Interventional EUS

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Aim

- Brief history of EUS
- Acute Cholecystitis.
- Gastric outlet Obstruction (Benign and Malignant)
- Post Surgical Anatomy.
- And more…..

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EUS Evolves from Diagnostic Tool to Therapeutic Platform

1970s–80s

EUS developed by Olympus; primarily used for diagnostic imaging.

1992

Linear echoendoscope enables EUS-guided pancreatic fluid collection drainage.

2003–04

First EUS-guided biliary drainage; development of Lumen-apposing metal stents (LAMS).

2011

First clinical implementation of LAMS for internal drainage procedures.

2015

EUS-guided gallbladder drainage (EUS-GBD) becomes a multicenter reality.

The Transition: EUS has shifted from a pure imaging modality to a robust therapeutic platform.

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Acute Cholecystitis: Significant Healthcare Burden

300,000

Annual Cases

High incidence of acute cholecystitis in the United States, placing a significant strain on hospital resources.

215,000

Hospital Discharges

Rising hospital utilization, increasing from ~150,000 in 1997 to over 215,000 by 2012.

$6.5 Billion

Economic Impact

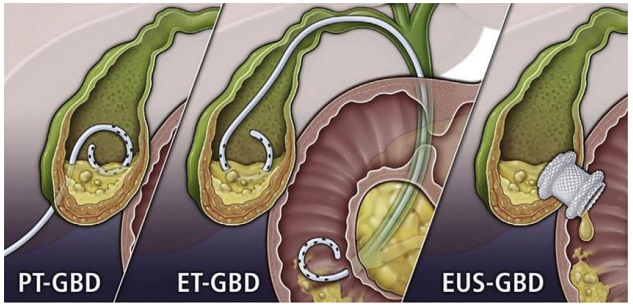
Total U.S. healthcare costs for gallbladder surgical care and related management annually.

$43,000+

Cost Per Case

Mean hospital charges per admission rose markedly from ~$14,600 to over $43,000 per case.

Non-Surgical Management Options for High-Risk Candidates



As the population ages, patients with significant comorbidities require effective alternatives to traditional cholecystectomy.

PT-GBD

Percutaneous Transhepatic Gallbladder Drainage

The traditional standard for non-surgical candidates. Involves external drainage which can impact quality of life and carry risks of tube dislodgement.

ET-GBD

Endoscopic Transpapillary Gallbladder Drainage

An endoscopic approach via the cystic duct. Can be technically challenging with lower success rates compared to other methods.

EUS-GBD

Endoscopic Ultrasound-Guided Drainage

An emerging therapeutic platform using LAMS to create a direct conduit between the gallbladder and the GI tract for internal drainage.

Goal: Provide effective internal drainage while minimizing the risks of external drains or invasive surgery.

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EUS-GBD Demonstrates Superior Clinical Success Rates

Approach	Patients (Studies)	Technical Success	Clinical Success
EUS-GBD	557 (14)	**95.3%**	**96.7%**
PT-GBD	13,351 (46)	**98.7%**	**89.3%**
ET-GBD	1,223 (22)	**83.0%**	**88.1%**

Clinical success with EUS-GBD is significantly superior to other approaches.

Mohan BP, Khan SR, Trakroo S, Ponnada S, Jayaraj M, Asokkumar R, Adler DG. Endoscopic ultrasound-guided gallbladder drainage, transpapillary drainage, or percutaneous drainage in high risk acute cholecystitis patients: a systematic review and comparative meta-analysis. Endoscopy. 2020 Feb;52(2):96-106. doi: 10.1055/a-1020-3932. Epub 2019 Oct 23. PMID: 31645067.

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Safety Profile Comparison Across Drainage Modalities

Overall complication rates are comparable between all primary drainage approaches.

ET-GBD

5.1%

Pancreatitis

EUS-GBD

4.3%

Bleeding

3.7%

Perforation

PT-GBD

7.4%

Stent Migration

Conclusion: EUS-GBD is a safe and effective alternative with a manageable risk profile.

EUS-GBD Does Not Increase Complexity of Subsequent Surgery

Clinical Evidence

Multicenter International Study (2018-2021)

Surgical technical success was not significantly different between EUS-GBD and PT-GBD groups.

Conversion Rates

No significant difference in conversion from laparoscopic to open cholecystectomy (11% vs 19%, P=0.23).

i-EUS Guidelines

Current evidence suggests that EUS-GBD does not increase the complexity of subsequent cholecystectomy compared with PT-GBD.

Recommendation: Remove LAMS before surgery. (98% Agreement)

Tyberg A, Duarte-Chavez R et al. Endoscopic Ultrasound-Guided Gallbladder Drainage Versus Percutaneous Drainage in Patients With Acute Cholecystitis Undergoing Elective Cholecystectomy. Clin Transl Gastroenterol. 2023 Jun 1;14(6):e00593. doi: 10.14309/ctg.0000000000000593. PMID: 37141073; PMCID: PMC10299765.

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EUS-GBD Improves Operative and Recovery Outcomes

Operative Time

EUS-GBD

84.2 min

PT-GBD

165.4 min

P < 0.00001

Symptom Resolution

EUS-GBD

4.2 days

PT-GBD

6.3 days

P = 0.005

Length of Stay

EUS-GBD

5.4 days

PT-GBD

12.3 days

P = 0.001

Abbasi, Abdullah A., et al. "Endoscopic-Ultrasound-Guided Gallbladder Drainage: Potential Shift in Practice or Still a Secondary Option?." *Current Treatment Options in Gastroenterology* 23.1 (2025): 12.

EUS-GBD significantly reduces operative time, recovery time, and hospital stay compared to PT-GBD.

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EUS-GBD for MBDO

Technical success		Clinical Success		AEs	
EUS-GBD	95.6%	EUS-GBD	86.6%	EUS-GBD	17.6
EUS-CDS	93.3%	EUS CDS	90.1%	EUS-CDS	19.7

EUS-GBD demonstrates comparable technical and clinical success, adverse events, and stent dysfunction compared to EUS-CDS for malignant distal biliary obstruction

Chandhan et al. " Efficacy and safety of EUS Choledochoduodenostomy compared with EUS guided GB drainage for MBDO GIE (2026): Article in press.

