Management of Hepatic Cysts

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Department of Surgery
SUNY Downstate Medical Center
August 15, 2008
Questions

1. Ultrasonography demonstrates a liver cyst with a thick wall and septations. The patient should be advised
   a. To have repeat sonograms every 6 months for 2 years
   b. Interventional radiologist for aspiration and biopsy
   c. Surgical referral for laparoscopic fenestration
   d. Surgical referral for complete resection

2. Cyst wall in cases of cystadenomas should be
   a. Partially resected
   b. Completely resected
   c. Suture ligated
   d. Fenestrated
Questions

3. Sclerotherapy with alcohol leads to
   a. Necrosis of cyst wall
   b. Fixation of the cells lining the cyst cavity thus disabling their ability to secrete fluid
   c. Is never performed because it leads to cholangitis
   d. Has 100% success rate

4. Polycystic liver disease is a contraindication for laparoscopic fenestration
   a. True
   b. False
   c. I don’t know
   d. All of the above
5. Laparoscopic fenestration
   a. Has lower recurrence rates than open unroofing
   b. Is considered the procedure of choice for congenital cysts
   c. Is less morbid than traditional unroofing
   d. A is the only incorrect answer!
Case Presentation

History

- **HPI:**
  - 56 YOF 5 week h/o RUQ pain

- **PMH:**
  - HTN
  - Endometrial cancer
  - No allergies

- **PSH:**
  - TAH/BSO
  - Cyst aspiration

- **Meds:**
  - Hyzaar
Case Presentation

Imaging

Anonymous, Female 1952
kingswise: 50304

PHILIPS
Gritten, Jacqueline
2131245Ki
KCHC RM5

07/03/2006
08:52:16AM
TIS0.2 MI 1.1
C5-2/Abd Gen

2D
52%
C 55
P Low
Res

Long Right lobe Liver

7/3/2006, 8:52:16 AM
A1
Physical Exam & Labs

- Physical Exam
  - 7/06: RUQ mass, non-tender
  - Pre-Op: Unremarkable

- Labs:
  - CBC - 4/11/38/248
  - Chem – 140/3.4/100/27/17/0.87/88
  - LFTs - 7.6/4.6/25/22/65/0.2
Anonymous, Female 1952
kingswise: 50304
Contrast:
Gantry: 0°
FoV: 400 mm
Time: ms
Slice: 3 mm
Pos: 190
FFS

Case Presentation

Operation: Cyst Fenestration

- Pneumoperitoneum created via open technique
- Followed by placement of ports for puncture, aspiration and deroofing of cyst
Case Presentation

Operation: Cyst Fenestration

- Cyst wall is incised
- Contents are drained
- Flaccid cyst wall is resected
Case Presentation

Operation: Cyst Fenestration

- Residual cyst wall carefully inspected
- Ablation of remnant cyst lining performed
- (Omentum can be placed within cyst remnant)

Operative Techniques in General Surgery, Vol 4 (March), 2002 76-87
Case Presentation

Pathology

- Benign cyst
  - Fibrous tissue
  - Single layer of cuboidal epithelium
Case Presentation

Post operatively

• POD#0
  – Tolerated diet
  – Pain controlled
  – Discharged home

• POD#6
  – Clinic f/u
  – No complaints
Questions??

www.downstatesurgery.org
Simple Hepatic Cysts
Classification

HEPATIC CYSTS

Primary (Congenital)
- Simple Cyst
- PCLD

Secondary (Acquired)
- Infectious
- Neoplastic
- Traumatic
Congenital Cysts

- **Simple/Solitary Cysts**
  - Abnormal development of intrahepatic BDs
  - Lined with cuboidal/columnar epithelium
  - No malignant transformation
  - 60% solitary
  - Rarely communicate with biliary tree
  - 90-95% asymptomatic

- **Polycystic Disease**
  - Autosomal Dominant
  - Also affects kidneys
  - Progressive hepatomegaly
  - Variable and numerous cysts
  - Liver function preserved
  - Prognosis directly related to severity of kidney disease
  - Associated with intracranial aneurysms
Acquired Cysts

• Neoplastic Cysts
  – Slow growing
  – SYMPTOMATIC
  – May have solid component or calc
  – Cystadenomas
    • Lined with mucus secreting epithelium
  – Cystadenocarcinoma
    • Result of malignant transformation
  – All treated surgically

• Traumatic Cysts
  – Pt w h/o trauma
  – Parenchymal injury with disruption of vascular or biliary structures
  – Most resolve spontaneously
Acquired Cysts

- Infectious Cysts
  - Echinococcal (hydatid)
  - Rare in US
  - Caused by tapeworm larvae
Symptoms usually result from mass effect, caused by enlarging cyst

