Management of common bile duct stones

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Visualization of choledochal stones

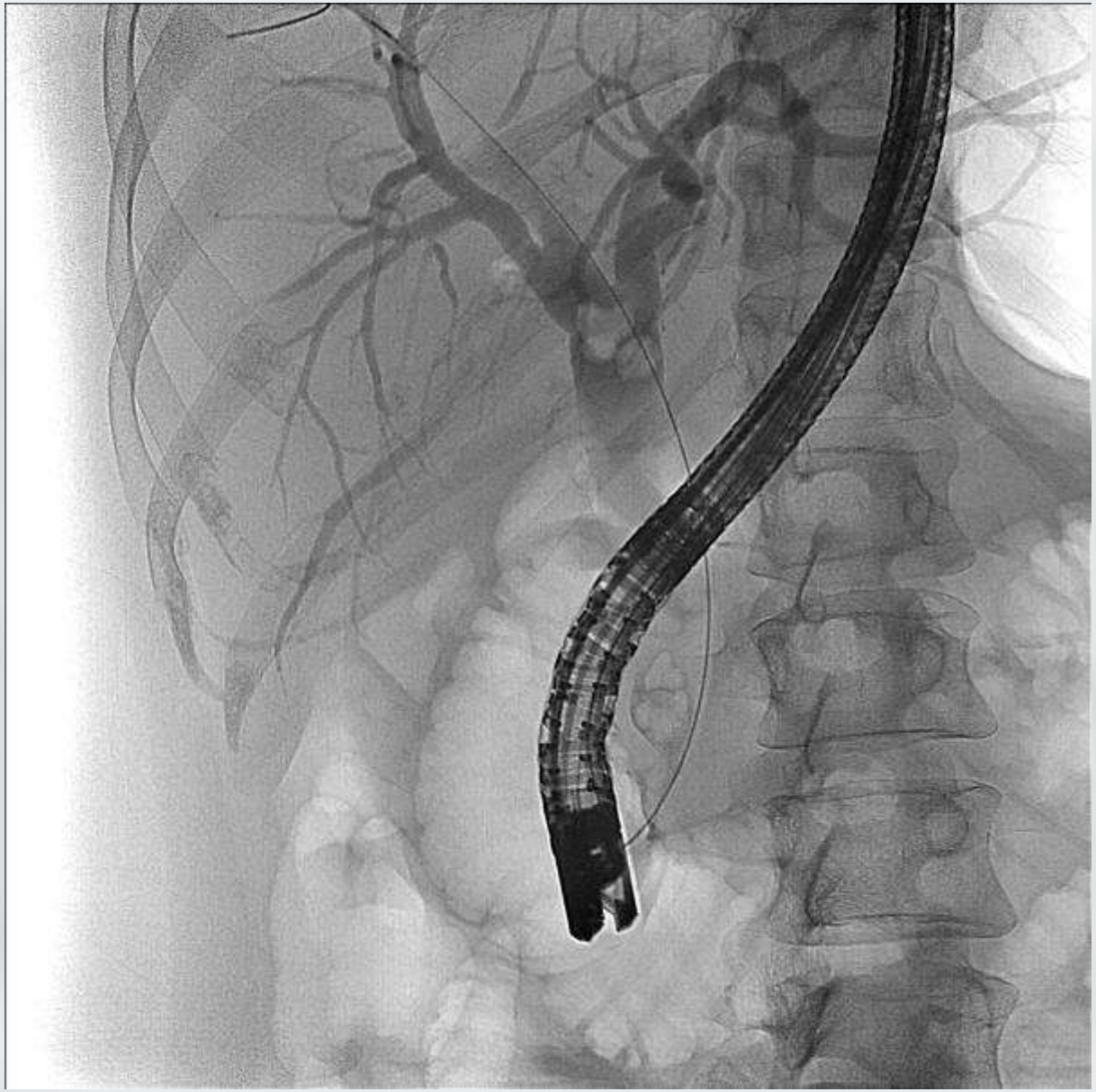
The preferred method in the treatment of common bile duct (CBD) stones is the endoscopic retrograde cholangio-pancreatography (ERCP).

It is of crucial importance to visualize and localize stones before removal.

After successful wire-assisted/wire-guided cannulation, cholangiogram is obtained fluoroscopically using contrast medium injected through the inserted cannula or sphincterotome into the bile duct.

Early filling images should be carefully analyzed for stones which are usually seen as filling defects.

Cholangiogram of multiple CBD stones



Management of choledochal stones

Endoscopic CBD stone extraction should usually be preceded by appropriately performed sphincterotomy which is the mainstay for endoscopic clearance of bile duct stones.

In order to accomplish successful stone extraction it is of key importance to assess stone size relative to the size of sphincterotomy and distal CBD.

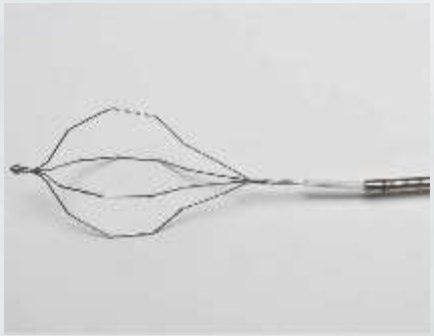
The routine stone extraction can usually be performed with retrieval balloon catheter or wire basket.

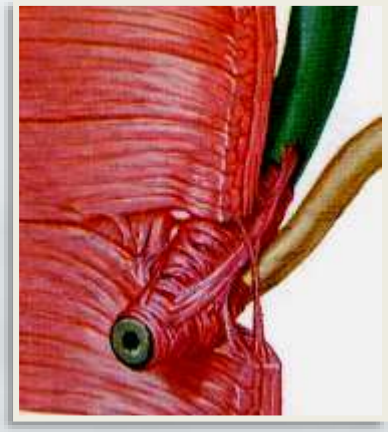
For multiple small CBD stone and/or sludge extraction the use of balloon catheter is recommended.

