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Successful staged endoscopic management of congenital hilar biliary stricture in a 15- month-old infant using therapeutic ERCP: complete stricture resolution after serial dilatation and stenting

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Case Report

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Abstract

Endoscopic retrograde cholangiopancreatography (ERCP) in infants remains technically challenging because of small anatomical dimensions and limited availability of pediatric duodenoscopes. We report a 15-month-old infant weighing 7.8 kg with repaired Tetralogy of Fallot who presented with obstructive jaundice and cholangitis. Magnetic resonance cholangiopancreatography showed a tortuous dilated common bile duct with mild intrahepatic biliary dilatation. ERCP was successfully performed using an adult duodenoscope despite difficult access from a narrow pylorus and duodenal narrowing. Cholangiography revealed marked intrahepatic biliary dilatation, a hilar biliary stricture, extrahepatic biliary filling defects, and anomalous pancreatobiliary anatomy. Endoscopic sphincterotomy, sludge extraction, stricture dilatation, and 10-Fr biliary stent placement achieved clinical and biochemical improvement. Follow-up ERCP after six months showed stricture improvement, permitting repeat dilatation and stent exchange, demonstrating staged endoscopic remodeling of a congenital hilar biliary stricture in an infant. The biliary stent was removed during a third ERCP performed six months later. The final ERCP demonstrated resolution of the hilar stricture with good biliary drainage and reduced intrahepatic biliary dilatation.

Introduction

Obstructive jaundice in infancy is an important clinical condition requiring prompt diagnosis and management (1). Although ERCP is widely established in adults and older children, its role in small infants remains technically demanding because of limited working space, small anatomical structures, and the restricted availability of pediatric ERCP equipment and experience (2).

Congenital pancreatobiliary malformations may present with obstructive jaundice, recurrent cholangitis, pancreatitis, or biliary sludge formation (3). Accurate delineation of the ductal anatomy is often difficult with noninvasive imaging alone, making ERCP both a diagnostic and therapeutic modality (4).

We report a technically challenging but successful therapeutic ERCP in a 15-month-old infant with corrected Tetralogy of Fallot and complex anomalous pancreatobiliary anatomy presenting with obstructive jaundice. To our knowledge, reports describing staged endoscopic remodeling of a congenital hilar biliary stricture using an adult duodenoscope in an infant weighing less than 8 kg remain exceedingly rare.

Case Presentation

A 15-month-old infant weighing 7.8 kg presented in June 2025 with obstructive jaundice and cholangitis. The patient had undergone surgical correction of Tetralogy of Fallot at 5 months of age. Magnetic resonance cholangiopancreatography demonstrated a tortuous, dilated common bile duct (CBD) with mild intrahepatic biliary radicle dilatation (IHBRD). Preprocedural abdominal ultrasonography showed a distended gallbladder containing biliary sludge, a 6-mm dilated CBD, and mild IHBRD without visible calculi.

Therapeutic ERCP was performed under general anesthesia using an adult duodenoscope (Pentax ED34-i10T). Endoscopic access was technically challenging because of a narrow pyloric ring and narrowing between the first and second portions of the duodenum. Despite these difficulties, the duodenoscope was successfully advanced into the second portion of the duodenum, where a prominent major papilla was identified, and selective biliary cannulation was achieved.

Cholangiography demonstrated marked IHBRD, a hilar biliary stricture, extrahepatic biliary dilatation with filling defects, an elongated tortuous low-inserting cystic duct, and a dilated tortuous main pancreatic duct. Endoscopic sphincterotomy was performed, followed by balloon extraction of biliary sludge and gravel. The hilar stricture was dilated using a 9-Fr dilator, with persistent narrowing demonstrated during subsequent balloon passage (Supplementary Video 1). A 10-Fr, 7-cm plastic biliary stent was then successfully placed, resulting in satisfactory biliary drainage (Fig. 1).

The postprocedural course was uneventful, with rapid resolution of jaundice and progressive normalization of bilirubin levels and liver biochemical tests (Table 1). Follow-up ultrasonography performed three months later demonstrated improvement in biliary dilatation.

