Diagnosing biliary stone disease
The endoscopist’s point of view

Session No.: 3

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„Quality in endoscopy is appreciable but hardly quantifiable”

Aksel Kruse (1942-2015)

To remember to a great pioneer of (quality) endoscopy, a teacher, a friend.
How to assure quality in the diagnosis of biliary stones?

• Make diagnosis as easy and sure as possible
  – Fewer labs
  – Non- and semi-invasive tests
  – Decrease costs

• To avoid pts from unnecessary ERCPs
  • Significant morbidity (up to 5-10%)
  • Rare, but existing mortality (<1%)
  • Expenses
Bile duct stones

• With gallbladder in situ
• After cholecystectomy
• Acute biliary pancreatitis
Bile duct stones – clinical predictors

<table>
<thead>
<tr>
<th>Predictors of choledocholithiasis</th>
<th>Prevalence of CBD stones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very strong</strong></td>
<td></td>
</tr>
<tr>
<td>CBD stone on transabdominal US</td>
<td>&gt;50%</td>
</tr>
<tr>
<td>Clinical ascending cholangitis</td>
<td></td>
</tr>
<tr>
<td>Bilirubin &gt; 4 mg/dL</td>
<td>&lt;10%</td>
</tr>
<tr>
<td><strong>Strong</strong></td>
<td></td>
</tr>
<tr>
<td>Dilated CBD on US (&gt; 6 mm with gallbladder in situ)</td>
<td>10-50%</td>
</tr>
<tr>
<td>Bilirubin level 1.8–4 mg/dL</td>
<td></td>
</tr>
<tr>
<td><strong>Moderate</strong></td>
<td></td>
</tr>
<tr>
<td>Abnormal liver biochemical test other than bilirubin</td>
<td></td>
</tr>
<tr>
<td>Age older than 55 y</td>
<td></td>
</tr>
<tr>
<td>Clinical gallstone pancreatitis</td>
<td></td>
</tr>
</tbody>
</table>

Assigning a likelihood of choledocholithiasis based on clinical predictors:

- Presence of any very strong predictor: High
- Presence of both strong predictors: High
- No predictors present: Low
- All other patients: Intermediate
Suggested management of bile stones based on the ASGE Guideline

Symptomatic Patient with Cholelithiasis

Likelihood of CBD Stone Based on Clinical Predictors (Table 2)

Low

Laparoscopic Cholecystectomy
No Cholangiography

Intermediate

Laparoscopic IOC or Laparoscopic Ultrasound
Positive
Laparoscopic Common Bile Duct Exploration
OR*
Post-operative ERCP

Pre-operative ERCP

High

Pre-operative EUS or MRCP

If Positive, or If Unavailable

*If Unavailable

If Positive, or If Unavailable
Criticism of the ASGE Guideline

Predicting the likelihood of a persistent bile duct stone in patients with suspected choledocholithiasis: accuracy of existing guidelines and the impact of laboratory trends

Megan A. Adams, MD, Amy E. Hosmer, MD, Erik J. Wamsteker, MD, Michelle A. Anderson, MD, MS, Grace H. Elta, MD, Nisa M. Kubillun, MD, Richard S. Kwon, MD, MS, Cyrus R. Pirakal, MD, James M. Schelman, MD, Akbar K. Waljee, MD, MSc, Hero K. Hussain, MD, B. Joseph Elmunzer, MD, MSc

Ann Arbor, Detroit, Michigan; Dallas, Texas; Charleston, South Carolina, USA

GASTROINTESTINAL ENDOSCOPE 2015

TABLE 2. Sensitivity, specificity, PPV, and NPV of various clinical and biochemical predictors in accurately predicting the presence of persistent choledocholithiasis

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilirubin level &gt; 4 mg/dL (first set)</td>
<td>.301</td>
<td>.825</td>
<td>.558</td>
<td>.603</td>
</tr>
<tr>
<td>Bilirubin level &gt; 4 mg/dL (second set)</td>
<td>.223</td>
<td>.856</td>
<td>.529</td>
<td>.603</td>
</tr>
<tr>
<td>Stone on US</td>
<td>.218</td>
<td>.935</td>
<td>.708</td>
<td>.623</td>
</tr>
<tr>
<td>Decrease in ALT and bilirubin &gt; 30% each on second set laboratory tests</td>
<td>.870</td>
<td>.150</td>
<td>.427</td>
<td>.611</td>
</tr>
<tr>
<td>Biliary pancreatitis</td>
<td>.417</td>
<td>.689</td>
<td>.439</td>
<td>.670</td>
</tr>
</tbody>
</table>