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Key Indications for EUS-Guided Gallbladder Drainage

High-Risk Acute Cholecystitis

Primary drainage strategy for patients with acute cholecystitis who are considered high-risk candidates for traditional surgery.

Internalization of Drainage

Conversion of percutaneous cholecystostomy (PT-GBD) to internal drainage in patients who are not candidates for subsequent cholecystectomy.

Malignant Biliary Obstruction

Salvage drainage for select patients with malignant biliary obstruction following failed ERCP and EUS-guided biliary drainage attempts.

Irani, Shayan S., Kaveh Sharzehi, and Uzma D. Siddiqui. "AGA clinical practice update on role of EUS-guided gallbladder drainage in acute cholecystitis: commentary." Clinical Gastroenterology and Hepatology 21.5 (2023): 1141-1147.

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Summary: EUS-GBD as a Preferred Therapeutic Option

Superior Outcomes

Demonstrated higher clinical success rates compared to traditional percutaneous and transpapillary methods.

Clinical Efficiency

Significant reductions in operative time, recovery duration, and overall hospital length of stay.

Proven Safety

Manageable complication profile without increasing the technical difficulty of future surgical interventions.

Surgical Bridge

Effective as both a definitive treatment and a viable bridge to subsequent cholecystectomy.

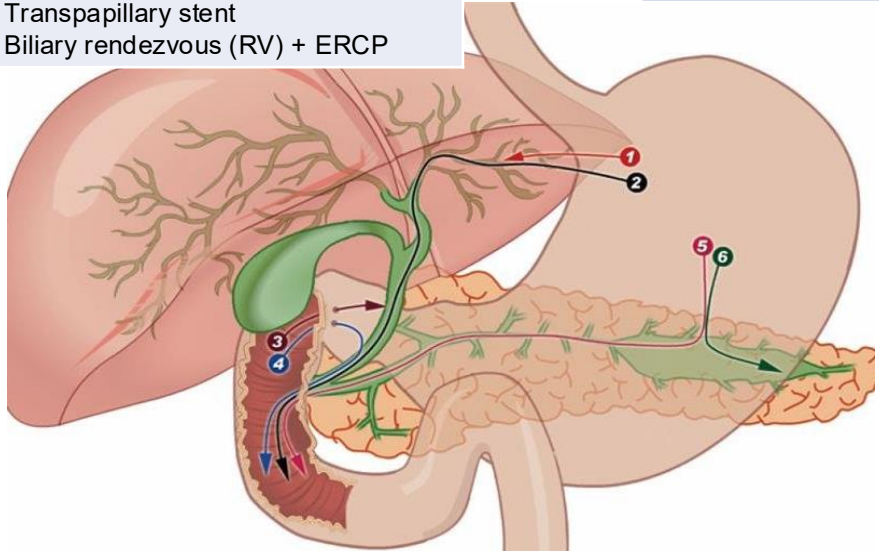
Recommendation: EUS-GBD should be considered a first-line alternative for high-risk patients requiring gallbladder drainage.

Transgastric Approach:

1. Hepaticogastrostomy stent (HGS)
2. Antegrade
   - Transpapillary stent
   - Biliary rendezvous (RV) + ERCP

Gallbladder Drainage:

7. Transgastric or transduodenal



Transduodenal Approach:

3. Choledochoduodenostomy stent (CDS)
   - Hepatico-duodenal or jejunal stent (not shown)
4. Biliary Rendezvous (RV) + ERCP

Adapted from Perez-Miranda M et al World J Gastrointest Endosc. 2010

Picture Courtesy: Dr Mustafa Arain, Advent Health Orlando.

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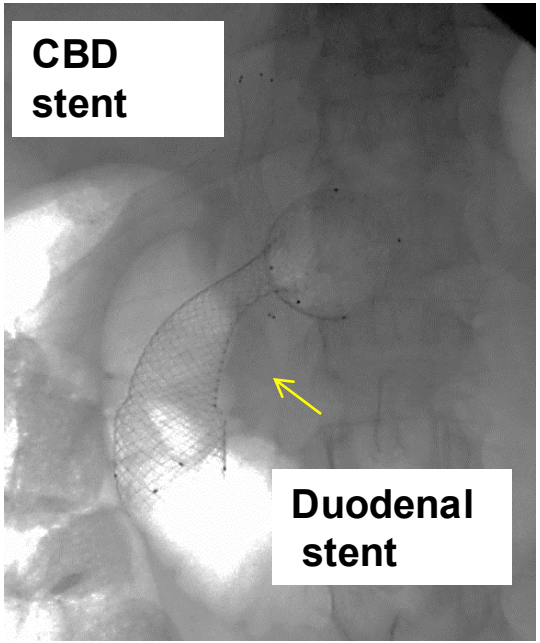
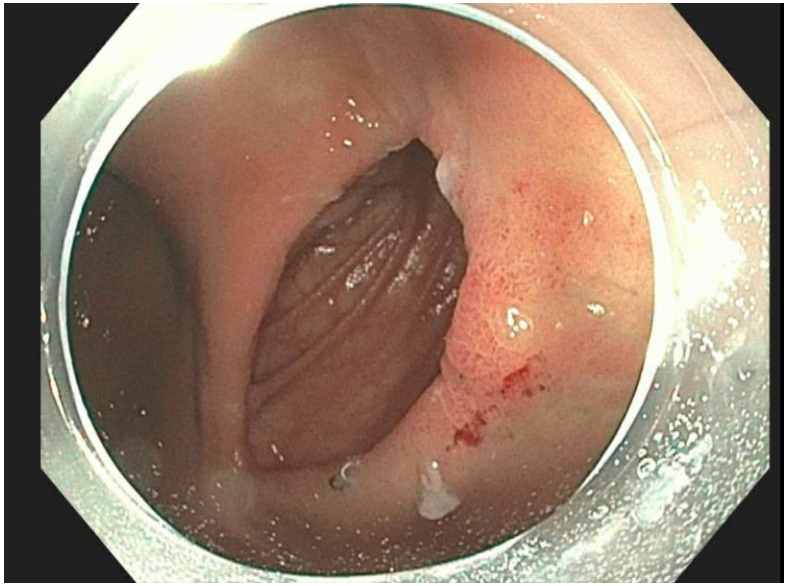
Gastric Outlet Obstruction:

