Gallstone Diseases

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Gallstones

- Common (10-20% population)
- Cholesterol stones in West
- Pigment stones in the East
- Female proponderance (3/1)
- Increasing incidence
Gallstones – Risk Factors

- Obesity
- Contraceptive
- Hyperlipidemia (trygliceredmia)
- Increasing age
- 5 F’s – (female, fat, flatulent, fertile, forty) ????
- Alcohol
- Hemolytic disease
- Drastic weight loss
Clinical Manifestations

- Asymptomatic – 60-80%
- Cholecystitis
- Biliary colic
- Complications
  - Jaundice/ Cholangitis
  - Pancreatitis
  - Gallstone ileus
  - Carcinoma
Symptoms of gallstone:

- Biliary colics – moderate to severe, colicky pain in upper middle & right abdomen, may radiate to back or shoulder tip
Chronic Cholecystitis

- Fatty food dyspepsia
  - Indigestion, belching, bloating, flatulence
  - “Acidity”
- Pain / Discomfort
  - RUQ / Epigastrium
  - Dull ache
  - Radiates to back
Acute Cholecystitis: Signs

- Pyrexia (37.5-38.5)
- Abdominal tenderness localized to RUQ
- Murphys’ sign positive
  - Inspiratory arrest with manual pressure below the gallbladder
Diagnostic test: Ultrasound Abdomen

- Ultrasound is 98% sensitive for gallstones.
- Cholecystitis diagnosed sonographically by:
  - GB wall thickening (>2-4 mm)
  - Pericholecystic fluid from perforation or exudate
  - Sonographic Murphy sign (pain when a probe is pushed directly on the gallbladder)
Treatment Modalities

- **Surgical**
  - Laparoscopic Cholecystectomy
  - Open Cholecystectomy

- **Non-Surgical**
  - Ursodeoxycholic acid (UDCA): 8-10 mg/kg/day
  - Contact dissolution therapy (MTBE)
  - ESWL (solitary stone < 20 mm)
Cholecystectomy

- Open surgery: Limited indication (conversion, unavailable skill)

- Laparoscopic: “gold standard”
Open cholecystectomy
Laparoscopic cholecystectomy

- Small umbilical incision for laparoscope
- Video camera produces magnified image
- Tiny instruments through other ports aid in dissection, surgery and removal of GB
- Conversion to open surgery 1.5% in elective and around 5% in acute cholecystitis
Laparoscopic Cholecystectomy
Lap Cholecystectomy: Advantages

- Less pain
- Faster recovery
- Shorter hospital stay
- Smaller incision (5 to 10 mm)
- Better cosmesis
- Earlier return to normal life
- Decreased social costs
- Low morbidity and conversion rate (< 5%)
If Laparoscopic Surgery is the transfer of pain from the patient to the surgeon...

...Single port laparoscopic surgery will be the transfer of more pain!!
Surgery for gallstone

- **Traditional: Open Cholecystectomy**
  - Large scar, pain, wound complications

- **Conventional: 4-hole laparoscopic cholecystectomy**
  - Less pain, only use puncture holes, less wound complications

- **Current: Single Incision Laparoscopic Surgery**
  - Only one puncture hole, less pain on movement, day surgery procedure
SINGLE INCISION
LAPAROSCOPIC
CHOLECYSTECTOMY
Early experience in single-site laparoscopic cholecystectomy

Stephen Kin Yong Chang¹, MBBS, MRCSE, Shaun Shi Yan Tan², MBChB, Yee Onn Kok³, MBBS

INTRODUCTION Laparoscopic cholecystectomy is currently the gold standard for removal of symptomatic gallbladders. The push in recent years toward reducing the number of ports required to perform this surgery has led to the development of single-incision laparoscopic cholecystectomy (SILC). We report our early experience with SILC and assess its feasibility and safety.

METHODS A prospective study was conducted of the first 100 patients who presented with complaints of biliary colic and underwent laparoscopic cholecystectomy via the single-port technique at our institution. SILC was performed via a single-port device such as a flexible umbilical port that could accommodate up to three surgical instruments. The port was inserted into a transumbilical incision around 15–20 mm long. Data on operative details and postoperative outcomes were collected and evaluated.

RESULTS The mean operation time was 67.8 minutes. Six patients needed conversion, requiring extra 5-mm ports to complete the surgery. No serious intraoperative complications, such as bile duct injury or bile leakage, were encountered. Cosmesis from the scar hidden within the umbilical fold was excellent.

CONCLUSION Our initial results of single-port laparoscopic cholecystectomy are promising, with no complications being seen in this early series. However, the drawbacks include the higher cost of equipment and a steeper learning curve. Further evaluation is required to assess the risks and benefits of this approach when compared with conventional laparoscopic cholecystectomy.

