

Uzayr Khan
Surgical GIT
CMJAH

EUS BILIARY DRAINAGE

INTRODUCTION

Giovannini 2003

Multistep, repurposed tools

Now dedicated, single step

Required

ERCP fails 3-10%

Surgery/ PTBD – morbid/↓QOL

Option for malignant biliary obstruction

Most for irresectable disease

Benign disease largely access procedures



EUS BILIARY DRAINAGE

- **EUS Guided**
 - Choledochoduodenostomy (CDS)
 - Hepaticoduodenostomy (HGS)
 - Antegrade Stenting
 - Cholecystogastrostomy/duodenostomy
- **EUS Assisted**
 - EUS Rendezvous
 - EUS assisted ERCP

EUS BILIARY DRAINAGE

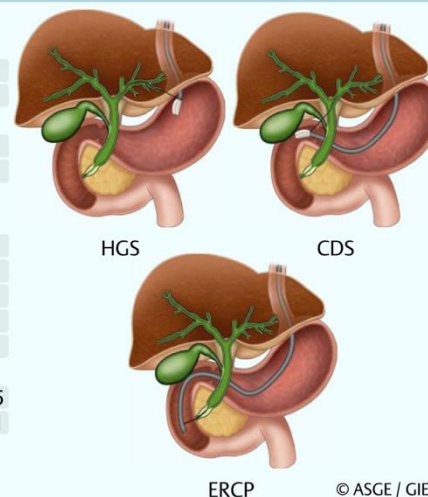
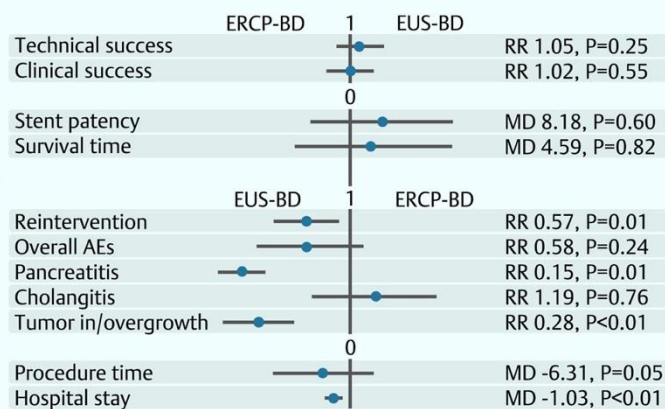
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EUS-BD versus ERCP-BD for Malignant Biliary Obstruction

Systematic Review
and Meta-Analysis

6 Randomized
Controlled Trials

577 Patients



CDS, choledochoduodenostomy
HGS, hepaticogastrostomy

EUS-BD, endoscopic ultrasound-guided biliary drainage
ERCP-BD, endoscopic retrograde cholangiopancreatography-guided biliary drainage

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Therapeutic endoscopic ultrasound: European Society of Gastrointestinal Endoscopy (ESGE) Guideline



Authors

Schalk W. van der Merwe¹, Roy L. J. van Wanrooij² , Michiel Bronswijk^{1,3} , Simon Everett⁴, Sundeep Lakhtakia⁵, Mihai Rimbac⁶ , Tomas Hucl⁷, Rastislav Kunda⁸ , Abdenor Badaoui⁹, Ryan Law¹⁰, Paolo G. Arcidiacono¹¹, Alberto Larghi¹², Marc Giovannini¹³, Mouen A. Khashab¹⁴, Kenneth F. Binmoeller¹⁵, Marc Barthet¹⁶ , Manuel Perez-Miranda¹⁷ , Jeanin E. van Hooft¹⁸ 

Indications

- Inaccessible papilla/ altered anatomy
- Failed ERCP/ incomplete biliary drainage

Contraindication

- Coagulopathy
- Large volume ascites

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Preferred over PTBD for failed ERCP in malignant disease

Potentially less morbid

Fewer interventions

Comparable success

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EUS-HGS

Only for inoperable hilar tumors

Not completely drained @ERCP

EUS-CDS distal MBDO

ERCP still recommended

EUS can be considered in high volume centers

Similar efficacy, perhaps increased patency with EUS

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EUS – rendezvous favoured for benign disease
Preferred over PTBD after **second failed ERCP**
However success lower & AEs higher
 Smaller ducts/ greater technical difficulty
 PTBD likely similar

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Adverse Events

Mortality 0-3%

<14d –procedure related/ >14d late complication

Pooled EUS-CDS & HGS – 16%

Cholangitis (4%)

Bleeding (4%)

Bile leak (4%)

Perforation (3%)

Abd pain – self limiting (18%)

