

Supplementary Table 1 Timing of ERCP and stent removal

Study first author (year)	Study design (n)	Key Findings	Conclusion	Quality ^a
Timing of ERCP				
Abbas[33](2019)	Retrospective nationwide cohort (1028)	No significant difference in AEs among emergent(11%), urgent(10%), and expectant(9%) ERCP ($P = 0.577$). Mortality showed U-shape trend (5%, 0%, 2%; $P < 0.001$).	ERCP timing not significantly associated with AEs.	High
Desai[43] (2021)	Retrospective nationwide cohort (1260)	Expectant ERCP (>3 days) had fewer AEs and rehospitalizations vs. emergent or urgent ERCP ($P = 0.004$, <0.001). Combination therapy superior to stent alone ($P = 0.02$).	ERCP does not need to be emergent or urgent.	High
Adler[44](2017)	Multicenter, retrospective (518)	No difference in clinical success by timing (≤ 1 day: 91.2%, 2–3 days: 90%, >3 days: 88.5%; $P = 0.77$).	Timing does not affect ERCP success or AE rate; elective ERCP is generally safe.	Medium
Chen [49](2024)	Multicenter, retrospective (94)	ERCP <3 weeks had higher success (92.0% <i>vs</i> 75.0%, $P = 0.032$) and lower stricture rate (18.0% <i>vs</i> 45.5%, $P = 0.005$). OR for success: 4.168; OR for stricture: 0.256.	ERCP within 3 weeks improves success and reduces strictures; early intervention recommended.	Medium

Stent removal

Mavrogiannis[34](2006)	RCT (52)	Stents removed after 6–8 weeks. Clinical improvement in 2–6 days; hospital stay 4–12 days.	6–8 weeks stent duration effective for leak resolution.	High
Canena[6] (2012)	Single-center, retrospective (17)	FCSEMS removed after median 16 days (range 7–28).	FCSEMS ≤30 days effective and safe for refractory BDLs.	Low
Pinkas [39](2008)	Single-center, retrospective (20)	NBD removed in 2–11 days (mean 4.7±0.9) vs. biliary stents in 14–53 days (mean 29.1±4.4). NBD group required fewer ERCPs (1.0 <i>vs</i> 2.2).	NBD allows earlier removal and fewer ERCPs than stents.	Medium

AE, adverse event; BDLs, bile duct leaks; ERCP, endoscopic retrograde cholangiopancreatography; FCSEMS, fully covered self-expandable metal stent; NBD, nasobiliary drainage; OR, odds ratio; RCT, randomized controlled trial. ^aQuality was assessed using the Newcastle-Ottawa Scale (NOS)[67] for non-randomized studies: High quality (score ≥7), medium quality (score 5-6), low quality (score ≤4). RCT was evaluated with Cochrane risk of bias[68].

Supplementary Table 2 Management of complex cases

Study first author (year)	Study design (n)	Key Findings	Conclusion	Quality ^a
Refractory Leaks				
Canena[5] (2015)	Multicenter, retrospective (94)	EST + 10 Fr stent had 91.0% success. Rescue with MPSs had 62.5% success; FCSEMS achieved 100% success in MPS failures.	Refractory leaks are better managed with FCSEMS rather than MPSs.	Medium

Canena[54] (2015)	Two center Prospective, non- randomized (40)	Leak closure: FCSEMS 100% <i>vs</i> MPS 65% ($P = .004$); predictors of MPS failure: <3 stents, <20F, high-grade leak.	FCSEMS superior to MPS in refractory BDLs; effective as rescue.	Medium
Phillips[55] (2011)	Single-center, retrospective (17)	Leak control 94%, but 35% developed strictures, 18% ulcerations post-transplant.	FCSEMS not recommended post-transplant due to stricture risk.	Low
Biloma				
Tonozuka[58] (2015)	Single-center, retrospective (13)	Technical success 100%; first-session clinical success: 83.3%; final clinical success 100% after necrosectomy in 2 patients; no adverse events or recurrence	EUS-guided drainage with metal stents is safe and effective.	Low
Lorenzo[59] (2021)	Single-center, retrospective (30)	Clinical success rate 704% (EUS-TD: 75%, TP/TF: 67%); serious AEs in 23%, including 2 procedure-related deaths.	EUS-TD or TP/TF drainage effective but with notable risk.	Medium
Sakamoto [60](2024)	Single-center, retrospective (47)	Technical success: ERCP 94%, EUS-TBD 100%; shorter procedure time and hospital stay with EUS-TBD.	EUS-TBD may offer faster recovery.	Medium

AE, adverse event; BDL, bile duct leak; ERCP, endoscopic retrograde cholangiopancreatography; EUS, endoscopic

ultrasound; EUS-TBD, EUS-guided transluminal biliary drainage; EUS-TD, EUS-guided transduodenal drainage; FCSEMS, fully covered self-expandable metal stent; MPS, multiple plastic stents; NBD, nasobiliary drainage; TP/TF, transpapillary/transfistula.