

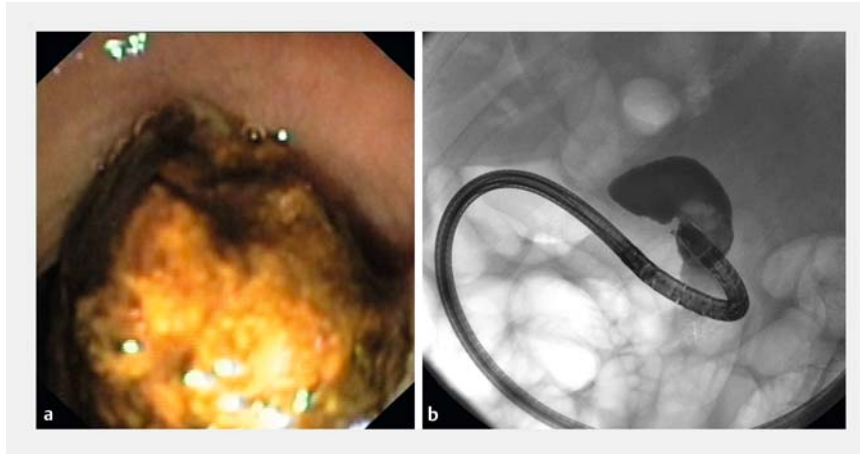
A “tandem approach” using sequential diagnostic (ultraslim) and therapeutic (standard size) direct freehand cholangioscopy to guide mechanical lithotripsy of a giant cystic duct remnant stone



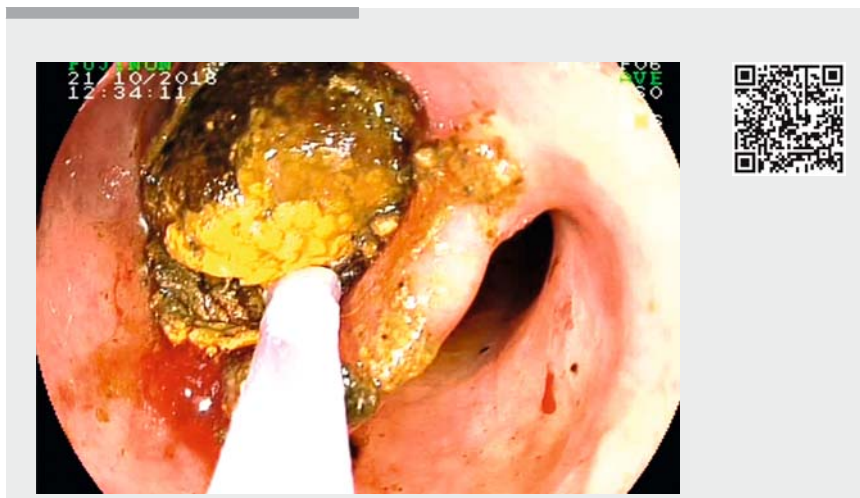
► **Fig. 1** Endoscopic retrograde cholangiography (ERC) image (mixed spontaneous air and dye cholangiogram) in the long axis provides limited information because of reduced maneuverability owing to a deep papilla location at the 3 o'clock position of a periampullary diverticulum. A large stone (25 mm in diameter) is seen, but its position is equivocal because of an overlying grossly dilated low-inserting cystic duct remnant.

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 papillectomy 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



