Is There Any Role of Laparoscopic Approach for GB Cancer?

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Current role of laparoscopy for GBC

**Diagnostic**
- Staging laparoscopy in advanced GBC
- Incidental diagnosis during or after LC
  → open surgery according to the tumor stage

**Therapeutic**
- Early GBC (T1a or T1b) on postoperative pathology after LC
NCCN guidelines for GBC

- **Preoperative** suspicion of GBC
  - open surgery

- **Intraoperative** diagnosis or suspicion of GBC during LC
  - open conversion or refer to experienced surgeon

- **Postoperative** diagnosis of GBC on pathologic review after LC
  - open radical second operation according to the stage
Concerns about laparoscopic approach for GBC

- Selection of appropriate indication
- Oncologic safety: Bile spillage
- Technical reproducibility of open surgery
Concerns about laparoscopic approach for GBC

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Possible indication of laparoscopic approach for GBC

Mode of tumor spread in GBC

- Hepatic bed (HB) type
- Hepatic hilum (HH) type
- Bed and hilum (BH) type
- Lymph node (LN) type
- Cystic duct (CD) type
- Localized (LC) type
Possible indication of laparoscopic approach for GBC

**Depth of invasion in GBC**

- **T1a:** invades lamina propria
- **T1b:** invades the muscle layer
- **T2:** invades perimuscular connective tissue
- **T3:** Tumor perforates the serosa and/or directly invades the liver and/or one other adjacent organ
- **T4:** Tumor invades the main blood vessels leading into the liver or several organs outside the liver.
Prediction of depth of invasion
- for proper selection of patients-

- CT, Conventional US
  - widely used for preoperative staging
  - good for evaluation of tumor spread
  - limitation in delineation of layers of GB wall

Need for High-quality radiologic studies

- Endoscopic US
- High-resolution US
- Intraoperative US
Endoscopic US

Abdominal CT

no definite liver invasion

EUS

liver invasion

Open extended cholecystectomy
Laparoscopic US

EUS

Laparoscopic US

A

B

no definite liver invasion

liver invasion

Conversion to laparotomy
for conventional radical cholecystectomy

Our experiences (n=39)
• Negative predictive value for excluding hepatic invasion: 100%
# High Resolution US


## TABLE 4. Comparison of Predicted of Depths of Invasion of GB Cancer by Modality

<table>
<thead>
<tr>
<th>Stage</th>
<th>Number</th>
<th>Accurate</th>
<th>Inaccurate</th>
<th>HRUS</th>
<th>Accurate</th>
<th>Inaccurate</th>
<th>EUS</th>
<th>Accurate</th>
<th>Inaccurate</th>
<th>CT</th>
<th>Accurate</th>
<th>Inaccurate</th>
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<tbody>
<tr>
<td>T1</td>
<td>13</td>
<td>9</td>
<td>↑4</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td></td>
<td>↑6</td>
<td>8</td>
<td></td>
<td>↑3</td>
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</tr>
<tr>
<td>T2</td>
<td>8</td>
<td>4</td>
<td>↑1</td>
<td></td>
<td></td>
<td>↓1</td>
<td>5</td>
<td></td>
<td>↓1</td>
<td>2</td>
<td></td>
<td>↑2</td>
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<td>X2</td>
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<td></td>
<td>X3</td>
</tr>
<tr>
<td>T3</td>
<td>6</td>
<td>4</td>
<td>↑1</td>
<td></td>
<td></td>
<td>↓1</td>
<td>3</td>
<td></td>
<td>↓2</td>
<td>2</td>
<td></td>
<td>↓3</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>X1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X1</td>
</tr>
<tr>
<td>Diagnostic accuracy</td>
<td>17 (62.9%)</td>
<td>15 (55.5%)</td>
<td>12 (44.4%)</td>
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<td></td>
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<tr>
<td>Weight score</td>
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<td>39</td>
<td>32</td>
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<td></td>
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<tr>
<td>$P$</td>
<td>$0.542$</td>
<td>$0.207$</td>
<td>$0.066$</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

↑ indicates overestimation of T stage; ↓, underestimation of T stage; X, malignancy not predicted.
Concerns about laparoscopic approach for GBC

- Selection of appropriate indication
- Oncologic safety: Bile spillage
- Technical reproducibility of open surgery
Initial LC for suspected early GBC (T1,2) (n=16/26)

- **Bile spillage**: 46% → cause of dissemination
- Lower survival than open surgery:
  
  3-year survival: T1 47%, T2 40%

→ Open surgery should be performed for suspicious GBC.

