A “tandem approach” using sequential diagnostic (ultraslim) and therapeutic (standard size) direct freehand cholangioscopy to guide mechanical lithotripsy of a giant cystic duct remnant stone

This is the case of an 85-year-old woman with a distant history of cholecystectomy and complicated bile duct stone disease who had undergone several endoscopic retrograde cholangiography (ERC) procedures including standard-incision papillotomy elsewhere, and was now undergoing repeat ERC after resolution of an episode of acute cholangitis. Because of a complicated ERC anatomy, fluoroscopy provided limited information as to the location of the stone; basket capture was unsuccessful (Fig. 1).

With the patient still receiving piperacillin/tazobactam antibiotic treatment, we therefore proceeded to diagnostic direct cholangioscopy after freehand intubation using an ultraslim endoscope (GIF XP160; Olympus, Hamburg, Germany; outer diameter 5.9 mm, working channel 2.0 mm) [1], unequivocally identifying a cystic duct remnant stone, which was confirmed by cholangioscopy-directed injection of contrast media (Fig. 2).

Biliary insertion of a standard-sized upper gastrointestinal endoscope was precluded because of an insufficiently large papillotomy opening; therefore, endoscopic papillary large balloon dilation (EPLBD; CRE Balloon Dilation Catheter, Video 1):

In light of equivocal findings on endoscopic retrograde cholangiography (ERC), we first performed diagnostic (ultraslim) direct cholangioscopy in freehand fashion to identify a giant stone in the markedly dilated cystic duct remnant, and subsequently used balloon dilation-assisted therapeutic (standard size) direct cholangioscopy with cholangioscopy-facilitated mechanical lithotripsy to complete stone clearance.

Video 1: In light of equivocal findings on endoscopic retrograde cholangiography (ERC), we first performed diagnostic (ultraslim) direct cholangioscopy in freehand fashion to identify a giant stone in the markedly dilated cystic duct remnant, and subsequently used balloon dilation-assisted therapeutic (standard size) direct cholangioscopy with cholangioscopy-facilitated mechanical lithotripsy to complete stone clearance.
Boston Scientific, Ratingen, Germany) was performed (▶ Fig. 3a). EPLBD-assisted therapeutic (standard size) direct cholangioscopy was likewise performed freehand using a Fujinon EG590WR (Fujifilm, Düsseldorf, Germany; outer diameter 9.6 mm, working channel 2.8 mm) and was followed by cholangioscopy-guided stone capture using standard ERC equipment (▶ Fig. 3b). The metal sheath, which exceeded the diameter of the working channel, was introduced after the external plastic sheath had been cut and the scope had been removed; mechanical lithotripsy was then performed under fluoroscopic control (▶ Fig. 3c). Thereafter, the cystic duct remnant was completely cleared of mechanical lithotripsy fragments under direct cholangioscopic vision (▶ Fig. 3d). In contrast to indirect visualization of the biliary system, for example by fluoroscopy-based ERC, direct cholangioscopy has advantages in both diagnosis and interventional potential in biliary diseases, and provides high quality imaging with a large field of view [2]. Here, we have presented a novel endoscopic technique for direct cholangioscopy-guided management of complex gall stone disease in a specifically committed endoscopy service. Cholangioscopy-guided mechanical lithotripsy of complex stone disease in the cystic duct stump is a novel innovative approach that integrates new and old endoscopic technology with widespread availability, contrary to catheter-based approaches, such as electrohydraulic or laser lithotripsy, with limited dissemination [3]. This novel, highly innovative concept of a “tandem approach,” sequentially using diagnostic (ultraslim) followed by therapeutic (standard size) direct cholangioscopy, may streamline complex biliary interventions in selected cases in the future.

Endoscopy_UCTN_Code_TTT_1AR_2AK

▶ Fig. 3 The subsequent stages of the tandem procedure. a Endoscopic papillary large balloon dilation (EPLBD) up to 18 mm was performed under prograde endoscopic visualization. b Direct cholangioscopy-directed basket capture was performed using standard endoscopic retrograde cholangiography (ERC) equipment. c Fluoroscopy was used to guide mechanical lithotripsy as the metal sheath diameter surpassed the diameter of the endoscope’s working channel. d Complete stone clearance up to the tip of the cystic duct remnant was confirmed by cholangioscopy after the mechanical lithotripsy fragments had been extracted by a basket and/or Roth net under direct cholangioscopic visualization.
Competing interests

None

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DOI https://doi.org/10.1055/s-0043-106892
Endoscopy 2017; 49: E160–E162
© Georg Thieme Verlag KG
Stuttgart · New York
ISSN 0013-726X

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