

North Carolina Society of Gastroenterology 2024 Annual Meeting



“Everything EndoHepatology!”

Jason B. Samarasena MD MBA FACG, AGAF
Associate Chief – Division of Gastroenterology and
Hepatology

Program Director – Interventional Endoscopy Program
Professor of Medicine

H. H. Chao Digestive Health Institute
UC Irvine Medical Center

Joint Providership



American Society for
Gastrointestinal Endoscopy



Background

- Growing number of endoscopic procedures that are pertinent to liver patients, particularly EUS
- We have termed this area of integration or overlap of endoscopic procedures within the practice of hepatology

Interventional Endoscopic
Ultrasound

GUEST EDITOR
Kenneth J. Chang, MD

GASTROINTESTINAL
ENDOSCOPY CLINICS
OF NORTH AMERICA



CONSULTING EDITOR
Charles J. Lightdale, MD

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Endo-Hepatology: A New Paradigm

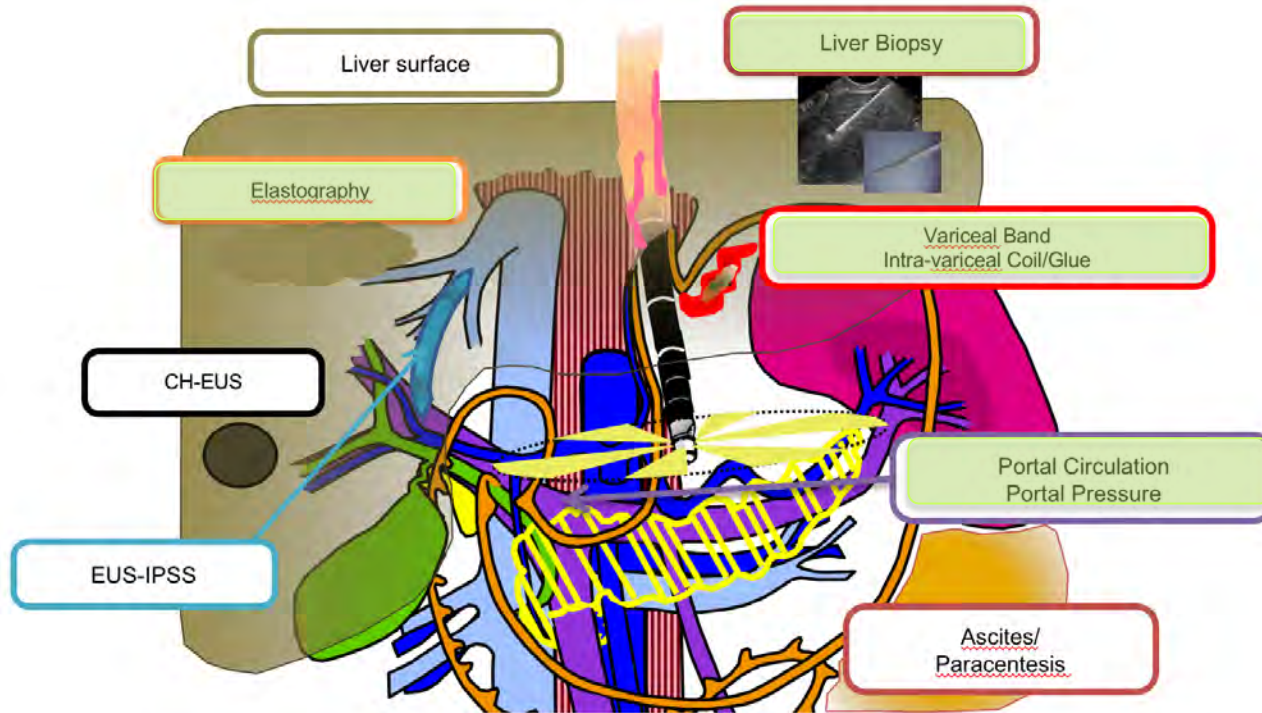
Kenneth J. Chang, MD^{a,*}, Jason B. Samarasena, MD
Takuji Iwashita, MD, PhD^{b,c}, Yosuke Nakai, MD, PhD^{a,d},
John G. Lee, MD^a

Definition:

**The integration of Endoscopy within
the practice of Hepatology**

“..making the liver cool again”

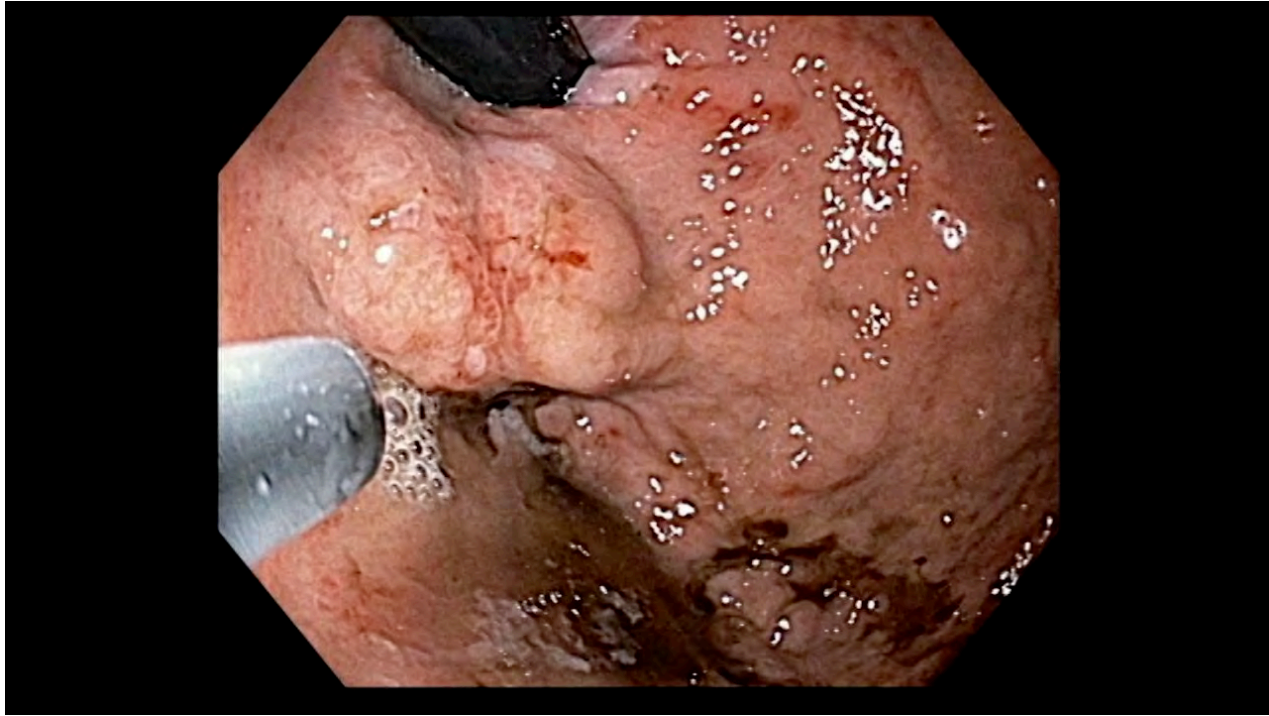
EndoHepatology



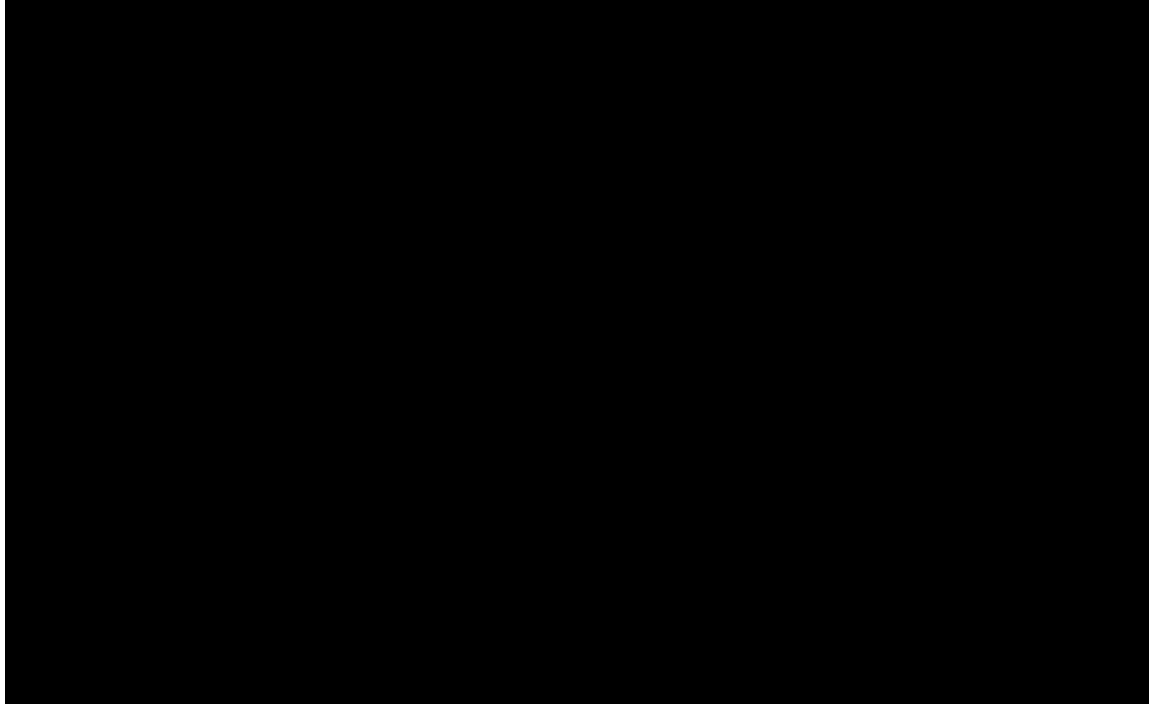
CH-EUS = contrast enhanced harmonic EUS
EUS-IPSS = intrahepatic porto-systemic shunt