< Problems of this study>

- Unsuspected GBC (stone) included: no attention to oncologic principle
- Index of suspicion: not standardized
Initial LC for suspicious early GBC: outcome in comparison with OC

- LC did not have any adverse effects on the long-term outcomes of the patients.
- Bile spillage: prognostic factor tumor recurrence and survival
  → need for meticulous removal of gallbladders:
  use of vinyl bag, careful dissection of GB

Cystic plate

reflection of the visceral peritoneum between the liver and the gallbladder


Cholecystectomy including the cystic plate

• risk of GB perforation ↓
• likelihood of leaving behind microscopic disease in T2 GBC ↓
Concerns about laparoscopic approach for GBC

- Selection of appropriate indication
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Technical Concerns of Laparoscopic extended cholecystectomy

- Laparoscopic LN dissection
- Laparoscopic liver resection of GB bed
Lymphatic spread of GBC


7th AJCC

- N1: LNs adjacent to the cystic duct, bile duct, hepatic artery and portal vein
- N2: celiac, periduodenal, peripancreatic, periaortic, pericaval, superior mesenteric artery LNs → Metastasis
Extent of LN dissection

- NCCN guideline, Korean HPBA guideline
  - LN1s in porta hepatis, gastrohepatic ligament, retroduodenal regions

- Laparoscopic surgery
  - Most of reports: LN 12
Extent of LN dissection - SNUBH -

Without CBD resection

• LN 8,12 → LN 8,12 +13

With CBD resection

• LN 12+8,13
• Need for biliary anastomosis
Liver resection of GB bed

**Open surgery**: controversial
- Limited 2 cm - wedge resection
- IVb and V Segmentectomy

**Laparoscopic surgery**
- Wedge resection
Laparoscopic IVb and V Segmentectomy: possible?

Laparoscopic Anatomical S5 Segmentectomy by the Glissonian Approach

Keun Soo Ahn, MD, Ho-Seong Han, MD, PhD, Yoo-Seok Yoon, MD, PhD, Jai Young Cho, MD, PhD, and Ji Hoon Kim, MD

IV segmentectomy
IVa segmentectomy
Laparoscopic extended cholecystectomy for suspicious GBC

<table>
<thead>
<tr>
<th>Patients (n)</th>
<th>Pathology</th>
<th>Surgical procedure</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cho A, 2008</td>
<td>3</td>
<td>T2 GBC 1 Benign</td>
<td>No recurrence (9, 20 months)</td>
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<tr>
<td>Gumbs AA, 2009</td>
<td>1</td>
<td>Benign</td>
<td>-</td>
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<tr>
<td>Gumbs AA, 2010</td>
<td>6</td>
<td>3 GBC 3 Benign</td>
<td>-</td>
</tr>
<tr>
<td>Aretxabala X*, 2010</td>
<td>5</td>
<td>5 GBC</td>
<td>1 recurrence (Mean: 22 months)</td>
</tr>
<tr>
<td>Cho JY, 2010</td>
<td>30</td>
<td>18 GBC 12 Benign</td>
<td>No recurrence (Median: 27 months)</td>
</tr>
</tbody>
</table>

* Laparoscopic reoperation after diagnosis of GBC by LC
Intention-to-treat analysis for planned laparoscopic surgery for GB cancer, including LLA