Others – haemobilia/ cholecystitis/ arteriobiliary fistula/ pseudoaneurysm

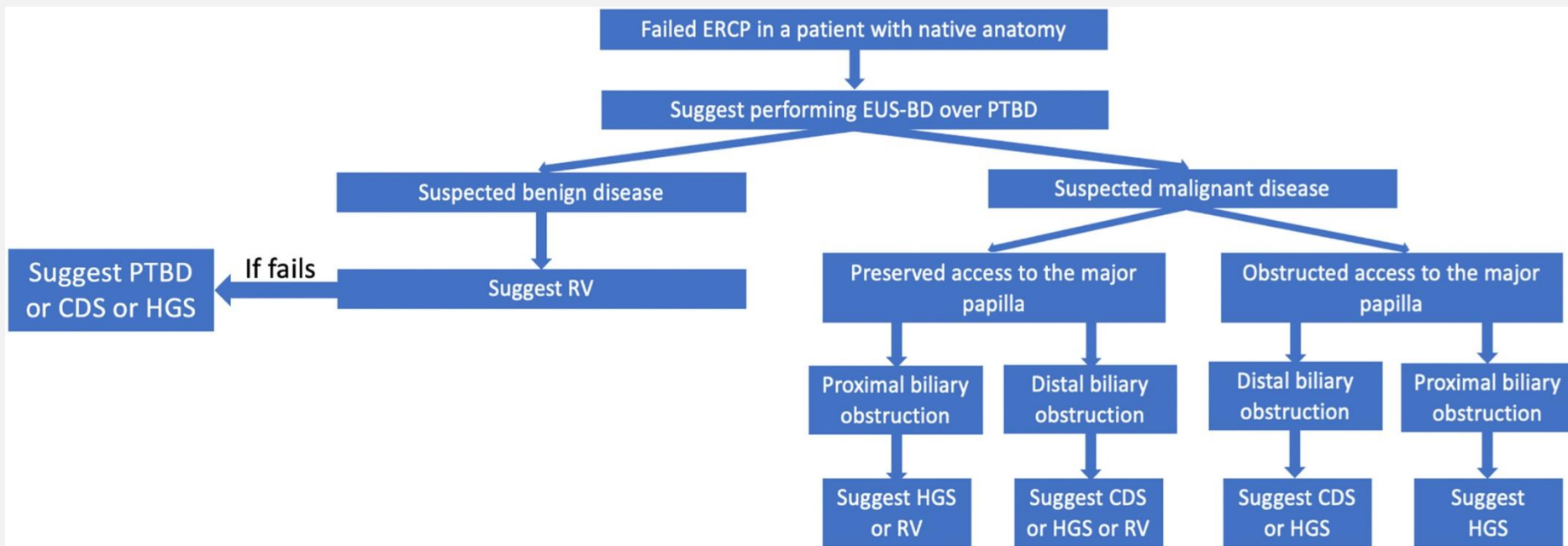
EQUIPMENT

Procedure	Plastic stents	Biliary self-expandable metal stents	Lumen-apposing metal stent* internal diameter × saddle length
EUS-CDS	Not advised for primary drainage	Fully covered - length: 6 cm - diameter: 8–10 mm	Hot Axios 6 × 8 mm, 8 × 8 mm, 10 × 10 mm
			Hot Spaxus 8 × 20/7 mm
EUS-HGS	Not advised for primary drainage	Fully covered - length: 8–10 cm - diameter: 8–10 mm	Not advised for primary drainage
		Partially covered - length: 8–10 cm (uncovered 3 cm, covered 5–7 cm) - diameter: 8–10 mm	
EUS-guided PD drainage (antegrade)	Straight or double pigtail 5, 7, 8.5, and 10 Fr - length 7–20 cm	Not advised for primary drainage	Not advised for primary drainage
EUS-GBD	Not advised for primary drainage	Not advised for primary drainage	Hot Axios 10 × 10 mm, 15 × 10 mm
			Hot Spaxus 8 × 20/7 mm, 10 × 20/7 mm
EUS-GE	Not advised for primary drainage	Not advised for primary drainage	Hot Axios 15 × 10 mm, 20 × 10 mm
			Hot Spaxus 16 × 20/7 mm

EUS-CDS, EUS-guided choledochoduodenostomy; EUS-HGS, EUS-guided hepaticogastrostomy; PD, pancreatic duct; EUS-GBD, EUS-guided gallbladder drainage; EUS-GE, EUS-guided gastroenterostomy.

* Lumen-apposing metal stents (LAMs) detailed here are all electrocautery-enhanced as their all-in-one design renders them ideal for therapeutic EUS procedures. LAMs without the electrocautery-enhanced delivery system (Axios, Spaxus) are also available in various sizes, but would require multiple accessory exchanges.

ASGE THERAPEUTIC EUS GUIDELINE





CHOLEDOCHODUODENOSTOMY

PRE-PROCEDURAL IMAGING & PLANNING

Use CT/MRI to evaluate anatomy and bile duct dilation.

A CBD diameter of ≥ 12 –15 mm is ideal.

Diameters < 12 mm risk failure or misdeployment.

Identify surrounding vessels & anticipate issues

ANATOMICAL & ENDOSCOPIC CONSIDERATIONS

Aim for the mid-distal CBD from the duodenal bulb.

Avoid the 'double mucosal sign' by using water-fill to enhance wall apposition.

Maintain a long scope position for stable access.

Apply counterclockwise rotation and forward pressure.

If possible, use a longitudinal view for optimal visualization.

Always perform DOPPLER assessment before puncture.

ANATOMICAL & ENDOSCOPIC CONSIDERATIONS

Long scope position may hinder stent exit from channel

Partially short/ straightened scope if issues arise

Space in bulb may limit ability to see proximal deployment

In channel deployment assists

NEEDLE & GUIDEWIRE TIPS

19G needle preferred; aspirate bile to confirm access

Use 0.025–0.035" guidewire, advance deep into ducts

Opinions divided for LAMS

May enhance stability and allows rescue options

TRACT DILATION APPROACHES

- 6Fr Cystotome/ 4 mm balloon for multi-step technique
- Electrocautery LAMS enables single-step puncture + dilation
- Avoid excessive dilation to reduce bile leak risk

STENT SELECTION STRATEGIES

- Plastic stents: Leaks, blocks, migrates, multistep
 - Coaxial placement may prevent stent dysfunction*
- FCSEMS (8-10mm): Blocks less, leaks less, may still migrate
 - Cheaper than LAMS
- LAMS (6-10mm): preferred for stability and reduced migration
 - EC-LAMS (HotAxios & Spaxus) game changers
 - Single step, fast, less potential for leak
 - Free hand. Wire for salvage/ deeper deployment
 - Smaller ducts increase difficulty, less room for error, limited space for flange
 - Smaller LAMS block & narrow margin for error
 - Rough guide ~12mm – 8mm LAMS/ 12-15mm – 10mm LAMS

DEPLOYMENT TECHNIQUES

- Deploy distal flange under EUS, proximal under endoscopy
- Intra-channel technique minimizes misdeployment risk
- Ensure full apposition before releasing second flange

Adverse Events with Endoscopic Ultrasound-guided Biliary Drainage: A Systematic Review and Meta-analysis

Data source

3 Databases



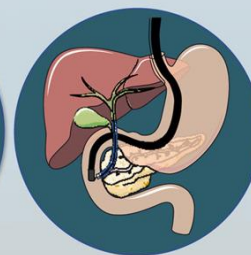
155 studies



7887 patients



Results



	Overall	EUS-CDS	EUS-HGS	EUS-AG	EUS-RV
Clinical success	95.0% (94.1-95.9)	97.2% (96.1-98.3)	92.3% (90.2-94.3)	97.2% (95.3-99.1)	-
Adverse events	13.7% (12.3-15.0)	11.9% (9.9-14.0)	15.5% (12.9-18.0)	9.9% (6.3-13.4)	8.8% (5.9-11.7)
Major adverse events	0.6% (0.3-0.9)	0.6% (0.1-1.1)	0.6% (0.1-1.1)	0.2% (0.0-1.3)	0.0% (0.0-1.1)
Mortality	0.1% (0.0-0.4)	0.0% (0.0-0.4)	0.2% (0.0-0.5)	0.0% (0.0-1.1)	0.0% (0.0-1.5)
Reintervention	16.0 (13.9-18.2)	15.8% (12.2-19.5)	20.9% (16.3-25.6)	9.2% (6.0-12.4)	-