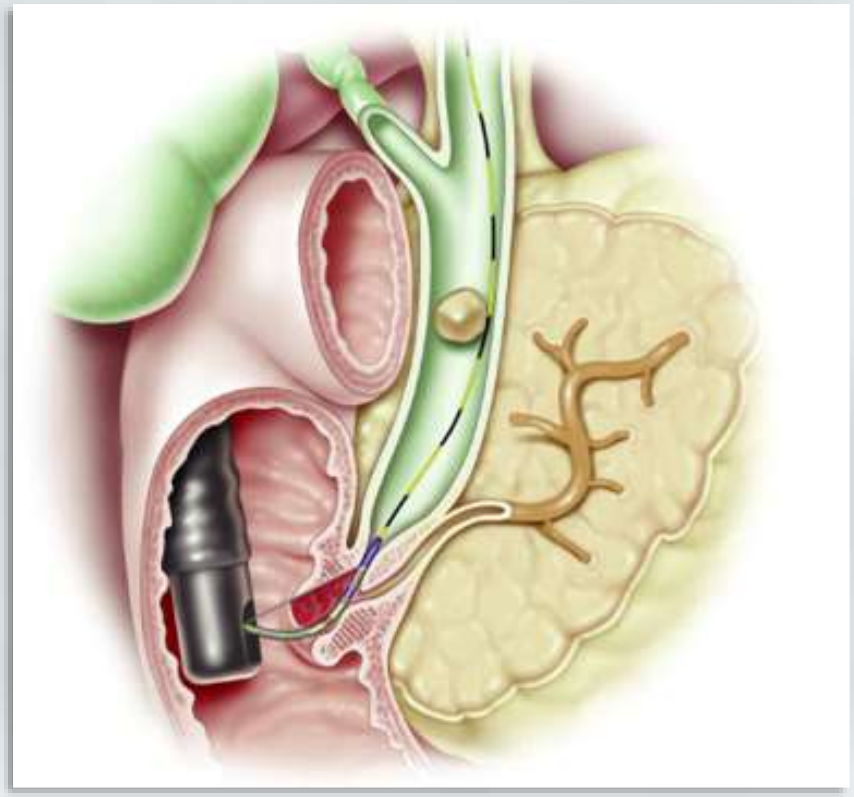
In case of multiple stones, it is substantial to remove stones individually, initiating with the lowermost ones.

Manes G *et al*. Endoscopy. 2019;51(5):472-491.
Ishiwatari H *et al.* Endoscopy. 2016;48(4):350-7.

Stone management

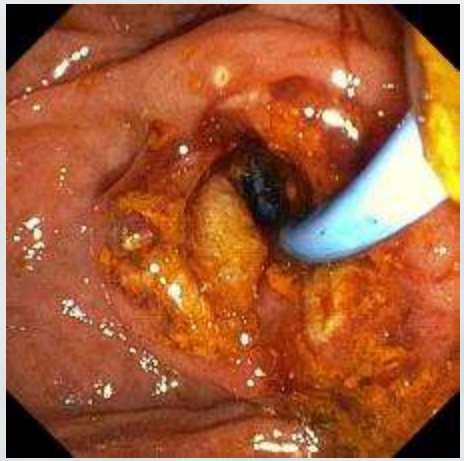
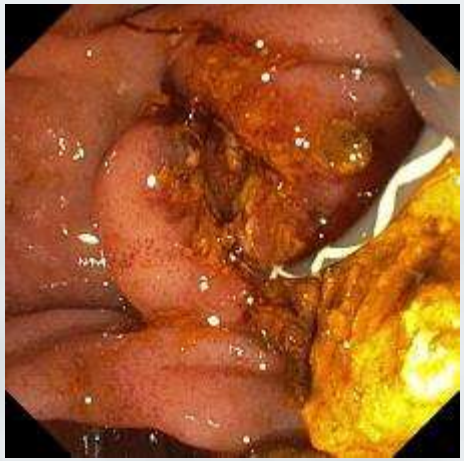
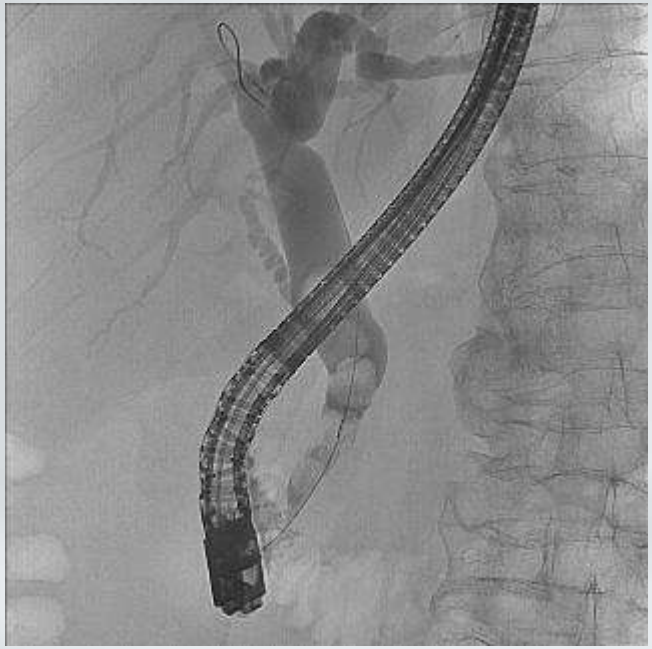






