Surgical Therapy for Choledocholithiasis

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Objectives

- Epidemiology
- Surgical options
- Clinical outcomes
- Cost analysis
- Technical feasibility
- Conclusions
**Epidemiology**

- Gallstones are present in approximately 15% of the general population

- Estimated $6 billion/yr to treat gallstone-related disease

- Nearly 700,000 cholecystectomies/yr in the US
  - >80% performed laparoscopically

- 10–15% found to also have choledocholithiasis
  - Suspected preoperatively by imaging, jaundice, abnormal LFTs, pancreatitis, etc.
Surgical Options
Anatomy of the CBD

- Right hepatic duct
- Left hepatic duct
- Right hepatic artery
- Portal vein
- Gastro-duodenal artery
- Common hepatic artery
- Cystic artery
- Common bile duct
- Neck
- Corpus
- Cystic duct
- Hartmann’s pouch
- Common bile duct
- Fundus
- Pancreatic duct
- Papilla
Open CBDE

- First open CBDE described in 1889 by Robert Abbe

- Indications:
  - Open/combined procedure
  - Large or multiple CBD stones
  - Need for transduodenal sphincteroplasty

- “Gold standard” for CBDE
Open CBDE

- Procedure details
  - Exposed in the free border of the lesser omentum and anterior vertical incision made
  - Duct flushed with irrigation
  - Balloon catheterization
  - +/- Sphincterotomy

- Closure
  - T-tube at choledochotomy site
Laparoscopic CBDE

- **Transcystic**
  - Preferred method (less cost, least invasive)
  - Successful for smaller stones
  - Requires dilation of the cystic duct to accept a 9 or 10Fr choledochoscope (3 – 5mm scope)

- **Choledochotomy**
  - Often necessary for larger (>6mm), multiple (>5), or proximal stones
  - Longitudinal incision on CBD, approx 1 cm
Laparoscopic CBDE

- Procedure details
  - Cystic or CBD irrigated
  - Balloon catheter dislodgement

- Endoscopic maneuvers
  - Direct visualization
  - Basket retrieval
  - +/- Lithotripsy
    - Risk of ductal damage

- 93% success rate overall
**ERCP**

- Clearance rate of ~90%

- 12.9% of pts have retained or new stones after preop ERCP

- Complications include pancreatitis, bleeding, infections, perforations
  - Complication rate 10%
  - Serious complications 1.5%
  - Mortality <0.5%
Clinical Outcomes
“Pre- or post-operative ERCP for bile duct clearance in patients undergoing cholecystectomy for gallstones offers no apparent advantage over surgical exploration.”
ERCP vs. open CBDE

- N=760 from 8 combined trials
- Greater clearance rate with open CBDE (93.3% vs 80.4%)
- No significant difference in morbidity or mortality
Pre-op ERCP vs. laparoscopic CBDE
- N=425 from 3 combined trials
- No significant difference in morbidity or mortality
- No difference in retained stones (87.6% vs. 87.6%)
- Extra 0.97 procedures per pt in ERCP arm
- Hospital stay 6 vs. 9 days in surgical arm (P<0.05)
Post-op ERCP vs. laparoscopic CBDE

- N=166 from 2 combined trials
- No significant difference in morbidity or mortality
- Greater risk of failure with ERCP (OR 4.50, p=0.01)
- Extra 1.09 procedures per pt in ERCP arm
- Significantly shorter hospital stay with surgery only
Cost Analysis
N=27,739 from National Inpatient Survey (2002)

Pts stratified by propensity score to receive CBDE vs. ERCP to similar subgroups

Only 7% of pts underwent CBDE

THC savings from CBDE was $5,500 ± $1,500
  ◦ 53% of these savings due to decreased LOS
National analysis of in-hospital resource utilization in choledocholithiasis management using propensity scores

B. K. Poulse,¹ P. G. Arbogast,² M. D. Holzman¹

Fig. 1. Mean total hospital charges per patient hospitalization by propensity score (PS) quintile. Significant differences were observed at PS quintiles 2 and 5 using complex sample t-test.

Fig. 2. Mean inpatient length of stay per hospitalization by propensity score (PS) quintile. Significant differences were observed at PS quintiles 2 and 5 using complex sample t-test.
Technical Feasibility
Training Higher Surgical Trainees in Laparoscopic Common Bile Duct Exploration

Matthew G. Tutton · Nikhil Pawa ·
Tan H. A. Arulampalam · Roger W. Motson

- Retrospective review comparing outcomes of attendings vs. trainees at one institution
  - 9.2% underwent lap CBDE
  - 79% by consultants (attendings), 21% by trainees

- Overall 11% complication rate, <0.5% mortality
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<th>Parameter</th>
<th>Consultants</th>
<th>HSTs</th>
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<td>Laparoscopic CBD exploration</td>
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<tr>
<td>Transcystic</td>
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<tr>
<td>Choledochotomy</td>
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<td>CBD diameter (mm), mean</td>
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<tr>
<td>Operating time (min), median</td>
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<tr>
<td>Conversion to open procedure</td>
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*CBD* common bile duct, *ERCP* endoscopic retrograde cholangiopancreatography

* Statistically significant (\(* p < 0.05\), Mann-Whitney U-test)
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Conclusions
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- Laparoscopic CBDE is equivalent to ERCP + LC based on clinical outcomes.

- LCBDE decreases length of hospital stay and total hospital costs.

- With the appropriate surgeon education, LCBDE can become a commonplace operation with good results.
Conclusions

Overall, LCBDE is the superior therapeutic modality for treatment of CBD stones.
Questions?
References