EUS-Guided Liver Biopsy

Presented by:

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Case Study #1

**HISTORY**

55-year-old male with Barrett’s esophagus, morbid obesity, diabetes and hypertension seen in GI clinic for elevated LFT’s. Patient recent lab work shows a ALT of 80, AST 75. A right upper quadrant ultrasound shows hyperechoic liver consistent with fatty infiltration.

**CASE**

Plan is for EGD for Barrett’s surveillance and EUS guided liver biopsy to stage his fatty liver. EGD revealed stable non dysplastic Barrett’s esophagus.

**OUTCOME**

EUS guided liver biopsy revealed NASH with moderate fibrosis. Patient was referred for weight loss management.

*Results from case studies are not necessarily predictive of results in other cases. Results in other cases may vary.*
Case Study #2

EGD for elevated LFT’s and nausea and vomiting
EGD-LB for staging of FLD

HISTORY

55-year-old female with history of roux-en-y gastric bypass in the past presents with nausea and vomiting and worsening liver function tests concerning for advanced liver disease (INR 1.2, bilirubin 1.5, AST 125, ALT 250, Alkaline phosphatase 200).

CASE

EGD was performed revealing an anastomotic ulceration. EUS-guided liver biopsy was performed of the left lobe of the liver.

OUTCOME

The biopsy revealed early advanced fibrosis without cirrhosis.

*Results from case studies are not necessarily predictive of results in other cases. Results in other cases may vary.
Elevated LFT Patient Pathway

↑ LFT’s

Liver Chemistries

- Positive: Specific Disease Suspected
  - Consider Liver Biopsy for staging/diagnosis

- Negative
  - Imaging
    - Ex: EUS, MRCP, RUQ US
  - ERCP
    - Dilated Ducts

- EUS-Guided Liver Biopsy
  - Is EGD needed for abdominal pain, varices etc.? 
  - Is there a need for CBD/GB/pancreas evaluation or FNA based on imaging?
  - Is there a need for sedation for anxiety (no need for breath hold)

- Transjugular Liver Biopsy
  - Is patient at high risk for bleeding or are portal pressures required?

- Percutaneous Liver Biopsy
Conventional Liver Biopsy Methods
Why EUS-Guided Liver Biopsy?
Why EUS-Guided Liver Biopsy?

**Safe**

- Real-time Doppler ultrasound allows avoidance of vessel
- Complication rates available are comparable to conventional methods; further studies required

**Clinically Effective**

- Reduce sampling error through fanning and ability to sample both lobes of liver
- Simultaneous evaluation of the pancreas, gallbladder, common bile duct and other structures
- Concurrent EGD to evaluate upper digestive disorders such as Barrett’s, varices, workup for abdominal pain etc.
- Adequate or superior specimens to PC & TJ^4
Why EUS-Guided Liver Biopsy?

Improved Patient Experience

- Single procedure is more convenient and cost effective
- Patient stays within gastroenterology allowing for smooth and direct communication
- Offers sedation/analgesia for increased comfort, reduced anxiety, and negates need for breath hold

Hospital Benefit

- Less than 10 minutes added to endoscopic procedure rather than additional procedure\(^3\)
- Grow outpatient referral
- Keeps the procedure within GI
Any patient who needs a liver biopsy and also needs:

- EGD for another reason (Barrett’s, varices, abdominal pain etc.)
- Sedation for liver biopsy
- Biopsy of both left and right lobes
- Concurrent EUS for evaluation of the common bile duct, pancreas, gallbladder or other structures

Who is not an appropriate candidate for EUS-LB?
- Thrombocytopenia
- Coagulopathy
**Right Lobe Access**

1. Approach the apex of duodenal bulb
2. 180 degree torque
3. Knob up
4. Use Doppler to identify puncture site
   - Site should have minimal blood flow
   - Use 19Ga needle
   - Perform 7-10 actuations with 20cc suction

**Left Lobe Access**

1. Identify celiac artery
2. 90° counter clockwise torque
3. Knob up (*bring scope closer*)
Specimen Preparation

Performed by pathology

1. Express into formalin
2. Technician pours contents into petri dish (a)
3. Pieces of liver tissue distinguishable from clot (b)
4. Wrapped in lens paper (c)
5. Process as surgical specimen
Portal Triads = 20

Total Specimen Length = 6.4 cm

- (4) long cores = 1.1, 1.1, 1.4 and 1 cm
- Fragments ranging from 0.1 to 0.3 cm
Specimen Adequacy

<table>
<thead>
<tr>
<th>Study</th>
<th>Diagnostic Adequacy (Sample Size)</th>
<th>Needle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stavropoulos (GIE 2012)</td>
<td>91% (20/22)</td>
<td>19Ga EchoTip</td>
</tr>
<tr>
<td>Multicenter Trial (Endoscopy 2015)</td>
<td>97.4% (108/110)</td>
<td>19Ga Expect or 19Flex</td>
</tr>
<tr>
<td>Gor (GIE 2014)</td>
<td>100% (10/10)</td>
<td>19Ga Expect</td>
</tr>
<tr>
<td>Sey (2014 DDW Abstract)</td>
<td>82% (14/17)</td>
<td>19Ga ProCore</td>
</tr>
</tbody>
</table>