EUS-guided Interventions for variceal bleeding

Gastric Varices



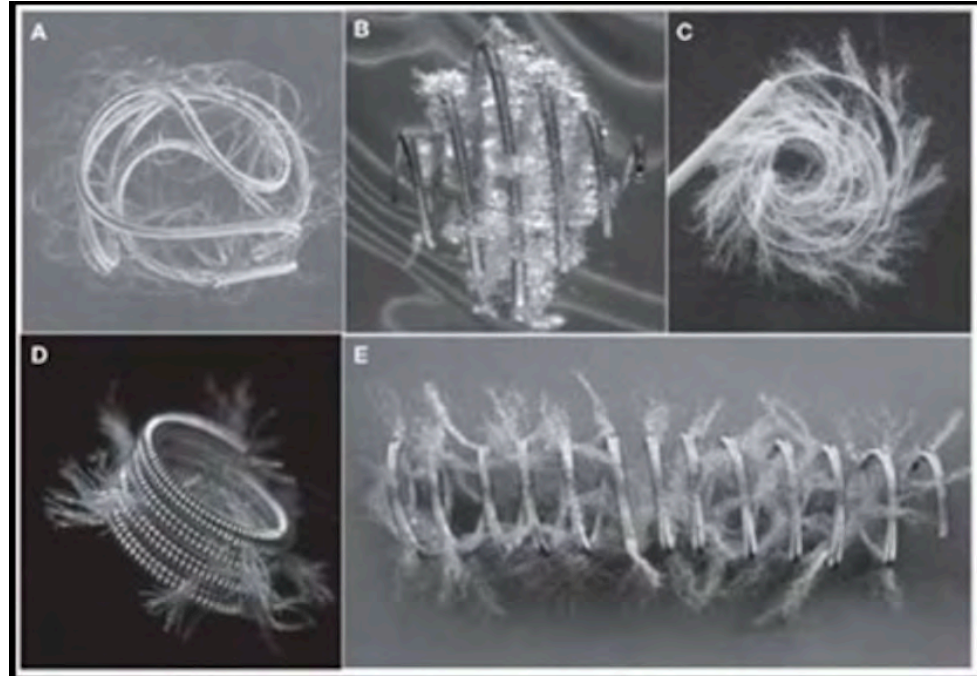
EUS-guided glue injection for gastric variceal bleeding



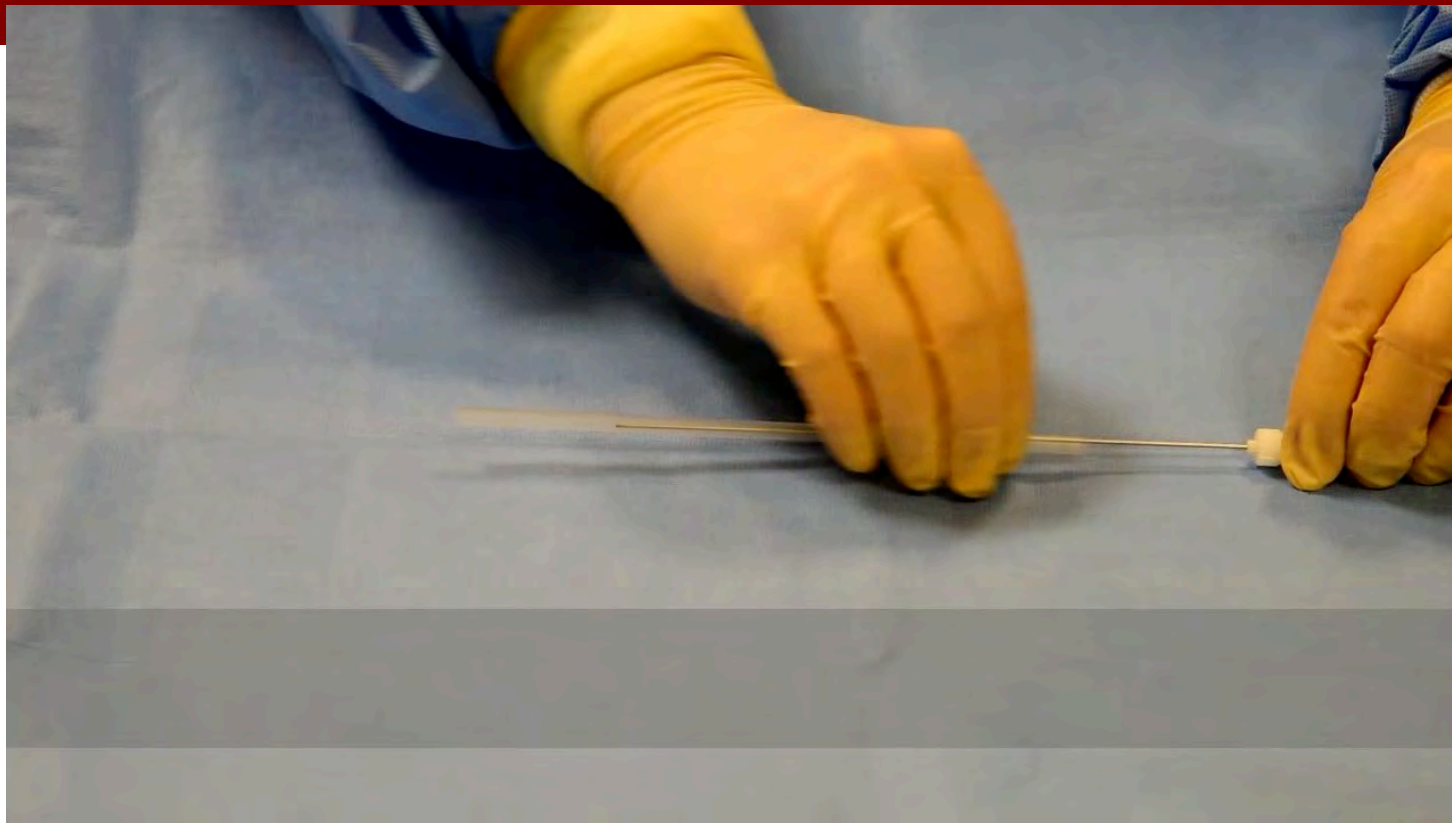
- Better assessment of size, morphology than EGD
- Doppler - evaluate flow
- Does not require luminal visualization
- More accurate delivery of glue
- Disadvantages: Systemic glue embolization

EUS Guided Coil Embolization + Glue

- Embolization coils used to serve as a scaffold for glue to reduce risk of glue embolization systemically
- Coils are made of soft platinum with synthetic fibers to promote clot formation
- 0.018in coils are compatible with 22G EUS needle
- 0.035in coils are compatible with 19G EUS needle



Embolization Coil Loading



Courtesy of Dr. Marvin Ryou, Harvard

EUS GUIDED COIL EMBOLIZATION + GLUE



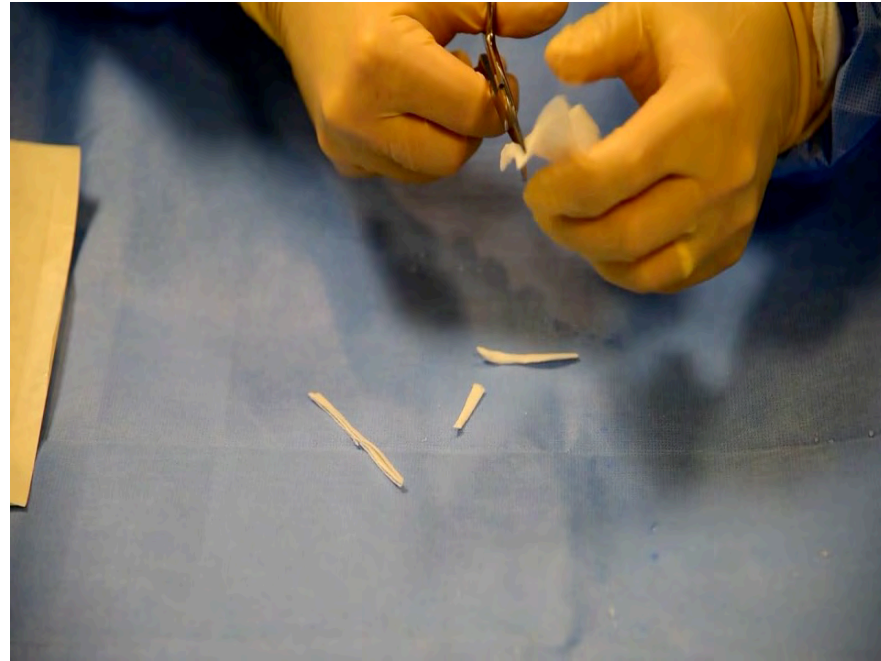
- 152 pts GFV (5% active hemorrhage, 69% recent bleeding, 26% 1^o prophylaxis)
- Once EUS confirmed obliteration, post-Rx bleeding only in 3% on f/u

Coil Embolization + Absorbable Gelatin Sponge

- Absorbable gelatin sponge is hemostatic device prepared from porcine skin gelatin
- Used routinely in surgery
- Absorbs 45 times its weight of whole blood
- An inert substance that does not lead to fibrosis, tissue reaction
- Injected as a slurry



Coil Embolization + Absorbable Gelatin Sponge



Courtesy of Dr. Marvin Ryou

Ge et al. VideoGIE April 2019 4: 154-156

Coil Embolization + Absorbable Gelatin Sponge



Take Home - EUS guided Variceal Interventions

- EUS - Better assessment of size, morphology than EGD
- Doppler - evaluate flow
- Does not require luminal visualization
- Disadvantages: Systemic glue embolization
- Surgifoam may be a better
- No standardized training for this procedure
- Needs buy-in from Interventional Radiology

EUS guided Liver biopsy

Liver Biopsy

- Liver biopsy plays a pivotal role in evaluating and directing the therapeutic management in patients with liver disease