Blonski, World J Gastroenterology 2006
<table>
<thead>
<tr>
<th>Table 1</th>
<th>Rare complications of simple liver cysts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstructive jaundice</td>
<td></td>
</tr>
<tr>
<td>Infection</td>
<td></td>
</tr>
<tr>
<td>Intracystic haemorrhage</td>
<td></td>
</tr>
<tr>
<td>Spontaneous rupture</td>
<td></td>
</tr>
<tr>
<td>Inferior vena cava obstruction</td>
<td></td>
</tr>
<tr>
<td>Neoplastic transformation</td>
<td></td>
</tr>
<tr>
<td>Primary squamous cell carcinoma</td>
<td></td>
</tr>
<tr>
<td>Cystadenocarcinoma</td>
<td></td>
</tr>
<tr>
<td>Adenosquamous carcinoma</td>
<td></td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td></td>
</tr>
<tr>
<td>Hepatocellular carcinoma</td>
<td></td>
</tr>
<tr>
<td>Cholangiocarcinoma</td>
<td></td>
</tr>
</tbody>
</table>

Blonski, World J Gastroenterology 2006
### Differential Diagnosis

**Table 3 Alternative explanations for symptoms in patients with simple hepatic cysts**

<table>
<thead>
<tr>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biliary colic</td>
</tr>
<tr>
<td>Gastroesophageal reflux</td>
</tr>
<tr>
<td>Peptic ulcer</td>
</tr>
<tr>
<td>Non-ulcer dyspepsia</td>
</tr>
<tr>
<td>Irritable bowel syndrome</td>
</tr>
<tr>
<td>Chronic pancreatitis</td>
</tr>
<tr>
<td>Abdominal wall pain syndrome</td>
</tr>
</tbody>
</table>
Diagnostic Evaluation

- Ultrasound
  - 1st imaging modality
  - >90% sen/spec
  - Anechoic
  - Smooth margins
  - Diff b/w solid lesions
  - Unilocular vs. septae
Diagnostic Evaluation

• Computed Tomography
  – Defines relationship of cyst to structures
  – Non-enhancing
  – Thin uniform wall
  – No intracystic septations
Diagnostic Evaluation

• Magnetic Resonance
  – More detailed anatomic picture
  – T1 – hypointense
  – T2 – hyperintense
### Table 2  Radiologic features of simple hepatic cysts

<table>
<thead>
<tr>
<th>Features supporting diagnosis of a simple cyst</th>
<th>Features not supporting diagnosis of a simple cyst</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anechoic lesion</td>
<td>Echoic lesion</td>
</tr>
<tr>
<td>Thin wall</td>
<td>Thick wall</td>
</tr>
<tr>
<td>Absence of septations</td>
<td>Presence of septations</td>
</tr>
<tr>
<td>No peripheral enhancement on CT/MRI</td>
<td>Peripheral enhancement on CT/MRI</td>
</tr>
<tr>
<td>Homogeneous appearance</td>
<td>Heterogeneity within the cyst</td>
</tr>
<tr>
<td></td>
<td>Hydatid sand</td>
</tr>
<tr>
<td></td>
<td>Presence of daughter cysts</td>
</tr>
<tr>
<td></td>
<td>Heavy wall calcifications</td>
</tr>
</tbody>
</table>
Treatment

*Only* indicated when symptoms are present and can be attributed to the cyst
## Treatment

### Table 4: Comparison of treatment options for symptomatic simple liver cysts

<table>
<thead>
<tr>
<th>Treatment options</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation alone</td>
<td>- Because most cysts are asymptomatic, intervention is unlikely to be helpful and may be harmful</td>
<td>- Only effective cyst treatment can prove whether symptoms are related to the cyst</td>
</tr>
<tr>
<td>US-guided aspiration</td>
<td>- Simple procedure</td>
<td>- High recurrence rate</td>
</tr>
<tr>
<td></td>
<td>- May be used as a diagnostic test to assess whether symptoms are related to the cyst</td>
<td></td>
</tr>
<tr>
<td>US-guided aspiration with sclerotherapy</td>
<td>- Relatively non-invasive</td>
<td>- Less effective for uncooperative patients</td>
</tr>
<tr>
<td></td>
<td>- Complications are rare</td>
<td>- Can not be performed if cyst communicates with biliary tree</td>
</tr>
<tr>
<td></td>
<td>- Effective</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Possible in poor surgical candidates</td>
<td></td>
</tr>
<tr>
<td>Laparoscopic unroofing</td>
<td>- Technically feasible and effective in &gt; 80% cases</td>
<td>- More invasive</td>
</tr>
<tr>
<td></td>
<td>- Improved results with extensive fenestration and argon beam coagulation or electrocoagulation</td>
<td>- Morbidity in up to 25%</td>
</tr>
<tr>
<td></td>
<td>- Low recurrence rate (0%-20%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Visualization of cyst interior (exclude other diagnoses)</td>
<td>- Less effective for cysts which are superior, posterior, or deep within hepatic parenchyma</td>
</tr>
<tr>
<td>Laparotomy (resection, fenestration, or excision)</td>
<td>- Effective</td>
<td>- Less effective if prior surgery has been attempted</td>
</tr>
<tr>
<td></td>
<td>- Allows treatment of laparoscopically inaccessible cysts</td>
<td>- Most invasive</td>
</tr>
<tr>
<td></td>
<td>- Useful for cysts with complications</td>
<td>- Larger scars</td>
</tr>
<tr>
<td></td>
<td>- May perform cystojejunostomy at time of laparotomy for cysts with biliary communication</td>
<td>- Longer hospital stays compare to laparoscopy</td>
</tr>
</tbody>
</table>