- Gastric/duodenal obstruction in the setting of malignancy
  - Pancreatic adenocarcinoma, Gastric adenocarcinoma, Metastatic disease, GIST, lymphoma etc.
  - Benign conditions: Peptic ulcer dx, gastric/duodenal ulcers, Inflammation, surgical anastomosis, acute pancreatitis.
- Inability to eat, nausea/vomiting, early satiety
- Major impact on nutrition, QoL, treatment/chemotherapy for underlying malignancy





Surgical gastrojejunostomy
(S-GJ)

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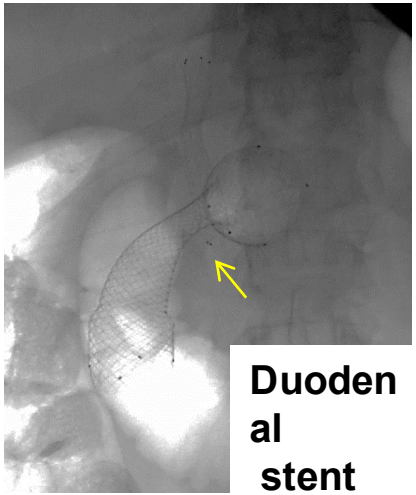
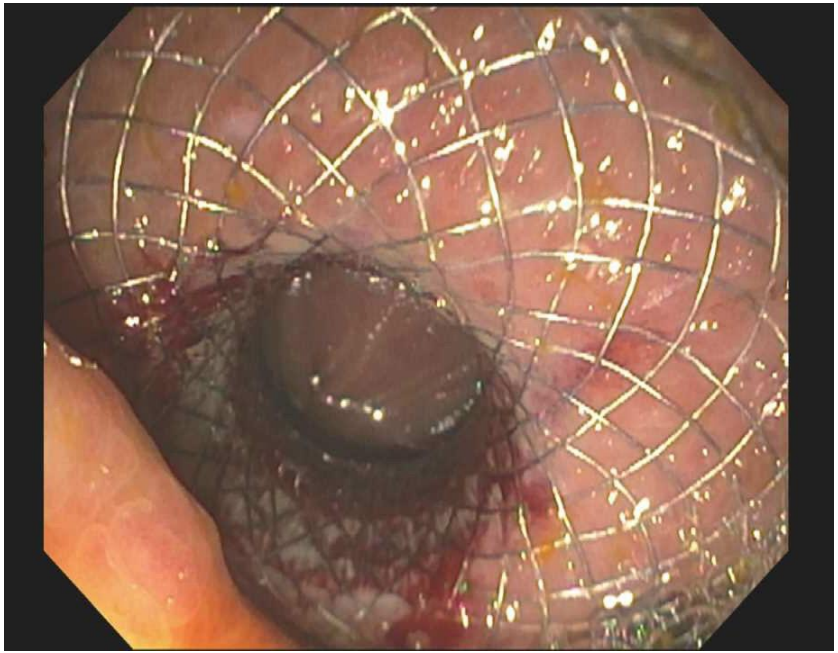
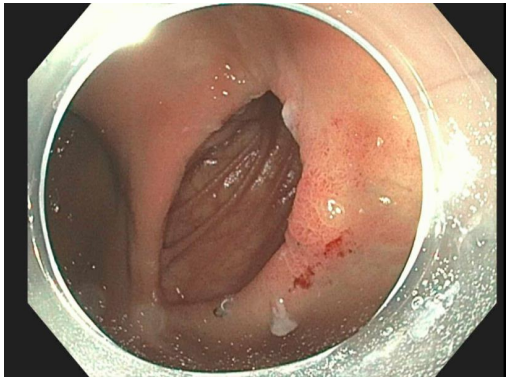


Duodenal stent



EUS guided gastrojejunostomy (GJ)



Surgical gastrojejunostomy (GJ)

EUS-GE vs. Surgical GJ for Malignant GOO

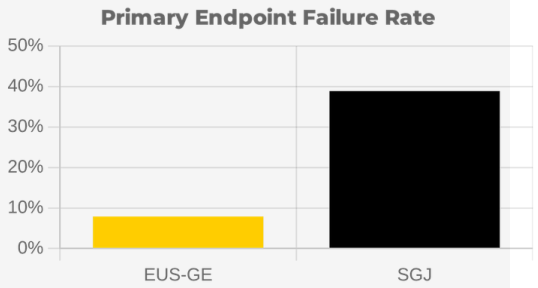
BACKGROUND & DESIGN

Standard: Surgical gastrojejunostomy (SGJ) for palliation.

- **Novel:** Endoscopic ultrasound-guided gastroenterostomy (EUS-GE).
- **Study:** Multicentre, randomised superiority trial.
- **Cohort:** 74 patients (38 EUS-GE, 36 SGJ).

Primary Endpoint: Composite of GOOSS score, reinterventions, nutrition needs, and adverse events.

KEY RESULTS



- Solid diet: **2 days** (EUS) vs **5 days** (SGJ).
- Stay: **3 days** (EUS) vs **9 days** (SGJ).
- Cost: **$33,934** vs **$51,437** .

CONCLUSION

In this randomised trial, **EUS-GE was superior to SGJ** across all major clinical and economic metrics.

EUS-GE associated with:

Faster oral intake
Shorter hospitalisation
Better Quality of Life (HRQoL)
Significant cost reduction

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Bang JY, et al. Endoscopic or surgical gastroenterostomy for malignant gastric outlet obstruction: a randomised trial. Gut. 2025. doi: 10.1136/gutjnl-2025-336339.

