Management of Giant Hepatic Cysts in Laparoscopic Era

Young Hoon Kim¹, Jeong Wook Seo², Young Hoon Roh¹, Ghap Joong Jung¹, Yang Hyun Baek³, Sung Wook Lee³, Myung Hwan Roh³, San Young Han³, Jin Sook Jeong⁴

Departments of Surgery¹, Preventive Medicine², Internal Medicine³, Pathology⁴, Dong-A University College of Medicine, Busan, Korea
Introduction

• Prevalence of up to 4-7%, increased with age
• Surgical Ix: highly symptomatic, complicated or rapid growth
• Hepatic cyst
  – Simple [ ] benign
  – Polycystic
  – Cystadenoma or ca. – neoplastic (MCT)
  – Hydatid cyst : parasitic
A. Simple cyst. Simple cuboidal epithelium.
B. Cystadenoma. Psuedostratified columnar epithelium with mucous producing cells.

Fig. 10.78 Mucinous cystic neoplasm with high-grade intraepithelial neoplasia (biliary cystadenocarcinoma). A. Transition from normal to dysplastic epithelium. B. Complex papillary projections and crypt-like invaginations in the area of high-grade neoplasia.
WHO classification of tumours of the liver and intrahepatic bile ducts
Recurrence (incomplete deroofing)
Recent debates I

1. Diagnostic accuracy
   ① Preoperative CT or US
   ② Serum, cystic fluid, CA 19-9 (CEA, α-feto)
   ③ Frozen sections
Recent debates II

2. Optimal management
   ① Fenestration
      Wide deroofing
      Cyst excision (Enucleation)
      hepatic resection
The International Position on Laparoscopic Liver Surgery
The Louisville Statement, 2008

• Should indications for resection of asymptomatic benign hepatic lesions be widened?
• Summary: Indications for surgery for benign hepatic lesions not be widened. Unroofing of simple hepatic cysts should not be considered a liver resection and should not be included in the analysis of laparoscopic liver resection.
② After laparoscopic deroofing of cystadenoma, early or late reintervention?

∵ low rate of malignancy (5~10%), long term clinical course (10 yrs), adenoma~adenocarcinoma sequence.
Management and long-term follow-up of hepatic cysts
Matthew F. Hansman, M.D., John A. Ryan, Jr., M.D., James H. Holmes IV, M.D., Stephen Hogan, M.D., Faye T. Lee, R.N., Donna Kramer, M.D., Thomas Biehl, M.D. Virginia Mason Medical Center, Virginia Mason Clinic, Buck Pavilion, 6th Floor, 1100 Ninth Ave, Seattle, WA, 98101, USA

Cystadenomas should be completely resected owing to the likelihood of recurrence after partial excision and the risk of eventual cystadenocarcinoma.

Laparoscopic Resection of Benign Hepatic Cysts: A New Standard
T Clark Gamblin, MD, MS, Shane E Holloway, MD, Jason T Heckman, MD, David A Geller, MD Department of Surgery, Liver Cancer Center, University of Pittsburgh, Pittsburgh, PA.

For those patients in our series who were found to have cystadenomas on final pathology, no additional intervention was taken and they are followed with an annual CT scan.
Recent debates III

3. Recurrence

① Definition & Criteria:
- Symptomatic:
- Imaging study:
  - How much refilling?

Nine-Year Single-Center Experience with Nonparastic Liver Cysts: Diagnosis and Management
G. Garcea · C. J. Pattenden · J. Stephenson · A. R. Dennison · D. P. Berry
Department of Hepatobiliary and Pancreatic Surgery, Leicester General Hospital
Laparoscopic fenestration of nonparasitic hepatic cysts: outcome and complications

