



MINIMALLY INVASIVE MANAGEMENT OF CHOLEDOCHOLITHIASIS

Integrating Choledochoscopy and Laser Lithotripsy for Optimal Ductal Clearance

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Background

Choledocholithiasis occurs in up to 20% of patients with gallstone disease.

Traditional treatment involves a two-stage strategy with ERCP followed by laparoscopic cholecystectomy.

Advances in minimally invasive surgery now allow single-stage laparoscopic common bile duct exploration (LCBDE). The addition of choledochoscopy and laser lithotripsy expands the ability to treat complex or impacted stones.

Objective

To evaluate the efficacy and safety of minimally invasive bile duct exploration using choledochoscopy and laser lithotripsy.

Methods

Recent literature on minimally invasive management of choledocholithiasis was reviewed, focusing on:

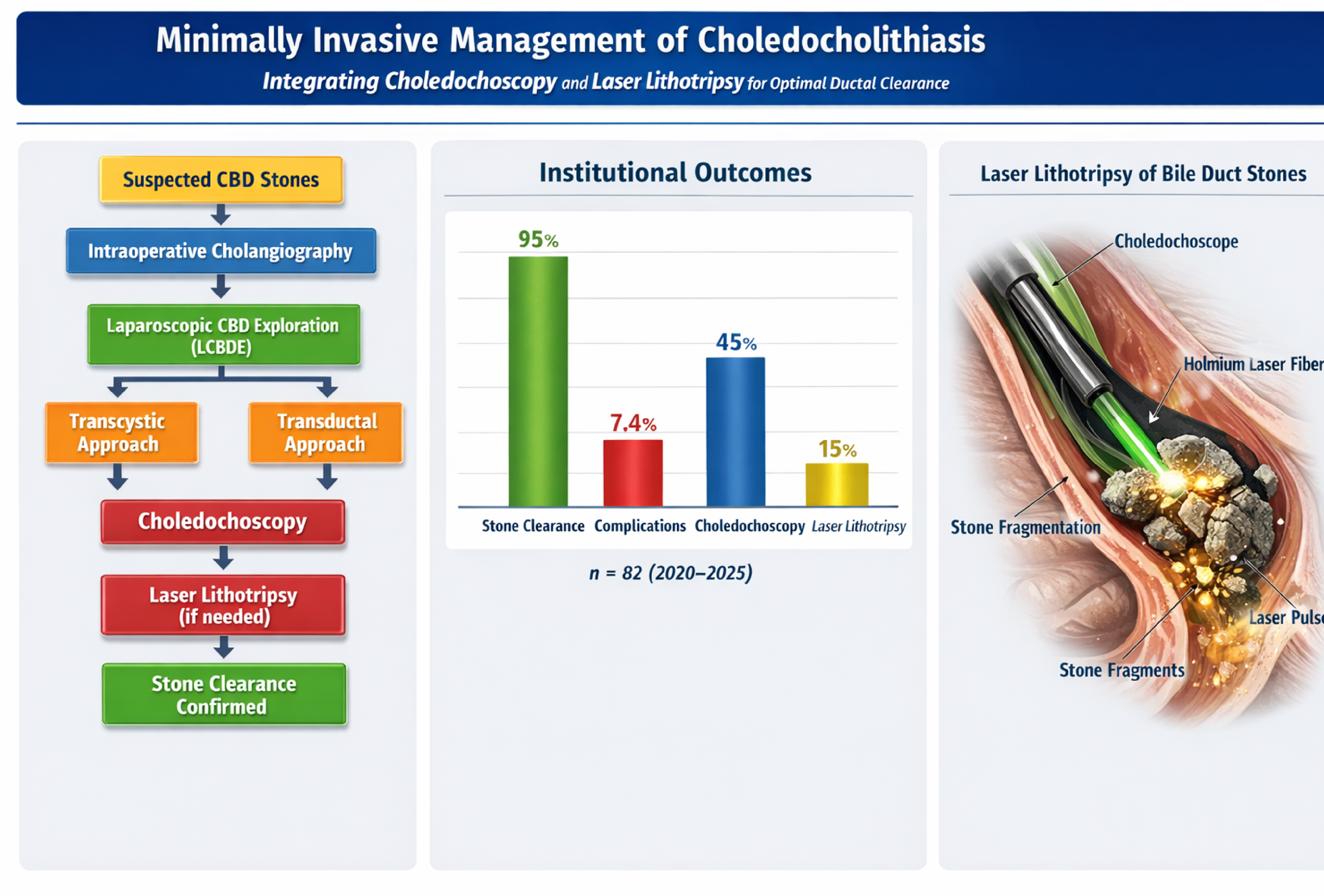
- Transcystic vs transductal LCBDE
- Intraoperative choledochoscopy
- Holmium:YAG laser lithotripsy

Institutional Experience

82 patients underwent LCBDE (2020–Aug 2025) at our institution.

Variables analyzed:

- Use of choledochoscopy
- Laser lithotripsy utilization
- Stone clearance rate
- Postoperative complications



Surgical Technique

Transcystic exploration

- Preferred for small stones
- Favorable cystic duct anatomy

Transductal choledochotomy

- Large or multiple stones
- Difficult cystic duct access

Choledochoscopy

- Direct visualization of duct
- Confirmation of clearance

Laser lithotripsy

- Fragmentation of large or impacted stones
- Performed under direct endoscopic guidance

Most common complications:

- bile leak
- retained stones

Discussion

LCBDE offers several advantages compared with staged ERCP strategies:

- ✓ Single-stage treatment
- ✓ Reduced hospitalization
- ✓ Improved ductal clearance
- ✓ Direct visualization with choledochoscopy

Laser lithotripsy enables laparoscopic management of large or impacted bile duct stones that previously required open surgery or staged endoscopic procedures.

Conclusion

Minimally invasive bile duct exploration combining: LCBDE; Choledochoscopy; Laser lithotripsy provides a safe and effective single-stage treatment for choledocholithiasis, achieving high stone clearance rates while reducing reliance on ERCP.