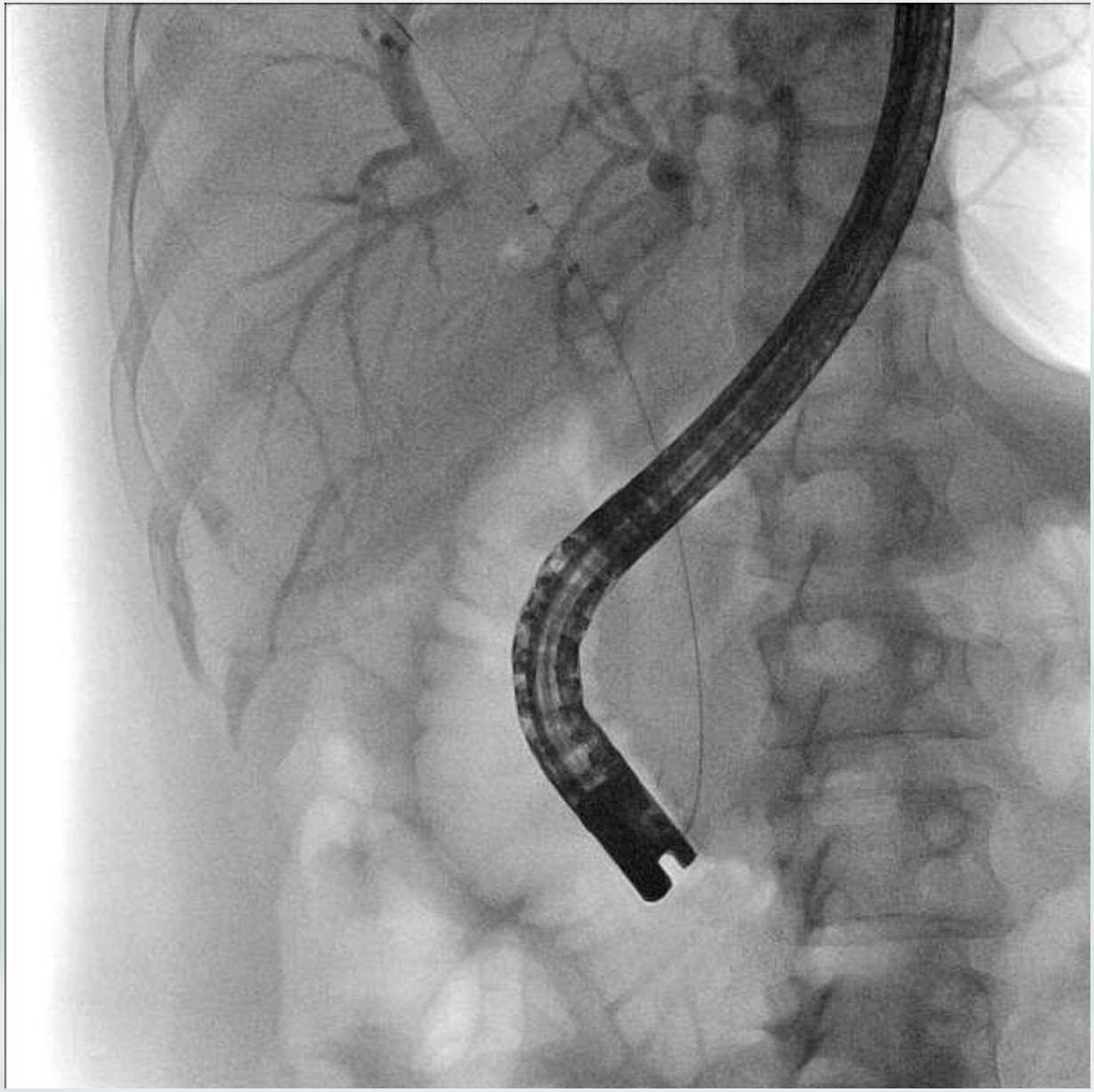
Balloon extraction of large CBD stones




Balloon extraction of distal CBD stones

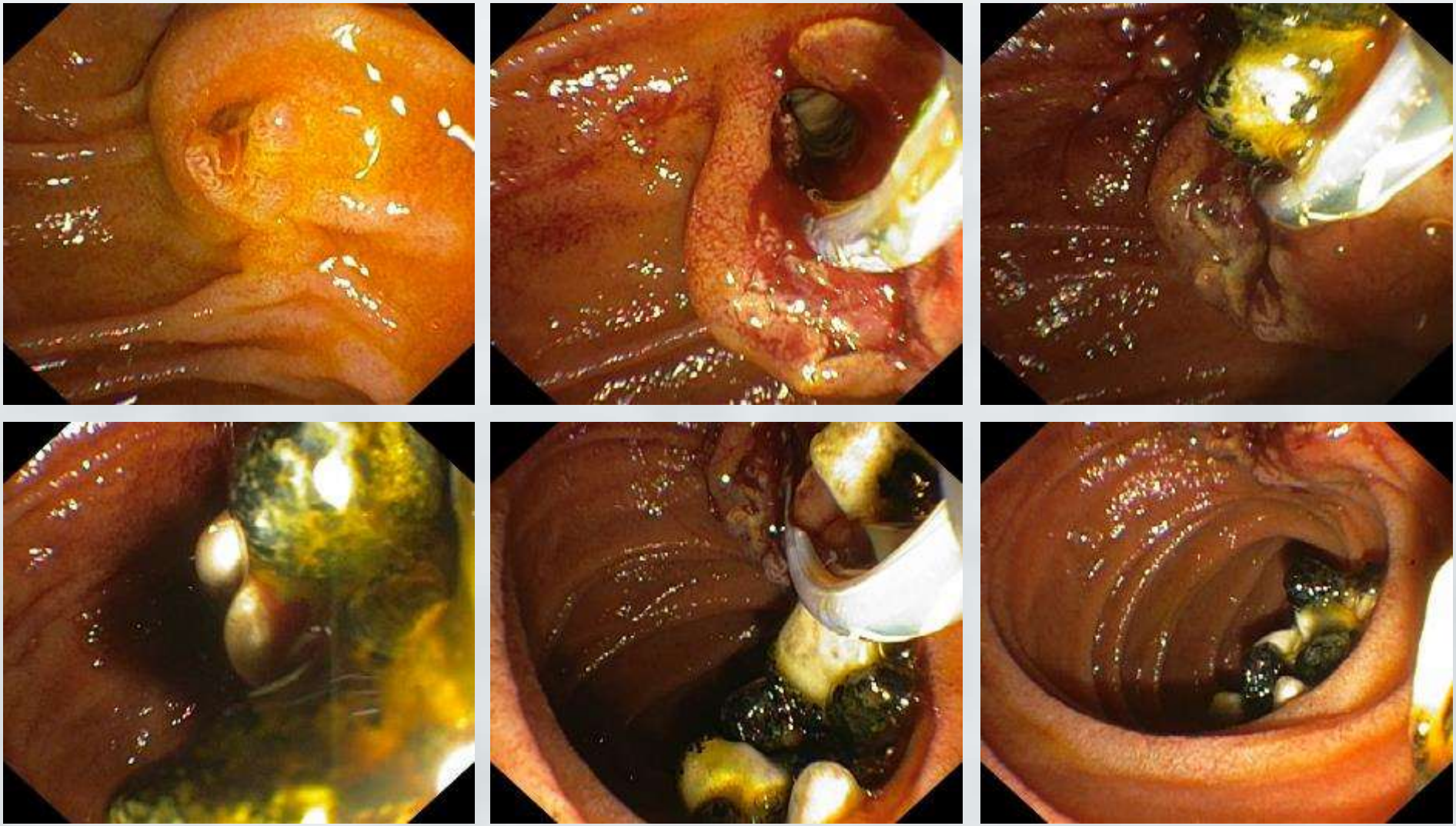
Balloon sweep of proximal CBD stones



Balloon extraction of proximal CBD stones

Control (occlusion) cholangiogram

Balloon extraction of multiple CBD stones



Stone extraction with Dormia basket

Bács-Kiskun County University Teaching Hospital, Endoscopy Unit

Difficult biliary stones

By definition: size (>1.5 cm), number, unusual shape, location (intrahepatic, cystic duct), anatomical factors (narrowing of the bile duct distal to the stone, sigmoid-shaped CBD, stone impaction, shorter length of the distal CBD, or acute distal CBD angulation <135°)

Clearance cannot usually be obtained using standard techniques

Multiple procedures and additional interventional techniques (large-balloon dilation, mechanical lithotripsy, cholangioscopy-assisted electrohydraulic/laser lithotripsy, or ESWL) may be required

Manes G *et al*. Endoscopy. 2019;51(5):472-491.

Endoscopic papillary large-balloon dilatation

Difficult stones

ESGE recommendation: limited sphincterotomy combined with endoscopic papillary large-balloon dilation is the first-line approach to remove difficult CBD stones

- limited EST: 1/3 to 1/2 of the distance to the papillary roof
- limited EST + EPLBD associated with less complications (bleeding, perforation)
- EPLBD size: 12-20 mm – diameter of the distal part of the CBD is the criterion
- EPLBD duration: 30-60 sec – from the disappearance of the waist
- EPLBD reduces the need for mechanical lithotripsy by 30-50%

Manes G *et al*. Endoscopy. 2019;51(5):472-491.