| Authors                  | Year | No. of patients | Technique                        | Outcome                             | Complications                                      | Follow-up               |
|--------------------------|------|-----------------|-----------------------------------|-------------------------------------|----------------------------------------------------|-------------------------|
| Caetano-Junior et al. [47]| 2006 | 12              | Laparoscopic deroofing            | No recurrences                      | 25% complication rate                               | Median, 20 mo           |
| Tan et al. [48]          | 2005 | 40              | Laparoscopic fenestration         | 6 recurrences (22%)                 |                                                    |                         |
| Civello et al. [46]      | 2005 | 10              | Laparoscopic deroofing            | No recurrences                      | None                                               | Median, 24 mo           |
| Fiamingo et al. [45]     | 2003 | 16              | Laparoscopic deroofing            | 1 asymptomatic recurrence (111%)    | Persistent ascites, trocar site bleeding, pleural effusion in 3 | Median, 20 mo           |
| Tocchi et al. [36]       | 2002 | 8               | Laparoscopic deroofing            | 2 recurrences (25%)                 | Minor                                              | Mean, 50 mo             |
| Tan et al. [44]          | 2002 | 11              | Laparoscopic deroofing            | 7 patients with radiological recurrence (28.5%), 2 symptomatic recurrences (1 with cystadenoma and 1 in a patient with PCLD) | Minor                                              | Mean, 44 mo             |
| Zalaba et al. [37]       | 1999 | 21              | Wide laparoscopic deroofing       | 2 recurrences (9.5%)                | Minor                                              | 1–54 mo                 |
| Roesch Dietlen et al. [38]| 1999 | 7               | Deroofing and fulguration of cyst bed | No symptomatic recurrences          | –                                                  | 6 mo                    |
| Martin et al. [14]       | 1998 | 13              | Wide laparoscopic deroofing       | 1 patient required reoperation (7.8%) | 25% complication rate                               | 3–124 mo                |
| Diez et al. [39]         | 1998 | 9               | Laparoscopic deroofing            | No recurrences                      | None                                               | 6–36 mo                 |
| Emmerman et al. [40]     | 1997 | 18              | Deroofing, aspiration, and omental transposition | Recurrence in 2 patients (11%) | 1 pulmonary atelectasis and 1 biloma               | 2–43 mo                 |
| Fabiani et al. [41]      | 1997 | 10              | Laparoscopic deroofing            | No recurrences                      | None                                               | Mean, 25.5 mo           |
| Gigot et al. [34]        | 1996 | 26              | Laparoscopic deroofing            | 2 symptomatic recurrences (7.7%)    | No major                                           | 1–48 mo                 |
| Morino et al. [42]       | 1996 | 31              | Laparoscopic deroofing            | Symptom recurrence in 36% of patients; open conversion in 2 patients | Persistent ascites in 2 patients                   | 8–22 mo                 |
| Zachler et al. [43]      | 1996 | 7               | Laparoscopic deroofing            | 1 symptomatic recurrence (14.3%)    | None                                               | Mean, 30 mo             |
4. Feasibility of laparoscopic wide deroofing in Seg VII, VIII?

Laparoscopic Unroofing of Nonparasitic Liver Cysts Within Segments VII and VIII: Technical Considerations
THOMAS WEBER, MD,¹ WOLFGANG SENDT, MD,² and JOHANNES SCHEELE, MD²
¹Department of Thoracic Surgery, University Hospital, Bern, Switzerland;
²Department of General and Visceral Surgery, University Hospital, Jena, Germany.

Solitary cysts located in segments VII and VIII of the liver can be safely treated by laparoscopic unroofing. Cyst recurrences may best be prevented by a complete excision of the cystic roof with an adjacent rim of hepatic parenchyma.
Our study
Patient and method

• From Feb. 2004 to Aug. 2011, 38 patients

• Background

  – Evaluate laparoscopic surgical success focus on cyst recurrence

  – Criteria for giant liver cyst: complex, larger (over 6cm), mural papillary projection, septation or debris.
– Resection proportion of the cyst:

\[
\frac{\text{width} \times \text{length (specimen)}}{3.14 \times r^2 (r=\text{half diameter of the cyst})}
\]

– Radiographical recurrence:

more than 75%
Results

- Sex (M/F): 4/34
- Age: 63.87 ± 12.85
- Mean diameter: 11.3cm
- Preoperative Dx:
  - Simple cyst: 20
  - Multiple cyst: 7
  - Polycystic: 2
  - Cystadenoma: 9
- Diagnostic accuracy of imaging study:
  - Correct: 21
  - Non-correct: 17
  - 55.3%
Results

- Location: Bilobar: 12
  - Lt: 14
  - Rt: 12
- Post. Seg. (VII, VIII): 19 (50%)
- Septation 유무: 17/21
- Serum CA 19-9: 10.96 ± 11.73
- Detection: by screening: 7
- ASA classification:
  - I: 3
  - II: 20
  - III: 9
- Op. duration: 132 ± 101.44 min
- Resection proportion: 45.39 ± 32.33%
- Mean follow up period: 21.14 ± 19.95 months
Results

• Operative procedures
  Open : 3
  Lap. Mar. : 25
  Lap. Cyst excision : 4
  Lap. Lt. Lat. Sectionectomy : 2
  HALS : 2
  SPLC : 2

• Accompanied op. : 12 (LC : 9)
Results

- recurrence: 6/32 (15.8%)
- Re-operation: 2/36
- Final pathologic Dx: cyst: 30, polycystic: 2, cystadenoma: 5, cystadenoma ca.: 1
- Aspiration, sclero Tx: 11/27
## Prognostic factors affecting giant hepatic cyst recurrence

