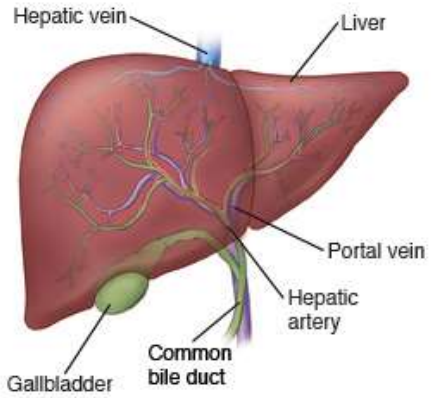
NEW YORK SOCIETY FOR GASTROENTEROLOGY & ENDOSCOPY
48th Annual
NEW YORK COURSE
December 12-13, 2024 • New York, NY

Endohepatology
Where Can EUS Take Us?



Christopher J. DiMaio, MD, AGAF, FASGE, NYSGEF

Regional Director of Endoscopy

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Disclosures

- None

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Agenda - Endohepatology

- Diagnosis and evaluation of liver disease
- Vascular interventions in portal hypertension
- Liver-related malignancy
- Liver-related fluid collections
- Bile duct and gallbladder disease

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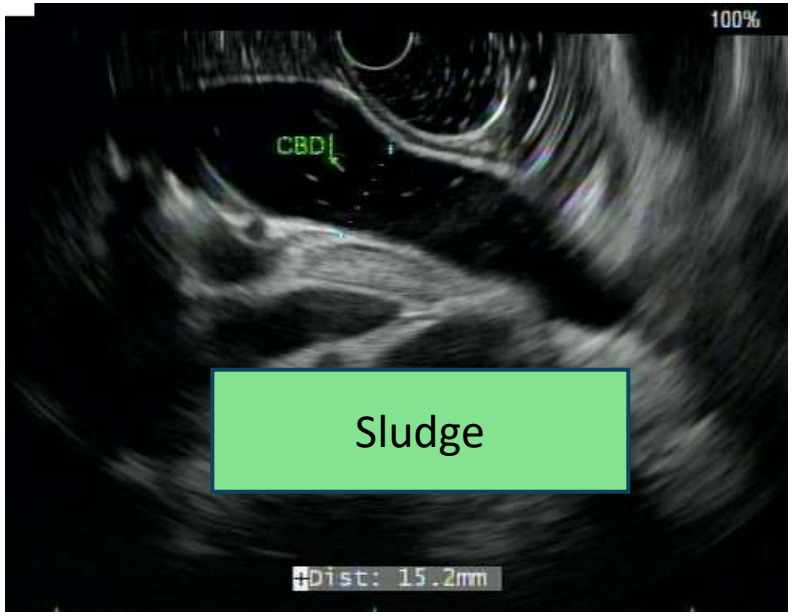
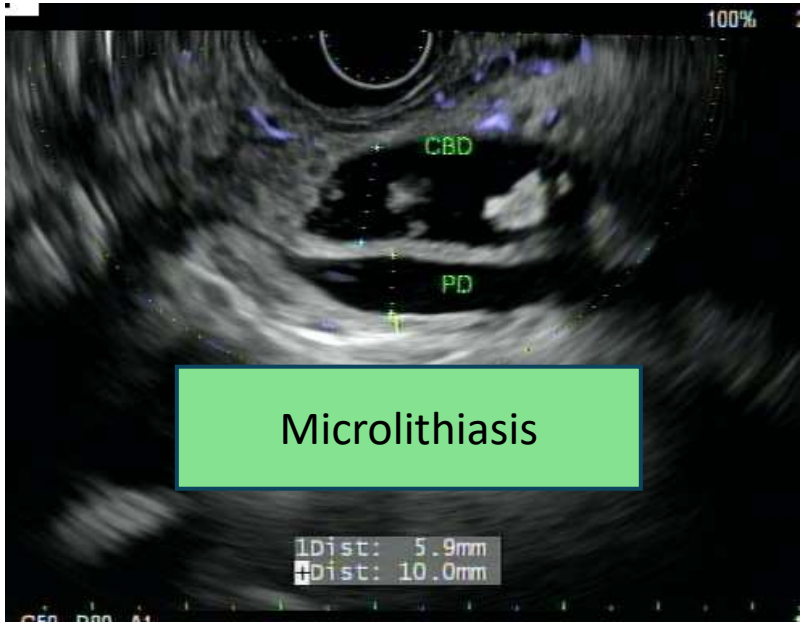
Role of EUS in the Evaluation of Liver Disease

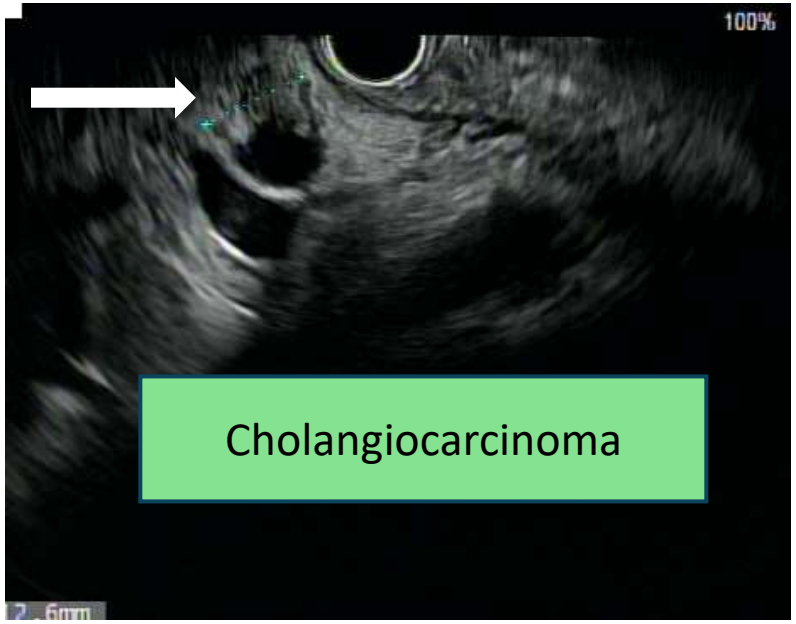
- Abnormal LFTs
- Liver biopsy
- Assessment of liver fibrosis



Sludge



Microlithiasis



Cholangiocarcinoma

Stones

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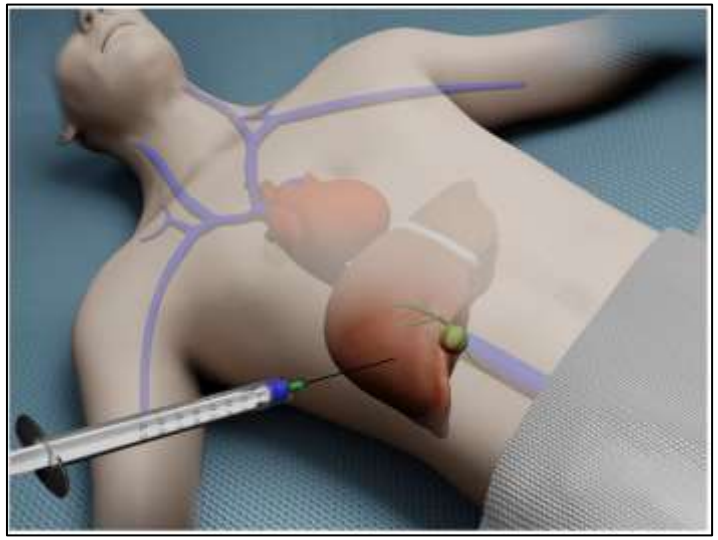
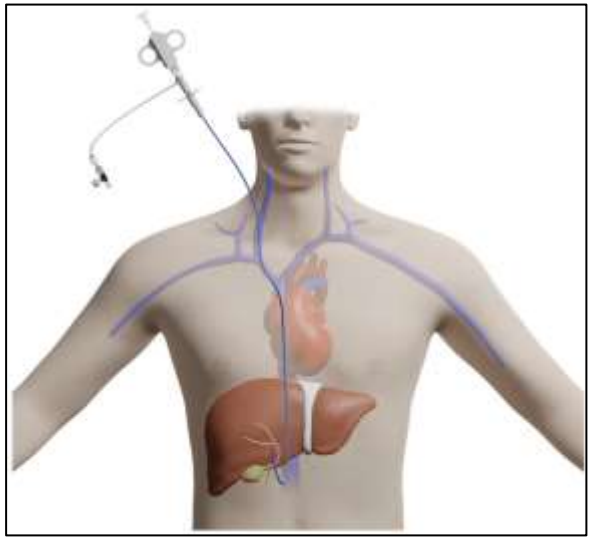
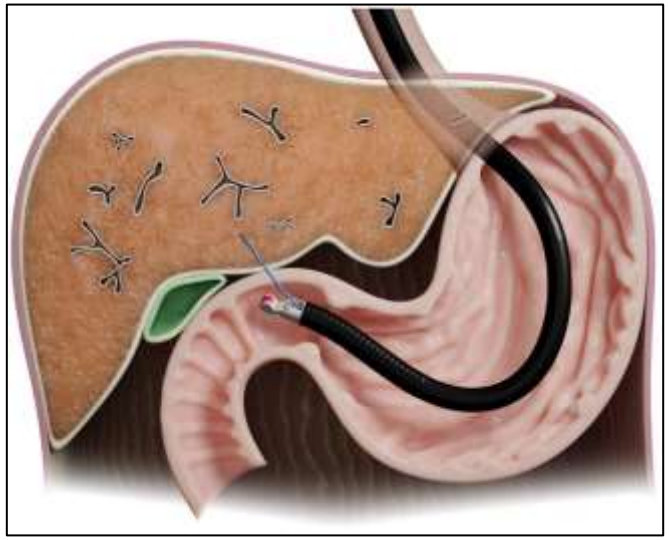
Liver Biopsy