International consensus guidelines for endoscopic papillary large-balloon dilation

Tae Hyeon Kim, MD,[1] Jin Hong Kim, MD,[2] Dong Wan Seo, MD,[3] Dong Ki Lee, MD,[4] Nageshwar D. Reddy, MD,[5] Rungsun Rerknimitr, MD,[6] Thawee Ratanachu-Ek, MD,[7] Christopher J. L. Khor, MD,[8] Takao Itoi, MD,[9] Ichiro Yasuda, MD,[10] Hiroyuki Isayama, MD,[11] James Y. W. Lau, MD,[12] Hsiu-Po Wang, MD,[13] Hoi-Hung Chan, MD,[14] Bing Hu, MD,[15] Richard A. Kozarek, MD,[16] Todd H. Baron, MD[17]

2.2. EPLBD can be used as the initial method when large bile duct stones have been identified on endoscopic retrograde cholangiography or cross-sectional imaging.
Evidence level: 1+
Recommendation level: B

2.4. In patients with obvious distal bile duct strictures or a nondilated bile duct, EPLBD is not recommended because of the increased risk of perforation.
Evidence level: 2+
Recommendation level: C

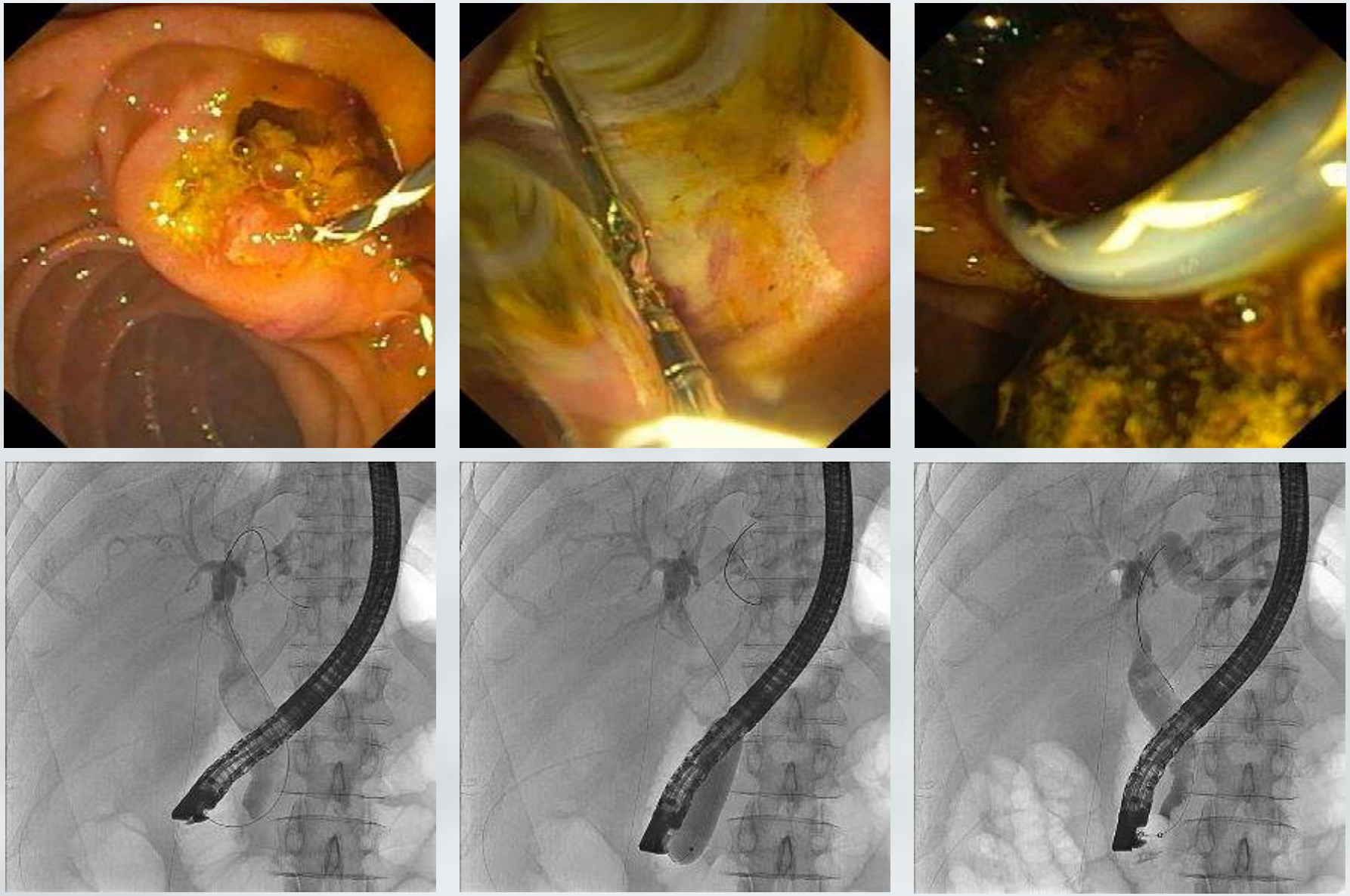
2.5. EPLBD without EST is preferred over EPLBD with EST in patients with coagulopathy.
Evidence level: 4
Recommendation level: D

4.2. Overall success rates of EPLBD with and without EST for bile duct stone clearance are comparable.
Evidence level: 2++
Recommendation grade: B

5.2. In patients with surgically altered anatomy, EPLBD may be an effective and safe procedure to remove bile duct stones.
Evidence level: 3
Recommendation: D

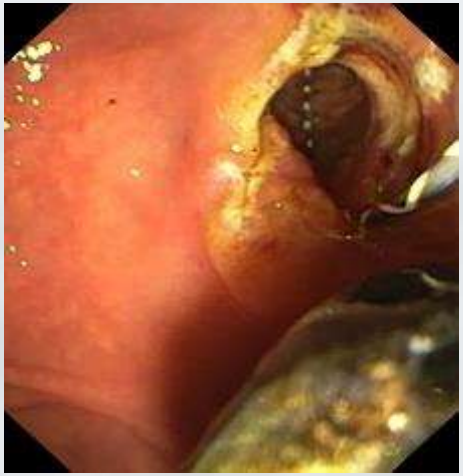
6.2. EPLBD may not increase the risk of pancreatitis.
Evidence level: 1+
Recommendation grade: B

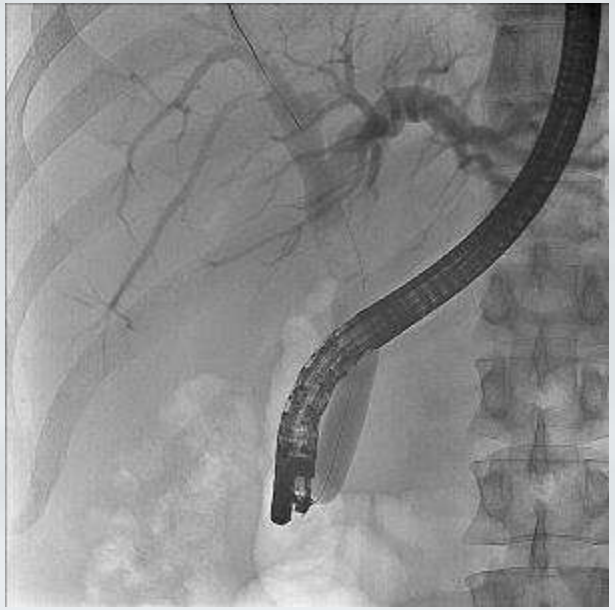
Endoscopic papillary large-balloon dilatation I.