Table 1
Serial biochemical and clinical follow-up during staged therapeutic ERCP management.

Parameter	Reference Range	Pre-ERCP	Day 1	2 Weeks	6 Months	7 Months	11 Months	14 Months
Date		16/6/25	19/6/25	5/7/25	18/12/25	8/1/26	21/5/26	9/8/26
Intervention		Before index ERCP	Post-ERCP	Follow-up	Before 2nd ERCP	After 2nd ERCP + stent exchange	Long-term follow-up	After final ERCP + stent removal
Clinical status	-	Jaundiced	Improved	Asymptomatic	Asymptomatic	Asymptomatic	Asymptomatic	Asymptomatic
CHOLESTATIC PROFILE								
Total bilirubin (mg/dL)	0.2–1.2	8.57	3.53	0.8	0.4	0.21	0.2	0.45
Direct bilirubin (mg/dL)	< 0.3	4.70	1.5	0.2	0.2	0.04	0.05	0.19
GGT (U/L)	5–32	716	483	—	46	31	10	16
ALP (U/L)	Age-adjusted	—	336	—	—	—	—	—
HEPATOCELLULAR PROFILE								
ALT (U/L)	< 40	79	48	—	—	17	9	38
AST (U/L)	< 40	72	48	—	—	40	28	19
PANCREATIC PROFILE								
Lipase (U/L)	< 60	404	—	54	34	—	29	22
Amylase (U/L)	25–125	51	—	36	35	—	43	48
Initial therapeutic ERCP with sphincterotomy, hilar stricture dilatation, and placement of a 10F plastic biliary stent was performed on 17/6/2025. Follow-up ERCP with repeat hilar dilatation and biliary stent exchange was performed on 29/12/2025. Final ERCP with stent removal was performed on 20/7/2026.								
Serial clinical and biochemical follow-up after staged therapeutic ERCP demonstrating progressive normalization of bilirubin, liver enzymes, and pancreatic enzymes together with sustained clinical improvement.								
Abbreviations: ALT, alanine aminotransferase; AST, aspartate aminotransferase; ALP, alkaline phosphatase; GGT, gamma-glutamyl transferase.								

A planned follow-up ERCP was performed six months after the index procedure to reassess the hilar stricture and biliary drainage. The previously placed stent was visualized protruding through the major papilla and was removed using a snare. Cholangiography demonstrated significant interval improvement of the hilar narrowing, although mild residual stenosis persisted. No filling defects, biliary sludge, or recurrent gravel were identified, while the elongated tortuous low-inserting cystic duct remained evident.

Balloon sweeping achieved satisfactory ductal clearance, after which serial stricture dilatation was performed using 5-Fr, 7-Fr, and 10-Fr dilators. A new 10-Fr, 7-cm plastic biliary stent was then successfully inserted (Fig. 2). The procedure was completed without complications, and no recurrence of jaundice, cholangitis, or pancreatitis was observed during long-term follow-up. Six months later, a final ERCP was performed. The previously placed biliary stent was removed using a snare. Cholangiography demonstrated resolution of the congenital hilar biliary stricture. The extraction balloon traversed the stricture easily, with reduced intrahepatic biliary dilatation, no residual biliary sludge, free biliary drainage, and an uneventful post-procedural course (Fig. 3, Table 1).

Discussion

Therapeutic ERCP in infants and very small children remains technically demanding because of limited working space, small anatomical structures, and the restricted availability of pediatric ERCP equipment. Nevertheless, advances in endoscopic expertise have expanded its role from a purely diagnostic procedure to an effective therapeutic modality for selected pediatric pancreatobiliary disorders (2, 4).

The present case was particularly challenging for several reasons. The patient weighed only 7.8 kg, endoscopic advancement was hindered by a narrow pyloric ring and duodenal narrowing, and cholangiography demonstrated complex congenital pancreatobiliary anatomy, including a hilar biliary stricture, elongated tortuous low-inserting cystic duct, and dilated tortuous main pancreatic duct. Despite these anatomical difficulties, selective biliary cannulation and therapeutic intervention were successfully accomplished using an adult duodenoscope without procedure-related complications.