EUS-GE for Benign GOO

Background & Aims

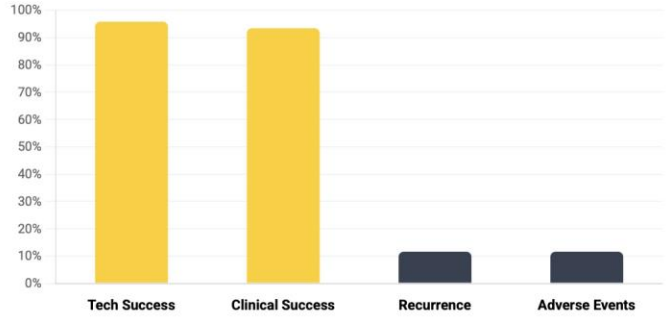
Problem:
Benign Gastric Outlet Obstruction (bGOO) is uncommon. Surgery is standard when medical/endoscopic therapy fails.

Intervention:
EUS-guided Gastrojejunostomy (EUS-GJ) as a minimally invasive alternative.

Study Design:
Systematic review (Feb 2025). 15 studies, 376 patients. Evaluated efficacy and safety.

Key Outcomes

High technical and clinical success rates with acceptable safety profile



95.8%
TECHNICAL SUCCESS

93.4%
CLINICAL SUCCESS

11.6%
RECURRENCE RATE

11.6%
ADVERSE EVENTS

**Safety analysis influenced by study quality (p=0.04) and AE classification method used (p=0.02).*

Conclusions

Effective & Safe

EUS-GJ demonstrates high efficacy and an acceptable safety profile for benign GOO patients.

CLINICAL IMPLICATIONS:

- ✓ Viable option when other endoscopic treatments fail.
- ✓ Suitable for patients where surgery is not an option.
- ✓ Can serve as a "bridge-to-surgery" strategy.

Rizzo, Giacomo Emanuele Maria, et al. "What is the benefit of endoscopic ultrasound-guided gastrojejunal anastomosis for patients with benign gastric outlet obstruction? A systematic review with meta-analysis." *Digestive and Liver Disease* 57.8 (2025): 1603-1614.

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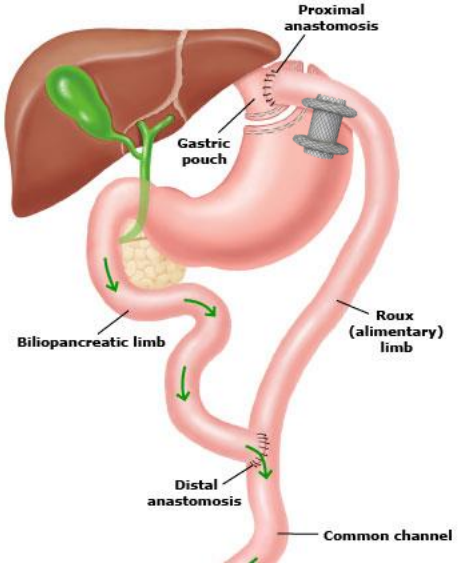
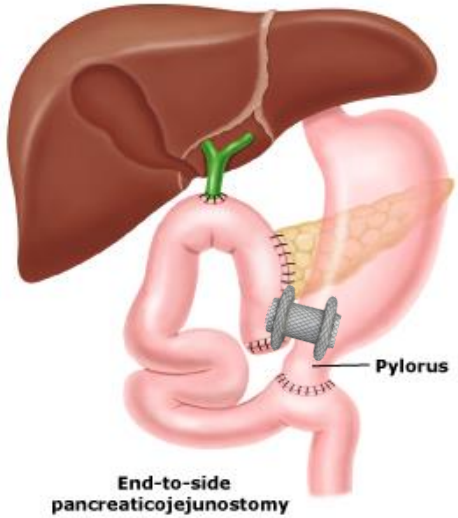
Altered anatomy – Bridging stents

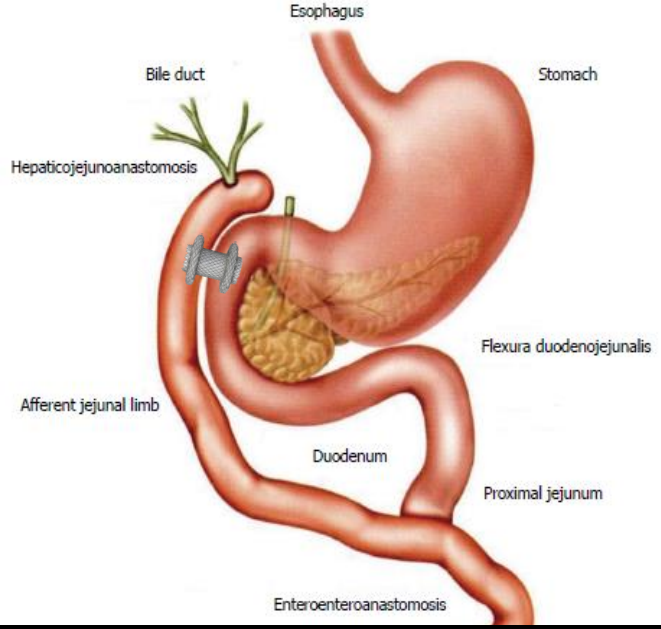
Roux-en-Y Gastric Bypass (RYGB)