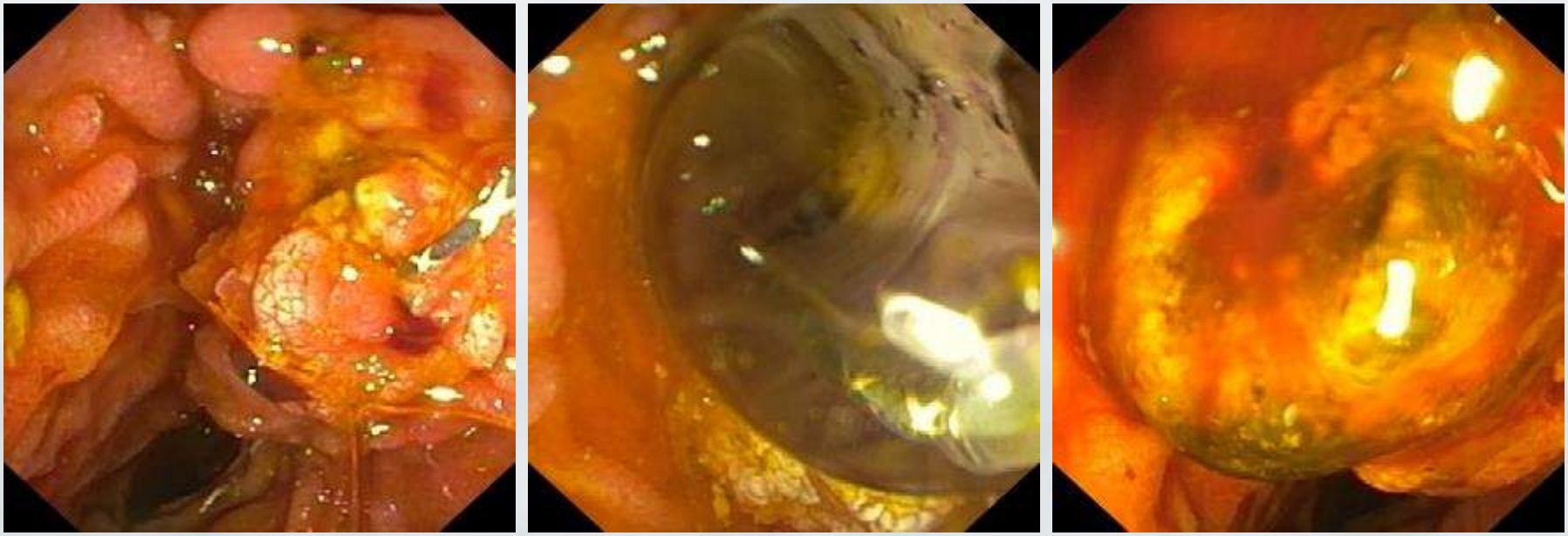
Endoscopic papillary large-balloon dilatation II.

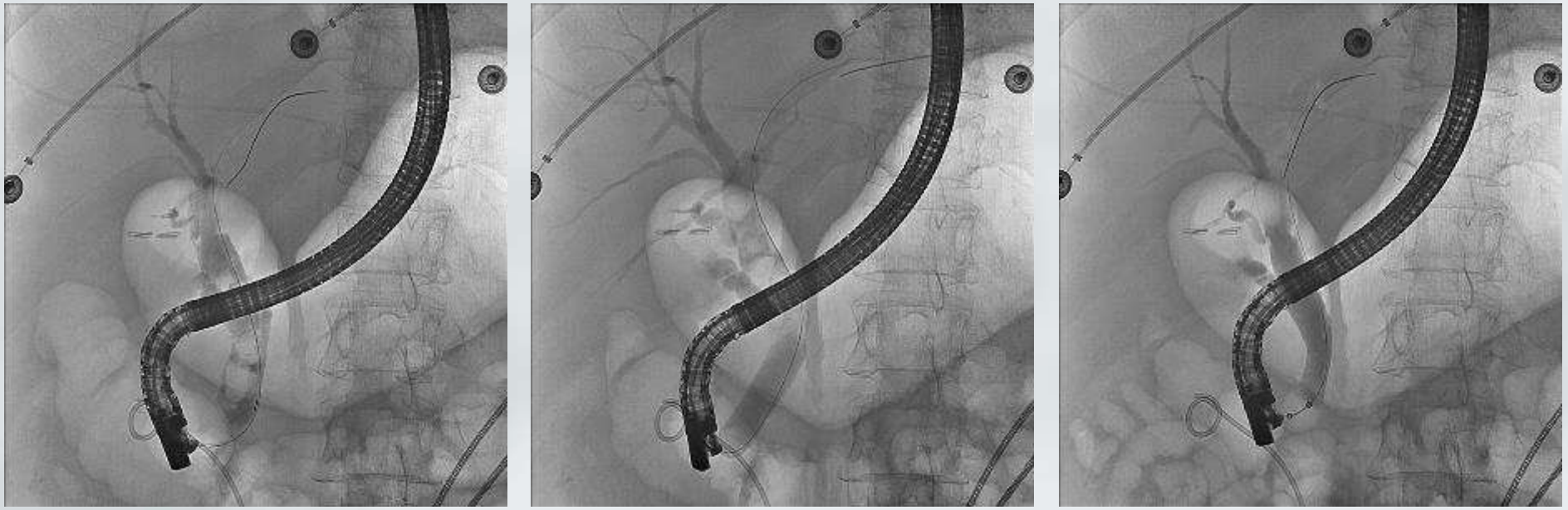




Endoscopic papillary large-balloon dilatation III.