ADVERSE EVENTS

Loss of access

Can attempt ERCP/ EUS-HGS or PTBD

Stent mis-deployment

Too deep – pull back if accessible

Into wall – guidewire & coaxial tandem SEMS

Into peritoneum – Surgical consult

Bile leak

Antibiotics. Alternative biliary access. Drain biloma

Bleeding

DOPPLER prior to prevent

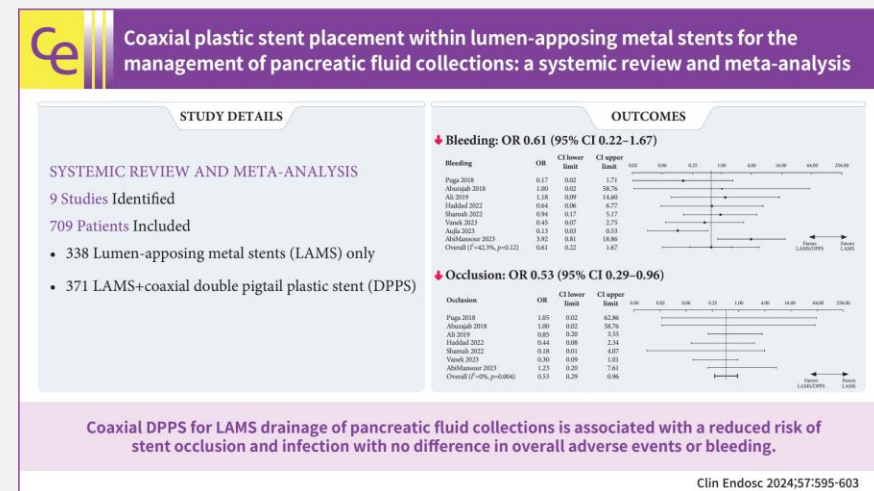
Angio + IR

COMPLICATION MITIGATION

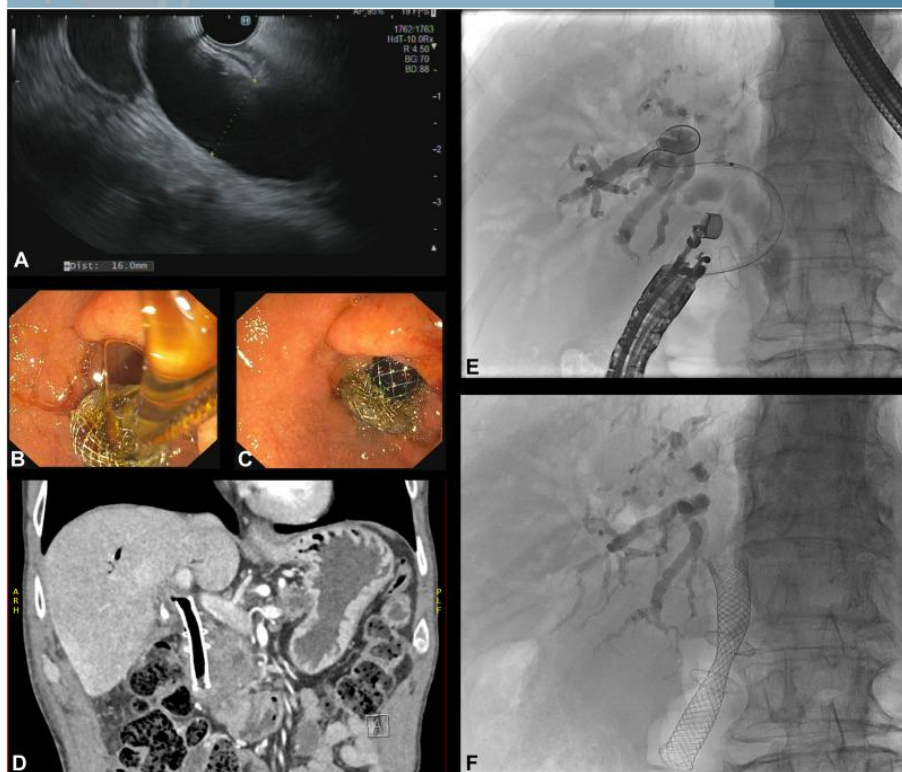
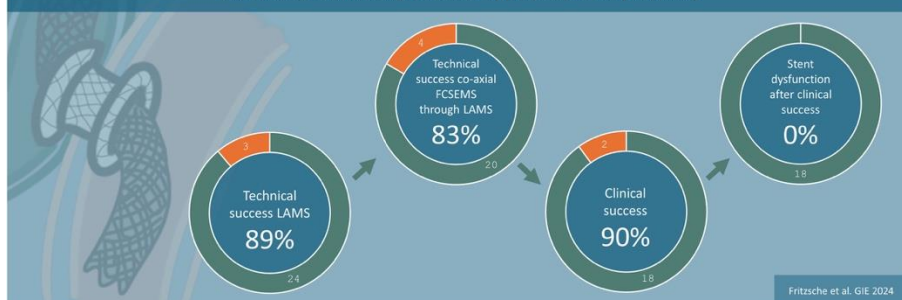
- Seal tract quickly with covered stent to prevent bile leak
- If misdeployment occurs, use guidewire or second stent
- Always assess for bleeding risk using Doppler

TIPS

- Coaxial stents (e.g. pigtail inside LAMS) may reduce occlusion
- Monitor for cholecystitis if cystic duct is covered
- Use of EC-LAMS streamlines and secures the procedure
- Sump syndrome – debris filling distal biliary tree
 - Mitigated by FCSEMS/ double pigtail in LAMS
 - Scorpion II pilot, LAMS with coaxial stent
 - ~10% stent dysfunction