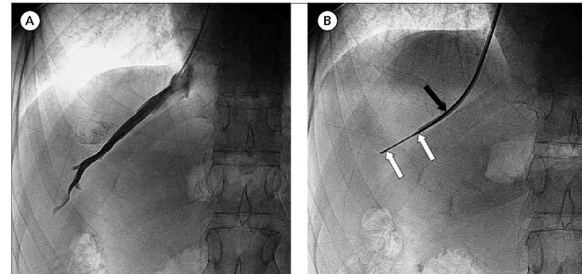
- **Percutaneous Biopsy**

- Evolved from a "blind" procedure to image guided
- 16 or 18G needles
- Associated with pain, bleeding



- **IR-guided Biopsy**

- Via the SVC, IVC and HV
- Can be done in patients with obesity, ascites, coagulopathy, uncooperative
- 2.5% complication rate
 - Hematoma, carotid puncture, IVC puncture



EUS Liver biopsy

Potential advantages:

1. Technically reproducible regardless of body habitus
2. Possibly less painful
3. Image guided approach that allows avoidance of blood vessels
4. Access to wide segment of liver parenchyma



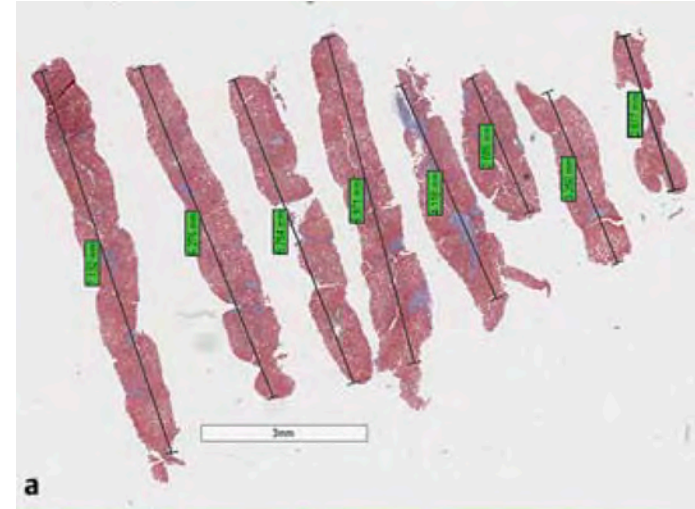
Minimal Measurements by Liver Societies

	Organization/society		
	AASLD	EASL	APASL
Recommended length	2.0	1.5	1.5
Recommended complete portal tracts	≥11	N/A	≥10

Initial Work

Endoscopic ultrasound-guided liver biopsy: a multicenter experience

- Prospective multicenter study (8 centers)
- 110 patients – EUS evaluation for elevated LFTs
- Technique:
 - 19G straight needle with the stylet in/out and Full suction
 - 7-10 actuations with fanning
- Results:
 - Median aggregate length 38mm
 - Median CPTs 14
 - Pathologic diagnosis made in 108 cases (98%)
 - 1 complication:
 - Self-limited bleeding in a patient with coagulopathy

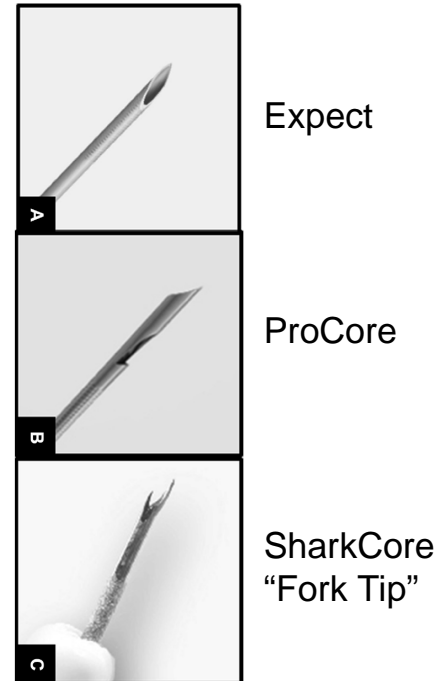


Straight vs Core Needles

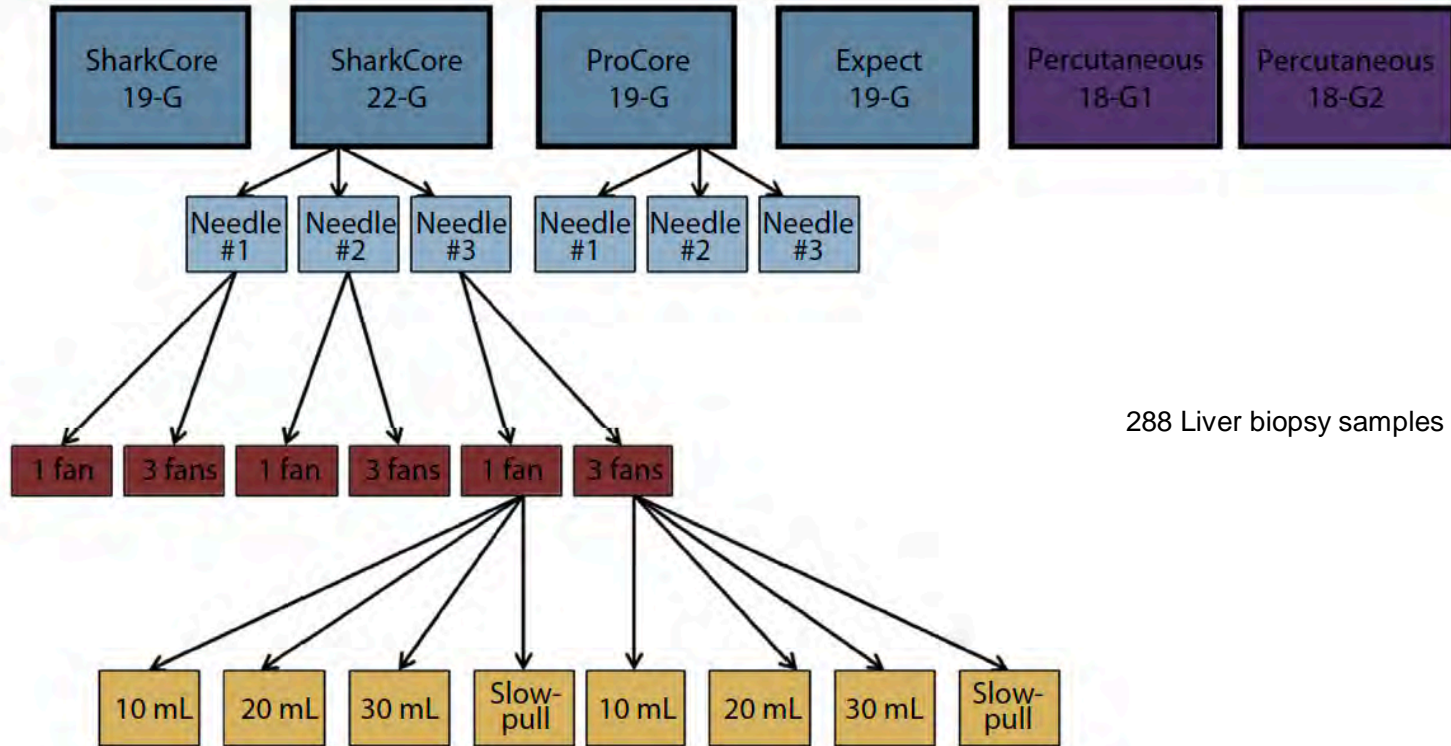
Optimizing EUS-guided liver biopsy sampling: comprehensive assessment of needle types and tissue acquisition techniques



- Ex-vivo Human Cadaveric tissue study
- 6 needles:
 - 19G Expect (straight)
 - 19G Cook ProCore
 - 19G & 22G Medtronic SharkCore “Fork Tip”
 - Two 18G percutaneous needles
- Technique:
 - 1 vs 3 fanning passes
 - Dry needle with varying suction
- Outcomes:
 - Complete portal tracts
 - Degree of fragmentation



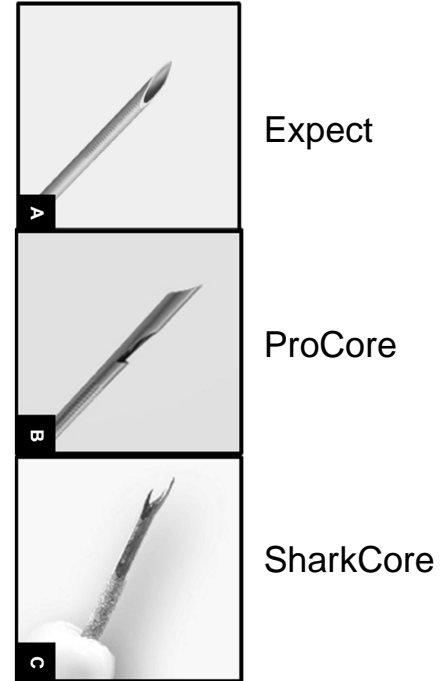
Optimizing EUS-guided liver biopsy sampling: comprehensive assessment of needle types and tissue acquisition techniques



288 Liver biopsy samples (48 per needle)

Results:

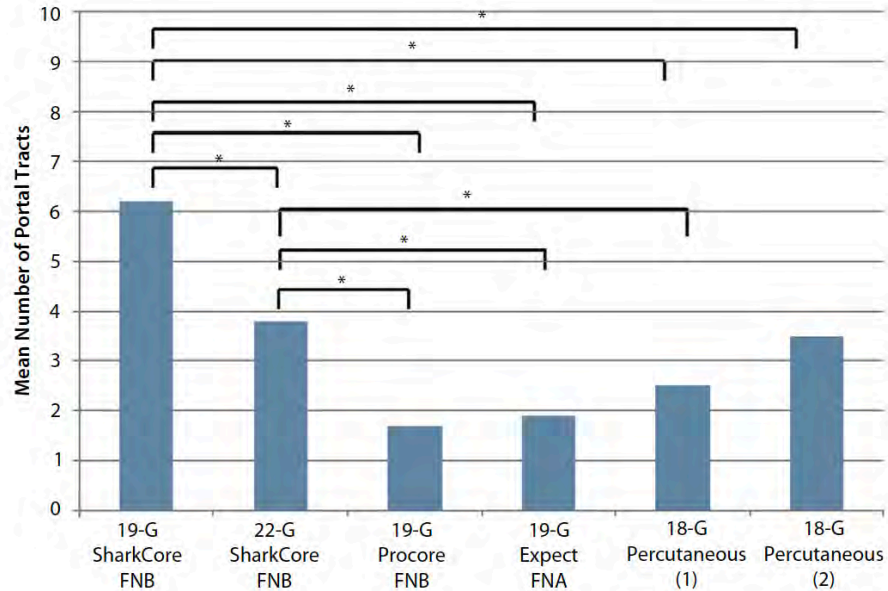
- 3 fanning passes > 1 pass
- Dry Suction: no significant difference between Slow pull, 10 ml, 20ml, 30ml



Optimizing EUS-guided liver biopsy sampling: comprehensive assessment of needle types and tissue acquisition techniques



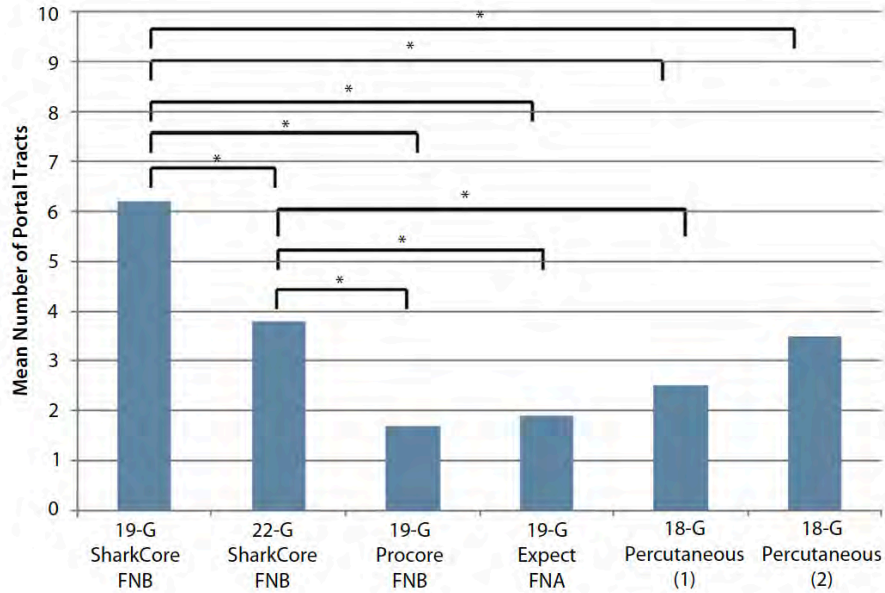
Complete Portal Tracts



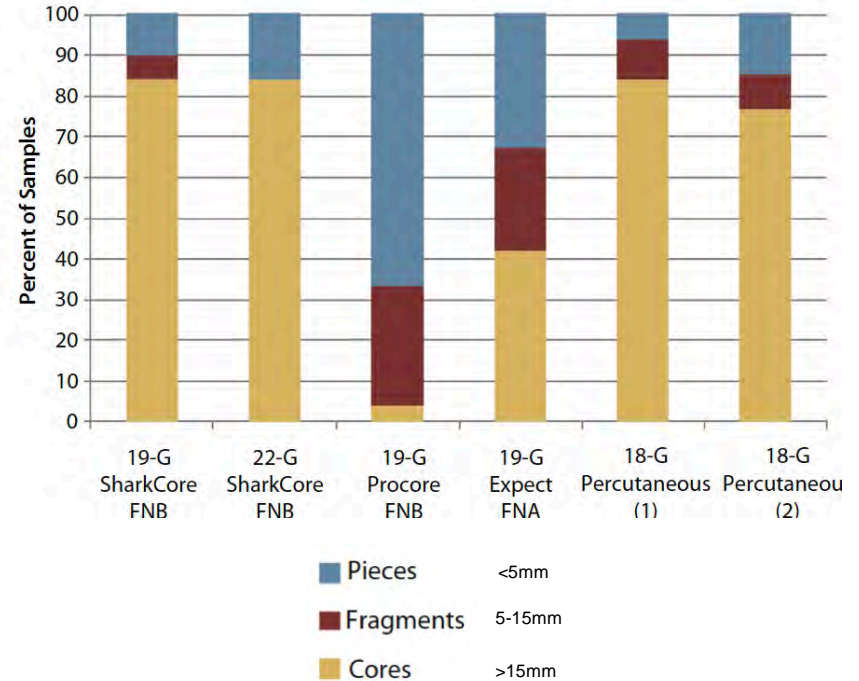
Optimizing EUS-guided liver biopsy sampling: comprehensive assessment of needle types and tissue acquisition techniques



Complete Portal Tracts



Fragmentation

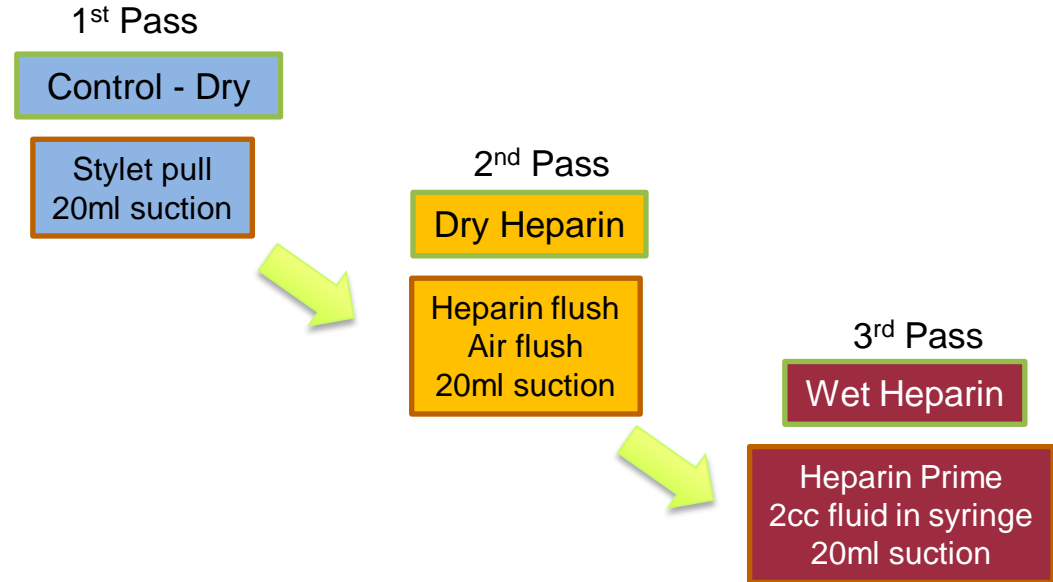


Dry vs Wet Suction Technique

A prospective pilot comparison of wet and dry heparinized suction for EUS-guided liver biopsy (with videos) 

- Cross over study

- 40 patients
- Each patient had three successive passes each with a different suction technique
- 19G FNA Needle
- 7-10 Fanning actuations; 4cm excursion

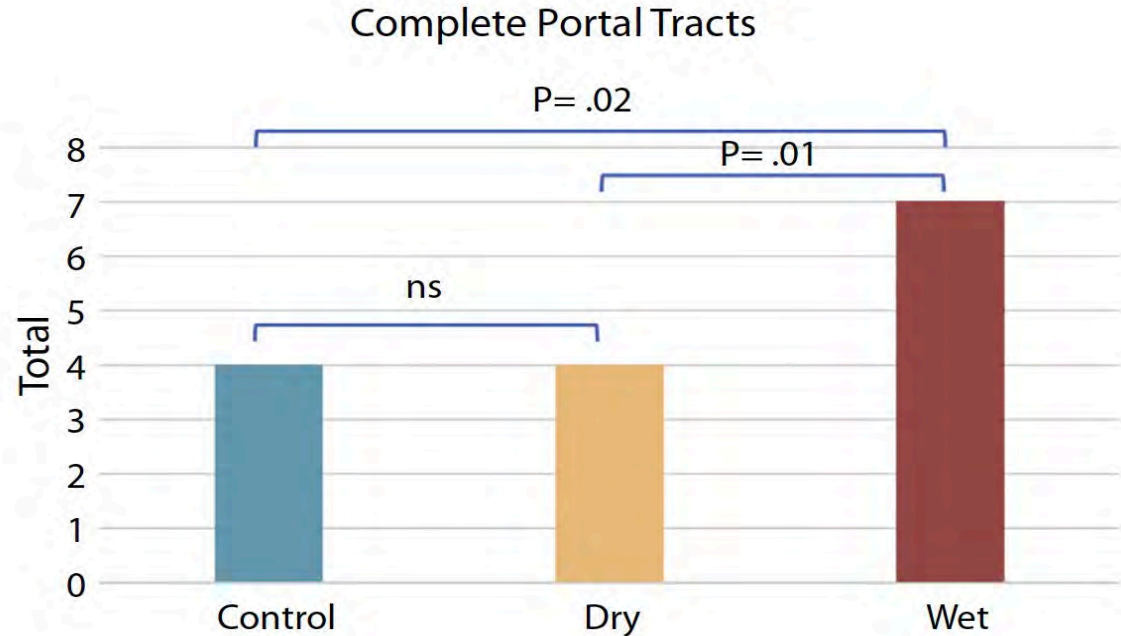


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EUS-guided fine-needle core liver biopsy sampling using a novel 19-gauge needle with modified 1-pass, 1 actuation wet suction technique



- EUS to evaluate for biliary disease with abn LFTs
- 165 consecutive patients
- Technique:
 - Medtronic Shark Core 19G, 1 pass, 1 actuation (7cm), wet suction
- Results:
 - Median maximum Intact Core 24mm
 - Median total length 60mm
 - Median # complete portal tracts 18
- Complications:
 - 36 pts with abdominal pain (up to 1mg of dilaudid)
 - 1 pt admitted for observation
 - 1 hematoma (device malfunction)



Comparison of Two Specialized Histology Needles for Endoscopic Ultrasound (EUS)-Guided Liver Biopsy: A Pilot Study

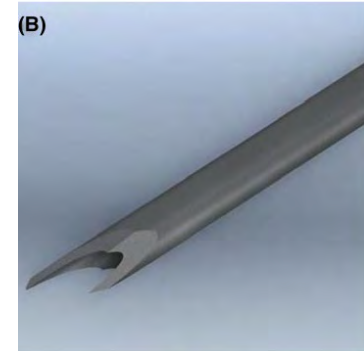
Rintaro Hashimoto¹ · David P. Lee¹ · Jason B. Samarasena¹ · Vishal S. Chandan² · Wenchang Guo² · John G. Lee¹ · Kenneth J. Chang¹

Aim:

- Compare the efficacy of two second-generation 19G fine-needle biopsy (FNB) (Franseen- and Fork-tip) devices for EUS-LB.