Mechanical litothripsy

ESGE recommendation: mechanical lithotripsy for difficult stones when sphincterotomy plus EPLBD has failed or is inappropriate

- simplest available method of fragmenting CBD stones
- consists: crushing the stone by closing the basket against a metal spiral sheath
- two techniques: through the scope (TTS) and out of the scope (OTS)
- effective and safe (success: 76-91%; complications: 3-34%)
- multiple sessions may be required
- predictors of failure: stone size, stone impaction, stone to CBD diameter ratio

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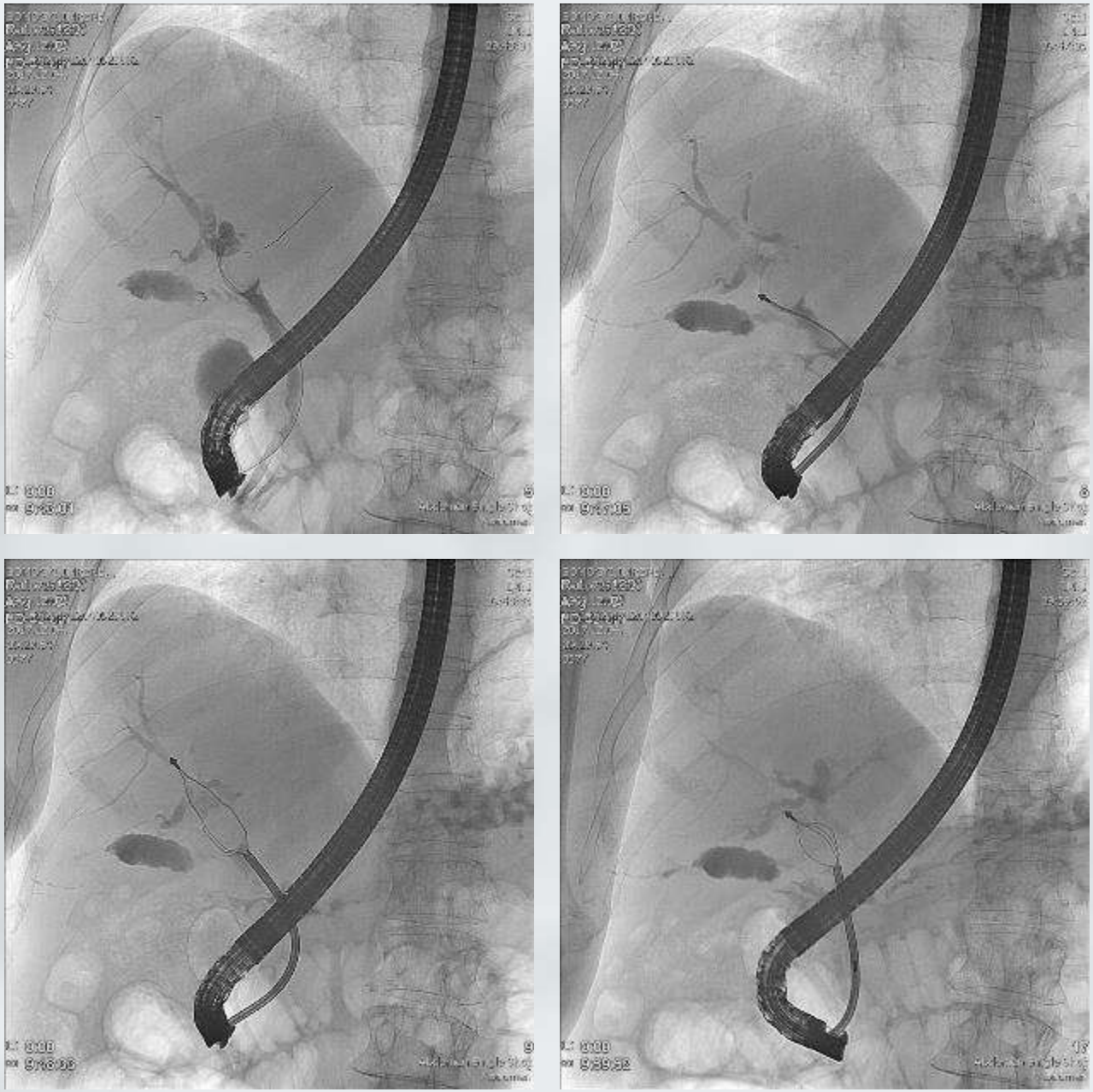
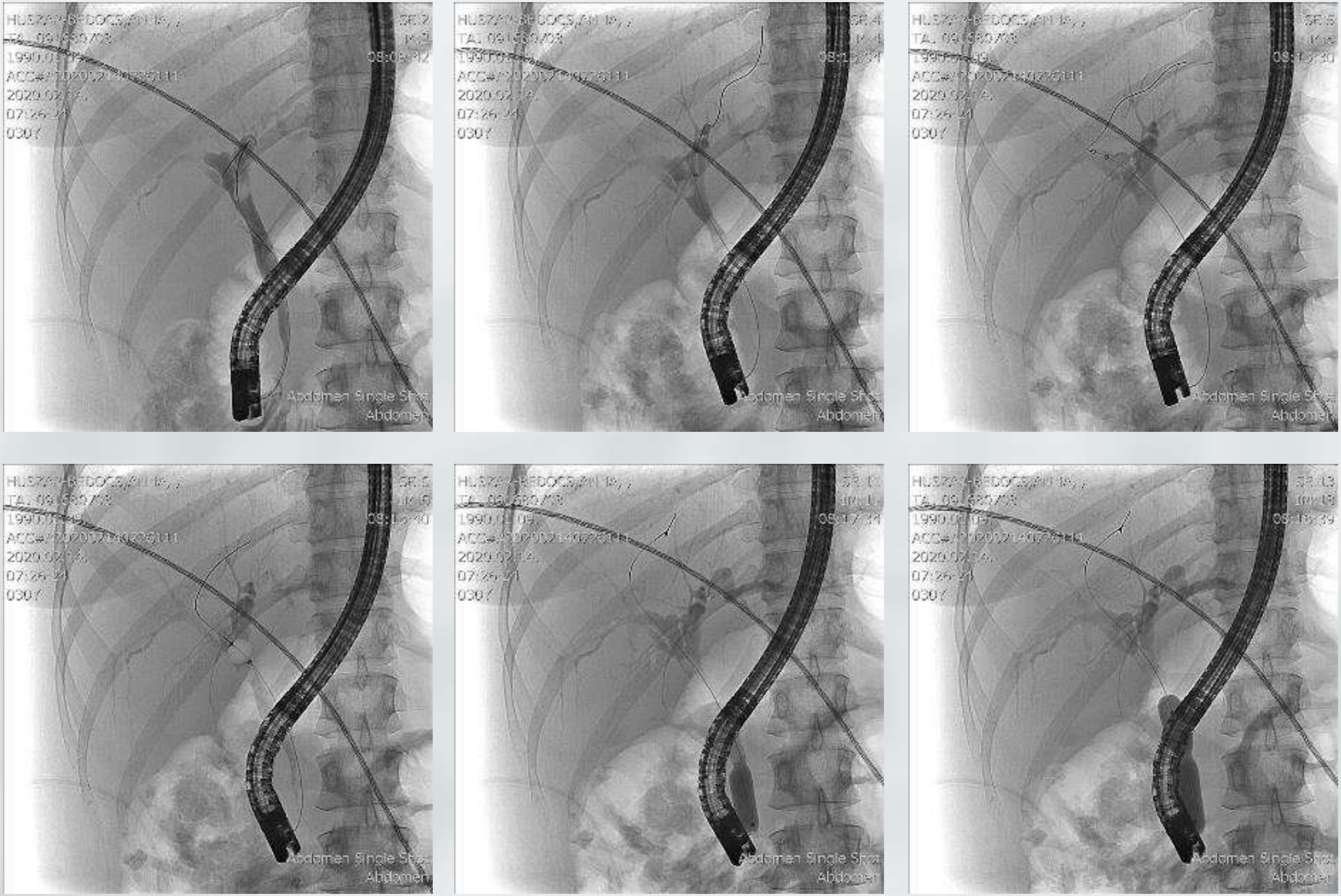
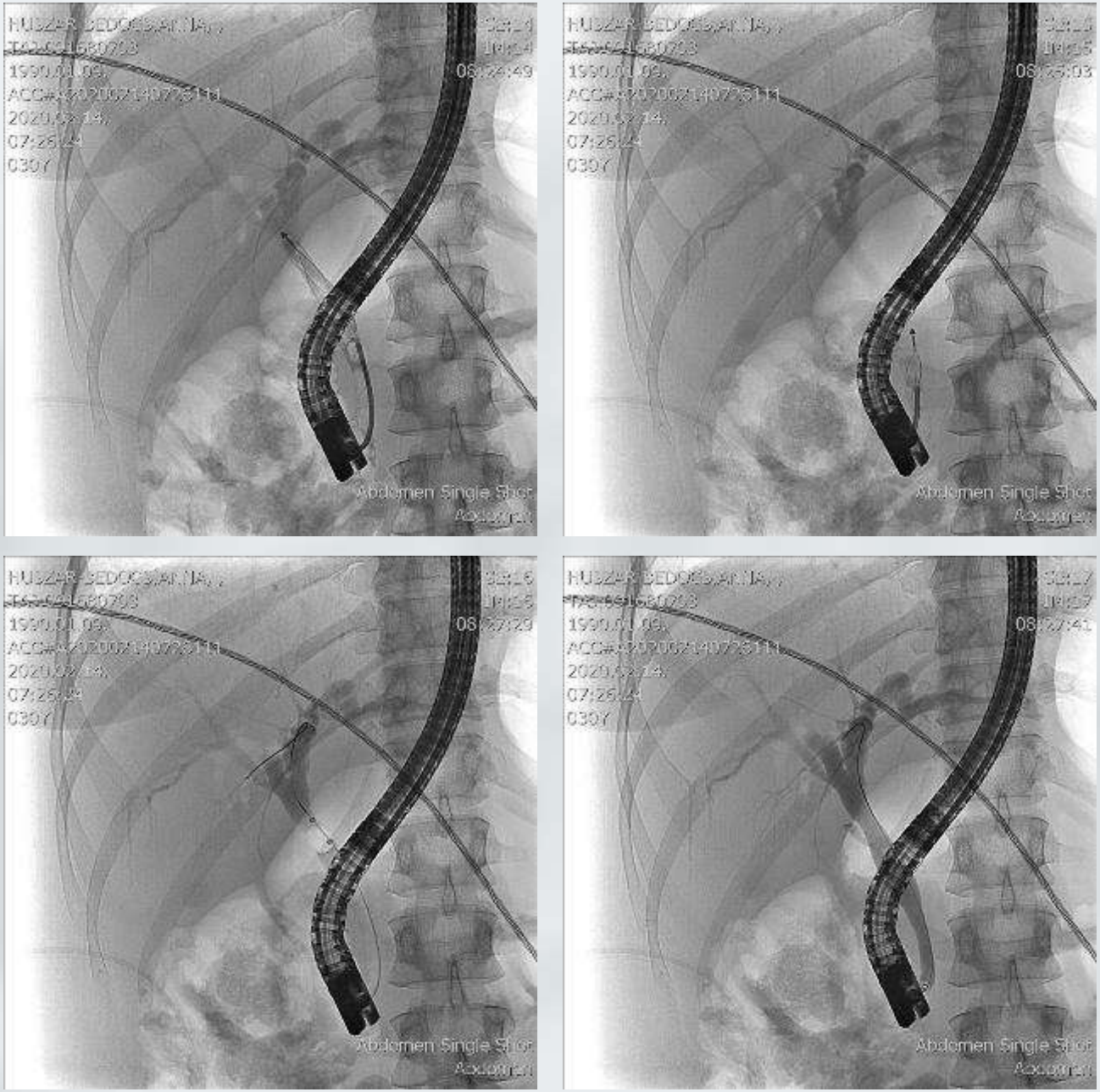
Mechanical litothripsy