Blonski / World J Gastroenterology 2006
Treatment Algorithm

Cyst

US/CT

Septated

Echinococcal

Resection vs. Unroofing

Non-echinococcal

Resection

Simple

Asymptomatic

Observe

PCLD

Dominant cysts

Unroofing vs. Resection

Multiple small cysts

Observe

Resection

Symptomatic†

Single or Multicystic

Unroofing

Simple cyst confirmed

Other

Recession
Surgical management has replaced non-operative management
Laparoscopic fenestration is an excellent treatment for highly symptomatic non-parasitic solitary hepatic cysts.

Morino / Annals of Surgery 1994
Laparoscopic Fenestration

- First described by Z’geggen in 1991
- Indicated for:
  - Solitary cysts or
  - PCLD characterized by large superficial cysts
- Reported complications:
  - Pleural effusion
  - Ascities
  - Bile leak
  - Bleeding
- Goal is to decompress cyst and limit recurrence
  - Careful patient selection
  - **Widest possible excision of cystic wall**
  - Careful hemostasis of cyst edge
  - Electrocautery/argon beam of cavity
  - Ligation of obvious biliary leaks
  - Omental packing as necessary
Optimal Surgical Management

• Retrospective review
• 38 patients b/w 1988 and 1997
  – 23 simple cysts
  – 15 PCLD
• Mean f/u 41 months
• Goal:
  – Determine morbidity rates
  – Assess long term recurrence

Martin / Annals of Surgery 1998 Vol 228 167-172
## Table 2. OPERATIONS UNDERTAKEN FOR SYMPTOMATIC NONPARASITIC HEPATIC CYSTS

<table>
<thead>
<tr>
<th>Operative Procedure</th>
<th>Number</th>
<th>Operation Time* (Min)</th>
<th>Blood Loss* (Milliliters)</th>
<th>Postop Stay* (Days)</th>
<th>Morbidity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple cyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laparoscopic deroof</td>
<td>13</td>
<td>60 (45–155)</td>
<td>10 (10–200)</td>
<td>3 (1–10)</td>
<td>3 (23)</td>
</tr>
<tr>
<td>Open deroof</td>
<td>8</td>
<td>88 (40–120)</td>
<td>229 (10–520)</td>
<td>8 (5–11)</td>
<td>3 (38)</td>
</tr>
<tr>
<td>Hepatic resection</td>
<td>5</td>
<td>90 (85–120)</td>
<td>170 (100–500)</td>
<td>8 (2–8)</td>
<td>1 (20)</td>
</tr>
<tr>
<td>PCLD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laparoscopic deroof</td>
<td>7</td>
<td>120 (75–180)</td>
<td>10 (10–50)</td>
<td>3 (1–7)</td>
<td>2 (29)</td>
</tr>
<tr>
<td>Open deroof</td>
<td>6</td>
<td>100 (80–150)</td>
<td>20 (10–1800)</td>
<td>8 (5–19)</td>
<td>2 (40)</td>
</tr>
<tr>
<td>Hepatic resection</td>
<td>9</td>
<td>120 (74–240)</td>
<td>150 (100–1700)</td>
<td>12 (10–30)</td>
<td>6 (67)</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>110 (40–240)</td>
<td>80 (10–1800)</td>
<td>5 (1–30)</td>
<td>19 (40)</td>
</tr>
</tbody>
</table>

PCLD = polycystic liver disease.
* Median values (range).
### Table 3. REOPERATIONS FOR RECURRENT SYMPTOMS FROM HEPATIC CYSTS