Keywords: laparoscopic cholecystectomy, minimally invasive, SILC, single-incision surgery, single-port laparoscopy

A Randomized Controlled Trial Comparing Post-operative Pain in Single-Incision Laparoscopic Cholecystectomy Versus Conventional Laparoscopic Cholecystectomy

Stephen Kin Yong Chang · Yi Liang Wang · Liang Shen · Shridhar Ganpathi Iyer · Krishnakumar Madhavan

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Abstract

Introduction  An increasing body of evidence is being published about single-incision laparoscopic cholecystectomy (SILC), but there are no well-powered trials with an adequate evaluation of post-operative pain. This randomized trial compares SILC against four-port laparoscopic cholecystectomy (LC) with post-operative pain as the primary endpoint.

Methods  Hundred patients were randomized to either SILC (n = 50) or LC (n = 50). Exclusion criteria were (1) acute cholecystitis; (2) ASA 3 or above; (3) bleeding disorders; and (4) previous open upper abdominal surgery. Patients and post-operative assessors were blinded to the procedure performed. The site and severity of pain were compared at 4 h, 24 h, 14 days and 6 months post-procedure using the visual analog scale; non-inferiority was assumed when the lower boundary of the 95% confidence interval of the difference was above −1 and superiority when \( p \leq 0.05 \).

Results  The study arms were demographically similar. At 24 h post-procedure, SILC was associated with less pain at extra-umbilical sites (rest; \( p = 0.004 \); movement; \( p = 0.008 \)). Pain data were inconclusive at 24 h at the umbilical site on movement; SILC was otherwise non-inferior for pain at all other points. Operating duration was longer in SILC (79.46 vs 58.88 min, \( p = 0.003 \)). 8% of patients in each arm suffered complications (\( p = 1.000 \)). Re-intervention rates, analgesic use, return to function, and patient satisfaction did not differ significantly.

Conclusions  SILC has improved short-term pain outcomes compared to LC and is not inferior in both short-term and long-term pain outcomes. The operating time is longer, but remains feasible in routine surgical practice.
Complications

- Jaundice/ Cholangitis
Laparoscopic common bile duct exploration

- First paper published: 1991
  Laparoscopic common bile duct exploration
  - First Author: Stoker ME
Mr L S H, 62 yr old man

Cholangiohepatitis

ERCP

- sphinterotomy
- drainage of purulent bile
- biliary stent insertion
- small filling defect in distal CBD
Complications

- Pancreatitis
- Pseudocyst
Mr S S, 42 yr old

- acute necrotising pancreatitis treated at HDU

developed pseudocyst

CT scan - pseudocyst 14.3 x 4.9 cm
Laparoscopic pancreatic cystogastrostomy

- First paper published: 1993
  Pancreatic cystogastrostomy by combined upper endoscopy and percutaneous transgastric instrumentation
  - First Author: Atabek U
  - Institution: Cooper Hospital/University Medical Center, UMDNJ-Robert Wood Johnson Medical School, Camden.
Summary

- Gallstones are common (about 10-13 % population)
- Usually asymptomatic in 60-80%
- Clinical manifestations
  - Biliary colic
  - Acute or chronic cholecystitis
- Complications
  - Jaundice, Pancreatitis, Cholangitis, Gallstone ileus, Carcinoma of gallbladder
Conclusions

- Gallstones that are asymptomatic and can be left alone
- But symptomatic stones are best managed surgically to avoid complications
- Laparoscopic cholecystectomy is the gold standard for gallstone
- Advance surgical technique can improve patient’s experience in treatment of gallstone and its complications
Thank you

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Acute Cholecystitis

- Acute inflammation of the gallbladder
- Usually associated with calculi (stones)
  - Calculus causes obstruction at Hartmann's pouch or cystic duct
- Less commonly with biliary sludge
- A-calculus (no-stone) cholecystitis rare
- Bacterial infection in 50% only
- Recurrent attacks result in fibroosed thickened gallbladder (chronic cholecystitis)
...Special tests...for complicated ones

- Endoscopic Retrograde Cholecystogram (ERCP)
  - Therapeutic (and Diagnostic)

- Colangio MRI: Diagnostic

- Other forms of Cholangiography
  - Intra-operative
  - Percutaneous Transhepatic (PTC)
  - Oral cholangiogram
Gallstone: Pathophysiology

Crystallization of bile into stones
?Nidus for crystallization
Gallstones: Planning Treatment

- Asymptomatic stones
  - Transplant candidates,
  - Chemotherapy
  - Porcelain GB