| Variable                        | recurrence |                |   |   |
|---------------------------------|------------|----------------|---|---|
|                                 | yes (n=6)  | no (n=31)      | p |
| Size                       |            |                |   |   |
| <10cm                         | 1(16.7)    | 16(51.6)       | 0.189     |
| >=10cm                        | 5(83.3)    | 15(48.4)       |   |   |
| Posterior 7,8 segment       |            |                |   |   |
| yes                           | 3(50.0)    | 16(51.6)       | 1.000     |
| no                            | 3(50.0)    | 15(48.4)       |   |   |
| Multiple                      |            |                |   |   |
| yes                           | 1(16.7)    | 12(38.7)       | 0.394     |
| no                            | 5(83.3)    | 19(61.3)       |   |   |
| Septation                     |            |                |   |   |
| yes                           | 4(66.7)    | 11(33.5)       | 0.198     |
| no                            | 2(33.3)    | 20(64.5)       |   |   |
| Asp, sclero Tx.              |            |                |   |   |
| yes                           | 5(83.3)    | 6(19.4)        | 0.005     |
| no                            | 1(16.7)    | 25(80.6)       |   |   |
| Serum CA19-9                  |            |                |   |   |
| <6.2                          | 3(75.0)    | 10(47.6)       | 0.593     |
| >=6.2                         | 1(25.0)    | 11(52.4)       |   |   |
| Operative procedure            |            |                |   |   |
| open                          | 1(16.7)    | 2(6.5)         | 0.421     |
| Lap.                          | 5(83.3)    | 29(93.5)       |   |   |
| Bile tinged cyst content      |            |                |   |   |
| yes                           | 1(25.0)    | 2(11.1)        | 0.470     |
| no                            | 3(75.0)    | 29(88.9)       |   |   |
| Resection proportion (%)      |            |                |   |   |
| <40%                          | 4(66.7)    | 10(38.5)       | 0.365     |
| >=40%                         | 2(33.3)    | 16(61.5)       |   |   |
| Final pathology Dx.           |            |                |   |   |
| cyst                          | 3(50.0)    | 24(82.8)       | 0.092     |
| polycystic                    | 1(16.7)    | 1(3.4)         |   |   |
| cystadenoma                   | 1(16.7)    | 4(13.8)        |   |   |
| cystadeno.ca                  | 1(16.7)    | 0(0.0)         |   |   |
### Univariate and multivariate logistic regression analysis

| Variable                              | Univariate |          |          | Multivariate |          |          |
|---------------------------------------|------------|----------|----------|--------------|----------|----------|
|                                      | OR         | 95% CI   | P value  | OR           | 95% CI   | P value  |
| Size                                  |            |          |          |              |          |          |
| <10cm                                 | 1.00       | reference|          |              |          |          |
| \( \geq 10 \text{cm} \)              | 5.33       | 0.56-51.09| 0.147    |              |          |          |
| Posterior 7,8 segment                 |            |          |          |              |          |          |
| yes                                   | 0.94       | 0.16-5.39| 0.942    |              |          |          |
| no                                    | 1.00       |          |          |              |          |          |
| Multiple                              |            |          |          |              |          |          |
| yes                                   | 0.32       | 0.03-3.05| 0.320    |              |          |          |
| no                                    | 1.00       |          |          |              |          |          |
| Septation                             |            |          |          |              |          |          |
| yes                                   | 3.64       | 0.57-23.13| 0.171    |              |          |          |
| no                                    | 1.00       |          |          |              |          |          |
| Asp, sclero Tx.                       |            |          |          |              |          |          |
| yes                                   | 20.83      | 2.04-212.97| 0.010   | 15.38        | 1.39-170.16| 0.026    |
| no                                    | 1.00       |          |          |              |          |          |
| Serum CA19-9                          |            |          |          |              |          |          |
| <6.2                                  | 3.30       | 0.29-37.10| 0.334    |              |          |          |
| \( \geq 6.2 \)                       | 1.00       |          |          |              |          |          |
| Operative procedure                   |            |          |          |              |          |          |
| open                                  | 2.90       | 0.22-38.32| 0.419    |              |          |          |
| Lap.                                  | 1.00       |          |          |              |          |          |
| Bile tinged cyst content              |            |          |          |              |          |          |
| yes                                   | 2.67       | 0.18-39.63| 0.476    |              |          |          |
| no                                    | 1.00       |          |          |              |          |          |
| Resection proportion (%)              |            |          |          |              |          |          |
| <40%                                  | 3.20       | 0.49-20.81| 0.223    |              |          |          |
| \( \geq 40\% \)                      | 1.00       |          |          |              |          |          |
| Final pathology Dx.                   |            |          |          |              |          |          |
| cyst                                  | 1.00       |          |          |              |          |          |
| others                                | 4.80       | 0.74-31.08| 0.100    | 1.00         | 0.24-18.46| 0.198    |
Conclusion

• Laparoscopic resection of giant hepatic cysts is a simple and effective method to relieve symptoms with minimal surgical trauma.

• Moreover the recurrence is dependent on the type of pathology involved, and the sclerotherapy undertaken.

• Adequate selection of patients and type of cystic liver together with meticulous surgical technique are recommended.

• General application of the laparoscopic technique should await a careful evaluation of safety and effectiveness in a larger series of patients, in comparison with the open surgical procedure.