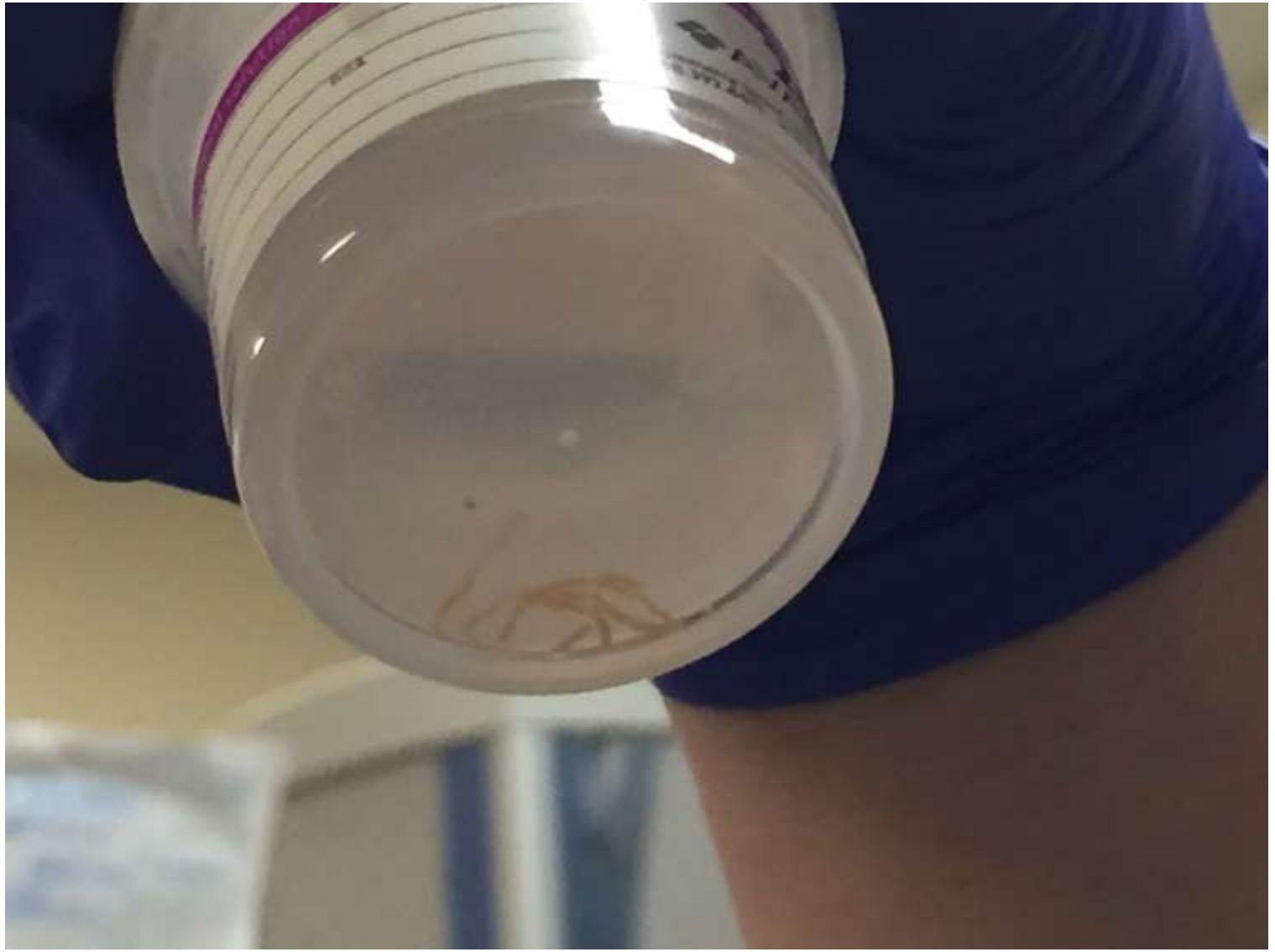






EUS-Guided Liver Biopsy

EUS-Guided Liver Biopsy



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Advantages of EUS-Liver Biopsy

Clinical

- Eliminates anxiety of the percutaneous approach
- Screen for portal hypertension
- Treatment of varices
- Other endohepatology applications (PPG)
- Other endoscopic interventions = cost effective
  - Diagnostic EGD
  - Colonoscopy
  - ERCP

Technical

- Obese patients
- Ascites
- Real-time visualization (avoid vessels, ducts)
- Access both right and left lobes
- Shorter recovery time, decreased pain
- Lower serious adverse events (0-2%)

EUS-LB vs Percutaneous vs Transjugular

- Systematic review, meta-analysis
  - 5 studies: EUS (n = 301), percutaneous (176), transjugular (179)
- No difference in diagnostic adequacy rates
- No difference in adverse events
  - EUS 16.46% (majority studies 2-4%) , Perc 12.24%, TJ 4.88%
- EUS vs perc: no difference in CPT and length of longest specimen
  - EUS with longer total specimen length
- EUS vs TJ: no difference in CPT, length longest specimen, total spec length

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McCarty TR, et al. Clin Endosc 2020

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Non-Invasive Measures of Liver Fibrosis

Serologic

- Indirect
  - Platelet count
  - Coagulation s
- Panels
  - AST:Platelet r
  - FibroSure
  - FIB-4 index
  - Hepascore
  - NAFLD fibrosis score

- Limited recognition of intermediate stages of fibrosis
- VCTE and SWE may be impeded in patients with obesity (may overestimate degree of fibrosis)

Imaging

- Real time elastography
  - of tissue by ultrasound probe
  - stography (FibroScan)
  - e shear waves
  - depth
  - Focused ultrasound beams to produce shear waves
  - Greater anatomic detail across larger area, precision
- Magnetic resonance elastography

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EUS-Guided Shear Wave Elastography