- Specimen adequacy remains widely debated and can vary by pathologist and liver biopsy method
- Diagnostic adequacy of 97.4% in EUS-LB prospective multicenter trial with 19Ga needle
- Needles as small as 20Ga may be used in transjugular liver biopsies
EUS-LB is a safe and effective technique

- 8 centers biopsied 110 patients using 19Ga Expect™ or 19ga Expect Flex²
- 98% specimen adequacy for pathological diagnosis
- Median tissue length = 38mm
- Median CPT = 14
EUS-Guided Liver Biopsy Provides Diagnostic Samples With Quantitative Yields Superior to Percutaneous or Transjugular Routes (DDW Abstract 2014)

*Geisinger Medical Center, Danville, PA*

- EUS-LB of both lobes had better tissue yield (TSL & CPT) than PC & TJ
- EUS LB of left lobe only was equivalent to PC and TJ

<table>
<thead>
<tr>
<th>Methods</th>
<th>Number of cases</th>
<th>TSL (mm)</th>
<th>CPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUS-LB (both lobes)</td>
<td>68</td>
<td>40 (29.5-82)</td>
<td>17 (10.5-29)</td>
</tr>
<tr>
<td>EUS-LB (left lobe only)</td>
<td>34</td>
<td>32 (16-66)</td>
<td>13 (6 -23)</td>
</tr>
<tr>
<td>PC</td>
<td>37</td>
<td>24.7 (17.6-38.8)</td>
<td>11 (7-15)</td>
</tr>
<tr>
<td>TJ</td>
<td>21</td>
<td>27.02 (19.52-36.94)</td>
<td>17 (6-26)</td>
</tr>
</tbody>
</table>

* indicates statistically significant p value compared to PC  ** indicates statistically significant p value compared to TJ  The values of CPT and TSL were reported as median with range of 25th to 75th percentile.
113 Consecutive Transgastric Liver Biopsies for Hepatic Parenchymal Diseases: A Single-Institution Study
Indiana University, Indianapolis, IN

<table>
<thead>
<tr>
<th></th>
<th>EUS TLB</th>
<th>EUS TLB</th>
<th>EUS TLB</th>
<th>PLB</th>
<th>TJLB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>QuikCore needle</td>
<td>ProCore needle</td>
<td>Flex needle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete/ near complete portal tracts</td>
<td>n=45</td>
<td>n=33</td>
<td>n=35</td>
<td>n=100</td>
<td>n=100</td>
</tr>
<tr>
<td>Range</td>
<td>0–12</td>
<td>0–36</td>
<td>0–85</td>
<td>3–30</td>
<td>1–28</td>
</tr>
<tr>
<td>Average number</td>
<td>3</td>
<td>9.8</td>
<td>19.4</td>
<td>14.53</td>
<td>11.41</td>
</tr>
<tr>
<td>Median number</td>
<td>2</td>
<td>9</td>
<td>12</td>
<td>14</td>
<td>11.5</td>
</tr>
<tr>
<td>Incomplete portal tract</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0–10</td>
<td>0–46</td>
<td>1–83</td>
<td>2–35</td>
<td>1–38</td>
</tr>
<tr>
<td>Average number</td>
<td>3.7</td>
<td>12.7</td>
<td>18.5</td>
<td>11.48</td>
<td>12.3</td>
</tr>
<tr>
<td>Median number</td>
<td>3</td>
<td>10</td>
<td>14</td>
<td>11</td>
<td>11.5</td>
</tr>
<tr>
<td>Number of cases adequate for diagnosis and staging</td>
<td>19/45</td>
<td>25/33</td>
<td>30/35</td>
<td>100/100</td>
<td>98/100</td>
</tr>
</tbody>
</table>
**113 Consecutive Transgastric Liver Biopsies for Hepatic Parenchymal Diseases: A Single-Institution Study**