Although ultrasonography and MRCP provided important preprocedural information, ERCP uniquely combined definitive anatomical delineation with immediate therapy. In a single session, sphincterotomy, extraction of biliary sludge and gravel, stricture dilatation, and biliary stenting restored biliary drainage and resulted in rapid clinical and biochemical improvement.

Published pediatric ERCP series have demonstrated acceptable technical success and safety when procedures are performed in experienced centers (5, 6). To our knowledge, reports describing successful staged endoscopic remodeling of a congenital hilar biliary stricture in an infant weighing less than 8 kg using an adult duodenoscope are exceedingly rare.

Unlike temporary biliary decompression alone, the objective of staged therapeutic ERCP in this patient was progressive endoscopic remodeling of the congenital hilar stricture through serial dilatation and temporary stenting, thereby avoiding surgical reconstruction.

The planned second ERCP demonstrated significant interval improvement of the hilar narrowing and allowed repeat dilatation with stent exchange, supporting the feasibility of serial endoscopic management rather than immediate surgical intervention. The final third ERCP demonstrated successful complete endoscopic remodeling of the biliary stricture with sustained resolution after stent removal.

The present case demonstrates that staged therapeutic ERCP can achieve progressive remodeling of a congenital hilar biliary stricture in infancy, allowing eventual stent removal with sustained clinical and cholangiographic resolution. This experience supports ERCP as a feasible minimally invasive alternative to surgery in carefully selected patients managed by experienced pediatric endoscopists.

The principal limitation of this report is its single-patient design, which precludes broad conclusions regarding efficacy and safety. In addition, the exact embryologic nature of the underlying pancreatobiliary malformation could not be definitively established. Nevertheless, the sustained clinical, biochemical, and radiological improvement during follow-up suggests that staged therapeutic ERCP can be an effective minimally invasive strategy in carefully selected infants managed at specialized pediatric ERCP centers.

Conclusion

This case demonstrates that staged therapeutic ERCP, including serial stricture dilatation and temporary biliary stenting, can be successfully performed in carefully selected infants even when an adult duodenoscope is required. In experienced centers, serial endoscopic intervention may provide an effective minimally invasive alternative to surgery for complex congenital obstructive biliary disorders.

Declarations

Conflicts of Interest

None declared

Source of Funding

The authors received no specific funding for this work

Ethics Statement

Written informed consent for publication of the clinical details and accompanying images was obtained from the patient's parents. All identifying information has been removed to preserve patient confidentiality.

This report describes a single anonymized case managed as part of routine clinical care. According to institutional policy, formal Research Ethics Committee approval was not required for publication of an individual case report.

Author Contribution

E.A.E contributed to radiological interpretation, supervised the ERCP procedures, critically revised the manuscript, and approved the final version.T. A. S performed the ERCP procedures, conceived the case report, critically revised the manuscript, and approved the final version.R. R.I performed the ERCP procedures, conceived the case report, collected clinical data, participated in patient follow-up, drafted the manuscript, and approved the final version.M. F. M. performed the ERCP procedures, critically revised the manuscript, and approved the final version.A. M. S. performed the ERCP procedures, conceived the case report, collected clinical data, participated in patient follow-up, drafted the manuscript, and approved the final version.