- 62 pts with MASLD/obesity
- EUS w/SWE + EUS-liver biopsy

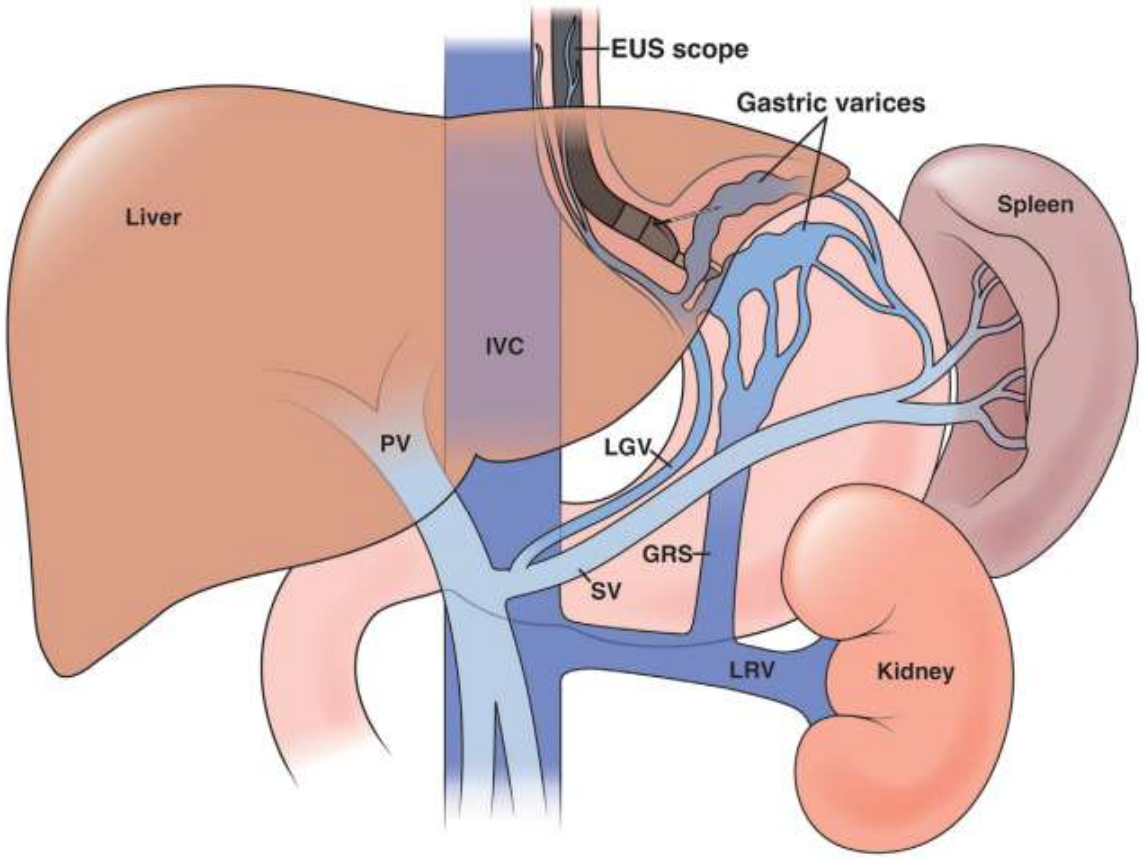
- SWE superior to FIB-4 in identifying significant fibrosis (AUC 0.87 vs 0.61) and advanced fibrosis (AUC 0.93 vs 0.63)

- SWE superior to VCTE in predicting advanced fibrosis (p=0.0067) and cirrhosis (p=0.0022)

Wang TJ, et al. GIE 2024

EUS-Guided Vascular Interventions

- Portal pressure measurement
- Gastric variceal embolization



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ORIGINAL ARTICLE: Clinical Endoscopy

EUS-guided portal pressure gradient measurement with a simple novel device: a human pilot study

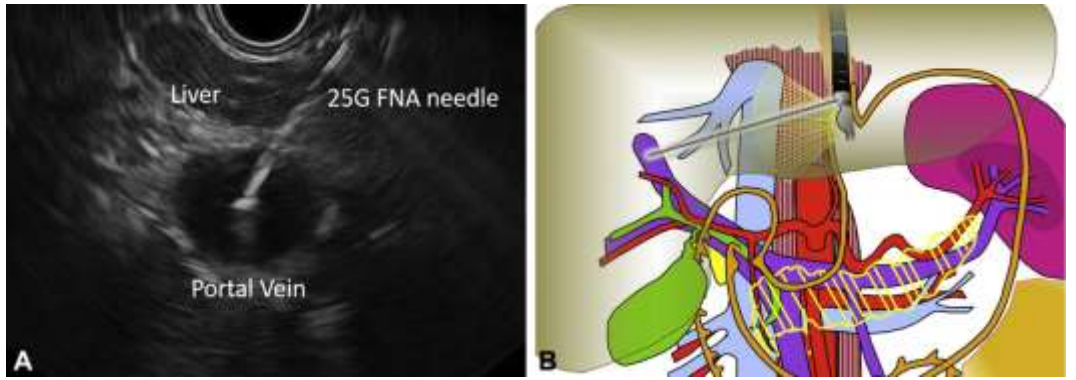
Jason Y. Huang, FRACP,[1] Jason B. Samarasena, MD,[1] Takeshi Tsujino, MD, PhD,[1] John Lee, MD,[1] Ke-Qin Hu, MD,[1] Christine E. McLaren, PhD,[2,3] Wen-Pin Chen, MS,[3] Kenneth J. Chang, MD[1]

Irvine, California, USA

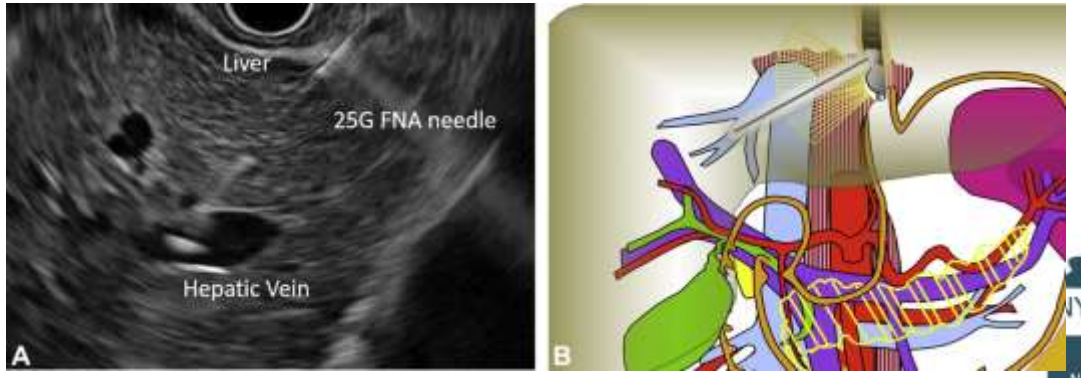
- 25 gauge FNA needle

- EUS-guided direct pressure measurement
  - Portal vein (intrahepatic portion near PV bifurcation)
  - Hepatic vein
  - IVC (if hepatic vein not accessible)

