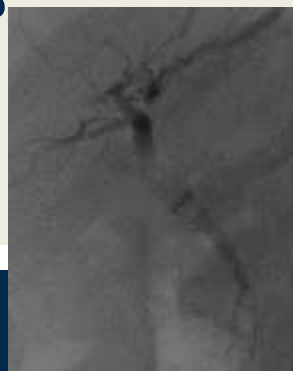


MICHIGAN MEDICINE  
UNIVERSITY OF MICHIGAN

Division of Gastroenterology & Hepatology

# BILE DUCT STRICTURE DUE TO CHRONIC PANCREATITIS

- Treatment indications: duct  $>12\text{mm}$  or alk phos  $>3 \times$  normal
- Dilation, then MPS or FCSEMs
  - Better without pancreatic calcifications
- RCT of MPS vs FCSEMs:
  - Similar resolution at 24 months: 76%
  - Less ERCPs (2.6 vs. 3.9) in FCSEMs
  - Similar Adverse Event rate



# BENIGN STRICTURE CONCLUSIONS

- **PSC + post-OLT: Endo Rx successful**
- **Recalcitrant strictures (post-op + CP):**
  - Added value to multiple plastic stents
  - Requires 4-5 ERCPs
  - Morbidity: stent occlusion / infection
  - Biliary bypass still reasonable alternative for CP
- **FCSEMs excellent alternative for recalcitrant strictures**

# WHEN TO CHOOSE A FCSEM?

- **Benign biliary strictures**
  - **Simpler to place and requires fewer ERCPs**
  - **Faster stricture resolution**
  - **More stent migration (25% vs. 16% with plastics)**
    - **Less migration risk with flanged FCSEM or with double pigtail within**
  - **Avoid in small ducts (<6 mm)**
  - **Probably no need to avoid cystic take off**
- **Treat post ES bleed / perforation, treat intra-ductal bleed**
- **When cancer diagnosis is unclear or stricture is close to hilum**
- **More costly and more migration than bare metal SEMS for inoperable panc cancer with low strictures**

# MALIGNANT BILIARY OBSTRUCTION

- **Presentation: Painless jaundice & wt. loss**
- **Diagnoses**
  - **Pancreatic cancer**
  - **Bile duct cancer**
  - **Ampullary carcinoma**
  - **Gallbladder cancer**
  - **Metastatic lymph nodes**

# SUSPECTED MALIGNANT OBSTRUCTION EVALUATION

- Pancreatic protocol CT for diagnosis / operability decision
- EUS / FNA: tissue confirmation if neoadjuvant Rx planned
- No need for pre-op biliary drainage\*
  - Studied for t. bili <14
- Neoadjuvant Rx planned pre-op:
  - Short SEMs due to surgery delay
- Suspected hilar cancer: MRCP before ERCP

# MANAGEMENT OF MALIGNANT HILAR OBSTRUCTION

- 5-year survival <5%
- Determine resectability or OLT candidacy: 73% are unresectable
- Most patients require biliary drainage for symptoms & to preserve liver function
- SEMSs is superior to Plastic stents unless operability not yet determined
- Bilateral SEMS (either stent in stent or side by side) better than unilateral
- Avoid Percutaneous drainage in potentially operative patients
- Inoperative patients:
  - PTBD likely higher success rate and lower adverse events
  - However, endoscopic drainage strongly preferred by patients



# CONCLUSIONS

- Determine benign vs. malignant & resectability
- Multiple imaging modalities: MRCP, CT, EUS, cholangioscopy, IDUS, probe confocal microscopy
- Role of ERCP
  - Obtain tissue diagnosis
  - Palliative stenting in malignancy
  - Endoscopic treatment of benign strictures