Methods

- Prospective repeated-measure crossover study
- EUS-LB with a one-pass and single-actuation method using two 19G FNB needles
- Randomized to left vs right liver lobes to be biopsied and needle sequence



Comparison of Two Specialized Histology Needles for Endoscopic Ultrasound (EUS)-Guided Liver Biopsy: A Pilot Study

Rintaro Hashimoto¹ · David P. Lee¹ · Jason B. Samarasena¹ · Vishal S. Chandan² · Wenchang Guo² · John G. Lee¹ · Kenneth J. Chang¹

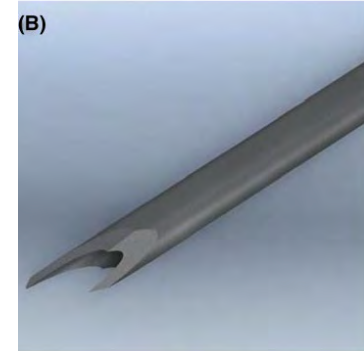
Results

- 44 liver biopsies in 22 patients.
- CPTs higher in Franseen-tip needle group > Fork-tip needle group (14.4 vs 9.5, $p = 0.043$).
- Lengths not significantly different
- Similarly high histologic adequacy (100% vs 95.5%, $p = 0.312$)

- Right Lobe higher yield of CPTs with both needles
Franseen, 16.2 vs. 12.8, $p = 0.003$, Fork-tip, 12.8 vs. 7.0, $p < 0.0001$

Conclusion

- EUS-guided liver biopsy using the 19G Franseen-tip needle may provide more CPTs than 19G Fork-tip needle on a single-pass, single-actuation comparison

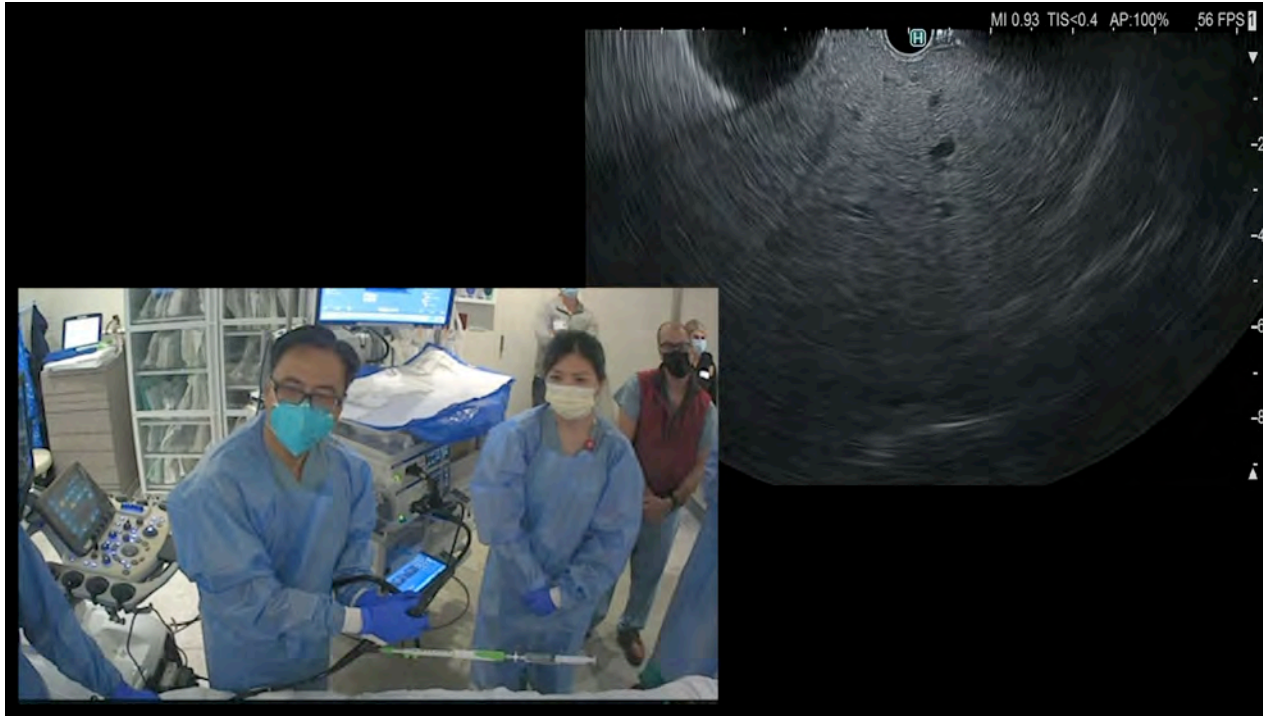


NEW Dynamic Wet Suction Technique

Dynamic Suction
Technique Recap

EUS-LB-D

NEW Dynamic Wet Suction Technique



Dynamic Wet Suction – UCI Single Center Experience



- 31 patients over 12 months
- Technical success 100%
- No serious complications

- Average fixed length was **6.74cm**, **Longest 16.1cm**
- Average CPT was **23.8** per biopsy sample
- All specimens adequate for diagnosis and staging Fibrosis
 - 39% with F4 Fibrosis

Take Home - EUS Liver Biopsy

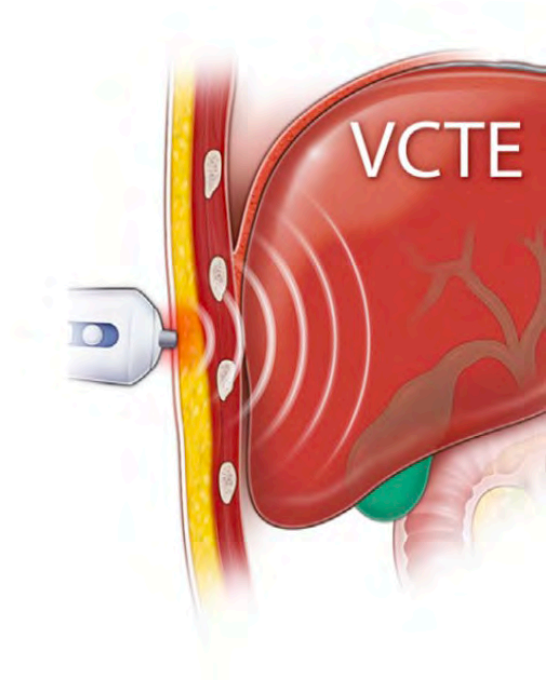


- Core needles vs Straight:
 - Newest core needles appear to be superior to straight
 - Pain appears to be more common with core needles
- Technique Matters!
 - A single actuation may be enough but 3 is likely better
 - Fanning method
 - Longer excursion leads to more tissue
 - Right liver may be better than Left
 - Heparin primed needle with wet suction > dry suction
 - New Dynamic Wet Suction technique may be best
- EUS guided liver biopsies are clearly exceeding minimum AASLD requirements. We need to start doing these correctly and getting the word out to our Hepatologists

EUS guided Shearwave Elastography

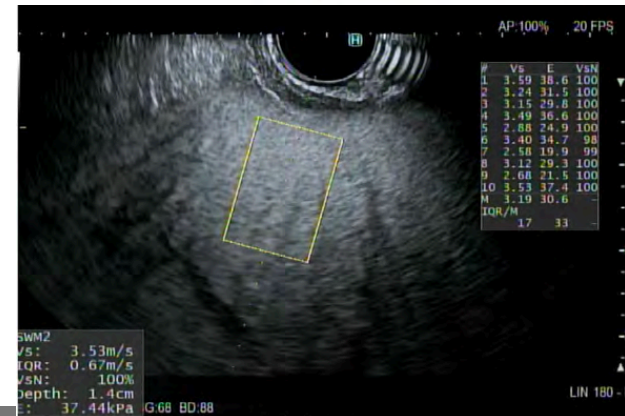
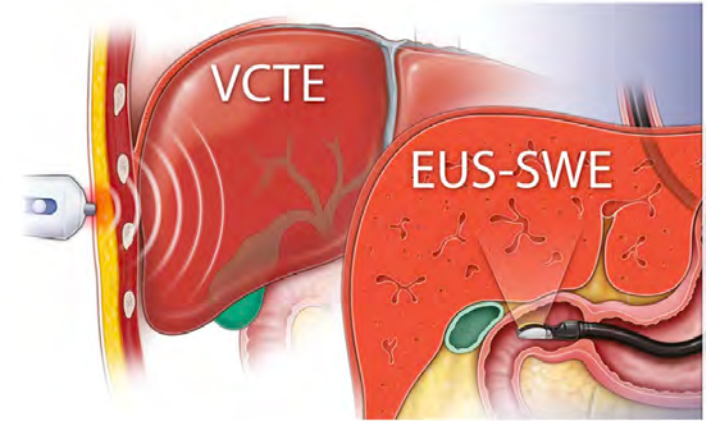
Elastography