EUS-guided portal venous pressure measurement



EUS-guided hepatic vein pressure measurement



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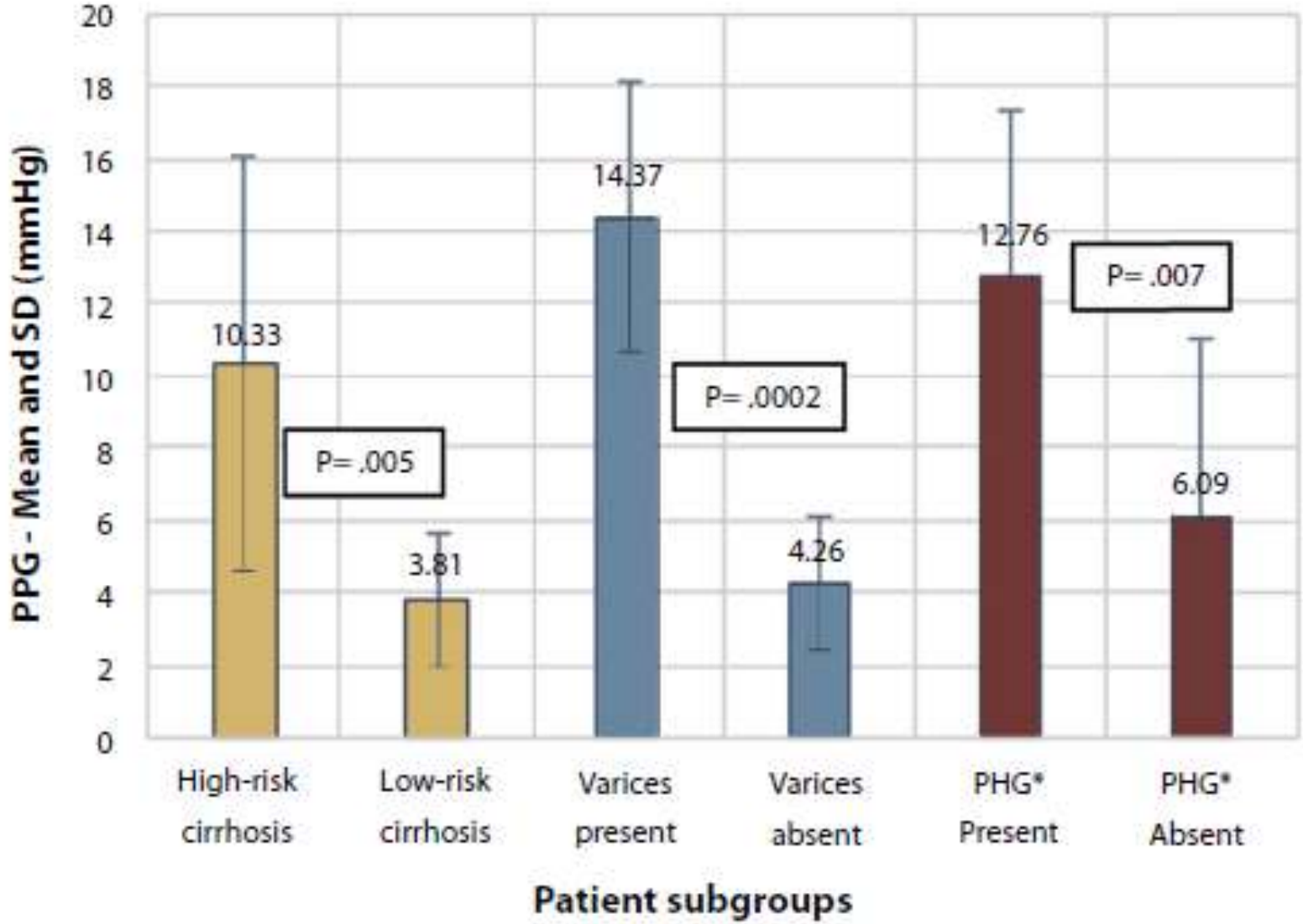
EUS-PPG Subgroup Analysis



* Denotes Portal Hypertensive Gastropathy

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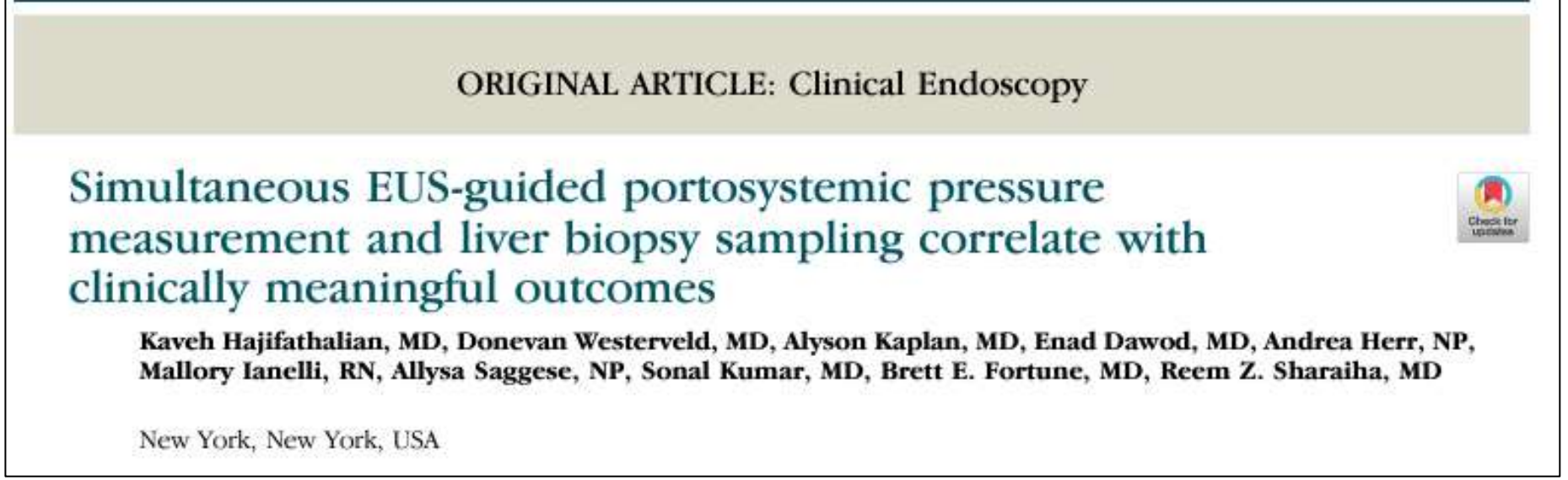
Transjugular vs EUS-PPG

	Transjugular	EUS-PPG
Technical	Fluroscopy	Real-time imaging, color Doppler
Measurement	Wedged hepatic vein pressure (surrogate for PV pressure) Limitations in presinusoidal conditions	Direct measure of portal vein and hepatic vein pressures (true gradient)
Adverse events	Vascular injury, bleeding, arrhythmias, contrast allergy, renal function, radiation exposure	Rare
Repeat sessions	Impractical	Easy
Simultaneous interventions	Liver biopsy	Diagnostic EGD/EUS, liver biopsy, treatment of varices, ERCP, colonoscopy



ORIGINAL ARTICLE: Clinical Endoscopy

Simultaneous EUS-guided portosystemic pressure measurement and liver biopsy sampling correlate with clinically meaningful outcomes

Kaveh Hajifathalian, MD, Donevan Westerveld, MD, Alyson Kaplan, MD, Enad Dawod, MD, Andrea Herr, NP, Mallory Ianelli, RN, Allysa Saggese, NP, Sonal Kumar, MD, Brett E. Fortune, MD, Reem Z. Sharaiha, MD

New York, New York, USA

- Prospective, 24 pts
- EUS-PPG + EUS-LB at same session

- Technical success: EUS-PPG 96%, EUS-LB 100%

- Significant association between PPG and liver stiffness as measured on transient elastography (p=.011) and Fibrosis-4 score (p=.026)
- No significant correlation between fibrosis stage (histology) and measured PPG
- EUS-PPG was predictive of clinically evident portal hypertension
- Adverse event: 1 mild abdominal pain