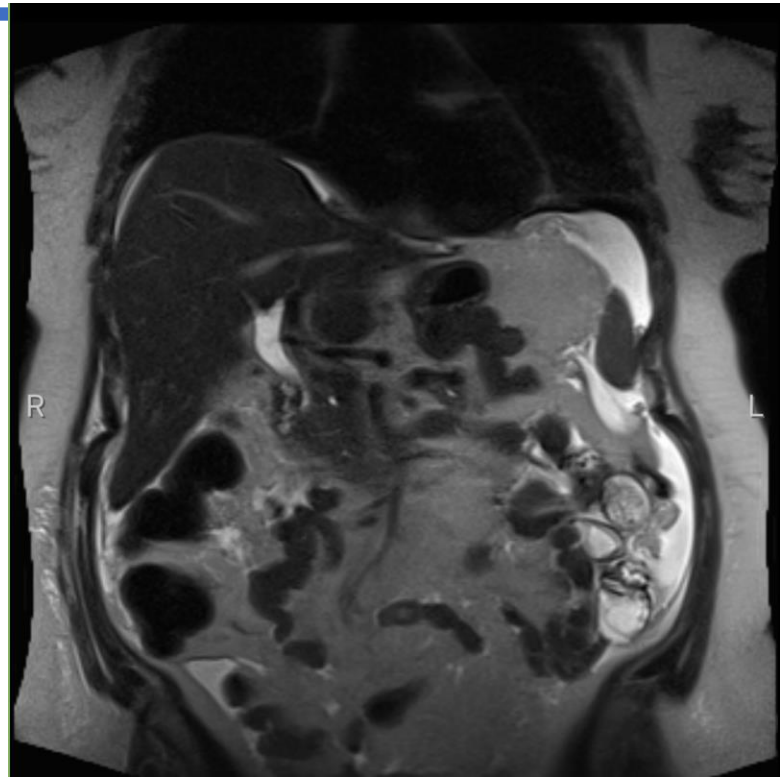
Whipple (Panceatico-duodenectomy

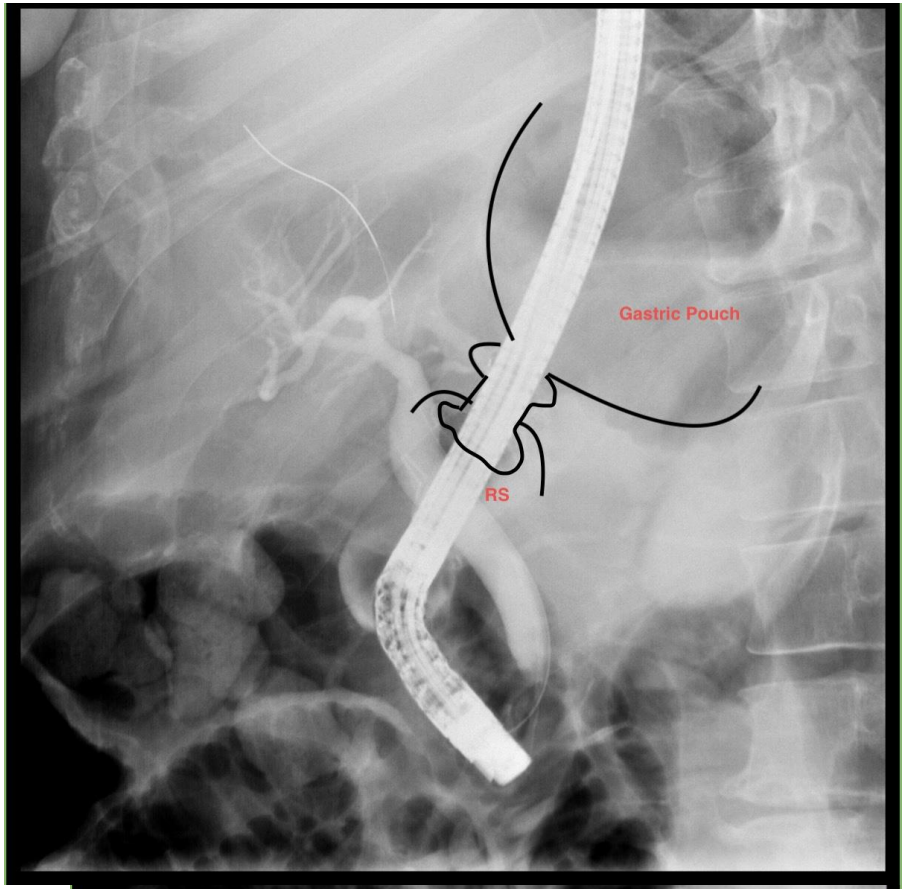


Roux-en-Y hepatico-jejunostomy (RYHJ)