<table>
<thead>
<tr>
<th>Initial Operation</th>
<th>Reoperation Rate (%)</th>
<th>Interval to Reoperation (Months)</th>
<th>Reoperation</th>
<th>Mean Follow-up (Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple cyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>1 of 13 (8)</td>
<td>7</td>
<td>Hepatic resection (1)</td>
<td>25 (2-80)</td>
</tr>
<tr>
<td>Open deroof</td>
<td>2 of 7 (29)</td>
<td>6,16</td>
<td>Open deroof (1)</td>
<td>56 (3-104)</td>
</tr>
<tr>
<td>Hepatic resection</td>
<td>0 of 3</td>
<td></td>
<td>Hepatic resection (1)</td>
<td>19 (7-35)</td>
</tr>
<tr>
<td>PCLD:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>5 of 7 (71)</td>
<td>8,10,12,36,40</td>
<td>Open deroof (1)*</td>
<td>37 (1-67)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hepatic resection (5)</td>
<td></td>
</tr>
<tr>
<td>Open deroof</td>
<td>1 of 5 (20)</td>
<td>12</td>
<td>Hepatic resection (1)</td>
<td>96 (43-144)</td>
</tr>
<tr>
<td>Hepatic resection</td>
<td>0 of 3</td>
<td></td>
<td></td>
<td>9 (2-13)</td>
</tr>
<tr>
<td>Total</td>
<td>9 of 38 (24)</td>
<td>10</td>
<td></td>
<td>41 (1-144)</td>
</tr>
</tbody>
</table>

* One patient required open deroofing at 12 months followed by hepatic resection 21 months later.
Optimal Surgical Management

• Conclusions
  – Percutaneous aspiration should be reserved for patients with questionable symptoms.
  – Recurrence may be expected even if meticulous and radical fenestration of all available cyst is performed.
  – Laparoscopic deroofing in PCLD patients is unlikely to be successful when only the largest cysts are dealt with.

Martin / Annals of Surgery 1998 Vol 228 167-172
Conclusions

- Laparoscopic technique was associated with a reduced morbidity (25%) and shorter hospital stay (3 days) compared with open deroofing (36% and 8 days)
- With respect to recurrence, radical deroofing is key
Well, what about the long term results?
Long term results

• Retrospective review over 15 years
• Total of 78 patients
  – 57 had simple cysts
  – 8 hydatid cysts
  – 8 hepatobiliary cystadenomas
  – 1 hepatobiliary cystadenocarcinoma
Long term results

- Retrospective review over 15 years
- 57 had simple cysts
  - 88% referred b/c pain
  - 96.5% had normal hepatic biochemical profile
  - 49% underwent perc aspiration
  - 84% (48) managed surgically
    - 30 laparotomy
    - 18 laparoscopically

Long term results

• Results:
  – Recurrence seen in all pts s/p aspiration
  – No operative deaths or major complications
  – 2 pts continued to have pain post operatively
  – 12.5% (6/48) demonstrated recurrence
    • 2/18 in laparoscopic group
    • 4/30 in open group
Long term results

• Concluded:
  – Cyst aspiration is associated with high rates of recurrence
  – Surgical treatment (wide unroofing or resection) is associated with good outcomes
  – Laparoscopic unroofing has become the procedure of choice for large simple cysts and is associated with low complication and recurrence rates
Location of cyst is a key factor influencing surgical outcome

Bia et al / Hepatobiliary Pancreatic Dis Int 2007
Adjuncts to lap fenestration?
The role of laparoscopic ultrasound in the minimally invasive management of symptomatic hepatic cysts

Schachter et al / Surg Endosc 2001 15; 364-367
The role of laparoscopic ultrasound in the minimally invasive management of symptomatic hepatic cysts

- Advantages of laparoscopic ultrasound
  - Allows the precise definition of the structure of the cyst wall component
  - Identifies presence of cyst wall nodules, irregularities and solid papillary growths
  - Allows for US guided biopsies intraoperatively
  - Allow differentiation between the portal and venous structures and the cystic lesions

Schachter et al / Surg Endosc 2001 15; 364-367
Management of liver cysts should be individualized by cyst type, symptoms and associated complications.

Percutaneous aspiration/ablation therapy may be a feasible option in poor surgical candidates.

Laparoscopic approaches have proven efficacious for simple cysts and are the treatment modality of choice.

Management of specific diseases such as PCLD is more complicated and dictates treatment in centers with hepatobiliary and transplantation expertise.
Questions

1. Ultrasonography demonstrates a liver cyst with a thick wall and septations. The patient should be advised
   a. To have repeat sonograms every 6 months for 2 years
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   b. False
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The End
References

1. P. Schachter et al “The role of laparoscopic ultrasound in the minimally invasive management of symptomatic hepatic cysts” Surgical Endoscopy 15; 364-367, 2001