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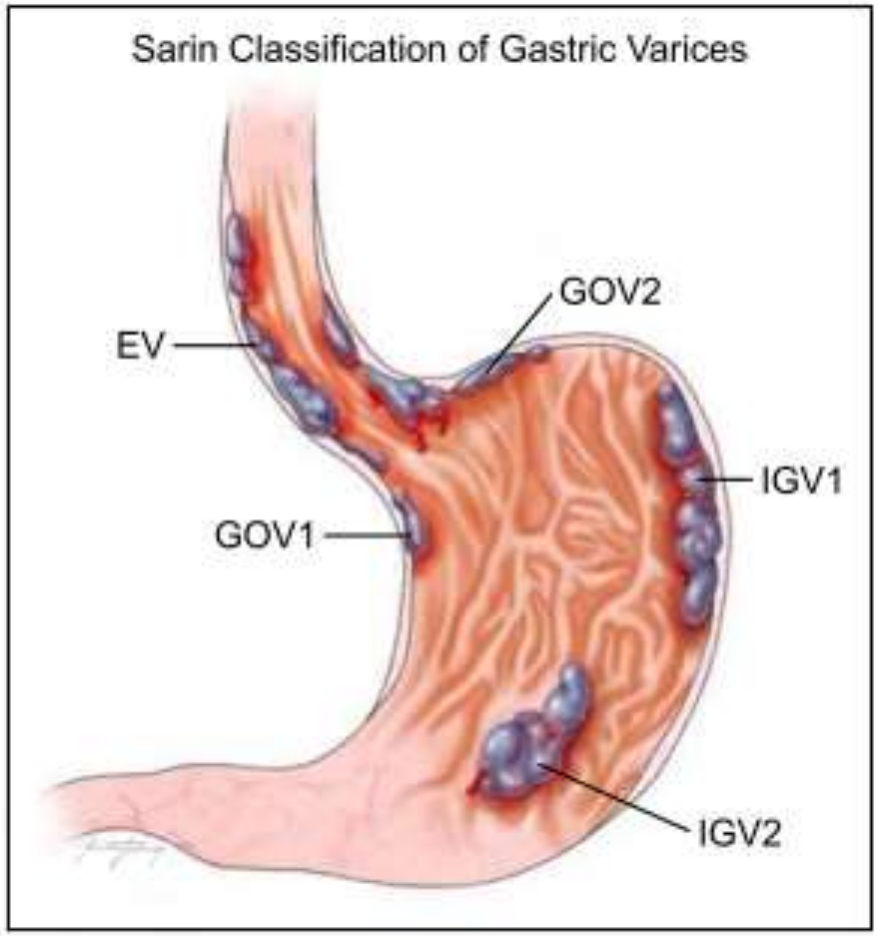
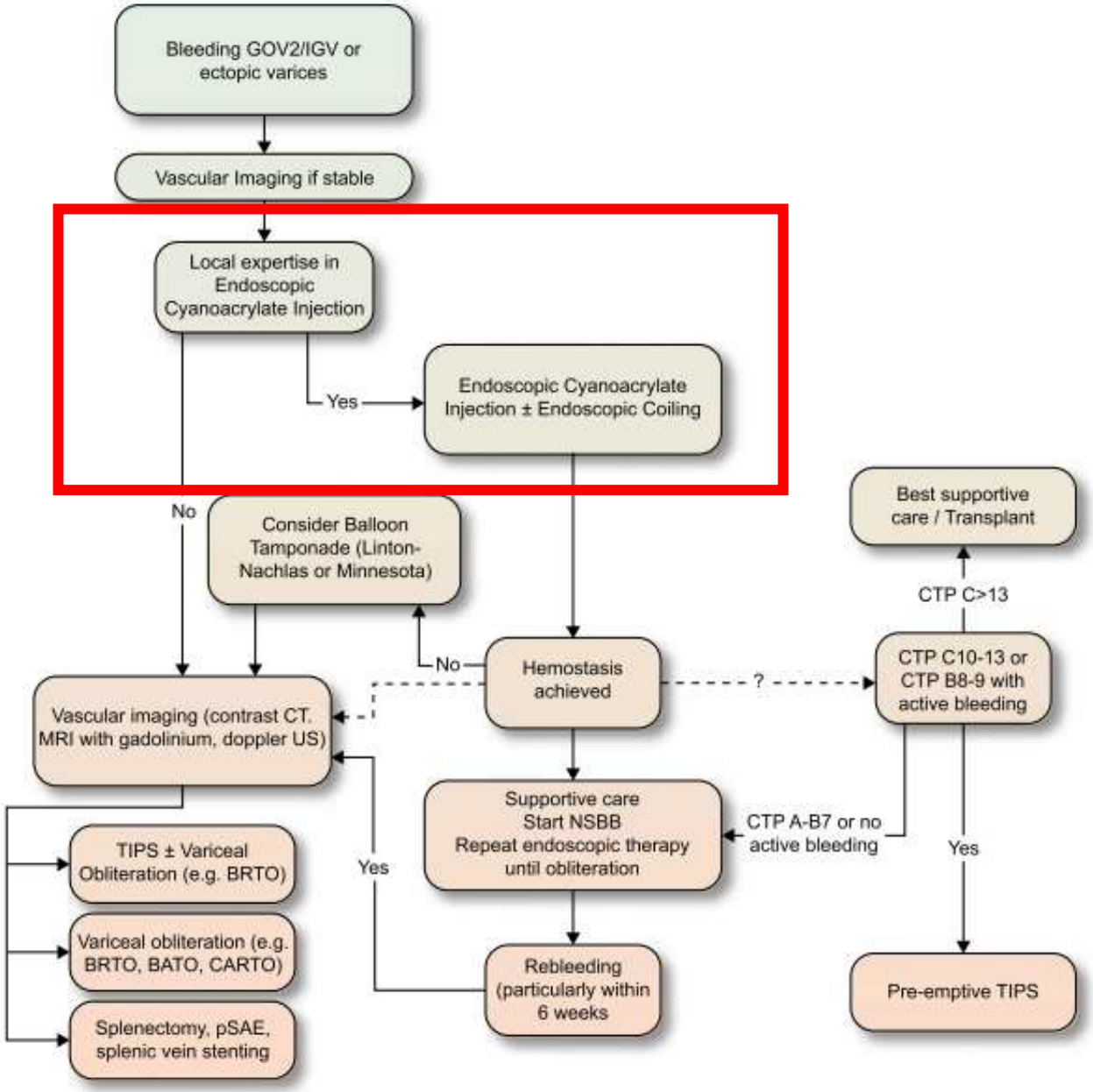
Gastric Varices





AASLD Clinical Guidelines 2024

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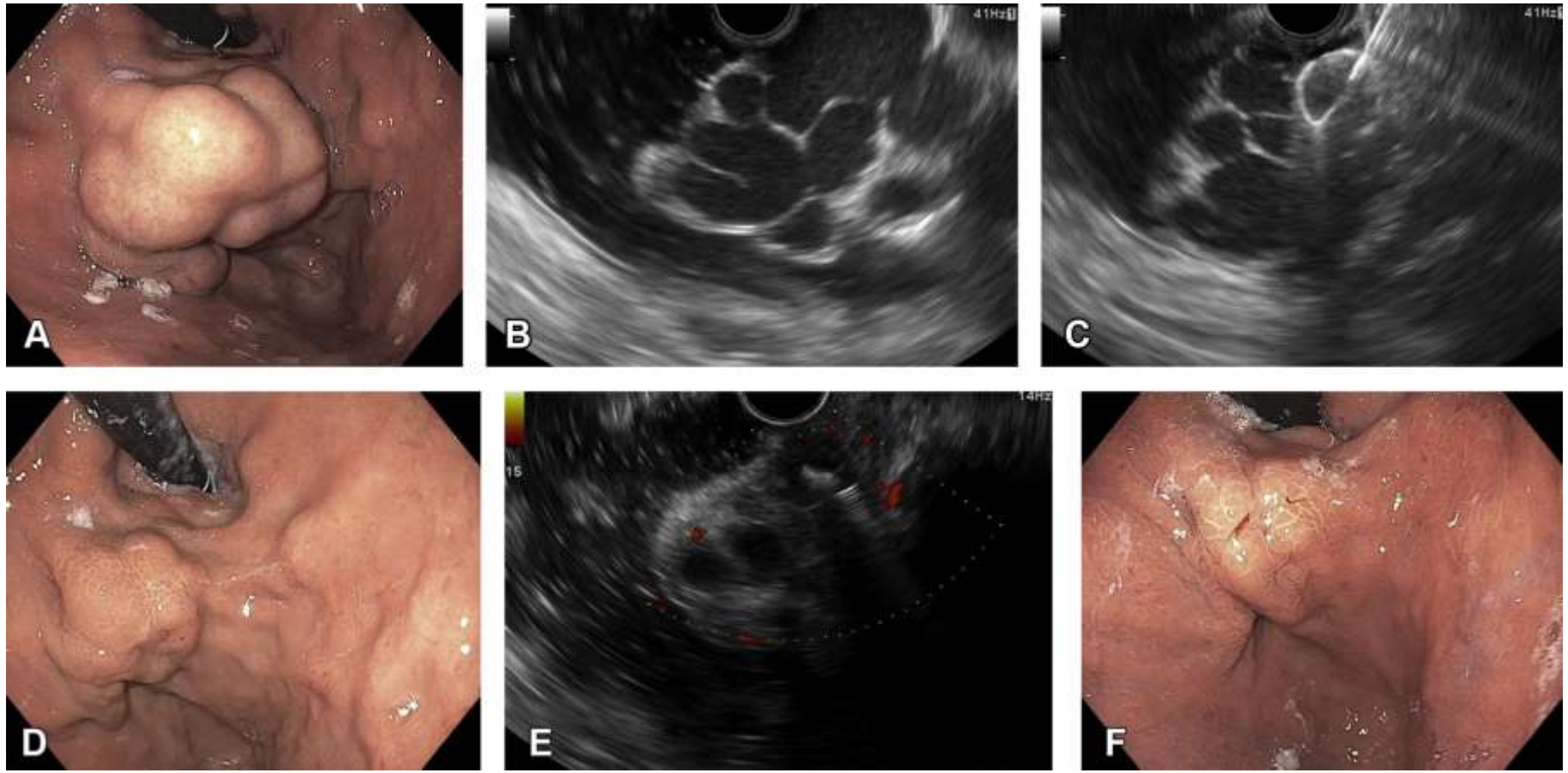
Injection Therapy for Gastric Varices

