

CASE REPORT

Radiation-Free Ultrasound-Guided ERCP in Pregnancy: A Case Series of Three Patients with Technical Standardization

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ABSTRACT

Background and Aims: Endoscopic retrograde cholangiopancreatography (ERCP) during pregnancy is indicated for symptomatic biliary obstruction, cholangitis, and gallstone pancreatitis. Although fetal radiation exposure during standard ERCP is typically below teratogenic thresholds, minimizing radiation adheres to the ALARA principle. We report a case series of three pregnant patients who underwent ultrasound-guided ERCP without fluoroscopy and propose a standardized technical approach.

Methods: Three pregnant patients with symptomatic biliary obstruction underwent radiation-free ERCP using wire-guided cannulation with real-time transabdominal ultrasound confirmation of guidewire placement and duct clearance.

Results: All three procedures were technically successful without the use of fluoroscopy. Complete duct clearance was achieved in all cases. No maternal procedural complications occurred. Fetal monitoring before and after the procedure was reassuring in all patients. All pregnancies progressed without adverse events.

Conclusions: Ultrasound-guided ERCP without fluoroscopy is feasible and safe in selected pregnant patients when performed by experienced endoscopists with multidisciplinary support. This technique eliminates fetal radiation exposure while maintaining therapeutic efficacy.

KEYWORDS

• Radiation Free ERCP • USG guided ERCP

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INTRODUCTION

Biliary pathology complicates approximately 0.05–0.1% of pregnancies, most commonly due to choledocholithiasis. ERCP remains the treatment of choice for symptomatic obstruction, cholangitis, or biliary pancreatitis.¹⁻¹⁰ While fetal radiation exposure during ERCP is generally low, concerns remain regarding teratogenicity during organogenesis and theoretical long-term carcinogenic risks. The principle of ALARA (As Low As Reasonably Achievable) supports minimizing radiation whenever feasible. Fluoroless ERCP techniques have been described;^{4, 11-14} however, standardization remains limited. We describe our experience with three cases of ultrasound-guided ERCP performed without fluoroscopy and outline a reproducible protocol.

METHODS

Study Design-Retrospective case series conducted at a tertiary referral center (Yashoda hospital, Secunderabad, India).

Patient Selection Pregnant patients presenting with:

- Symptomatic obstructive jaundice
- Acute cholangitis
- Persistent biliary pancreatitis with obstruction.

All procedures were performed after:

- Multidisciplinary consultation (gastroenterology, obstetrics, anesthesia)
- Informed consent explaining fluoroscopy avoidance strategy — Procedural Technique Pre-procedure
- Obstetric evaluation and fetal heart rate documentation
- Left lateral positioning to avoid IVC compression
- Conscious sedation or monitored anesthesia care (specify your protocol)

ERCP Technique used was as follows:

1. Side-viewing duodenoscope advanced to second part of duodenum
2. Wire-guided biliary cannulation using sphincterotome (Figure 1)

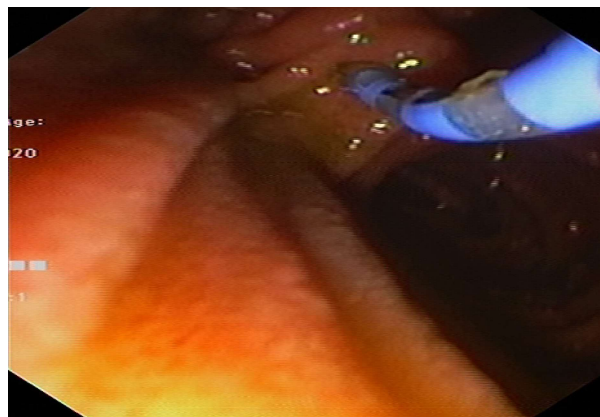


Figure 1: Canulation of CBD

3. Avoidance of contrast injection
4. Confirmation of bile aspiration
5. Real-time transabdominal ultrasound performed simultaneously
6. Visualization of guidewire within dilated CBD (Figure 2)



Figure 2: Guidewire in CBD seen on Real time USG abdomen

7. Limited biliary sphincterotomy (Figure 3)



Figure 3: Biliary Sphincterotomy

8. Balloon sweep for stone/sludge extraction (Figure 4)

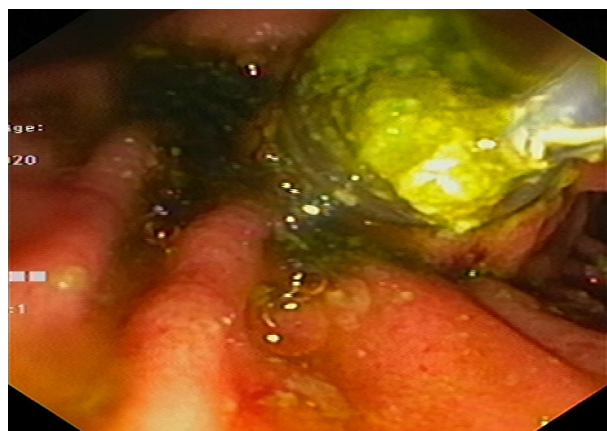


Figure 4: Balloon trawl of CBD-Stone and sludge cleared

9. Ultrasound confirmation of duct decompression and absence of residual echogenic shadow.
10. Backup Plan made: Minimal fluoroscopy with abdominal shielding was available but not required in any case.

Procedural Outcomes:

- Successful cannulation in all 3 cases
- Complete duct clearance achieved
- No post-ERCP pancreatitis
- No bleeding or perforation
- No obstetric complications
- All pregnancies continued uneventfully

Patient Characteristics:

Age (Gestation-Wks)	Indication	CBD (mm)	Sphincterotomy	Stone extraction	Complications	Fetal Outcome
26	Cholangitis	10	Yes	Yes	No	Good
12	Obs. Jaundice	8	Yes	Yes	No	Good
18	CBD cal.	6	Yes	Yes	No	Good

DISCUSSION

This series demonstrates the feasibility of ultrasound-guided ERCP without fluoroscopy in pregnancy.

Why Radiation Avoidance Matters Fetal radiation sensitivity depends on gestational age:

- First trimester: organogenesis risk
- Second/third trimester: stochastic carcinogenic risk Although reported fetal exposure during ERCP is usually <5 mGy. (well below teratogenic threshold of 50 mGray)¹¹, complete elimination is preferable when it is technically feasible.

The available options to minimise radiation exposure to fetus include an Ultrasound guided ERCP¹² as was discussed and recent available modality of Cholangioscopy¹³ which needs additional skill set to manage in this setting.

Technical Advantages of USG guided ERCP:

- Real-time confirmation of wire placement
- Avoids contrast injection
- No radiation exposure
- Immediate definitive therapy

Critical Requirements

- Dilated bile duct for visualization
- Experienced endoscopist

- Skilled ultrasonographer
- Multidisciplinary coordination
- Limitations
- Operator dependent
- Challenging in obesity
- Difficult in non-dilated ducts
- Small sample size

Proposed Standardized Protocol for Radiation-Free ERCP in Pregnancy:

1. Confirm indication strictly
2. Perform only in dilated ducts
3. Use wire-guided cannulation
4. Avoid contrast injection
5. Confirm wire position via ultrasound
6. Perform limited sphincterotomy
7. Confirm clearance sonographically
8. Post-procedure fetal monitoring

CONCLUSION

Ultrasound-guided ERCP without fluoroscopy is a safe and effective therapeutic option in pregnant patients with biliary obstruction when performed in specialized centers. This technique aligns with radiation minimization principles while maintaining procedural success. Further prospective data are needed

to validate reproducibility and long-term outcomes.

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