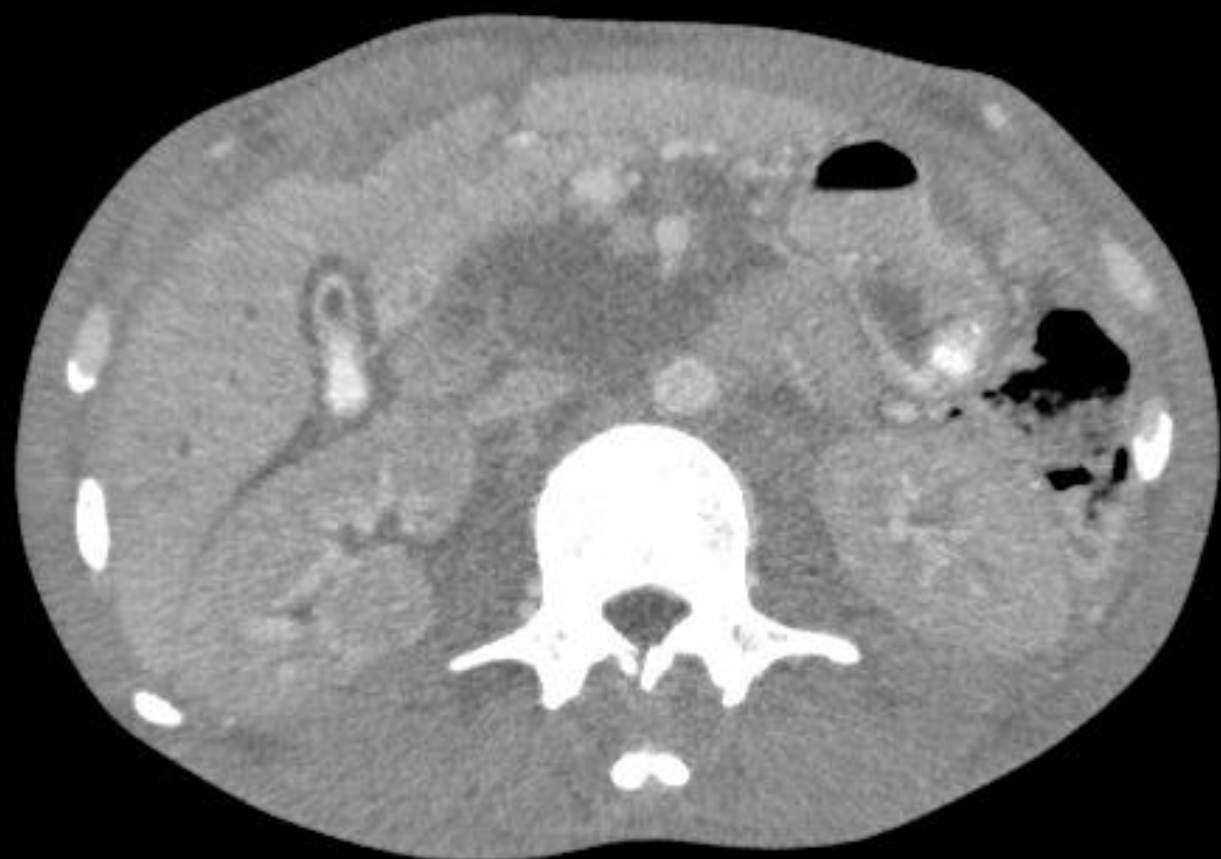
Optimizing EUS-guided choledochoduodenostomy with lumen-apposing metal stents for primary drainage of malignant distal biliary obstruction (SCORPION-IIP): a prospective pilot study



SCORPION-IIP

FRITZSCHE ET AL. GIE. 2024

- Stent dysfunction 6-37%
- SEMS in LAMS prevents bile duct wall apposition & diverts stent lumen into D2
- Mostly SEMS, some plastic
- 10% stent dysfunction @6months



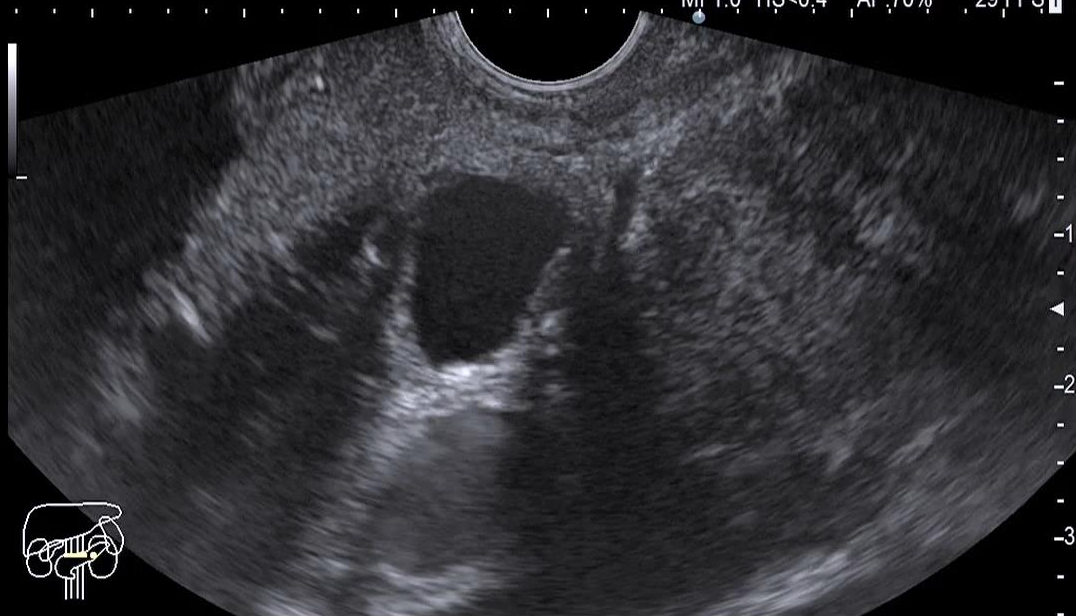


HITACHI CMJAH

go02

28-05-'25
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MI 1.0 TIŞ<0,4 AP:70% 29 FPS



