Tandem Standard-Size and (“Diagnostic”) Ultra-Slim Cholangioscopy to Guide and Validate Completeness of Mechanical Lithotripsy

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An 86-year-old patient with a prior history of cholecystectomy was referred for endoscopic retrograde cholangiopancreatography (ERCP) due to stone-related cholangitis. At the index ERCP, biliary drainage using a 10-Fr double-pigtail stent was established after limited papillotomy. Repeat ERCP including adequate contrast application indicated marked biliary dilation with distal tapering and > 8 large, partly barrel-shaped stones > 15 mm (Fig. 1a). After 2 ERCP sessions including large-balloon dilation to 13.5 mm, and multiple mechanical lithotripsy (MLs), the biliary stone burden was markedly diminished. However, a smooth distal tapering of the distal common bile duct (CBD), most likely attributable to high mechanical stress from multiple stone and/or ML fragment extractions, emerged at the 3rd ERCP, with a remaining large stone detected above the relative stricture. Given the transient unavailability of electrohydraulic lithotripsy (EHL) at our institution, we opted for standard-size direct cholangioscopy (DC, outer-scope diameter 9.8 mm and working-channel 2.8 mm) after freehand intubation to cope with failed stone capture by conventional ERCP technology as a sine qua non for proceeding with ML. Direct endoscopic visualization likewise replicated a scarred, unpassable bile duct stricture with visible stone material higher in the CBD (Fig. 1b). Under endoscopic vision, a rotatable retrieval basket was introduced and the stone was successfully grasped (Fig. 1c). Next, ML, using a rescue lithotripter, was performed under fluoroscopic guidance (Fig. 1d). This was followed by the flushing out and extraction of some smaller ML fragments, and a final “diagnostic” ul-
tra-slim DC (outer diameter 5.9 mm; working channel 2.0 mm) able to pass the stricture excluded remnant biliary stone disease throughout the biliary system (Fig. 1e). Of note, given the known lack of sensitivity to exclude remnant stone disease on cholangiography in the presence of diffuse bile duct dilation, cholangioscopic confirmation of freedom from stones might be implemented on a low-threshold basis; a recent small-scale study indicated detection of residual stones in > 20% of patients [1].

Tandem approaches in DC, relying on standard-size (a large-capacity working channel able to accept standard ERCP equipment) followed by (“diagnostic”) ultra-slim scope technology, are rarely considered in clinical practice [2]. Nonetheless, as is illustrated in this unique clinical report, tandem cholangioscopy can add to the endoscopic armamentarium in complex biliary diseases in highly selected cases.

**Statement of Ethics**

The patient gave written informed consent for publication (including publication of images).

**Conflict of Interest Statement**

The authors have no conflicts of interest to declare.
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Author Contributions

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References