*Indiana University, Indianapolis, IN*

<table>
<thead>
<tr>
<th></th>
<th>All EUS TLB</th>
<th>ProCore needle</th>
<th>Flex needle</th>
<th>PLB vs TJLB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length of longest tissue core</strong></td>
<td>vs PLB (P=0)</td>
<td>vs PLB (P=0)</td>
<td>vs PLB (P=0)</td>
<td>(P=0.001)</td>
</tr>
<tr>
<td></td>
<td>vs TJLB (P=0)</td>
<td>vs TJLB (P=0)</td>
<td>vs TJLB (P=0)</td>
<td></td>
</tr>
<tr>
<td><strong>Total no. of complete portal tracts</strong></td>
<td>vs PLB (P=0)</td>
<td>vs PLB (P=0)</td>
<td>vs PLB (P=0.40) (NS)</td>
<td>(P=0)</td>
</tr>
<tr>
<td></td>
<td>vs TJLB (P=0)</td>
<td>vs TJLB (P=0.03)</td>
<td>vs TJLB (P=0.30) (NS)</td>
<td></td>
</tr>
<tr>
<td><strong>Total no. of incomplete portal tracts</strong></td>
<td>vs PLB (P=8E-05)</td>
<td>vs PLB (P=0.59) (NS)</td>
<td>vs PLB (P=0.23) (NS)</td>
<td>(P=0.3) (NS)</td>
</tr>
<tr>
<td></td>
<td>vs TJLB (P=0)</td>
<td>vs TJLB (P=0.34) (NS)</td>
<td>vs TJLB (P=0.37) (NS)</td>
<td></td>
</tr>
<tr>
<td><strong>Cases with (\geq 10) tissue cores</strong></td>
<td>vs PLB (p&lt;0.0001)</td>
<td>vs PLB (p&lt;0.0001)</td>
<td>vs PLB (p&lt;0.0001)</td>
<td>(P=0.27) (NS)</td>
</tr>
<tr>
<td></td>
<td>vs TJLB (p&lt;0.0001)</td>
<td>vs TJLB (p&lt;0.0001)</td>
<td>vs TJLB (p&lt;0.0001)</td>
<td></td>
</tr>
</tbody>
</table>

- More complete portal tracts provided by Expect™ 19ga Flex needle compared to QuickCore and ProCore Needles. \(^9\)
- 19 Flex was non-inferior to percutaneous or transjugular approaches with regard to number of portal tracts provided. \(^9\)
Addressing Objections and Barriers to Entry
Clinical Efficacy

19ga FNA needle is too small to procure complete portal triads and doesn’t obtain a long single core.
EUS-LB is not “standard of care” and there is too much risk of complications with vasculature of liver.
Cost

PC is less expensive and doesn’t require sedation.

- EUS-LB does not have dedicated CPT code; code EUS-LB as EUS-FNA
Identifying NASH patients with liver biopsy won’t change patient management.
In America:
- **10-20%** have Non-Alcoholic Fatty Liver Disease (NAFLD)\(^9\)
- **2-5%** have Non-Alcoholic Steatohepatitis (NASH)\(^9\)
  - Liver biopsy must be performed to diagnosis NASH
  - NASH patients at higher risk for liver failure

**NAFLD and NASH continue to become more common with the rise of obesity**

- **Indications:** Many patients with fatty liver disease have indications for other endoscopic treatments (varices, Barrett’s Esophagus)
- **Prognosis:** Need liver biopsy to determine prognosis
- **Future Treatment:** Pharmacological treatments in development
Hepatology won’t refer the patients to me; they refer most of them to IR.
68-year-old male with history of cholecystectomy in the past is hospitalized for jaundice and right upper quadrant pain for 2 weeks. Right upper quadrant ultrasound shows 8 mm CBD with poor visualization of the distal duct, cannot rule out distal obstruction. Patient has a history of a sinus infection and recently completed a course of antibiotic. Liver function tests are elevated with bilirubin of 8.

Plan for EGD to evaluate his abdominal pain and EUS to rule out distal CBD obstruction.

EGD showed moderate esophagitis and a large hiatal hernia. EUS showed a 8 mm CBD with no stones or sludge. The pancreas was normal. An EUS guided liver biopsy was performed to evaluate for intrinsic liver disease. Liver biopsy showed acute hepatocellular injury consistent with DILI (drug induced liver disease).
Case Study #4

- EGD for epigastric abdominal pain
- EUS-LB for Hepatitis C staging

**HISTORY**

49-year-old with a history of morbid obesity, hepatitis C presents for evaluation of epigastric abdominal pain, abnormal liver function tests and an abnormal CT scan. She has had epigastric abdominal pain which has become progressively worse over the past 2 months. CT scan shows a fatty liver and questionable 3 cm mass lesion in or adjacent to the pancreatic head. Her liver function tests are elevated from baseline, with AST 222, ALT 130, total bilirubin 0.5, alkaline phosphatase 202, INR 1.13. She has had hepatitis C for over 20 years and was never treated.

**CASE**

Plan for EGD to evaluate her epigastric abdominal pain. In addition, an EUS to evaluate the questionable mass lesion as well as for EUS guided liver biopsy to stage her hepatitis C and further evaluate the liver test abnormalities.

**OUTCOME**

EGD revealed multiple erosions in the gastric antrum. EUS revealed a 3 cm porta hepatitis lymph node for which FNA showed a benign reactive lymph node consistent with her hepatitis C status. EUS liver biopsy revealed chronic active hepatitis as well as moderate fibrosis also consistent with chronic hepatitis C. She was started on acid blocking medication for gastritis and therapy for her hepatitis C.
References


8. Nonalcoholic Steatohepatitis. NIH 2006; Nov: No. 07-4921


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