WbT-3.9S R:4.00 BG:57 BD:70

Endoscope

Probe:EG38J10UT

Page 1/1

Study 28-05-'25 - 1

Layout 4 x 1 Reload

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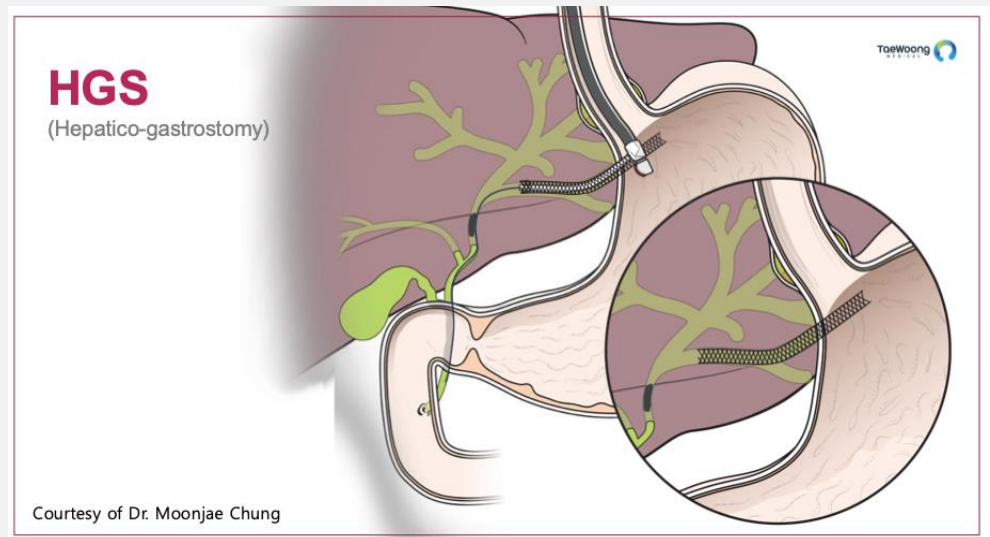
HDD



28-05-'25
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OVERVIEW – RATIONALE & EVOLUTION OF EUS-HGS

- Smaller ducts
- Movement
- Portal triad/ vessels
- Multistep process
- Requires sonar+fluro

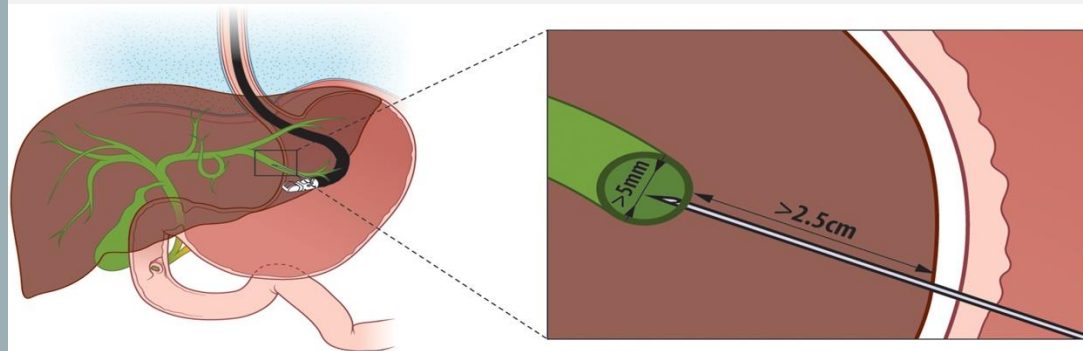


PREPROCEDURAL PLANNING & PATIENT SELECTION

- • Patient Selection: Avoid in high-risk anatomy (ascites, varices, atrophy).
- • Equipment & Setup: All accessories prepped to minimize delay.
- • Positioning: Prone or modified prone (right side down) to enhance duct opacification.

PUNCTURE SITE SELECTION & LANDMARKS

- Target: Prefer B3 access near B2-B3 confluence.
- Ideal Duct: ≥ 5 mm diameter; 2.5–3 cm tract length.
- Avoid: Transpleural puncture; GHL puncture.
- Needle Angle: $> 135^\circ$ for optimal guidewire access.



