Surgical Management of Uncomplicated Biliary Stone Disease in Children

Sims, Achey, & Zamora (2025)

Seminars in Pediatric Surgery

Prof. Hadji Mirzaei, Mohammad Reza Arshadi

Background

- The prevalence of biliary stone disease in children is increasing significantly, estimated between 1.9% and 4%. This trend parallels the rising rates of obesity and metabolic syndrome.
- Historically, pigmented stones associated with **hemolytic** anemias (e.g., sickle cell) were the leading cause. Today, cholesterol stones are more frequently observed, driven by **metabolic** factors like obesity, hyperlipidemia, and sedentary lifestyle.
- This review focuses on the diagnosis and surgical treatment of uncomplicated symptomatic cholelithiasis and acute cholecystitis in children.

Diagnosis: Symptomatic Cholelithiasis

- Characterized by recurrent biliary pain and gallstones in the absence of acute infectious/inflammatory signs.
- Diagnostic criteria
- Pain located in the epigastrium and/or right upper quadrant

Supportive criteria

- The pain may be associated with:
- Nausea and vomiting
- Radiation to the back and/or right infra subscapular region
- Waking from sleep

Evaluation & Management

- Non-urgent evaluation with Right Upper Quadrant Ultrasound (RUQ US) for patients presenting for outpatient follow-up.

- Patients with symptomatic cholelithiasis may benefit from earlier intervention to prevent complications (pancreatitis, choledocholithiasis). The definitive treatment is elective cholecystectomy.

Diagnosis: Acute Cholecystitis

- Diagnosed when gallstones are observed with evidence of inflammation and/or systemic illness.

Local signs of inflammation

- Murphy's sign
- RUQ Mass, pain, and/or tenderness

Systemic signs of inflammation

- Fever / Elevated CRP / Elevated white blood cell count

Imaging findings

- Characteristic of acute cholecystitis (stones/sludge in gallbladder, gallbladder wall thickening, pericholecystic fluid, etc.) (italics ours.)
- **Suspected diagnosis: one item in A + one item in B**
- **Definite diagnosis: one item in A + one item in B + C**

Evaluation & Management

- Ultrasound is the preferred imaging modality. It should look for stones/sludge, gallbladder wall thickening, and pericholecystic fluid.

- Acute Cholecystitis requires urgent/emergent cholecystectomy. Percutaneous cholecystostomy is generally reserved for critically ill patients unable to tolerate surgery.

Surgical Gold Standard & The Basics

- Laparoscopic Cholecystectomy (LC) is the gold standard for pediatric patients.

- For elective procedures, recent pediatric data suggests cefazolin prophylaxis is associated with a decreased risk of surgical site infection. For acute cholecystitis, preoperative antibiotics targeting Gram-negative enteric bacteria are standard.

Advances: Robotic vs. Laparoscopic

- Robotic-assisted approaches are increasingly utilized. Advantages include a slightly more cosmetic result with single-incision techniques.
- Overall, pediatric publications within the last decade are mixed but generally report similar outcomes between RC and LC.
- RC is safe and feasible in the pediatric population for both elective and acute settings.

