Supplementary Table 1 Details of the studies used in the mini review

References	Country	Number	Design Control Group	Conclusion
Cholecystectomy *Meta-analysis*				
Moody *et al. 2019*	United Kingdom	N=629	RCT meta-analysis Early versus delayed cholecystectomy Mild pancreatitis	Reduction of recurrent biliary events that required readmission in early cholecystectomy arm (OR 0·17, 95% CI 0·09 to 0·33). No difference in the rate of intraoperative (OR 0·58, 0·17 to 1·92) or postoperative complications (OR 0·78, 0·38 to 1·62)
Prasanth *et al. 2022*	India	N=1176	RCT meta-analysis Early versus delayed cholecystectomy Mild and moderate pancreatitis	Reduction in the risk for recurrent biliary events in favour of early cholecystectomy (RR 0.10, 95% CI 0.05 to 0.19). No increased risk of surgical complications with EC (RR 1.04, 95% CI 0.47 to 2.26).

Kamarajah *et al. 2020*	United Kingdom	N= 326517	RCT meta-analysis and non-RCT meta-analysis Cholecystectomy in the elderly population compared to younger patients	Increasing age was significantly associated with increased rates of overall complications (OR 2.37, 95% CI 2.00-2.78), major complication (OR 1.79, 95% CI 1.45-2.20), risk of conversion to open cholecystectomy (OR 2.17, 95% CI 1.84-2.55), risk of bile leaks (OR 1.50, 95% CI 1.07-2.10), risk of postoperative mortality (OR 7.20, 95% CI 4.41-11.73) and was significantly associated with increased length of stay 2.21 days, 95% CI 1.24-3.18).
Niknami *et al. 2024*	Iran	N= 128421	Cohort studies meta-analysis Impact on frailty on postoperative outcomes following cholecystectomy	Higher odds of short-term mortality (OR: 5.54, 95% CI: 1.65-18.60, p = 0.006), postoperative morbidity (OR: 2.65, 95% CI: 1.51-4.64, p = 0.001), major morbidity (OR: 3.61, 95% CI: 1.52-8.59), and respiratory failure (OR: 3.85, 95%CI: 1.08-13.79) among

				frail patients.
Randomized clinical trials				
Da Costa *et al 2015*	Netherlands	N=266	Same-admission versus delayed cholecystectomy (25-30 days after randomization) Mild pancreatitis	Reduction of recurrent gallstone-related complications or mortality within 6 months after randomisation (risk ratio 0·28, 95% CI 0.12-0.66; *P=0·002*) with EC
Da Costa *et al 2016*	Netherlands	N=264	Same-admission versus delayed cholecystectomy (25-30 days after randomization) Mild pancreatitis	Mean total costs from a societal perspective were €234 (95%CI 1249 to 738) less per patient in the same-admission cholecystectomy group.
Aboulian *et al. 2010*	USA	N=50	Early cholecystectomy group (within 48 hours of admission) versus a control cholecystectomy group (performed after resolution of abdominal pain and normalizing trend of laboratory enzymes) Mild pancreatitis	Shorter hospital length of stay in EC group (mean: 3.5 [95%CI, 2.7-4.3], versus 5.8 [95%CI, 3.8-7.9], *P=0.0016*)

Kelly *et al. 1988*	USA	N=165	Early surgery (less than 48 hours after admission) versus delayed surgery (more than 48 hours after admission) Mild pancreatitis Ranson ≤3 Severe pancreatitis Ranson >3	EC had minimal effect on outcomes in patients with ≤3 Ranson criteria.
Mueck *et al. 2019*	USA	N=97	Early cholecystectomy group (within 48 hours of admission) versus a control cholecystectomy group (performed after clinical resolution) Mild pancreatitis	30-day length of stay (hours) including readmissions 30 h (27–82) IQR vs 77 h (52–111) IQR (*P< 0.005*)
Riquelme *et al. 2019*	Chile	N=52	Early cholecystectomy within 72 h from admission versus delayed cholecystectomy (after 72h) Mild pancreatitis	Significantly shorter length of stay (median 58 versus 167 h; *P=0.001*) No differences in postoperative complications