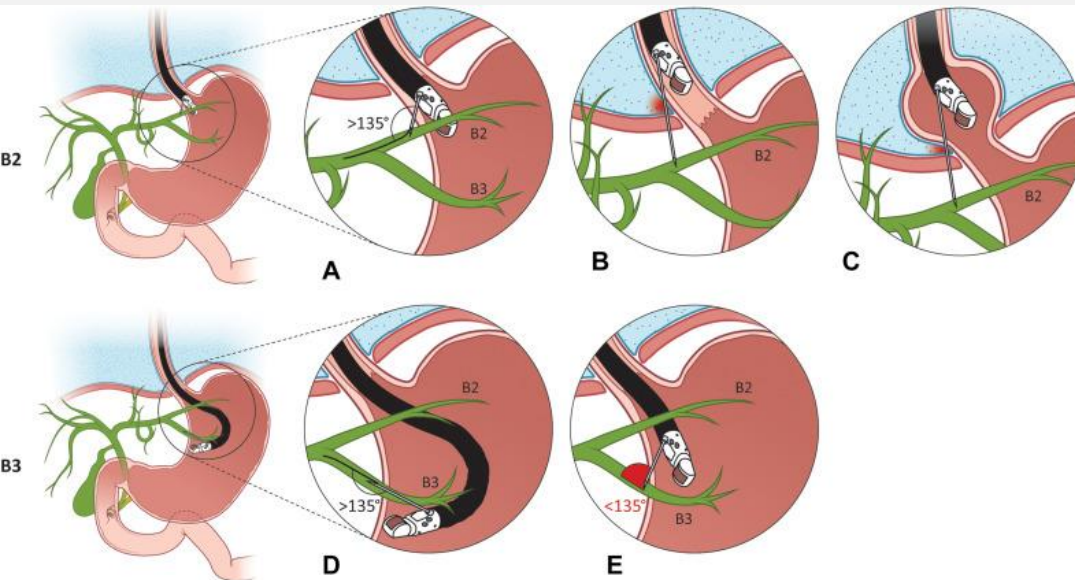
DUCT SELECTION

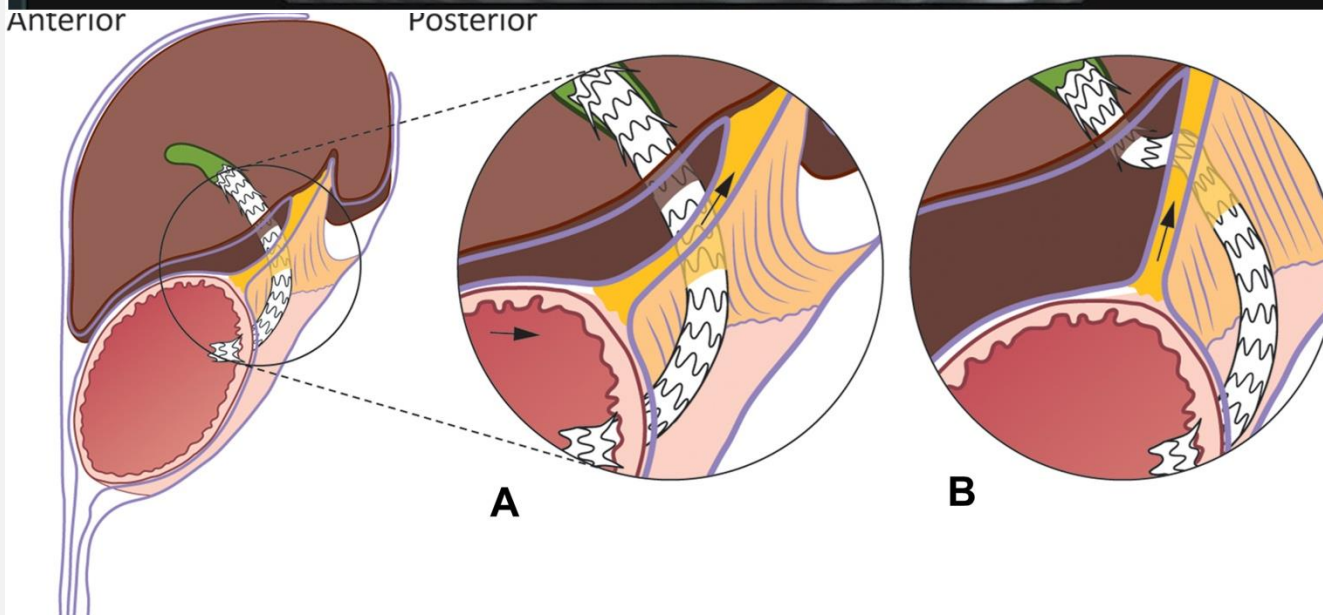
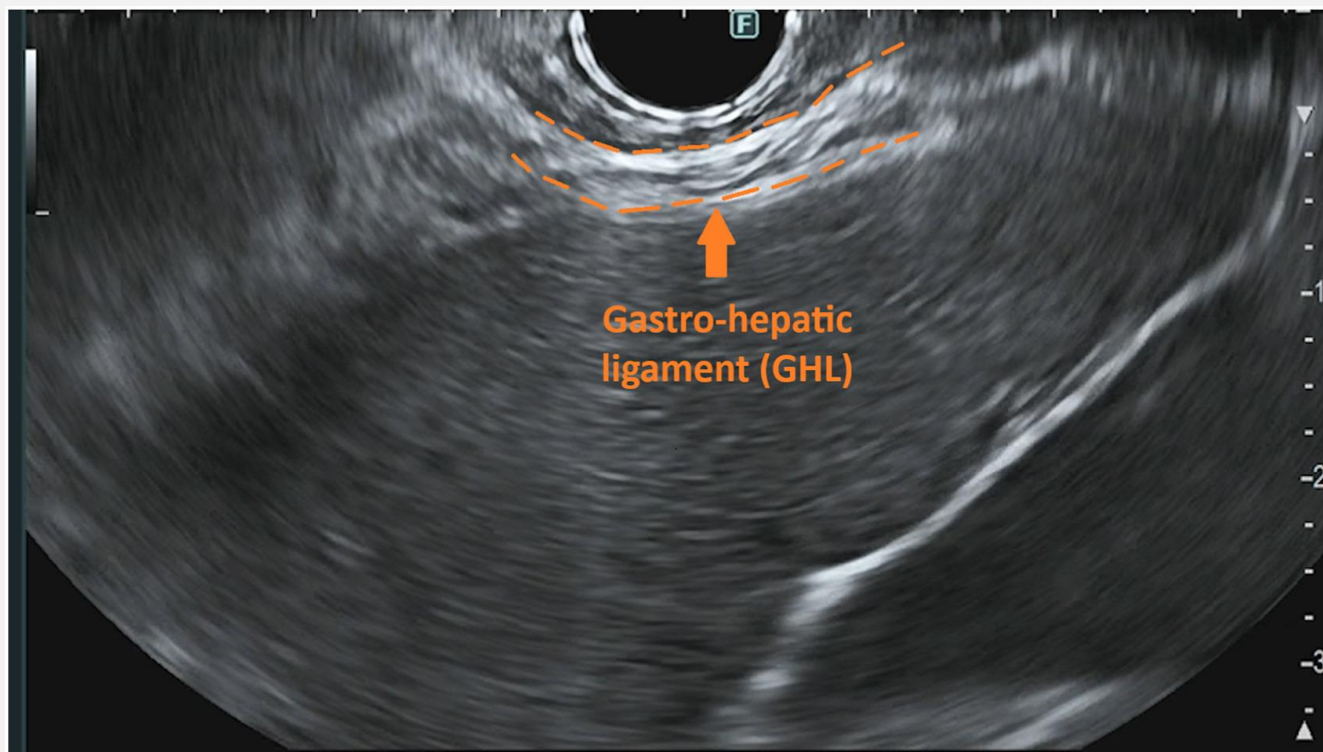
B2

- Cephalad
- Transoesophageal puncture risk
- Easier access
- Less angulated entry into duct

B3

- Caudal
- Lower risk of mediastinitis
- Difficult access/ flexed scope
- More difficult to avoid peripheral placement





BILIARY PUNCTURE TECHNIQUE

- Needle Prep: Use 19G; prime with saline to prevent air artifact.
- Puncture: One swift motion; confirm with bile aspiration.
- Bent Needle Technique: For suboptimal trajectory.
- Scope Stability: Critical for wire insertion.