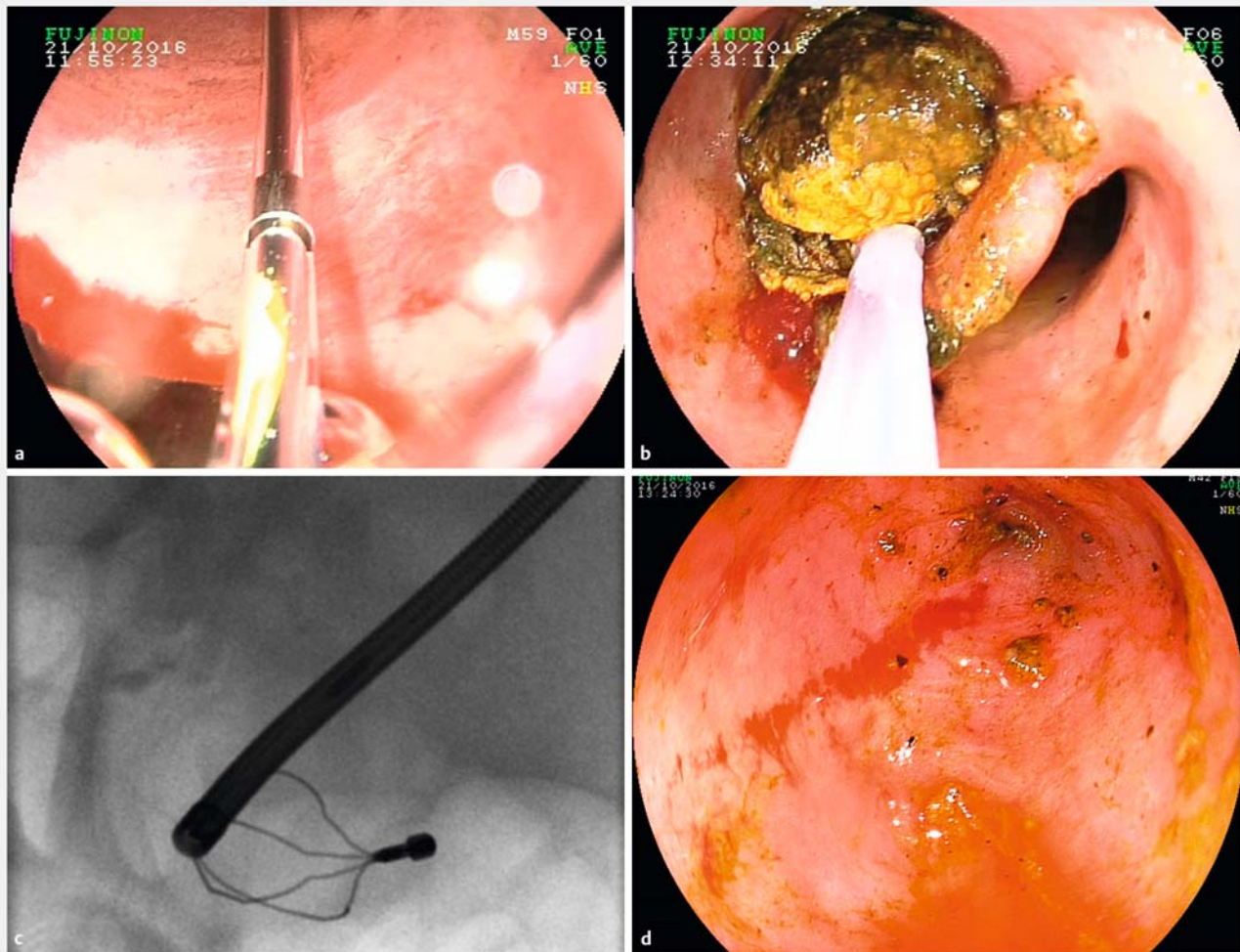
► **Fig. 2** Direct cholangioscopy was performed using an ultraslim upper gastrointestinal endoscope (note: neither CO₂ insufflation nor saline instillation was needed, given the markedly dilated biliary system). **a** Direct cholangioscopy view showing a stone in the cystic duct remnant. **b** Fluoroscopic image after cholangioscopy-guided contrast injection confirming the stone to be located in the hugely dilated cystic duct remnant.



► **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.

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,



► **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.

Boston Scientific, Ratingen, Germany) was performed (► **Fig. 3 a**).

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. 3 b**). 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. 3 c**). Thereafter, the cystic

duct remnant was completely cleared of mechanical lithotripsy fragments under direct cholangioscopic vision (► **Fig. 3 d**). 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

Competing interests

None

The Authors

Vincent Zimmer^{1,2}, **Frank Lammert**²

- 1 Department of Medicine, Marienhausklinik St. Josef Kohlhof, Neunkirchen, Germany
- 2 Department of Medicine II, Saarland University Medical Center, Saarland University, Homburg, Germany

Corresponding author

Vincent Zimmer, MD

Department of Medicine, Marienhausklinik
St. Josef Kohlhof, 66539 Neunkirchen,
Germany
Fax: +49-6821-3632624
vincent.zimmer@gmx.de

References

- [1] Brauer BC, Chen YK, Shah RJ. Single-step direct cholangioscopy by freehand intubation using standard endoscopes for diagnosis and therapy of biliary diseases. *Am J Gastroenterol* 2012; 107: 1030–1035

- [2] Komanduri S, Thosani N, Abu Dayyeh BK et al. Cholangiopancreatography. *Gastrointest Endosc* 2016; 84: 209–221
- [3] Forbes N, Ishikawa T, Mohamed R. High resolution cholangioscopic electrohydraulic lithotripsy for fragmentation and extraction of impacted cystic duct stones. *Endoscopy* 2016; 48 (Suppl. 01): E88–E89

Bibliography

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

ENDOSCOPY E-VIDEOS

<https://eref.thieme.de/e-videos>



Endoscopy E-Videos is a free access online section, reporting on interesting cases and new techniques in gastroenterological endoscopy. All papers include a high quality video and all contributions are freely accessible online.

This section has its own submission website at
<https://mc.manuscriptcentral.com/e-videos>