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Figures

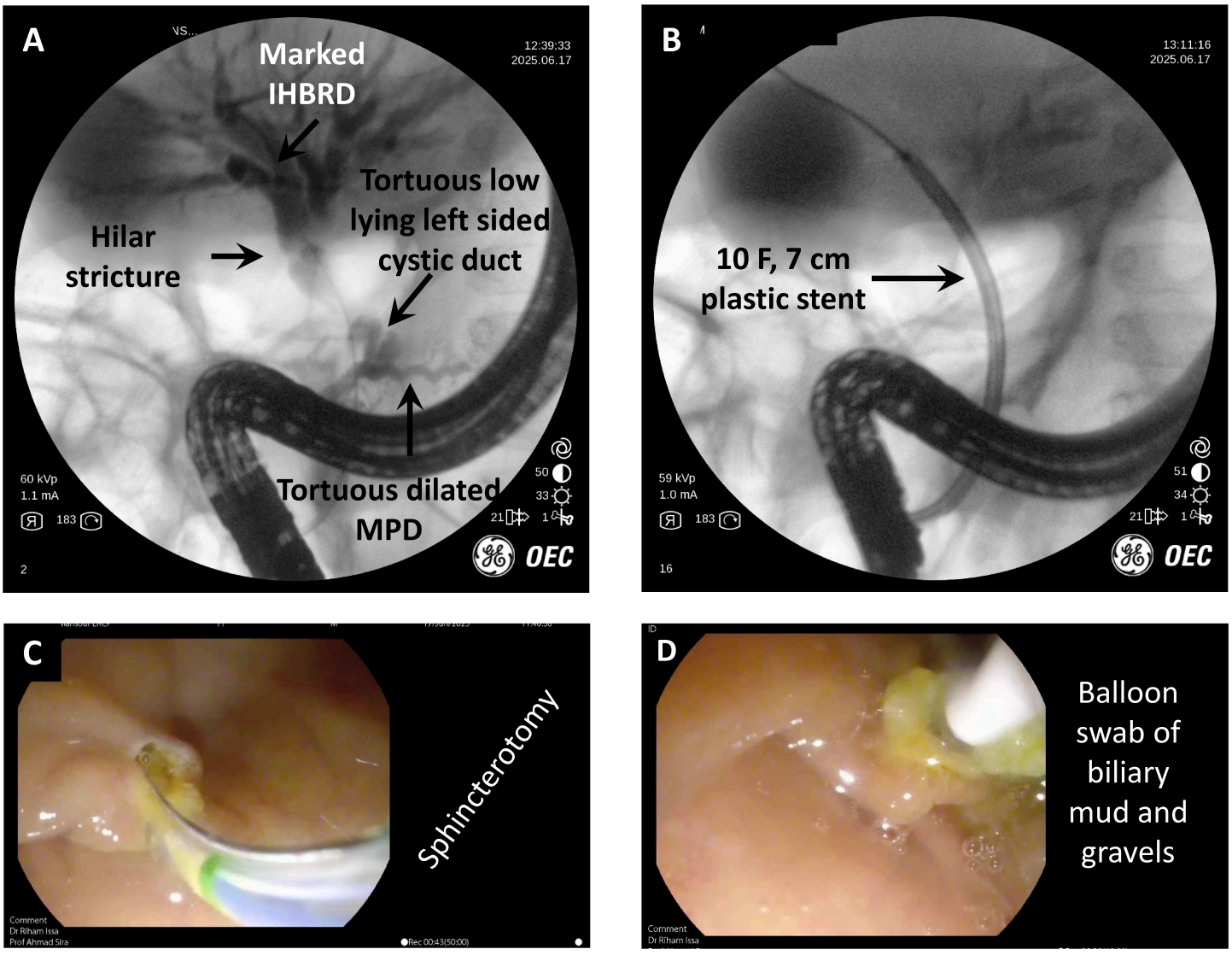


Figure 1

Initial therapeutic ERCP demonstrating complex congenital pancreatobiliary anatomy and endoscopic management.

(A) Cholangiogram showing marked intrahepatic biliary radicle dilatation with a hilar biliary stricture, elongated tortuous low-inserting cystic duct, and dilated tortuous main pancreatic duct.

(B) Placement of a 10-Fr, 7-cm plastic biliary stent with satisfactory biliary drainage.

(C) Endoscopic sphincterotomy.

(D) Balloon extraction of biliary sludge and gravel.