CONTRAST INJECTION

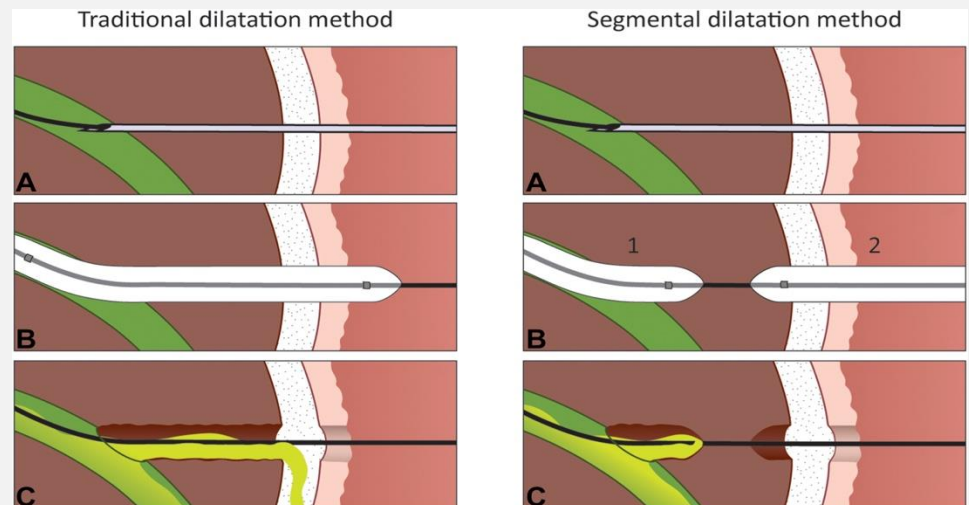
- • Pre-injection: Decompress duct in cholangitis.
- • Diluted Contrast: 50:50 with saline for clarity.
- • Avoid Overinjection: Prevents leak and pressure spikes.
- • Intravascular Clue: Rapid contrast washout → reposition needle.

GUIDEWIRE INSERTION

- • Wire: 0.025" hydrophilic, stiff core, angled tip.
- • Manipulation: Loop, torque, re-orient if misdirected.
- • Re-puncture: Consider if alignment is poor.
- • Maintain Access: Prevent dislodgement during exchange.

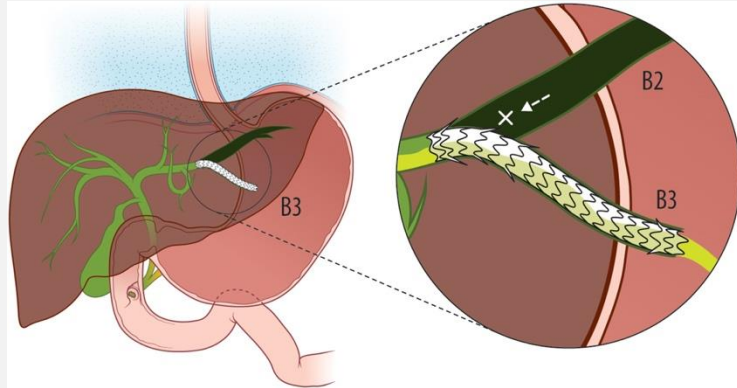
TRACT DILATION OPTIONS

- Graded Catheter: Preferred for small stents; low trauma.
- Balloon: Easier insertion, higher leak risk at 6 mm.
- Diathermy: Use in fibrotic tissue; last resort.
- Tailor Method: Match to stent size and anatomy.



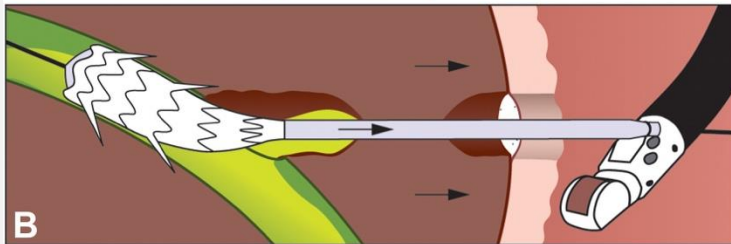
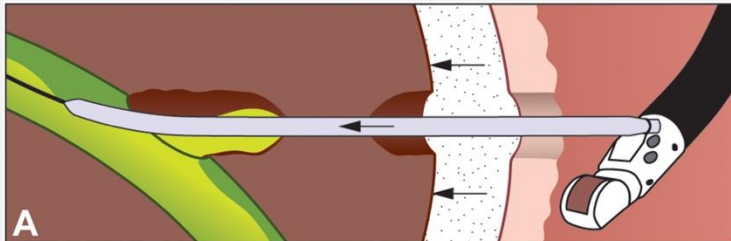
TROUBLESHOOTING DILATION & PREVENTING LEAK

- • Fibrotic Tract: Predilate with cannula/balloon.
- • Downstream Strictures: Dilate during same session.
- • Leak Risk: Avoid diathermy in atrophic or stiff livers.
- • Segmental Dilation: Leave liver parenchyma intact to seal tract.
- • Avoid Needle-Knife: Last resort; risk of perforation.



STENT SELECTION & DEPLOYMENT

- Design: Partially covered/ Fully covered, anti-migration features.
- Size: 8–10 mm diameter, 8–10 cm length.
- Positioning: 2–3 cm in duct and gastric lumen.
- Avoiding Segmental Occlusion: Use side-hole stents if needed.
- Technique: Steady echo contact; cautious unsheathing.



PITFALLS & ADVERSE EVENT PREVENTION

- • **Anatomy:** Avoid atrophic segments, large ascites, varices.
- • **Tumor Traversal:** Prefer upstream access.
- • **Transpleural Risk:** Ensure intra-abdominal access.
- • **Wire Stability:** Crucial for device exchanges.
- • **Migration/Leak:** Follow length and deployment best practices.