- Symptomatic - CHOLECYSTECTOMY
Surgical management

- Removing gallbladder is the preferred treatment for symptomatic gallstones
  “gallbladder should be removed because it makes stone”… Karl Langebeck, 1865
Lap vs. Open Surgery

Clinical Studies showed that LS have:

➢ Less Pain

I did lap!
Lap vs. Open Surgery

Clinical studies showed that LS have:

- Less Pain
- Faster recovery
Lap vs. Open Surgery

Clinical studies showed that LS have:

- Less Pain
- Faster Recovery
- Shorter hospital stay
Lap Choley: Cost of surgery

- A Ward  S$ 3500 to 5000 approx
- B1 ward S$ 3187 (50th percentile)
- B2 ward S$ 952 (50th percentile)
- C ward S$ 715 (50th percentile)

- Average length of stay is about 2.5 days
- Average time to return to work is 3-12 days
- Recent programme on Day-surgery
Tackling the Hot Gallbladder
Interval Cholecystectomy

- Traditionally done after 6 weeks of acute episode of cholecystitis
- Less inflamed gallbladder
- Less blood loss

- 2 separate admissions
- Recurrent of attack during interval
- ? Reduce conversion rates
Early vs Interval

- Early Vs. Delayed-Interval Laparoscopic Cholecystectomy of Acute Cholecystitis
  -- H. Lau et al, Surg Endo 2006; 20:82-87

  - Metaanalysis
  - Database search of Medline/EMBASE
  - Early defined as surgery within 72 h after establishment of clinical diagnosis of acute cholecystitis.
  - Delayed-interval surgery defined as initial conservative treatment followed by interval lap chole 6-10 weeks later.
  - Only prospective randomized or quasi-randomized trials
### Table 1. Recruited studies and details of patient characteristics

<table>
<thead>
<tr>
<th>Studies</th>
<th>Year</th>
<th>Countries</th>
<th>Intervention</th>
<th>Sample size</th>
<th>Male:female</th>
<th>Age (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serralta et al. [29]</td>
<td>2003</td>
<td>Spain</td>
<td>Early</td>
<td>82</td>
<td>NA</td>
<td>62 (mean)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delayed</td>
<td>87</td>
<td>N/A</td>
<td>60 (mean)</td>
</tr>
<tr>
<td>Johansson et al. [18]</td>
<td>2003</td>
<td>Sweden</td>
<td>Early</td>
<td>74</td>
<td>63% female</td>
<td>58 (mean)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delayed</td>
<td>71</td>
<td>57% female</td>
<td>55 (mean)</td>
</tr>
<tr>
<td>Lo et al. [23]</td>
<td>1998</td>
<td>Hong Kong</td>
<td>Early</td>
<td>45</td>
<td>26:19</td>
<td>59 (median)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delayed</td>
<td>41</td>
<td>21:20</td>
<td>61 (median)</td>
</tr>
<tr>
<td>Lai et al. [22]</td>
<td>1998</td>
<td>Hong Kong</td>
<td>Early</td>
<td>53</td>
<td>23:30</td>
<td>56 (mean)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delayed</td>
<td>51</td>
<td>15:36</td>
<td>56 (mean)</td>
</tr>
</tbody>
</table>

NA, not available

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*Early Vs. Delayed-Interval Laparoscopic Cholecystectomy of Acute Cholecystitis*  
-- H. Lau et al, Surg Endo 2006; 20:82-87
Conversion Rates

Early vs. Delayed Interval Laparoscopic Cholecystectomy of Acute Cholecystitis
-- H. Lau et al, Surg Endo 2006; 20:82-87

<table>
<thead>
<tr>
<th>Studies</th>
<th>Year</th>
<th>Early</th>
<th>Delayed</th>
<th>0.1</th>
<th>0.2</th>
<th>0.5</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>10</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serralta et al.</td>
<td>2003</td>
<td>2 / 82</td>
<td>15 / 87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.120 (0.027, 0.543)</td>
</tr>
<tr>
<td>Johansson et al.</td>
<td>2003</td>
<td>23 / 74</td>
<td>20 / 71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.150 (0.563, 2.348)</td>
</tr>
<tr>
<td>Lo et al.</td>
<td>1998</td>
<td>5 / 45</td>
<td>9 / 41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.444 (0.135, 1.458)</td>
</tr>
<tr>
<td>Lai et al.</td>
<td>1998</td>
<td>11 / 53</td>
<td>9 / 38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.844 (0.310, 2.294)</td>
</tr>
<tr>
<td>Overall effect</td>
<td>1998</td>
<td>41 / 254</td>
<td>53 / 237</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.563 (0.238, 1.335)</td>
</tr>
</tbody>
</table>
## Length of Operation