Observational or retrospective studies

			Post hoc analysis of a multicentre prospective cohort Necrotising biliary pancreatitis	Overall recurrent biliary events risk prior to cholecystectomy significantly lower before 10 weeks after discharge (risk ratio 0.49 (95% CI 0.27 to 0.90); *P=0.02*).
Hallensleben *et al. 2022*	Netherlands	N=248	Outcome: optimal timing of cholecystectomy in patients with necrotising biliary pancreatitis, defined as: the optimal point in time with the lowest risk of recurrent biliary events and the lowest risk of complications of cholecystectomy.	Recurrent pancreatitis rate significantly lower before 8 weeks after discharge (risk ratio 0.14 (95% CI 0.02 to 1.0); *P=0.02*). Complication rate of cholecystectomy did not decrease over time.
Cho *et al. 2023*	USA	N= 129451	US Nationwide Readmissions Database Timing of laparoscopic cholecystectomy was divided into Early (within 2 days of admission)	Late cholecystectomy was associated with higher irsk of major adverse events (adjusted odds ratio 1.40, 95% CI 1.29-1.51)

			and Late (>2 days after admission) cohorts	
			Mild gallstone	
Di Martino *et al.*	International	N=378	Retrospective analysis Severe pancreatitis Early defined as a cholecystectomy performed within 14 days of admission versus delayed cholecystectomy	EC was associated with higher mortality (16 [15.6%] vs 2 [1.2%], P < .001), morbidity (30 [30.3%] vs 17 [10.3%], P < .001), and infections (12 [14.6%] vs 2 [1.3%], *P< .001*) compared with patients with moderately severe and severe ABP who underwent DC.
Decision model study				
Siddiqui *et al. 2006*	USA	-	Decision model study Endoscopic sphincterotomy alone versus Endoscopic sphincterotomy followed by Cholecystectomy	For age 80+ years, Sphincterootmy was dominant with an incremental success rate of 8%. Mortality in the Endoscopic sphincterotomy followed by Cholecystectomy was 7.6 times that of Endoscopic sphincterotomy.
ERCP				

Meta-analysis

Petrov *et al. 2009*	New-Zealand	N=213	RCT meta-analysis EUS-guided ERCP versus ERCP alone	The use of EUS significantly reduced the risk of overall complications (RR 0.35 (95% CI 0.20 to 0.62); *P<0.001*) and post-ERCP acute pancreatitis (RR 0.21 (95% CI 0.06 to 0.83); *P=0.030*).
Aksintala *et al, 2023*	USA	N=19038	RCT meta-analysis Incidence of post-ERCP pancreatitis	The overall cumulative incidence of post-ERCP pancreatitis was 10.2% (95% CI, 9.3-11.3)
Iqbal *et al. 2022*	USA	N=5521	Non RCT trials meta-analysis ERCP in nonagenarians compared to younger patients	There was no significant difference in technical success rate and overall rate of adverse events comparing ERCP outcomes in nonagenarians. ERCP-related mortality was also significantly higher in nonagenarians compared to younger patients with OR = 4.720 [1.368-16.289]
Singh *et al. 2018*	India	N=1513	RCT meta-analysis	No significant difference in mortality [OR 0.37, 95% CI (0.09, 1.51), p =

			Laparoscopic common bile duct exploration and cholecystectomy versus ERCP followed by cholecystectomy	0.17], morbidity [OR 0.97, 95% CI (0.70, 1.33), *P=0.84*], cost [MD -379.13, 95% CI (- 784.80, 111.2), p = 0.13] or recurrent/retained stones [OR 1.01, 95% CI (0.38, 2.73), *P=0.98*].
Randomized clinical trials				
Schepers *et al. 2020*	Netherlands	N=232	Urgent ERCP with sphincterotomy or conservative treatment Predicted severe gallstone pancreatitis but without cholangitis	No difference in mortality or major complications (risk ratio [RR] 0·87, 95% CI 0·64-1·18; *P=0.37*)
Staubli *et al. 2022*	Switzerland	N=122	Intraoperative cholangiography (IOC) and laparoscopic cholecystectomy (LC), followed by ERCP versus MRCP followed by ERCP if needed, and LC	Overall length of hospitalization was shorter in this IOC+LC group (*P=0.0309*)
Prospective studies				
Hallensleben *et al. 2023*	Netherlands	N=196	Multicentre, prospective cohort study	No difference in mortality or major complications (RR 0.93, 95% CI 0.67 to 1.29; *P=0.65*)