• 498 pts
  - 36% **High risk**
    - 55.3% had stone on MR/EUS/ERCP
    - 44.7% were negative
  - 64% **Intermediate risk**
    - 34.8% had stone
    - 65.2% were negative

• The guideline had (poor)
  - 42% accuracy
  - 47% sensitivity
  - 71% specificity
**EUS** – the best an endoscopist can have

- Excellent specificity, sensitivity and accuracy, even for small (<5mm) stones - better than MRCP
- Semi-invasive with extremely low risk of complications (<1%)
- EUS could be performed at the same setting as the ERCP (cost-effective)

### Table 1 Detection of CBD stones by EUS and ERCP

<table>
<thead>
<tr>
<th></th>
<th>CBD stone detected by EUS n (%)</th>
<th>CBD stone detected by ERCP n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate likelihood</td>
<td>11 (22.44%)</td>
<td>11 (22.44%)</td>
</tr>
<tr>
<td>(n = 49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High likelihood (n = 44)</td>
<td>18 (40.90%)</td>
<td>17 (38.63%)</td>
</tr>
</tbody>
</table>

*CBD common bile duct, EUS endoscopic ultrasonography, ERCP endoscopic retrograde cholangiopancreatography.*

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Diagnostic yield of endoscopic ultrasonography in patients with intermediate or high likelihood of choledocholithiasis: a retrospective study from one university-based endoscopy center

Vorayu Prachayakul, Pitrak Asawakul, Patomsarut Bhunthumluomol and Morakod Deesomsak

*BMC Gastroenterology 2014, 14:165*

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**Role of Endoscopic Ultrasonography in Prevention of Unnecessary Endoscopic Retrograde Cholangiopancreatography**

A Prospective Study of 150 Patients

Rasoul Sotoudehmanesh, MD, Shadi Kolahdoozian, MD, Ali Ali Asgari, MD, Masoud Dooghaei-Moghadam, MD, Sanaz Almechi, MD

*J Ultrasound Med 2007; 26:455–460 • 0278-4297.*

The great debate: CBD Stones in Acute Biliary Pancreatitis

• Problems with the ABP definition
  – Is all pancreatitis of biliary origin if a pt had a single stone in the GB with normal liver enzymes and CBD diameter?

• Problems with the labs - used to predict CBD stones
  – These lab parameters could be elevated because of the edematous pancreatic head → producing relative intrapancreatic CBD compression and bile obstruction

• Problems with the definition of cholangitis in ABP (do the ERCP or not?)
  – The Tokyo Guideline was assigned in pts without pancreatitis and uses those laboratory parameters (LFT, CRP, WBC) which could be elevated because of the pancreatitis itself
EUS in ABP

- **Seven studies, 545 pts** (but only one was a RCT)
- **EUS had a lower failure rate than ERCP** (in all the studies)
- **EUS avoided ERCP in 71.2% of cases**
- **No complications were related to EUS** (whereas EST was associated with bleeding in up to 22% of pts)

- In cases of suspected biliary pancreatitis, **EUS reliably selects patients** for therapeutic endoscopic retrograde cholangiography

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**Endoscopic Ultrasound in Acute Pancreatitis**
Quality management of CBD stone diagnosis – the endoscopist’s suggestions

- **Low risk** for CBD stones – observe/cholecystectomy

- **Intermediate risk**
  - At least MRCP **but**
  - Rather EUS – especially when small (<5mm) stones are suspected

- **High risk** for CBD stones
  - *Consider EUS/MRCP if*
    - Transabdominal US negative for CBD stones and
    - Cholangitis is missing

- **ABP**
  - Do not hesitate to use EUS if it is easily available AND the non-invasive methods (US/MRCP) are negative
  - The labs predicting stones and cholangitis must be criticized if severe pancreatitis is present - consider EUS before ERCP
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