### Early Vs. Delayed-Interval Laparoscopic Cholecystectomy of Acute Cholecystitis

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<table>
<thead>
<tr>
<th>Studies</th>
<th>Year</th>
<th>-1.00</th>
<th>-0.50</th>
<th>0.00</th>
<th>0.50</th>
<th>1.00</th>
<th>WMD (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serralta et al.</td>
<td>2003</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>-0.522 (-0.831, -0.213)</td>
</tr>
<tr>
<td>Johansson et al.</td>
<td>2003</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
<td>1</td>
<td>Not estimable</td>
</tr>
<tr>
<td>Lo et al.</td>
<td>1998</td>
<td></td>
<td></td>
<td>-</td>
<td>0</td>
<td>1</td>
<td>0.504 (0.068, 0.940)</td>
</tr>
<tr>
<td>Lai et al.</td>
<td>1998</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>1</td>
<td>0.443 (0.016, 0.871)</td>
</tr>
<tr>
<td><strong>Overall effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>0.129 (-0.585, 0.843)</td>
</tr>
</tbody>
</table>

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*Favors early*  *Favors delayed*
# Postoperative Complications

## Early Vs. Delayed Interval Laparoscopic Cholecystectomy of Acute Cholecystitis

H. Lau et al, Surg Endo 2006; 20:82-87

<table>
<thead>
<tr>
<th>Complications</th>
<th>Early group</th>
<th>Delayed group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraabdominal fluid collection</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Bile leakage</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Fever, ileus, or persistent pain</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Wound infection</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Intraabdominal infection</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Retained ductal stone</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Chest infection</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Bile duct injury</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Bleeding</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Early postoperative failure</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Heus dialysis</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Small bowel obstruction</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Unspecified infection</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>
Postoperative Complications

Early Vs. Delayed-Interval Laparoscopic Cholecystectomy of Acute Cholecystitis
-- H. Lau et al, Surg Endo 2006; 20:82-87
### Table 3. Total length of hospital stay among the four recruited trials comparing early and delayed-interval laparoscopic cholecystectomy for acute cholecystitis

<table>
<thead>
<tr>
<th>Studies</th>
<th>Treatment</th>
<th>Sample size</th>
<th>Length of stay (days)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serralta et al. [29]</td>
<td>Early</td>
<td>82</td>
<td>5.6 (mean)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>Delayed</td>
<td>87</td>
<td>13.4 (mean)</td>
<td></td>
</tr>
<tr>
<td>Johansson et al. [18]</td>
<td>Early</td>
<td>74</td>
<td>5 (median)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>Delayed</td>
<td>71</td>
<td>8 (median)</td>
<td></td>
</tr>
<tr>
<td>Lo et al. [23]</td>
<td>Early</td>
<td>45</td>
<td>6 (median)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Delayed</td>
<td>41</td>
<td>11 (median)</td>
<td></td>
</tr>
<tr>
<td>Lai et al. [22]</td>
<td>Early</td>
<td>53</td>
<td>7.6 (mean)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Delayed</td>
<td>51</td>
<td>11.6 (mean)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Studies</th>
<th>Year</th>
<th>-2.00</th>
<th>-1.00</th>
<th>0.00</th>
<th>1.00</th>
<th>2.00</th>
<th>WMD (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serralta et al.</td>
<td>2003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.00</td>
<td>-1.485 (-1.828, -1.142)</td>
</tr>
<tr>
<td>Johansson et al.</td>
<td>2003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not estimable</td>
</tr>
<tr>
<td>Lo et al.</td>
<td>1998</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.736 (-1.180, -0.293)</td>
</tr>
<tr>
<td>Lai et al.</td>
<td>1998</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1.137 (-1.591, -0.683)</td>
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<tr>
<td>Overall effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1.139 (-1.580, -0.697)</td>
</tr>
</tbody>
</table>

**Early Vs. Delayed-Interval Laparoscopic Cholecystectomy of Acute Cholecystitis**

-- H. Lau et al, Surg Endo 2006; 20:82-87
Conclusion

- Chief benefit of early lap chole is sig. reduction in total length of hospital stay/pharmacological & hospital expenses.
- Main disadvantage of delayed lap chole is the potential failure of conservative treatment and requiring emergency cholecystectomy.
- Operation time and postoperative outcomes were comparable between early and delayed lap chole.
- Bile leakage and intraabdominal collection 2 most common complications.
- Major bile duct injury rare during early lap chole.
- Higher incidence of bile duct injury among patients who underwent delayed lap chole due to fibrosis & adhesions.