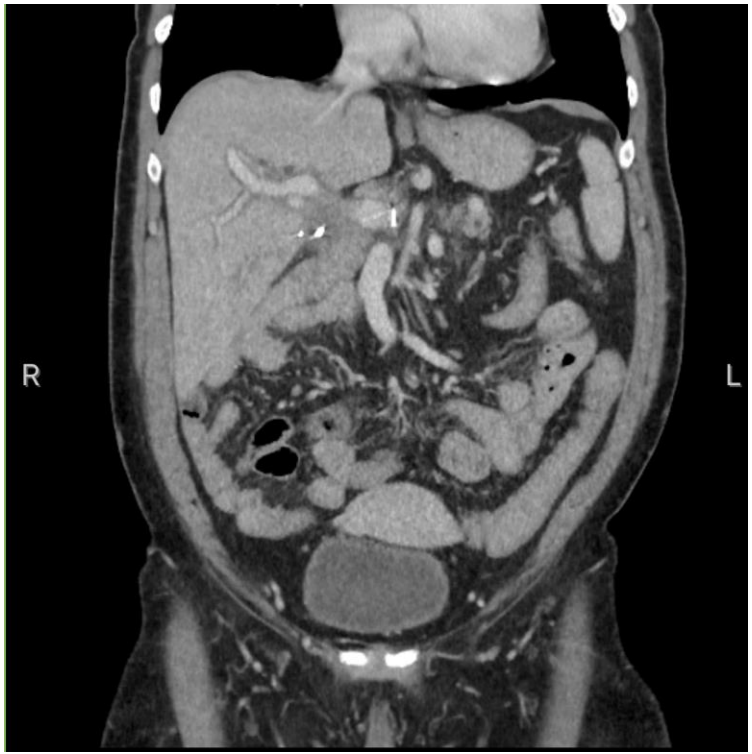


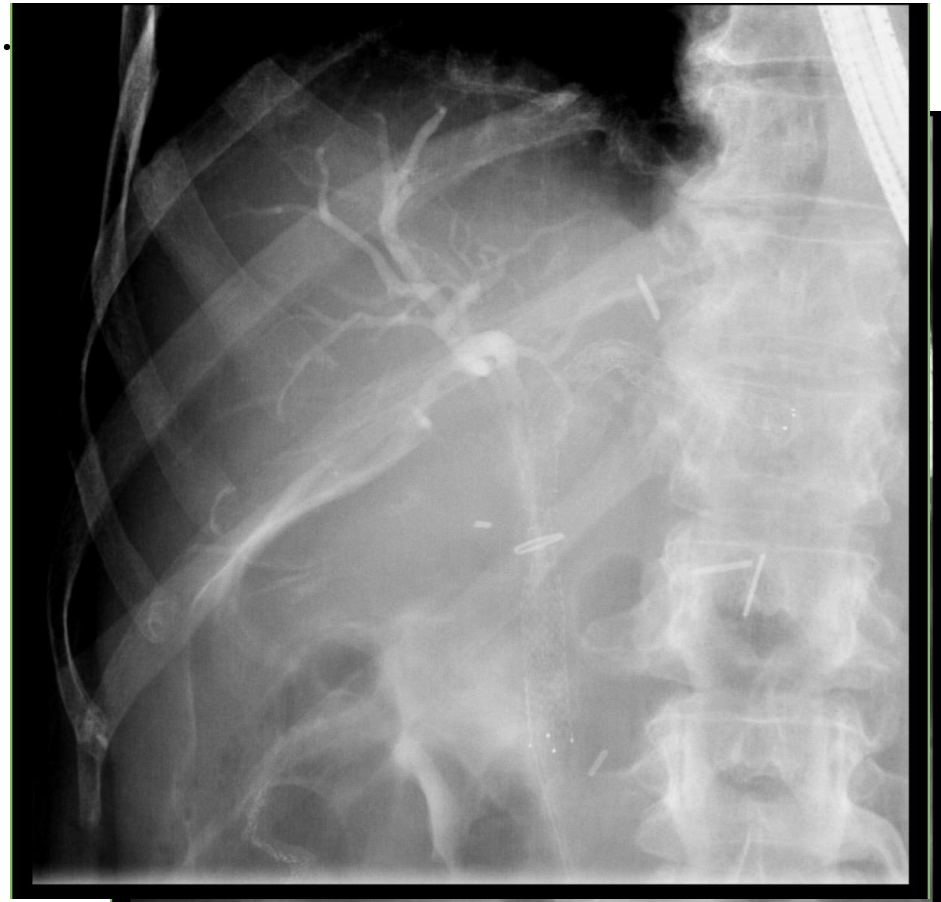
Bile leak in pt with RYGB.



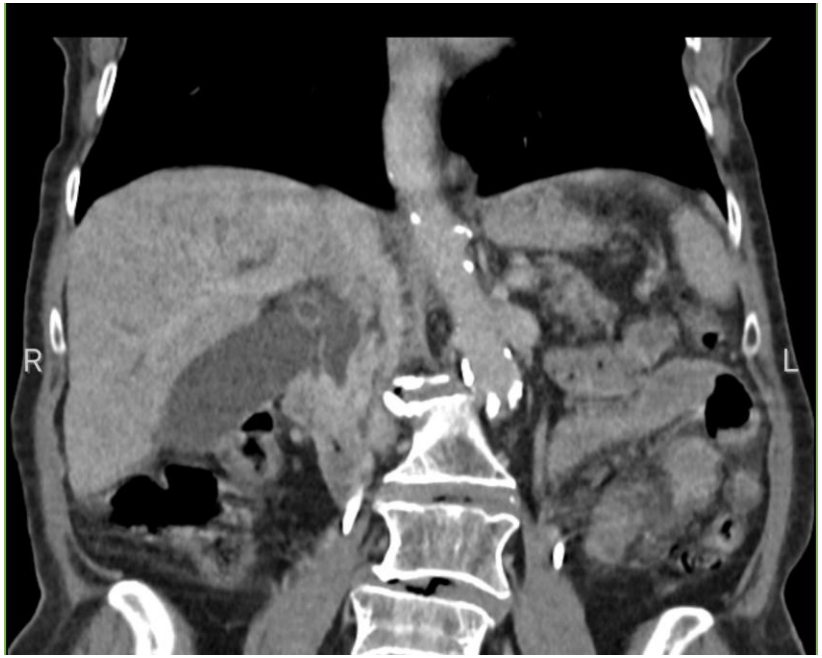


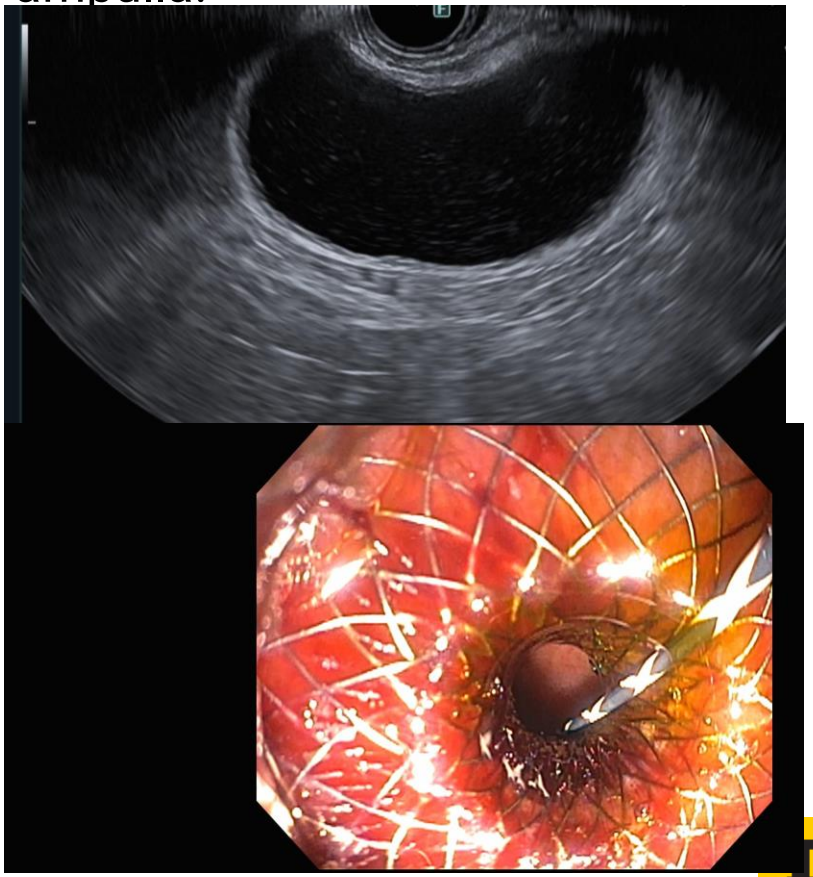
Post Whipple Pan. CA recurrence.