- Vibration-controlled transient elastography (VCTE) uses shear wave elastography to estimate liver stiffness, a surrogate for hepatic fibrosis
- Limitations:
 - low positive predictive value
 - suboptimal performance in patients who are morbidly obese
 - measurements are obtained only over the right hepatic lobe



EUS-Shearwave Elastography

- Vibration-controlled transient elastography (VCTE) uses shear wave elastography to estimate liver stiffness, a surrogate for hepatic fibrosis
- Limitations:
 - low positive predictive value
 - suboptimal performance in patients who are morbidly obese
 - measurements are obtained only over the right hepatic lobe
- EUS-guided shear wave elastography (EUS-SWE) is performed during real-time visualization of the hepatic parenchyma
- Advantages:
 - Real-time liver visualization allows the operator to select an optimal spot for measurement
 - it can be performed in patients with morbid obesity or narrow intercostal spaces
 - Both the right and left hepatic lobes can be assessed with EUS SWE and the Spleen



Endoscopic Ultrasound-Guided Bi-lobar Liver and Spleen Shear Wave Elastography and its Association with Hepatic Fibrosis Stage

Alyssa Y. Choi MD, Peter H. Nguyen MD, Jason B. Samarasena MD, Ke-Qin Hu MD, Kenneth J. Chang MD



H.H. Chao Digestive Health Institute
University of California - Irvine



@DDWMeeting | #DDW2022

Aims

- To determine the clinical utility and cut-off values of L-EUS-SWE and S-SWE in predicting histological hepatic stage ≥ 3 fibrosis on EUS-Lbx.

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 **DDW2022**
Digestive Disease Week®
MAY 21-24 | SAN DIEGO, CA
IN PERSON & VIRTUAL

Methods

- Review of patients with chronic liver diseases who underwent Endo-Hepatology work-up, from 2019 to 2021.
- EUS-SWE was performed in the same endoscopic session as EUS-Liver biopsy
- Cut offs used to assess accuracy in predicting hepatic fibrosis stage on EUS-Lbx:
 - 12.5 kPa and 15 kPa for EUS-SWE liver[^]
 - 26.3 kPa for EUS-SWE spleen*

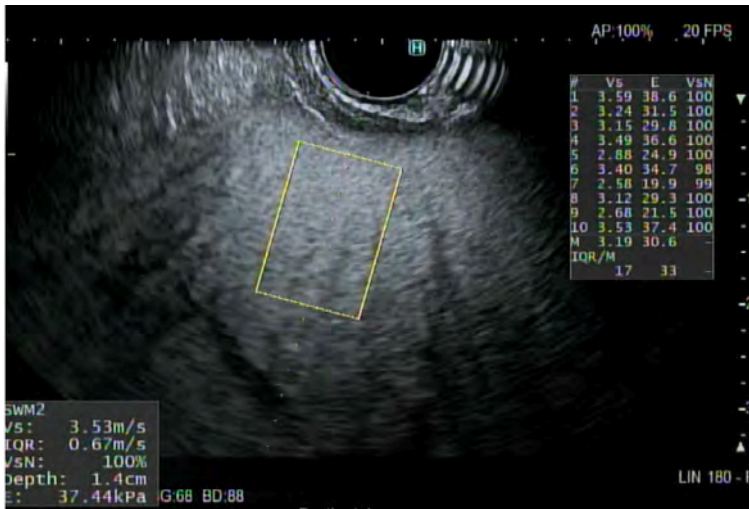
[^]Mueller S, Sandrin L. Liver stiffness: a novel parameter for the diagnosis of liver disease. *Hepat Med*. 2010;2:49-67. Published 2010 May 25.

*Jansen C, Bogs C, Verlinden W, et al. Shear-wave elastography of the liver and spleen identifies clinically significant portal hypertension: A prospective multicentre study. *Liver Int*. 2017;37(3):396-405.

Results – EUS Prediction of Fibrosis Stage 3-4

Variables	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
EUS-SWE RL \geq 12.5 kPa	81.3	70.4	61.9	86.4
EUS-SWE LL \geq 12.5 kPa	88.9	77.8	72.7	91.3
EUS-SWE RL \geq 15 kPa	68.8	85.2	73.3	82.1
EUS-SWE LL \geq 15 kPa	83.3	92.6	88.2	89.3
EUS-SWE Spleen \geq 26.3 kPa	80	58.8	36.4	90.9
EUS-SWE LL \geq 12.5 kPa & Spleen \geq 26.3 kPa	80	87.5	66.7	93.3
EUS-SWE LL \geq 15 kPa & Spleen \geq 26.3 kPa	80	93.8	80	93.8
EUS-SWE RL \geq 12.5 kPa & Spleen \geq 26.3 kPa	80	82.4	57.1	93.3
EUS-SWE RL \geq 15 kPa & Spleen \geq 26.3 kPa	80	94.1	80	94.1
EUS-SWE LL \geq 12.5 kPa, RL \geq 12.5 kPa & Spleen \geq 26.3 kPa	80	87.5	66.7	93.3
EUS-SWE LL \geq 15 kPa, RL \geq 15 kPa & Spleen \geq 26.3 kPa	80	100	100	94.1

Take Home - EUS Shearwave Elastography



- New Module on the latest EUS processors
- Real-time liver visualization
- It can be performed in patients with morbid obesity or narrow intercostal spaces
- Both the right and left hepatic lobes can be assessed with EUS SWE
- Operator Dependent
- Formalized Protocol is needed
- Initial data is promising

EUS guided Portosystemic Pressure Gradient Measurement

Background

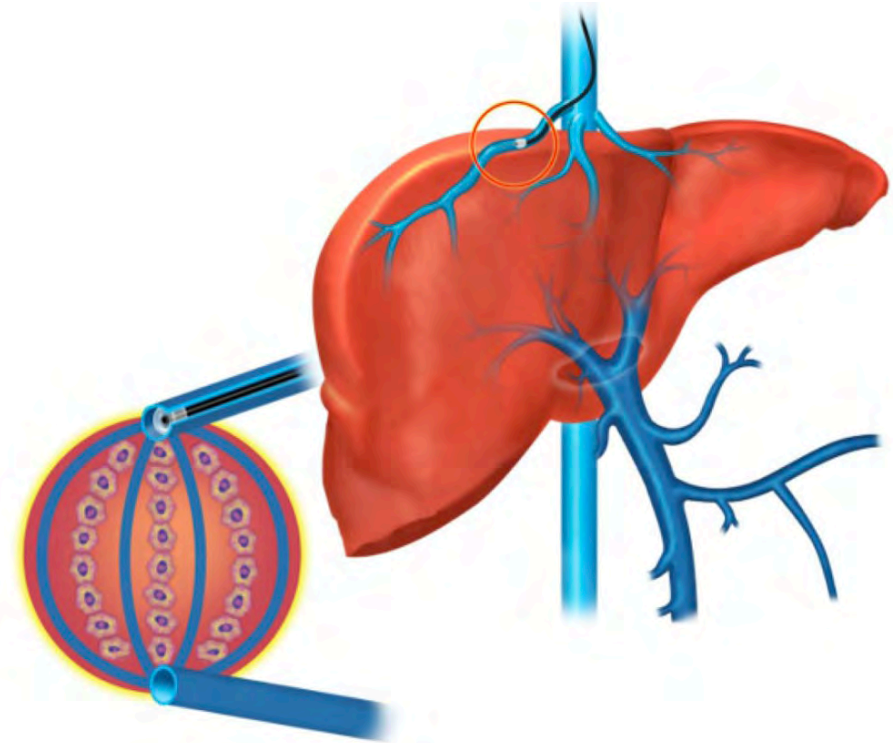
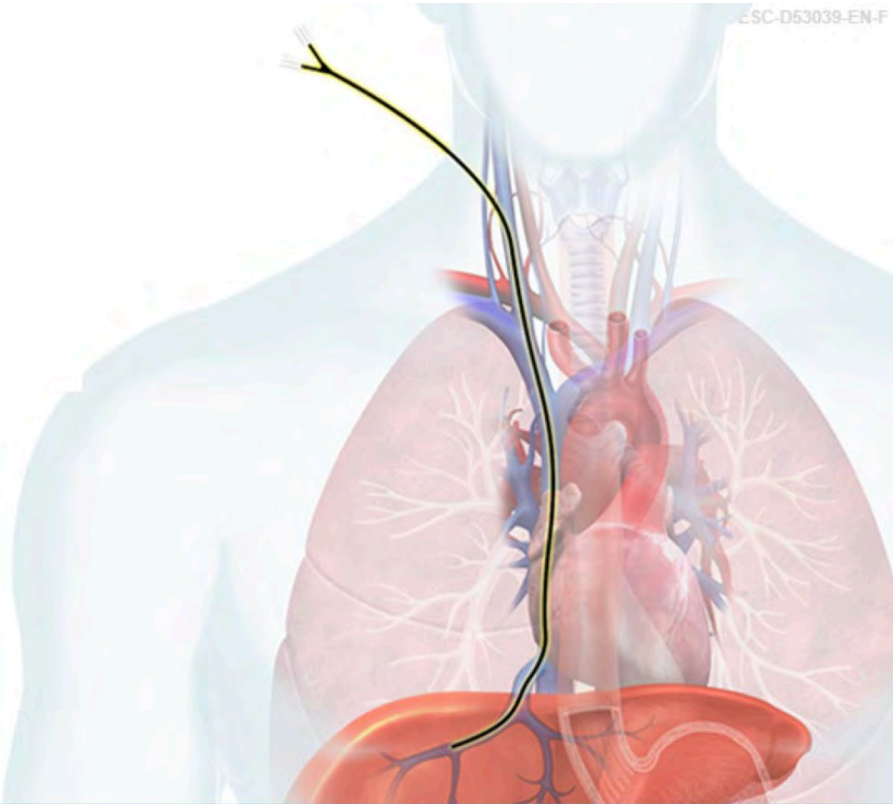
- 1.5 billion cases of chronic liver disease (CLD) globally¹.
- Patients with cirrhosis transition through compensated to decompensated stages
- Portal hypertension marks the transition to decompensation.
- The hepatic venous pressure gradient or portosystemic pressure gradient (PPG) accurately reflects the degree of PH and is the single best prognostic factor in liver disease²

1. Moon AM, Singal AG, Tapper EB. Contemporary epidemiology of chronic liver disease and cirrhosis. *Clin Gastroenterol Hepatol* 2020;18:2650-2666.