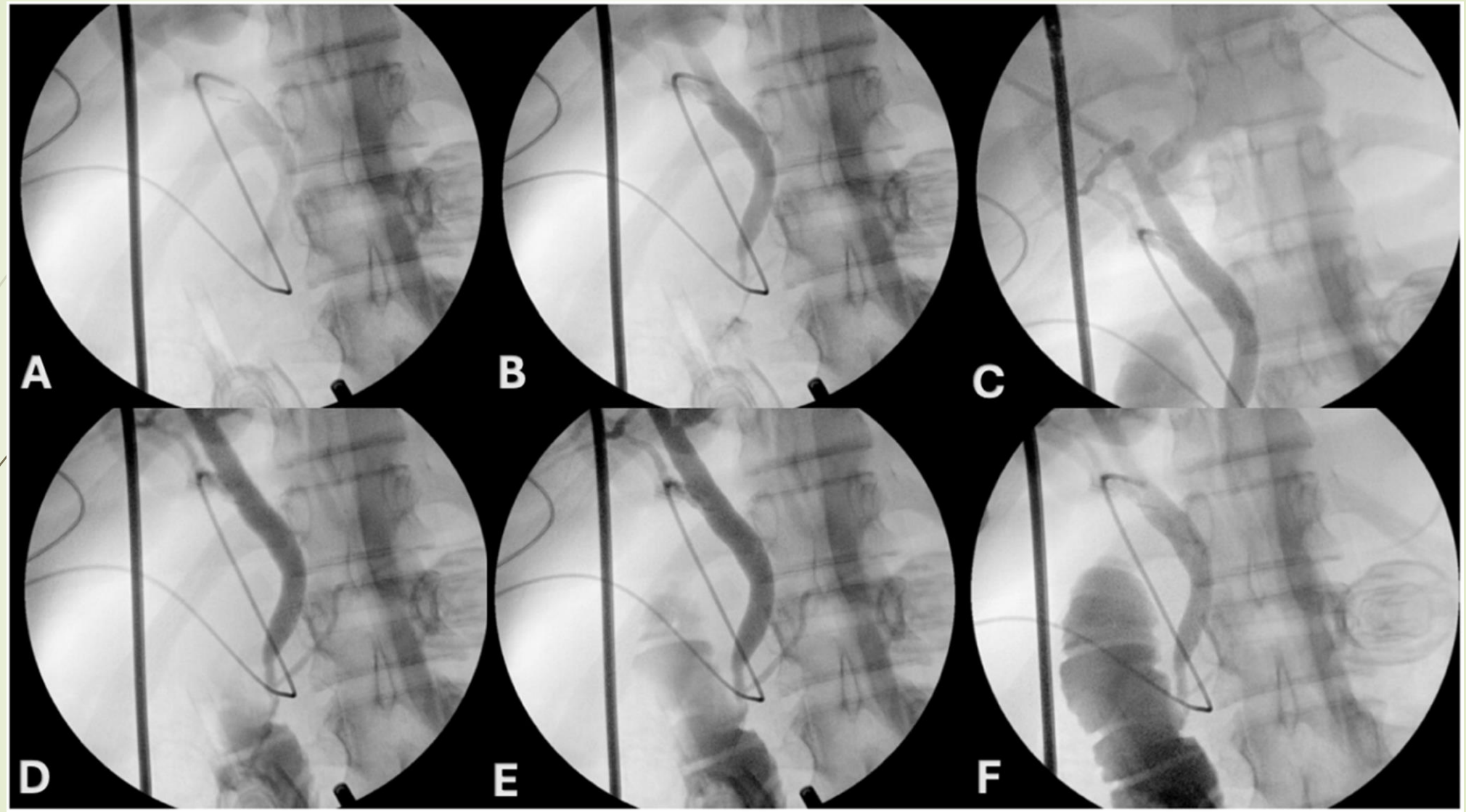
Intraoperative Imaging Techniques

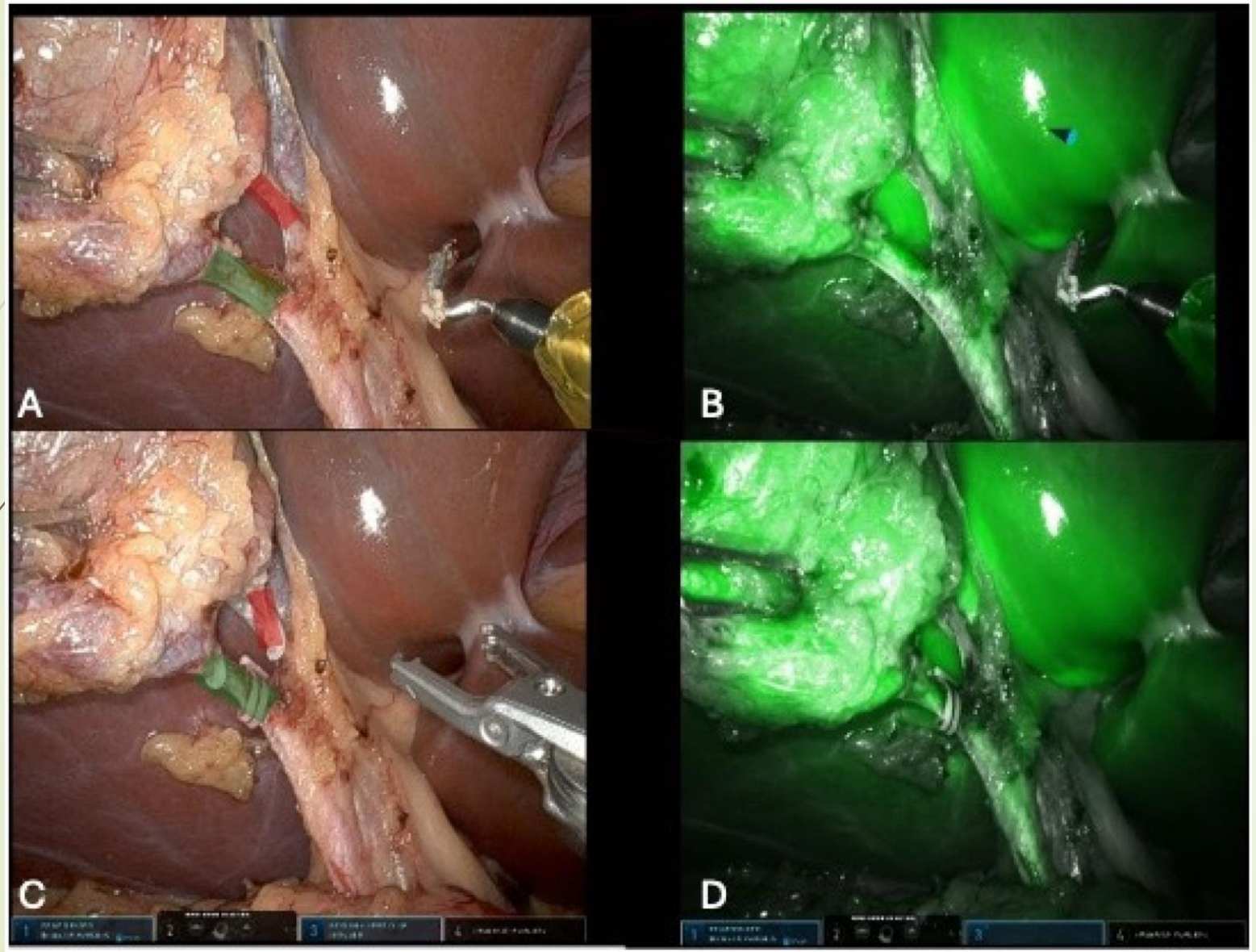
Intraoperative Cholangiography (IOC)

- Selective approach to IOC is recommended to balance radiation exposure with the need for clarity on biliary anatomy. IOC can:
- - Rule out complications (choledocholithiasis)
- - Clarify uncertain anatomy/identify injury

Fluorescent Cholangiography (ICG)

An alternative technique that uses Indocyanine Green (ICG) dye. ICG is excreted in bile, offering excellent visualization of anatomy without radiation exposure.


A
B
C
D
E
F


A
B
C
D

Conclusion & Critical Analysis

- anagement of uncomplicated biliary stone disease in children parallels the adult population.
- The rising incidence (due to obesity) requires surgeons to be increasingly comfortable with this perioperative and operative management.

Paper Weaknesses

- Relies on Tokyo guidelines developed for adults.
- The review is limited to **uncomplicated** disease, while many patients present with sequelae (pancreatitis, choledocholithiasis).

Thank you for your attention