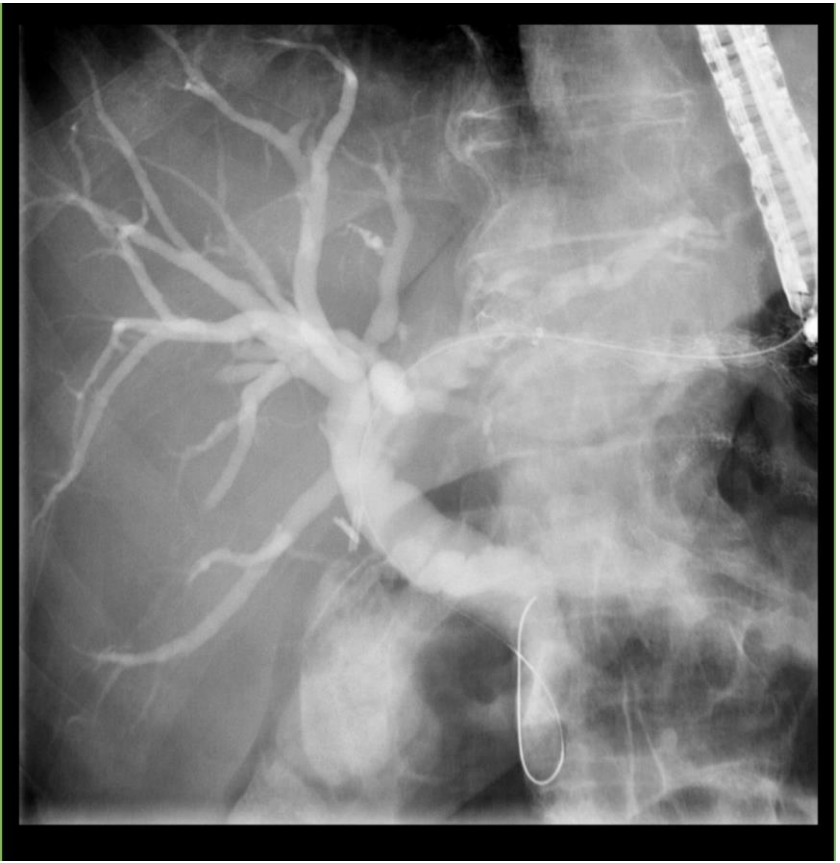


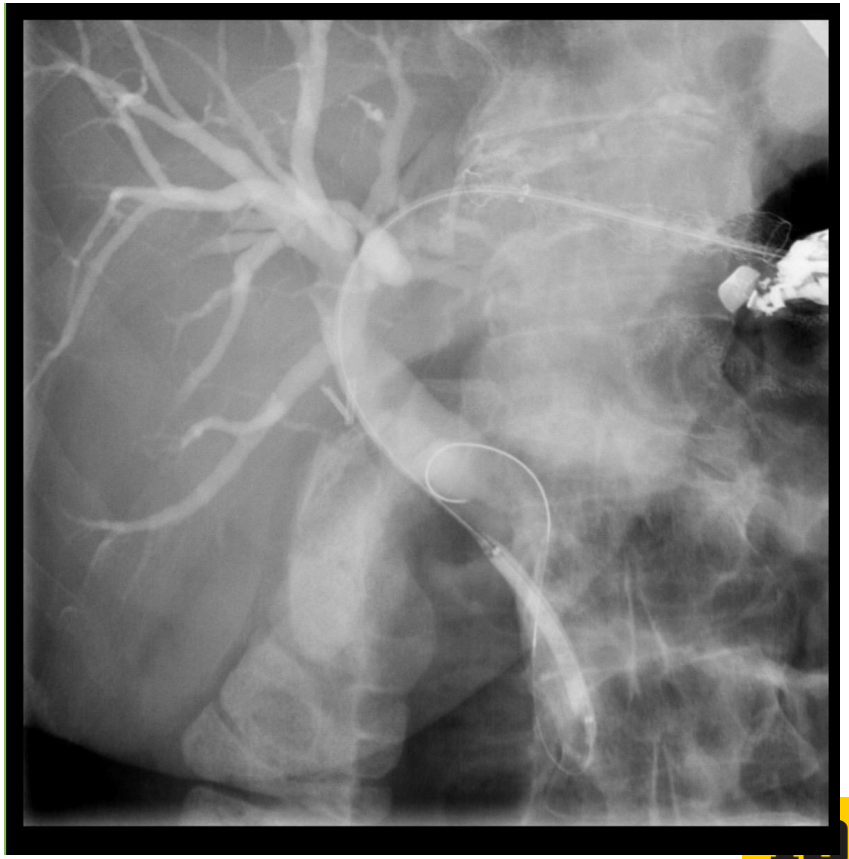
Pancreatic cancer with inaccessible ampulla.