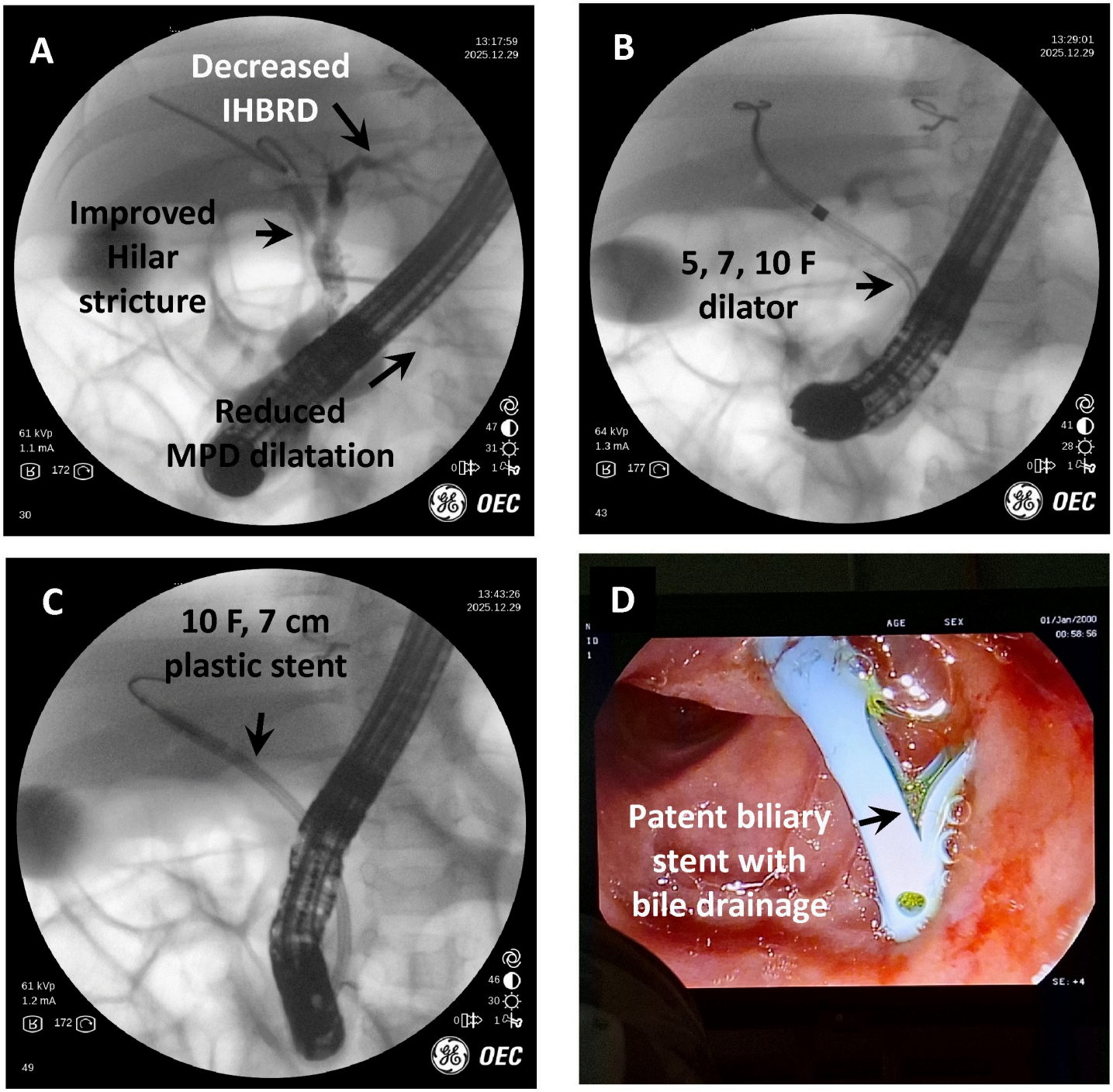


Figure 2

Follow-up ERCP performed six months after the index procedure demonstrating staged endoscopic remodeling.

(A) Cholangiogram showing significant improvement of the hilar narrowing with reduced intrahepatic biliary dilatation.

(B) Serial dilatation of the residual stricture using 5-, 7-, and 10-Fr dilators.

(C) Placement of a new 10-Fr, 7-cm plastic biliary stent.

(D) Endoscopic view confirming satisfactory biliary drainage.