2. Armonis A, Patch D, Burroughs A *Hepatology*. 1997;25(1):245-8.

Current standard for measurement

PPG measurement (PPGM) is performed by interventional radiology (IR) via a transjugular approach



Background

HVPG Disadvantages

- Invasive
- Uses Ionizing radiation
- Indirect measurements of the portal vein pressure

EUS-guided portal vein catheterization and pressure measurement in an animal model: a pilot study of feasibility

Lawrence Lai, MB, John Ponerros, MD, John Santilli, MD, William Brugge, MD

Background: The extrahepatic portal vein is inaccessible to direct catheterization.

Methods: Because EUS can readily image the portal vein, the feasibility of EUS-guided portal vein catheterization by using a 22-gauge needle was studied in 7 normal pigs and 14 pigs in which portal hypertension was induced (7/14 anticoagulated).

Results: Catheterization was not possible by EUS or transhepatic methods in, respectively, 3 and 5 animals. One anticoagulated animal had a small amount of periduodenal bleeding as a result of EUS catheterization. The mean normal portal vein pressure (1 standard deviation) as determined by EUS and transhepatic methods was, respectively, 20.3 (4) mm Hg and 20.4 (2) mm Hg. Injection of polyvinyl alcohol particles increased the portal vein pressure by 10.2 (11.59) mm Hg. There was a close correlation under all conditions between the mean portal vein pressures obtained by EUS and transhepatic catheterization ($r = 0.91$).

Conclusions: EUS-guided portal vein catheterization appears to be feasible in an animal model and provides accurate pressure measurements.



EUS-guided portal vein catheterization: a promising novel approach for portal angiography and portal vein pressure measurements

Samuel A. Giday, MD, John O. Clarke, MD, Jonathan M. Buscaglia, MD, Eun J. Shin, MD, Chung-Wang Ko, MD, Priscilla Magno, MD, Sergey V. Kantsevov, MD, PhD

Baltimore, Maryland, USA

Background: Portal vein (PV) pressure measurements can provide valuable information for the management of patients with liver disease and portal hypertension.

Objective: To evaluate the feasibility and the safety of EUS-guided PV catheterization and pressure measurements in a porcine model.

Setting: Acute and survival experiments on five 50-kg pigs.

Design and Interventions: Intrahepatic PV was punctured under EUS guidance by using a 19-gauge FNA needle. A 0.035-inch guidewire was advanced through the needle into the PV. The needle was withdrawn. A 5.5F ERCP catheter was advanced over the guidewire into the PV and then connected to a pressure monitor. Continuous PV measurements were obtained for an hour. Afterward, the catheter was removed, and the animals were observed for 30 minutes. Three animals were then immediately euthanized for a necropsy. The other two animals were observed for two weeks and then were euthanized.

Main Outcome Measurements: The ability to perform EUS-guided PV catheterization and pressure measurement without complications.

Results: PV catheterization, angiography, and pressure measurements were performed without any problems or complications. There were no changes in vital signs and hemodynamic parameters during PV catheterizations, angiography, pressure measurements, and catheter removal. Survival experiments did not demonstrate any change in animal condition, behavior, or eating habits after the procedure. A necropsy in all animals revealed no active bleeding, and no damage to the liver, other intra-abdominal organs, or blood vessels.

Limitations: No validation of measured PV pressure was made.

Conclusions: EUS-guided PV catheterization is feasible, safe, and can be used for portal angiography and pressure measurements.



Kenneth Chang MD



EUS-guided portal pressure gradient measurement with a novel 25-gauge needle device versus standard transjugular approach: a comparison animal study

Jason Y. Huang, FRACP, Jason B. Samarasena, MD, Takeshi Tsujino, MD, Kenneth J. Chang, MD
Orange, California, USA

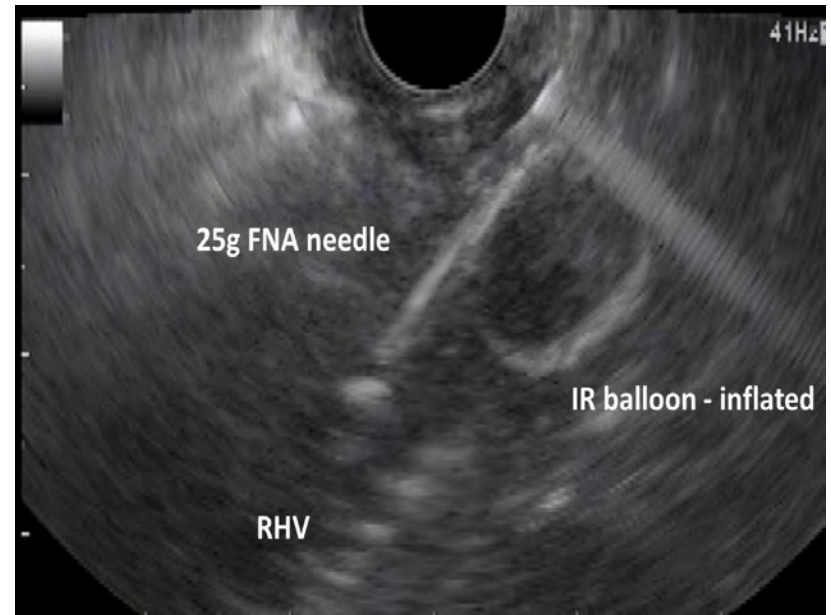
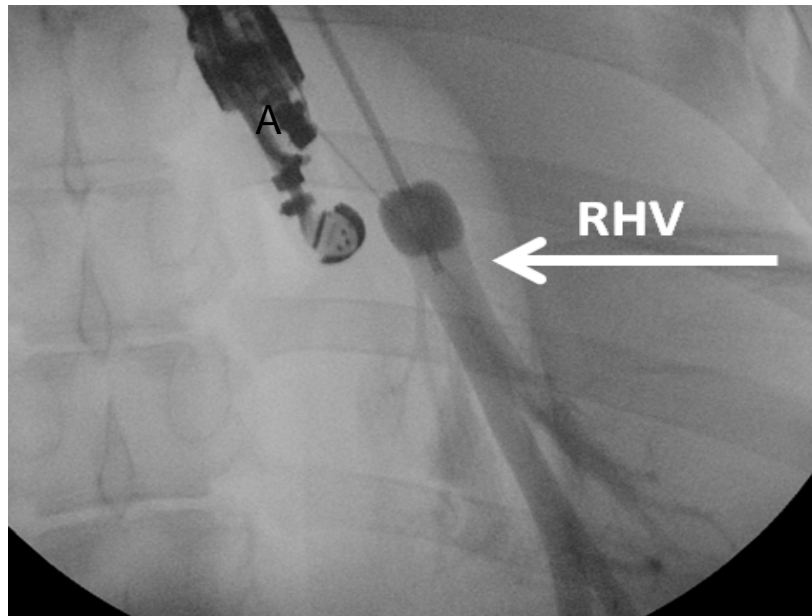
Novel EUS-guided portal pressure gradient (PPG) measurement system using a 25g FNA needle and compact manometer

Gastrointest Endosc. 2016 Aug;84(2):358-62



EUS-guided portal pressure gradient measurement with a novel 25-gauge needle device versus standard transjugular approach: a comparison animal study

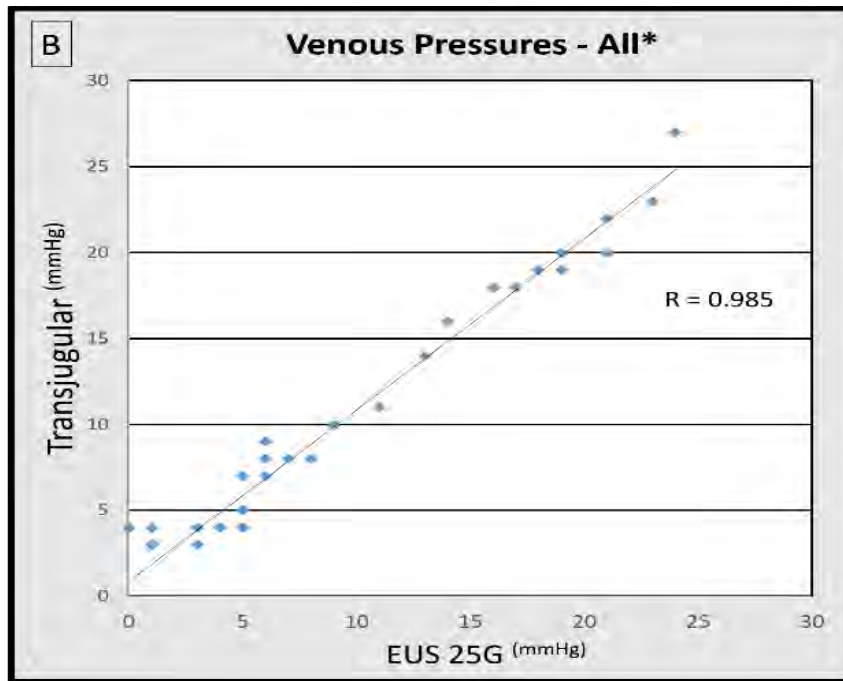
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Orange, California, USA



EUS-guided portal pressure gradient measurement with a novel 25-gauge needle device versus standard transjugular approach: a comparison animal study