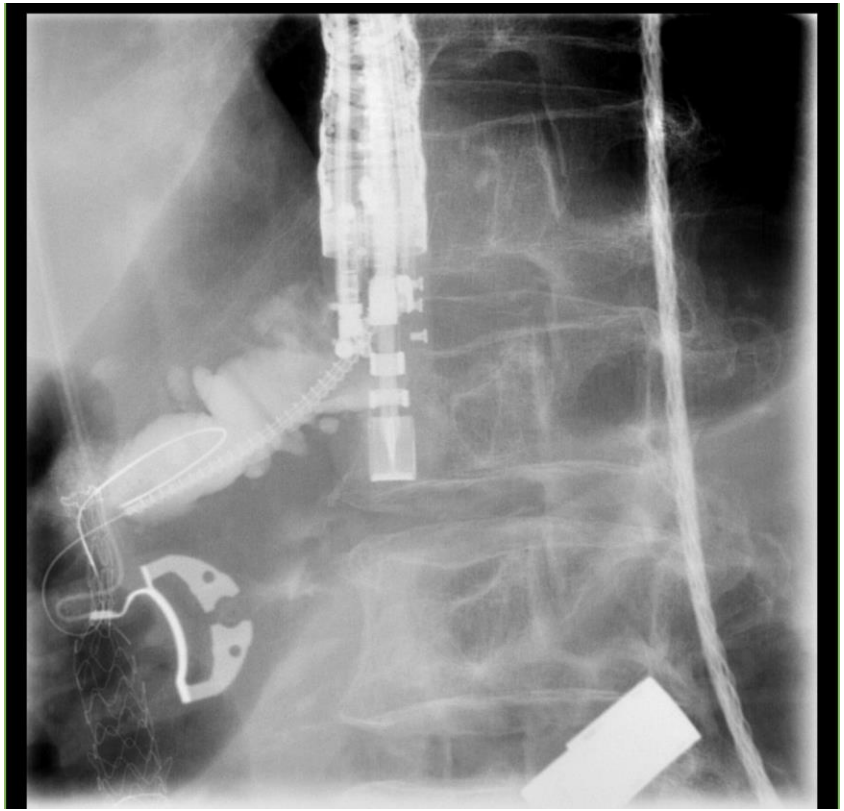


Ampullary stenosis in RYGB and Sleeve gastrectomy.





Large Pancreatic duct stones.



Picture Courtesy: Dr Mustafa Arain, Advent Health Orlando.

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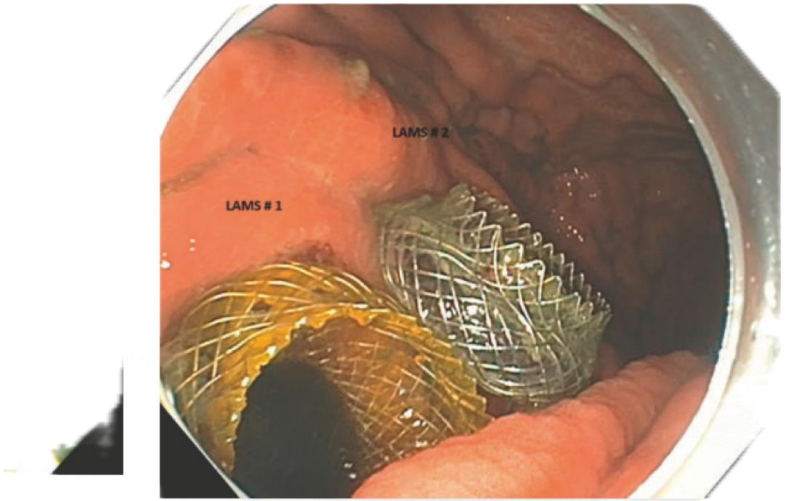
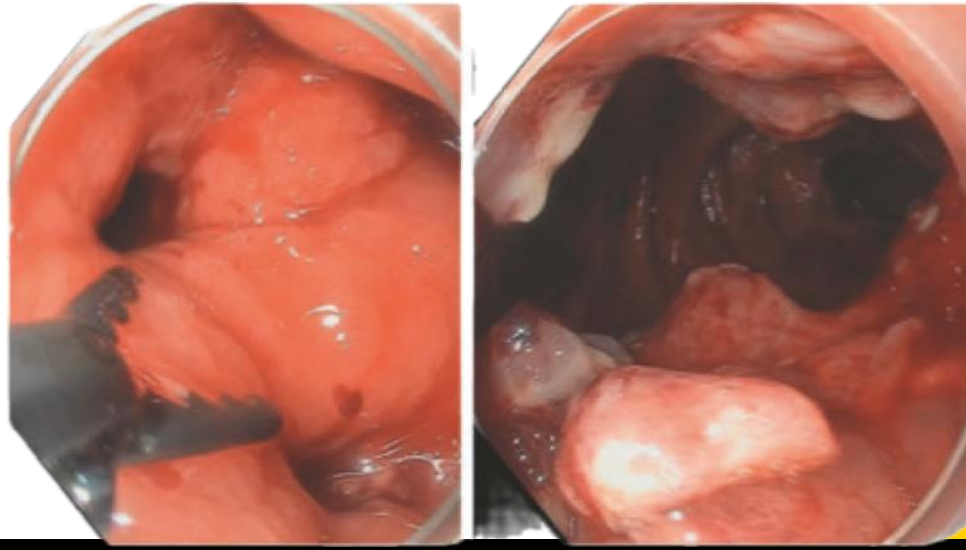
Durable endoscopic gastrojejunal anastomosis using the double-lumen apposing metal stent septotomy technique: Feasibility study

OPEN ACCESS

Authors
Kambiz Kadkhodayan[1], Mohamad Khaled Almujarkesh[2], Saurabh Chandan[1], Abdullah Abassi[1], Natalie Cosgrove[1], Maham Hayat[1], Mustafa A Arain[1], Deepanshu Jain[1], Sagar Pathak[1], Armando Rosales[1], Dennis Yang[1], Muhammad Khalid Hasan[1], Shayan Irani[3]





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UI Health Care first in nation to perform procedure using ARCHIMEDES biodegradable pancreatic stent

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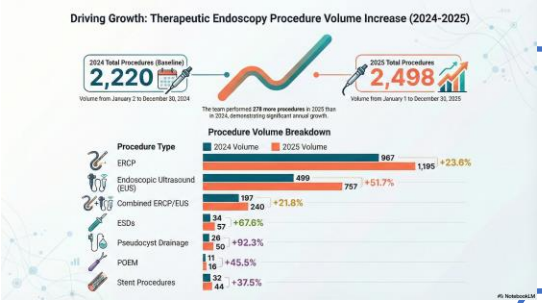
An incredible milestone at the University of Iowa! Dr. Abbasi, Dr. Ashat, and Dr. Hashimoto successfully completed three first-ever EUS-guided EndoDrill® GI cases for subepithelial lesions. Congratulations on this achievement!

These cases demonstrate the ability of EndoDrill® GI to deliver precise, high-quality core tissue samples in challenging lesions—supporting improved diagnostic confidence and better patient care.



- Biliary
- Pancreatic
- Dedicated HPB Clinic

- Diagnostic EUS
- Interventional EUS
- Liver Biopsy
- PPG

ERCP | EUS | Therapeutic Colonoscopy | Third Space Endoscopy

- EMR
- ESD

- POEM
- EFTR

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Thank you

Abdullah Abbasi, MD.

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