

Appendix 5: Specialized endoscopic techniques for the removal of large stones in the common bile duct when ERCP has failed

Specialized endoscopic technique	Description	Advantages	Limitations
Endoscopic papillary balloon dilatation (EPBD) after a limited sphincterotomy ¹	After performing a limited sphincterotomy, a balloon dilator is introduced through the papilla and then dilated (sometimes at a separate setting) for up to five minutes; stones are then removed using any of the retrieval accessories available to the endoscopist	Success rate 91 - 98%* Decreases the need for a large sphincterotomy and intracorporeal mechanical lithotripsy of the CBD stones	To be used cautiously in patients with coagulopathy
Mechanical lithotripsy ^{2,3}	The mechanical lithotripsy device is similar to the regular biliary extraction basket but with a stronger tensile strength and metal sheath; with the aid of an external device, mechanical force is applied to fragment the stone	Success rate 78 - 95%* Widely available and simple to operate	Increased failure rates when stone-to-CBD diameter ratio >1, and stone size ≥ 30 mm; complication of stone impaction
Intracorporeal electrohydraulic lithotripsy (EHL) ^{4,5}	Through a probe, electrical energy is transformed into shock waves that fragment stones that the probe is positioned against while immersed in fluid	Success rate 74 - 97%*	Requires targeting through fluoroscopy or cholangioscopy; risk of hemobilia, and CBD perforation
Endoscopic laser lithotripsy ⁶⁻⁸	A light energy at a certain wave length is amplified and concentrated into a beam; when applied directly onto the CBD stones, it causes a shock wave and fragmentation	Stone clearance rates approximate 88% for difficult stones up to 20 mm in size	Not widely available; expensive; complications include hemobilia, pancreatitis and cholangitis
Extracorporeal shockwave lithotripsy (ESWL) ⁹⁻¹²	High-intensity acoustic pulse that fragments stones. It is generated and applied to the target, CBDS, from a source outside of the patient	Stone clearance rates 75 - 86%* in patients who failed ERCP. Water bath immersion usually required	Mild transient hemobilia; microhematuria

CBD: common bile duct, CBDS: common bile duct stones, ERCP: endoscopic retrograde cholangiopancreatography.

*Using different reference gold standards.

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