- Direct endoscopic injection of glue
  - 2-octyl-cyanoacrylate (Dermabond)
  - N-butyl-2-cyanoacrylate (Histoacryl)
  - Difficult retroflexion position
  - Difficult to confirm if glue within vessel (or just submucosa)
  - Most units do not have portable Doppler probe

- EUS-guided approach
  - Scope is straight
  - Direct visualization of vessels
  - Target “perforator” vessels
  - Confirm direct intravascular injection
  - Confirm vessel obliteration with color Doppler

- Coils
  - Scaffold for intravascular clot formation
  - Facilitates glue polymerization to potentially minimize embolic event

EUS-Guided Coil + Glue Injection



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Bhat YM, et al. GIE 2016.

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Challenges with Glue

- Scope damage from glue
  - Glue with rapid polymerization
  - Can slow it down by using lipiodol
  - But slower polymerization may increase risk of embolism
- Risk of thromboembolism
  - Pulmonary or cerebral thromboembolism
  - 1-3% risk (8% risk in prospective study)
  - Patent foramen ovale (present in 25% people) is risk factor
  - Can be related to type of glue, volume, speed of injection
  - Use coils with glue
- Off-label use

Optimal Method?

- **DEI glue vs EUS-FNI glue[1]**
  - Rebleeding: 23.7% vs 8.8% (p=0.045)
  - Adverse events: 17.5% vs 20.3% (NS)

- **EUS coils/glue vs EUS coils alone[2]**
  - Immediate obliteration of vessels: 86.7% vs 13.3% (p < 0.001)
  - Rebleeding: 3.3% vs 20% (p=0.04)
  - Free of repeat intervention: 83.3% vs 60% (p=0.01)

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Bick BL, et al. Surg Endosc 2019
Robles-Medranda C, et al. Endoscopy 2020

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Emerging EUS-Guided Vascular Interventions

- Injection of ectopic varices
- Injection of rectal varices
- Splenic artery embolization
- Treatment of arterial bleeding
- Pseudoaneurysms

- Portal vein embolization
- Portal vein stent placement

Bazarbashi AN, et al. VideoGIE 2020
Rana SS, et al. Endosc Ultrasound 2021
Zhang ZG, et al. GIE 2022
Rai P, et al. Endosc Int Open 2018
Maharshi S, et al. Endosc Int Open 2020
Matthes K, et al. Acta Gastroenterol Belg 2005
Vazquez-Sequerios E, et al. World J Gastrointest Endosc 2010
Park TY, et al. Endosc Ultrasound 2018
Park TY, et al. Endosc Ultrasound 2016

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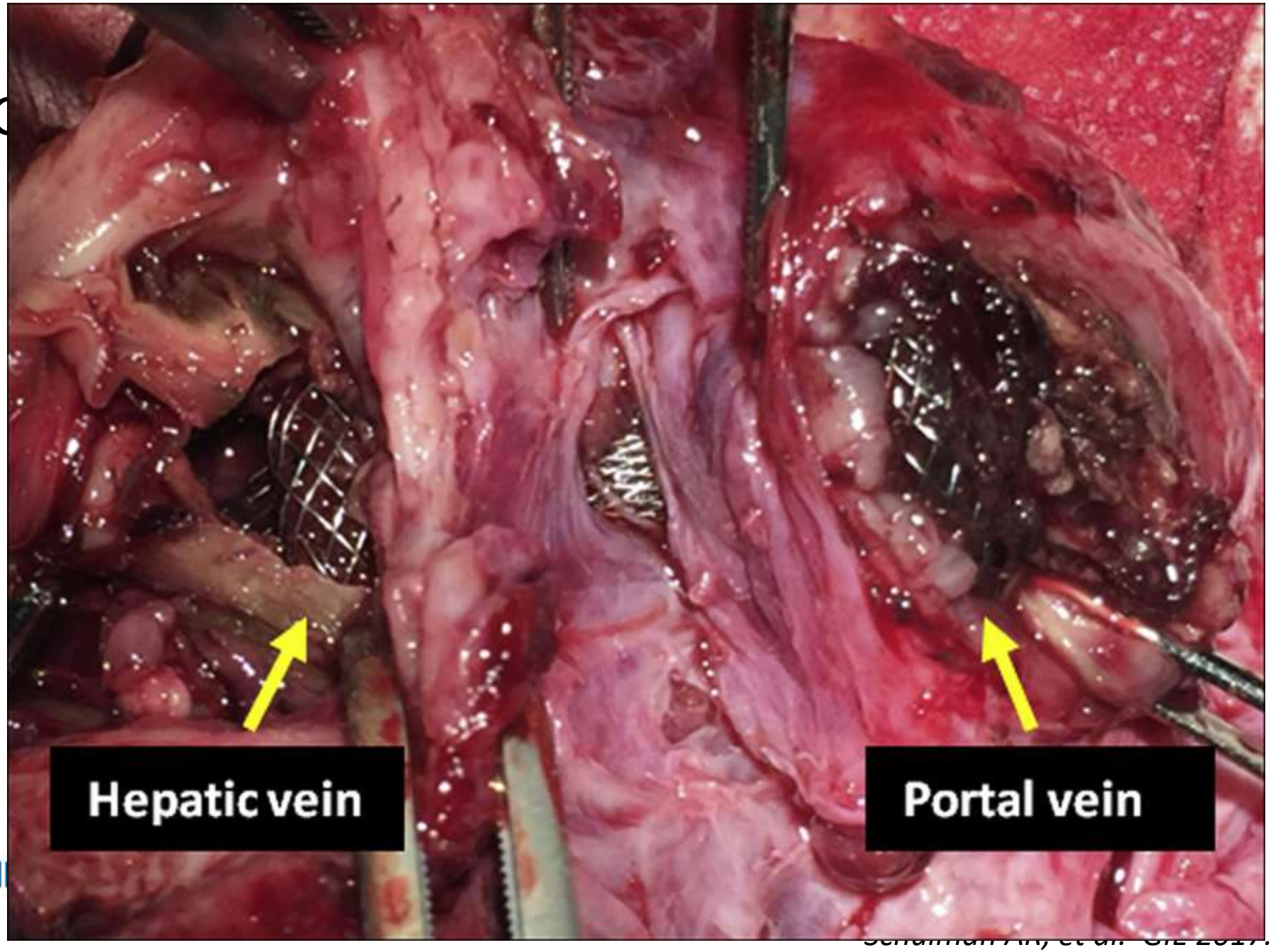
EUS-C



Schulman AR, et al. GIE 2019.