Difficult small stone I.



Difficult small stone II.



Cholangioscopy-assisted litothripsy

ESGE recommendation: cholangioscopy-assisted intraluminal lithotripsy (electrohydraulic or laser) as an effective and safe treatment of difficult bile duct stones – when conventional techniques fail

- cholangioscopy: dual-operator dedicated "mother-baby" (MBC); single-operator catheter-based (SOC), direct peroral cholangioscopy (DPOC)
- litothripsy: electrohydraulic (EHL) or laser litothripsy
- stone extraction: conventional techniques (balloon, Dormia basket)

Tringali A *et al*. Endoscopy. 2015;47(8):739-53.
Manes G *et al*. Endoscopy. 2019;51(5):472-491.

Cholangioscopy – biliary stone extraction

Abhitabh Patil. SpyGlass DS System, Boston Scientific™

ESWL

ESGE recommendation: considering extracorporeal shock wave lithotripsy when conventional techniques have failed to achieve bile duct clearance and the intraluminal lithotripsy techniques are not available

- electrohydraulic or electromagnetic energy
- shock waves that travel through the soft tissues
- complex and technically demanding: NB drain inserted to allow fluoroscopic identification and targeting of CBDSs and to perform continuous irrigation of the bile duct with saline during ESWL
- multiple ESWL sessions and subsequent ERCP procedures
- clinical success (ductal clearance) of 70-90% – needs EST!!!
- adverse events of 9-35.7% (cholangitis, pancreatitis)