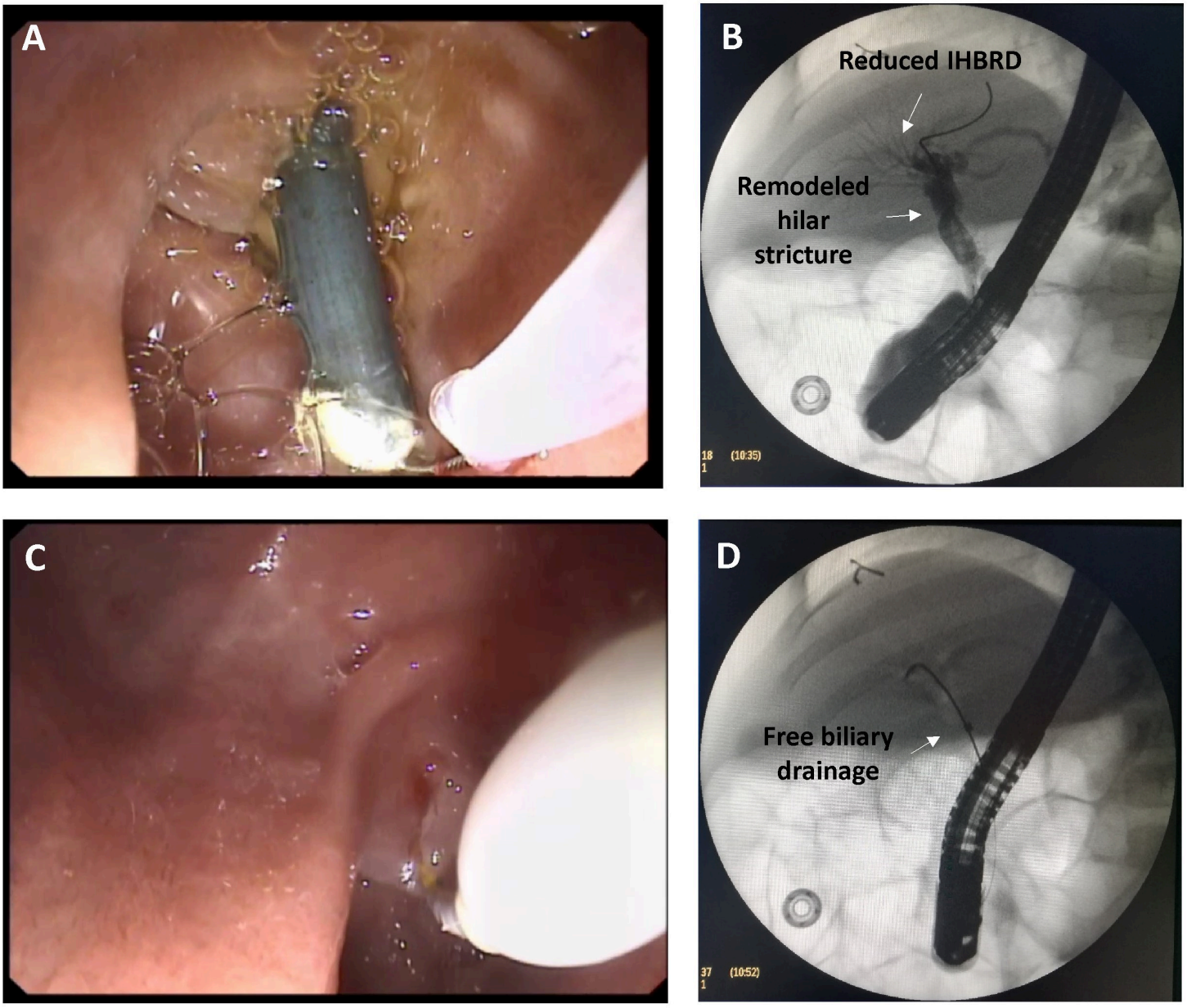


Figure 3

Final ERCP performed six months after the second procedure demonstrating successful endoscopic remodeling and completion of endoscopic therapy.

(A) Endoscopic view showing the biliary stent *in situ* before removal with a snare.

(B) Cholangiogram showing marked improvement of the hilar biliary stricture with reduced intrahepatic bile duct dilatation (IHBRD).

(C) Balloon sweep showing no residual sludge.

(D) Easy passage of the extraction balloon across the hilar stricture with free contrast drainage and complete ductal emptying.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryVideo1FirstERCP.mp4