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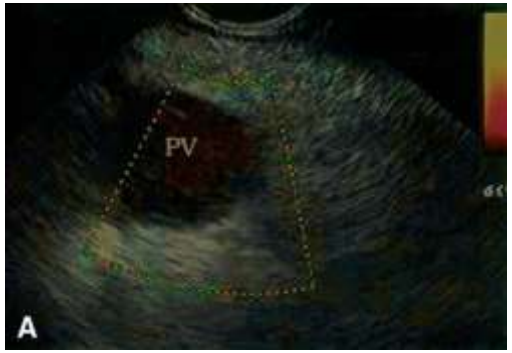
Role of EUS in Management of Liver-Related Malignancy

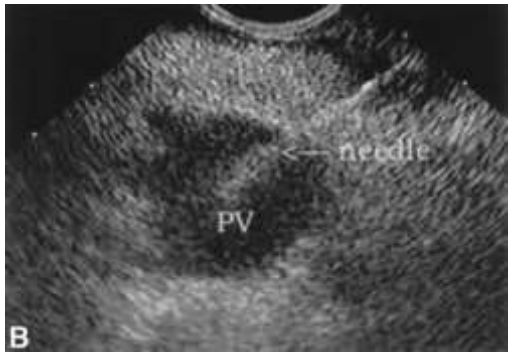
- Diagnosis of liver mets
- Diagnosis of occult malignancy
- Tumor ablation

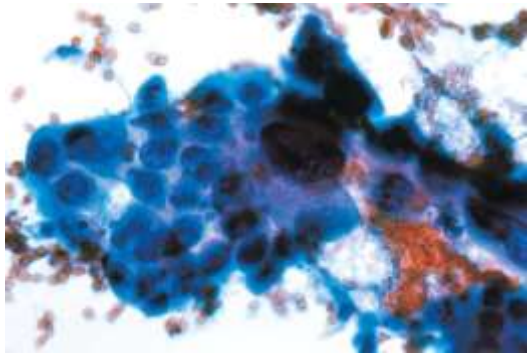
EUS-FNA of Sub-Centimeter Liver Met

EUS-FNA of Venous Thrombosis for Staging of HCC

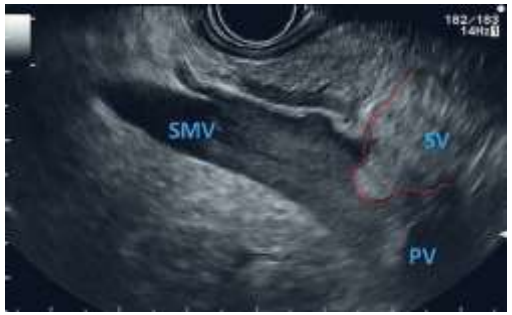
- Portal vein thrombosis

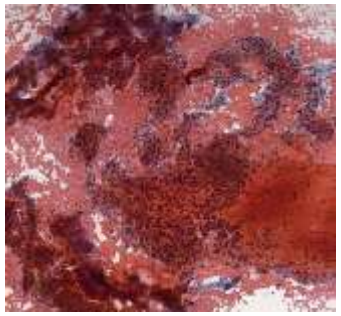






- Splenic vein thrombosis





Lai R, et al. GIE 2004.
Delconte G, et al. Endoscopy 2016.

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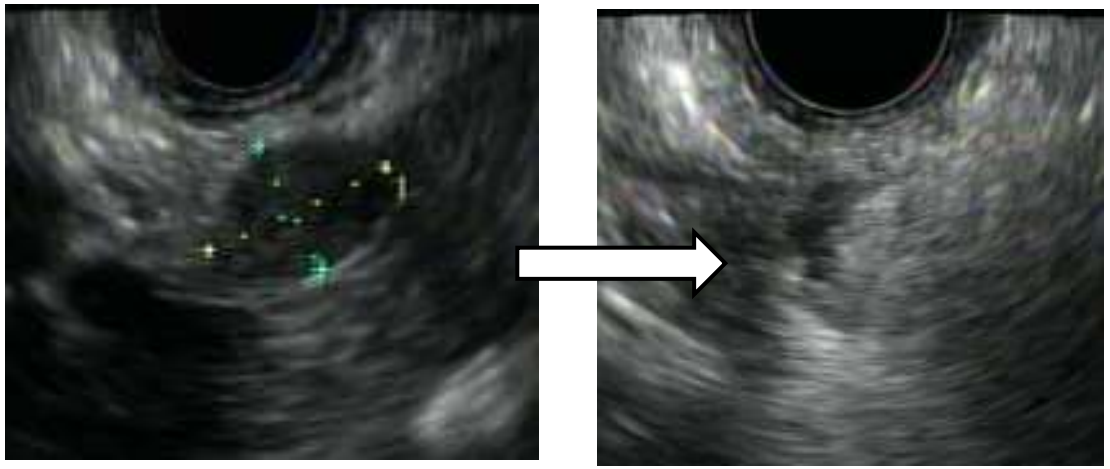
EUS-Guided Ablation of Liver Tumors

- Ethanol injection
- Thermal therapy
  - Radiofrequency ablation
  - Cryoablation
  - Laser
  - High-intensity focused ultrasound
- Photodynamic therapy
- Brachytherapy
- Fiducial placement



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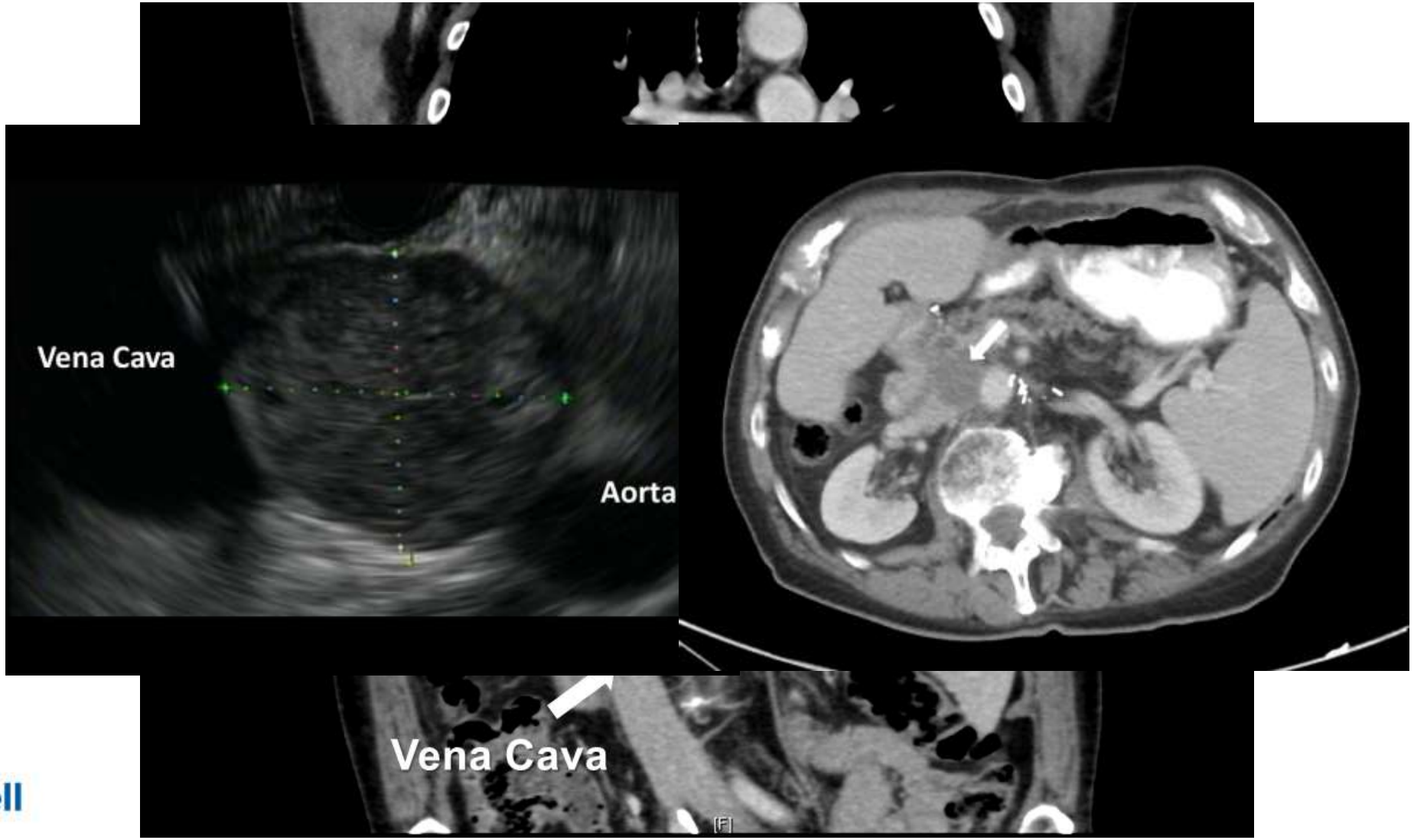
Ethanol Ablation – *Single HCC Met*



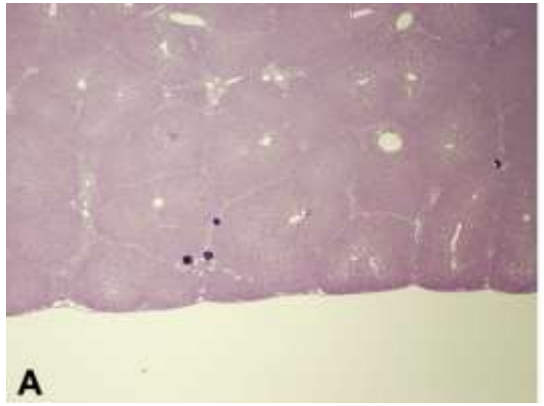
DiMaio CJ, et al. Journ Interv Gastro 2014.