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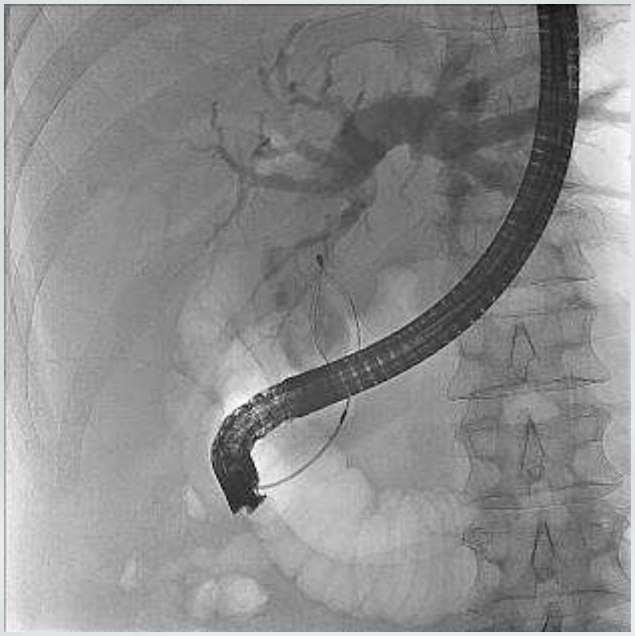
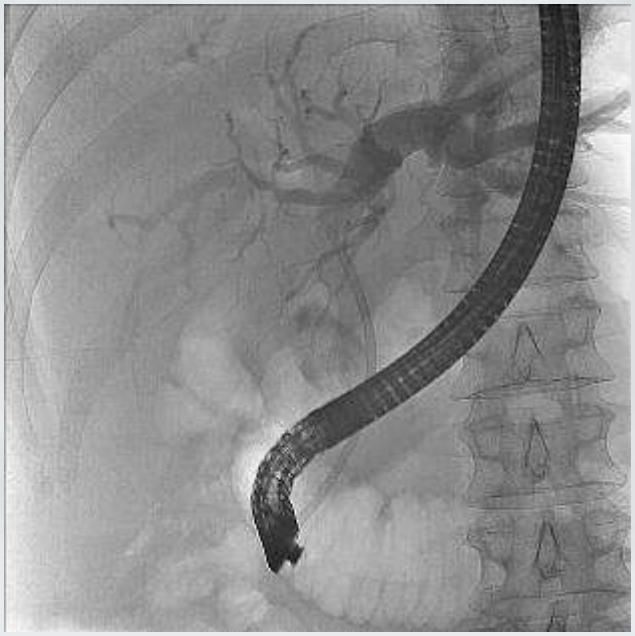
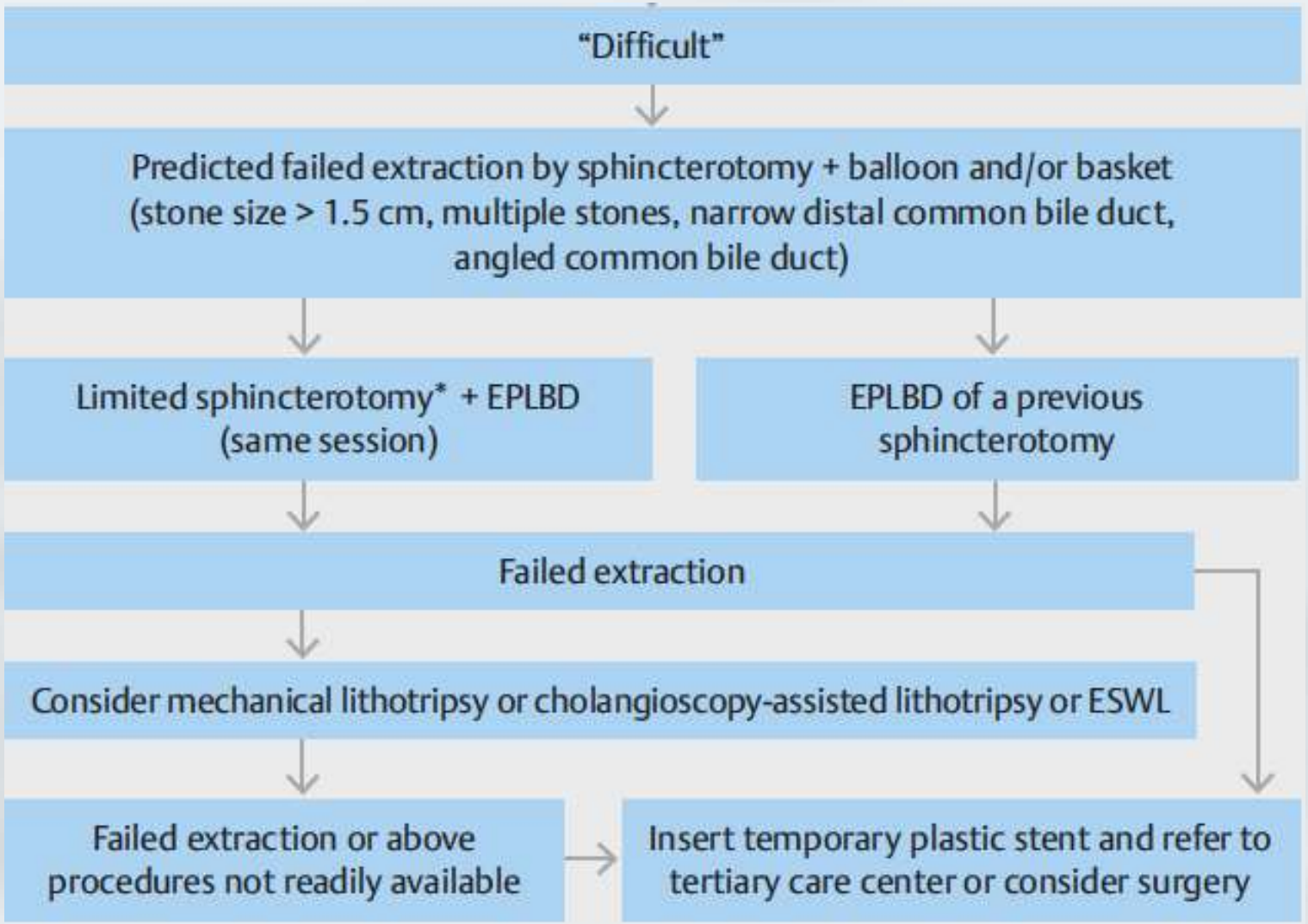
Unsuccessful CBD stone extraction





Management algorithm of difficult CBD stones



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ESGE guideline

Endoscopic management of common bile duct stones: European Society of Gastrointestinal Endoscopy (ESGE) guideline

Gianpiero Manes[1], Gregorios Paspatis[2], Lars Aabakken[3], Andrea Anderloni[4], Marianna Arvanitakis[5], Philippe Ah-Soune[6], Marc Barthet[7], Dirk Domagk[8], Jean-Marc Dumonceau[9], Jean-Francois Gigot[10], Istvan Hritz[11], George Karamanolis[12], Andrea Laghi[13], Alberto Mariani[14], Konstantina Paraskeva[15], Jürgen Pohl[16], Thierry Ponchon[17], Fredrik Swahn[18], Rinze W. F. ter Steege[19], Andrea Tringali[20], Antonios Vezakis[21], Earl J. Williams[22], Jeanin E. van Hooft[23]

Endoscopy 2019; 51: 472–491

ESGE

The papilla that I dream of…

Courtesy of Dr. Guido Costamagna