			Urgent EUS, followed by ERCP with ES in case of common bile duct stones/sludge in comparison to historical control group = APEC study conservative treatment arm	
Observational or retrospective studies				
Lee *et al. 2024*	Republic of Korea	N=162	Retrospective study with cholangitis who underwent urgent ERCP Acute biliary pancreatitis Comparison ERCP within 18h versus after 18h	Significantly higher rates of aspiration pneumonia (odds ratio [OR] 4.00, 95% CI 1.15-13.92, *P=0.021*) and post-ERCP hypotension (OR 11.9, 95% CI 1.39-101.33, *P=0.005*) were observed in the ≤ 18-h group
Qayed *et al. 2018*	USA	N=153480	National Readmissions Database Comparision of 3 groups: no cholecystectomy nor ERCP, no cholecystectomy with ERCP and cholecystectomy group Gallstone Pancreatitis	In no cholecystectomy group, ERCP was associated with lower all-cause readmissions (adjusted hazard ratio, 0.80; 95% confidence interval, 0.76-0.83; *P<0.0001*) and pancreatitis readmissions rate (adjusted hazard ratio, 0.51; 95% confidence interval,

				0.47-0.55; *P<0.0001*) compared with no ERCP.
Garci de la Filia Molina *et al. 2019*	Spain	N= 247	Retrospective study of patients admitted for a first episode of acute gallstone pancreatitis rejected for cholecystectomy. Evaluation of the role of endoscopic sphincterotomy	In multivariate analysis, sphincterotomy showed a protective role for recurrence of pancreatitis (adjusted hazard ratio [HR]: 0.29, 95% CI: 0.08-0.92, *P=0.037*) and for any gallstone-related event (HR 0.46, 95% CI: 0.21-0.98, *P=0.043*)
Velamazan *et al. 2024*	Spain	N= 3016	Multicenter retrospective cohort study First episode of symptomatic gallstone disease and no cholecystectomy during admission Retrospective study	Sphincterotomy was independently associated with lower risk of relapse (HR = 0.58, 95% CI: 0.49-0.68)
Ridtitid *et al. 2019*	Thailand	N=266	Non-severe ABP Delayed cholecystectomy with	Recurrent ABP in the ES group was lower than those from the non-ES group (2% vs. 17%; *P=0.01*)

			Endoscopic sphincterotomy versus delayed cholecystectomy without Endoscopic sphincterotomy Retrospective study	
Weissman *et al. 2023*	USA	N= 70030	Acute biliary pancreatitis without cholangitis	ERCP was associated with significantly lower all-cause inpatient mortality aOR: 0,6 P<0,05
Pecsi *et al. 2021*	Hungary	N=490	Impact of ERCP Cohort study Prospectively collected data from the Hungarian ERCP Registry ERCP in Acute biliary pancreatitis versus Cholangitis	Significantly more pancreatic guidewire manipulation (aOR 1.921 [1.24-2.97]) and prophylactic pancreatic stent use (aOR 4.687 [2.42-9.10]) in the ABP group. Average cannulation time in the ABP patients were longer (248 vs. 185 s; *P=0.043*).
Ramai *et al. 2023*	USA	N=5751	National Readmissions Database ERCP for cholangitis in frail versus	frail patients experienced higher post-ERCP complications (6.20% vs 14.63%, *P<0.001*)

non-frail patients

EC: Early Cholecystectomy; OR: Odds ratio; CI: Confiance Interval; ERCP: Endoscopic Retrograde Cholangiopancreatography: ABP: Acute Biliary Pancreatitis, EUS: Endoscopic Ultrasound; ES: Endoscopic Sphincterotomy.