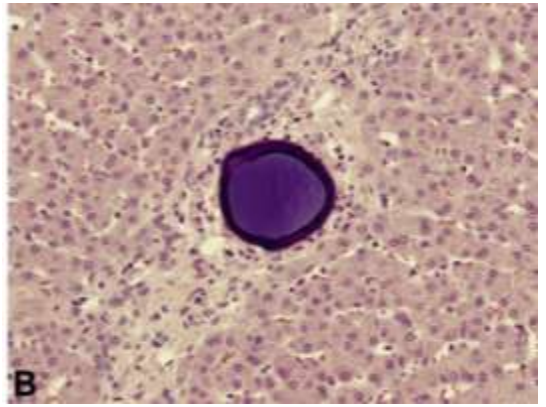
EUS-Guided Chemotherapy – *Liver Mets*

- Portal vein injection
- Porcine model

- Irinotecan microbeads, doxorubicin, microbeads, albumin-bound paclitaxel nanoparticles
- Compared w/systemic admin

- EUS-guided PV injection
  - Up to 60% higher hepatic concentration
  - Up to 50% lower systemic concentration
  - Doxorubicin had 30x ↓ in cardiac levels





Faigel DO, et al. GIE 2016.

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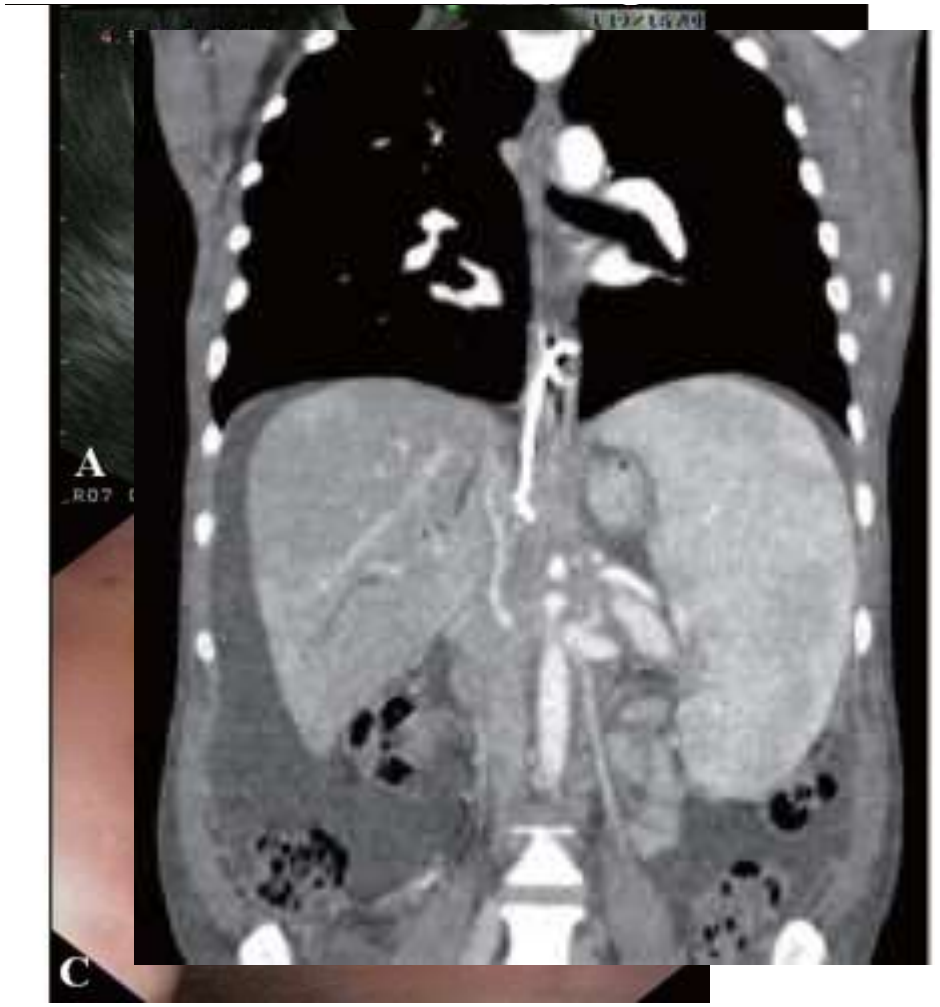
EUS-Guided Drainage Liver Collections

- Liver abscess
- Bilomas
- Simple hepatic cysts



Keohane J, et al. J Interv Gastroenterol 2011.

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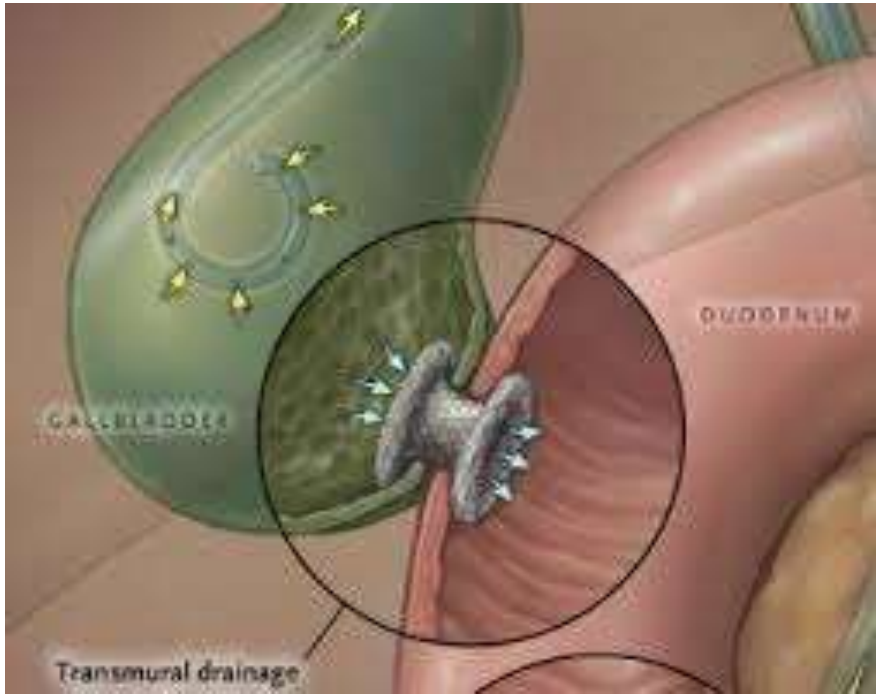
EUS-Guided Biliary Interventions

- Evaluation of unexplained biliary dilation
- Evaluation of indeterminate biliary strictures
- EUS-guided biliary drainage
- EUS-guided gallbladder drainage



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Summary

- **Evaluation of liver disease**
  - Abnormal LFTs
  - Liver biopsy
  - Elastography
- **Cirrhosis**
  - Portal pressure gradient
  - Gastric variceal embolization
- **Malignancy**
  - Tissue sampling
    - Liver mets
    - Lymph nodes
    - Occult disease
  - Tumor ablation
  - FNI chemotherapy (?)
- **Drainage**
  - Abscess
  - Bilomas
  - Hepatic cysts
- **Biliary interventions**

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