Endoscopic ultrasound-guided hepaticogastrostomy without tract dilation using a novel ultra-tapered slim-delivery metallic stent

Ritsuko Oishi, Gastroenterological Center, Yokohama City University Medical Center, Yokohama, Japan

Haruo Miwa, Gastroenterological Center, Yokohama City University Medical Center, Yokohama, Japan

Kazuki Endo, Gastroenterological Center, Yokohama City University Medical Center, Yokohama, Japan

Hiromi Tsuchiya, Gastroenterological Center, Yokohama City University Medical Center, Yokohama, Japan

Yuichi Suzuki, Gastroenterological Center, Yokohama City University Medical Center, Yokohama, Japan

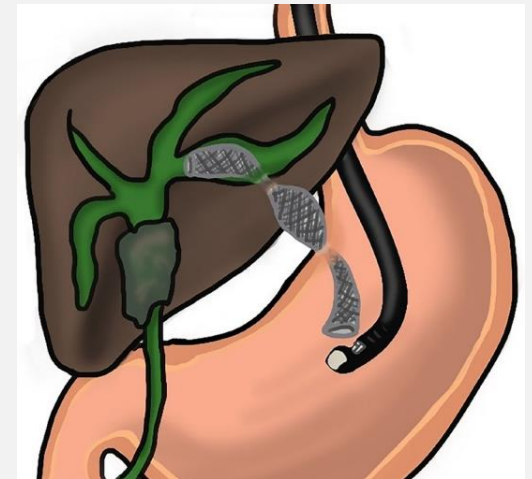
Kazushi Numata, Gastroenterological Center, Yokohama City University Medical Center, Yokohama, Japan

Shin Maeda, Department of Gastroenterology, Yokohama City University Graduate School of Medicine, Yokohama, Japan

Endoscopy
E-Videos

ADVERSE EVENTS

- Bleeding from PV or hepatic artery
- Pseudoaneurysms
- Guidewire shearing – maldeployment
- Peripheral wire placement
- Bile leak
 - ↑multiple punctures, duration >20min, <2.5cm duct to capsule
- Stent migration
- Mediastinitis



Adverse Events with Endoscopic Ultrasound-guided Biliary Drainage: A Systematic Review and Meta-analysis

Data source

3 Databases



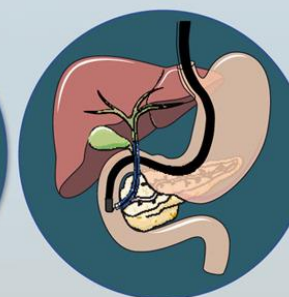
155 studies



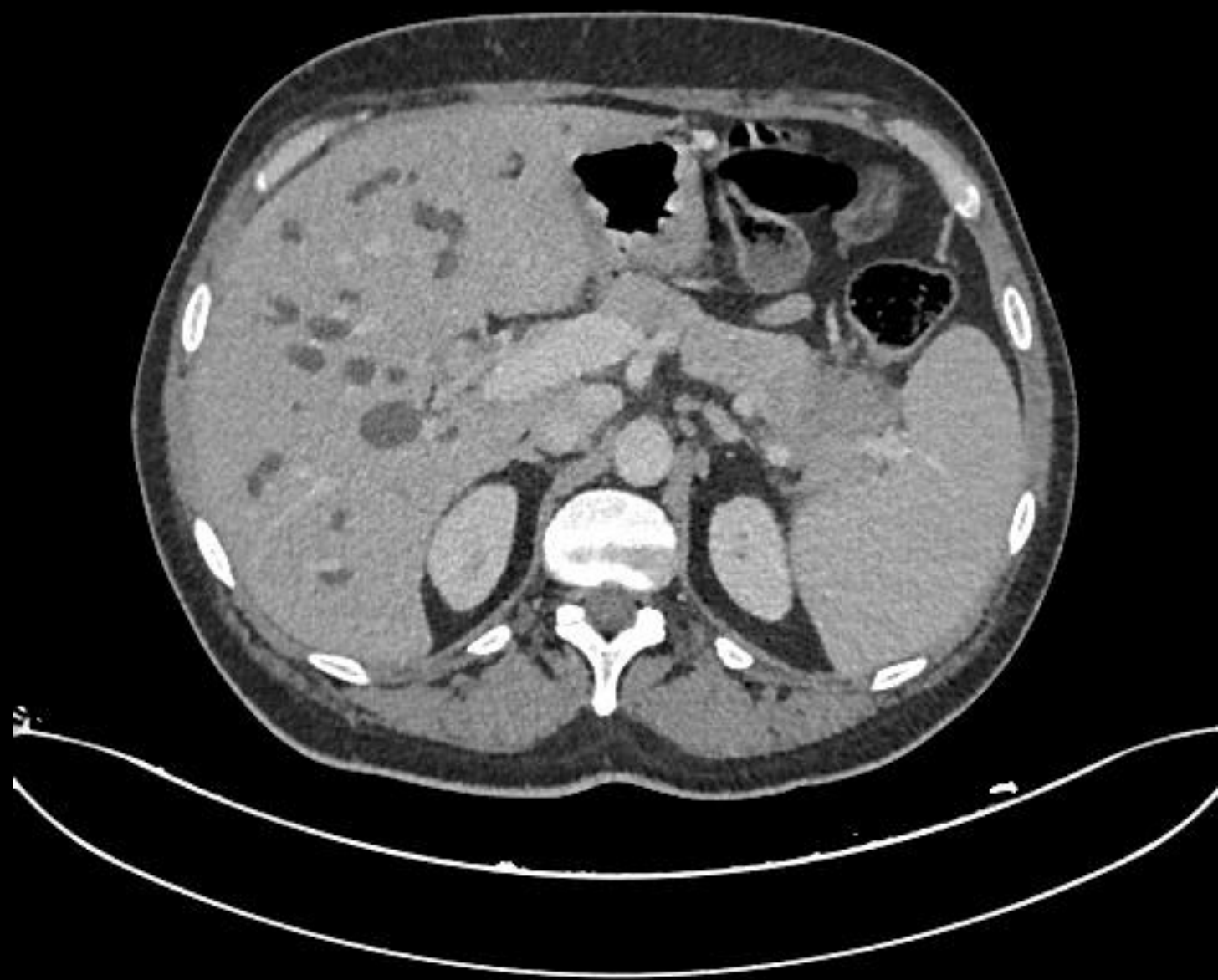
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CONCLUSION

- Revolution in biliary drainage
- Safety not in question
- May be preferred to other options
- Can be hazardous
- Know the options, procedural steps, equipment
- Ensure availability
- Anticipate problems & be prepared to troubleshoot
- Teamwork is invaluable