- Inclusion criteria: suspicious GBC on the preoperative CT
  - Radiological T1 or T2
  - No liver invasion
  - No involvement of the extrahepatic bile duct
Treatment Algorithm

from May 2004 to October 2007

Early Stage Gallbladder Carcinoma (n = 36)

Endoscopic Ultrasonography

Liver Invasion (-) (n = 33)

Diagnostic Laparoscopy (n = 33)

Laparoscopic Ultrasonography

Liver Invasion (-) (n = 30)

Liver Invasion (+) (n = 3)

Laparoscopic Cholecystectomy

Full-thickness Frozen Biopsy

Benign (n = 12)

Finish of Surgery

Malignant (n = 18)

Laparoscopic Lymphadenectomy

New detection of liver invasion by EUS & LUS: 6/36 (16.7%)
Pathologic Results

Laparoscopic Cholecystectomy (n = 30)

Full-thickness Frozen Biopsy

Benign (n = 12)

Finish of Surgery

Malignant (n = 18)

Laparoscopic Lymphadenectomy

Pathology
- Benign (n = 10)
  - Tubular adenoma (n = 6)
  - Adenomyomatosis (n = 1)
  - Xanthogranulomatous cholecystitis (n = 1)
  - Chronic cholecystitis (n = 2)
- T1aNx (n = 2)

Pathology
- TisN0 (n = 2)
- T1aN0 (n = 2)
- T1bN0 (n = 4)
- T2N0 (n = 8)
- T2N1 (n = 2)

These patients (1/3) clearly benefited from the planned laparoscopic approach.
Postoperative outcomes after laparoscopic lymphadenectomy for GBC (n=18)

- Median number of retrieved LNs: 8 (4 - 21)
- Median hospital stay: 4 days (range: 3 – 11 days)
- Postoperative complications (n = 3, 16.8%)
  - Symptomatic fluid collection at the GB fossa (n = 1)
  - Postoperative transient blood drainage via drain (n = 1)
  - Voiding difficulty (n = 1)
- Follow-up outcome: after median follow-up of 24 months
  - no tumor recurrence or port site metastasis
Long-term survival outcome

At least 60 months follow-up after surgery

- 2 death from metastatic recurrence: T2N0, T2N1

Actual 5 Year DFS = 88.9%
Case

Laparoscopic extended cholecystectomy  
(liver wedge resection + LN dissection)

• M/52: incidentally detected GB mass
Postoperative results

• **Pathology**: T3N0
  – invasion of liver parenchyma: 0.2cm
  – no metastasis in 16 lymph nodes
  – Safety margin:
    - cystic duct: 4.4cm, hepatic parenchyma: 2.7cm

• Discharge on POD 6 without postoperative complication
Laparoscopic completion radical cholecystectomy

  - T1b at final pathology after LC
  - Wedge liver resection
    + LN dissection
    + CBD resection

  - T1b (3), T2 (15), T3 (5)
  - High conversion rate due to postoperative adhesion
  - 5 patients: one patient peritoneal recurrence
Summary I

Initial LC for suspicious GBC:

• Acceptable, if
  ✓ Well selection of early GBC:
    EUS, high-resolution US, laparoscopic US
  ✓ Careful manipulation to avoid bile spillage:
    use of vinyl bag, cholecystectomy including cystic plate

• Advantage: Patients, who are found to have benign or pT1a, clearly benefit from laparoscopic approach.
Laparoscopic extended cholecystectomy

for pre- or intra-operative diagnosed GBC: limited to a few case reports or small case series
  – technically feasible
  – oncologic outcome is acceptable for highly selected patients with early GBC

for postoperative diagnosed GBC: still difficult due to postoperative adhesion related to previous op
Conclusion

- Role of laparoscopy can be changed from diagnostic to therapeutic in treatment for GBC.

- **Planned laparoscopic approach including extended cholecystectomy** can be a therapeutic option in selected patients with localized gallbladder cancer.

- However, more number of cases and comparative study are needed to confirm the definite role of laparoscopic surgery for GBC.
Thank you for your kind attention.