-PPGM

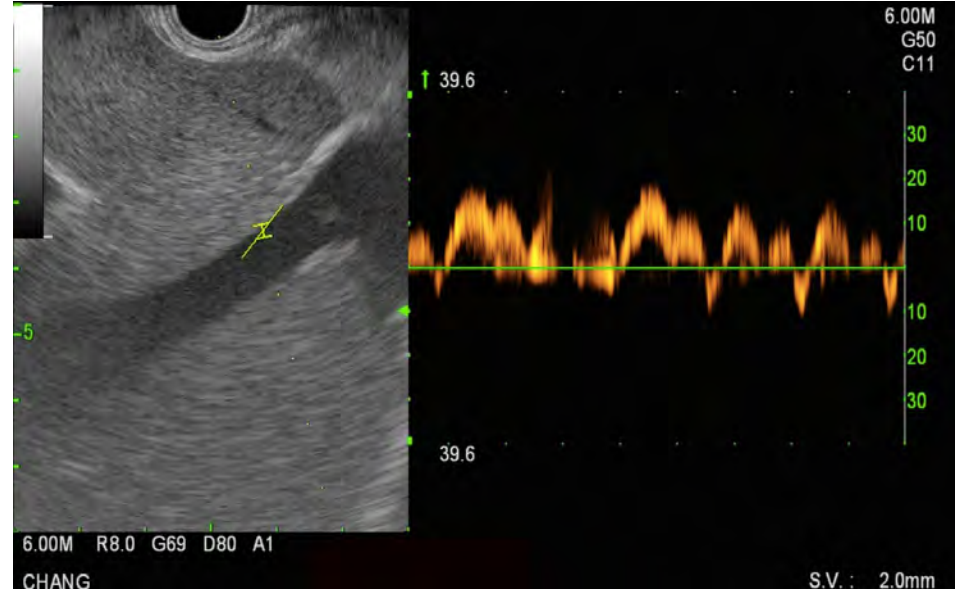
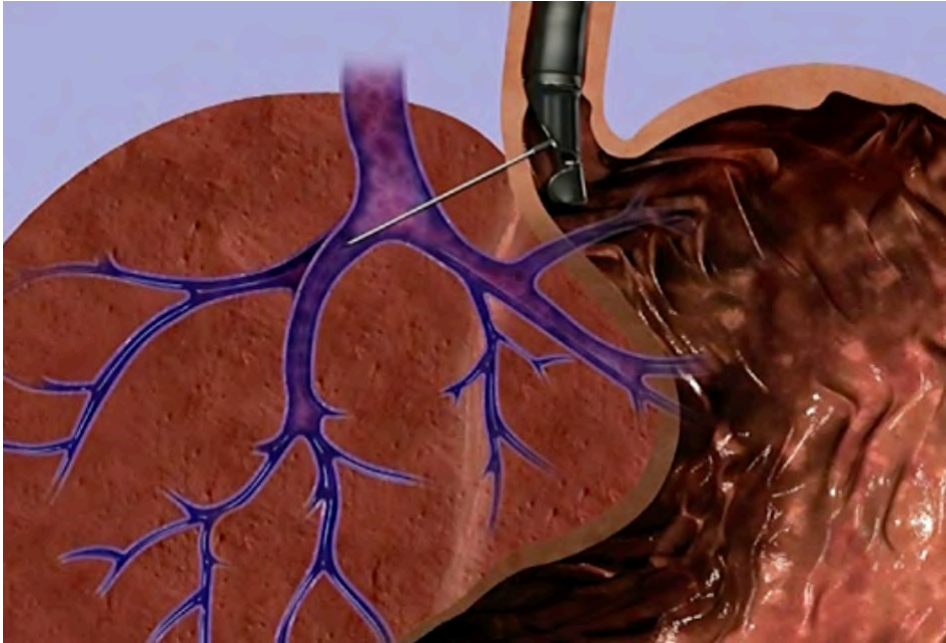
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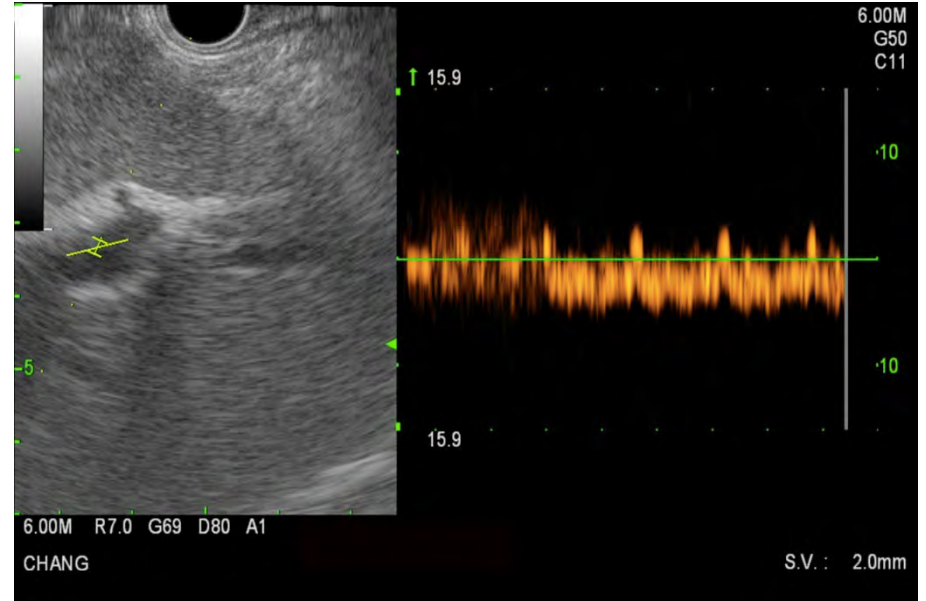
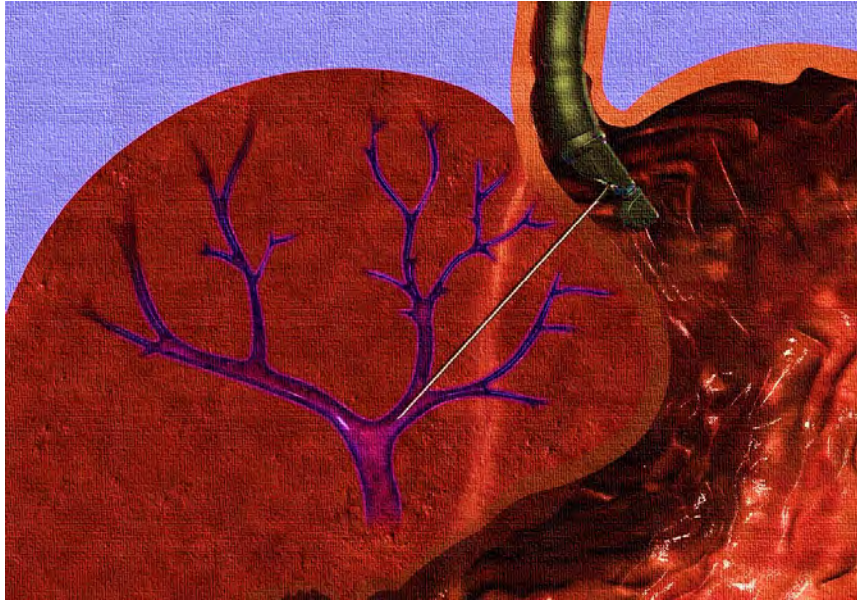
EUS PPG Equipment Setup



Hepatic Vein Pressure Reading



Portal Vein Pressure Reading





Hepatic Vein Access

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, MD¹

Irvine, California, USA

- All 28 subjects underwent EUS-PPG with 100% Technical Success
- Identifying and accessing target vessels
- Obtaining Manometric measurements
- There was no complications
- PPG range 1.5 - 19mmHg

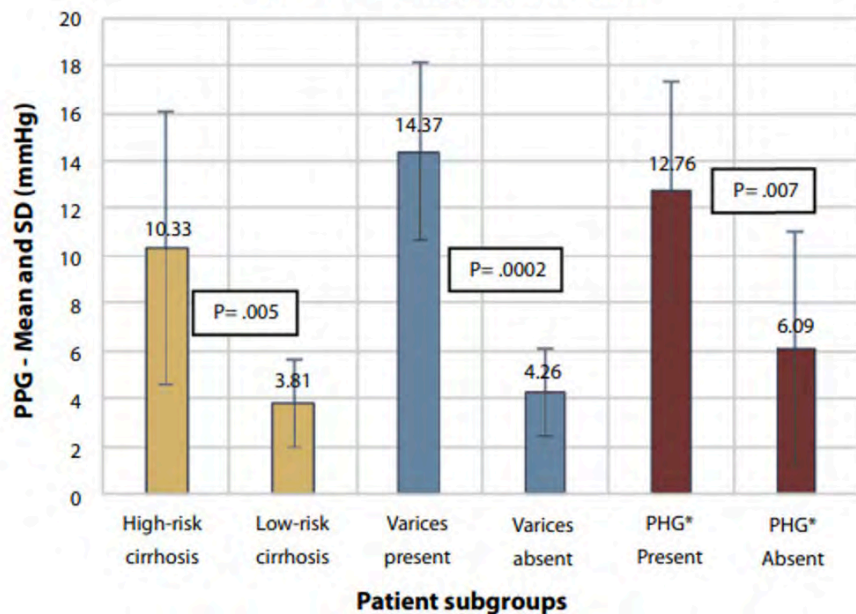


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Irvine, California, USA

EUS-PPG Subgroup Analysis



PREDICTION OF LIVER HISTOLOGY AND CLINICAL PARAMETERS OF LIVER DISEASE USING EUS GUIDED PORTOSYSTEMIC PRESSURE GRADIENT MEASUREMENT: RESULTS FROM A US MULTI-CENTER ENDOHEPATOLOGY EXPERIENCE

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DDW2022

Digestive Disease Week[®]

MAY 21-24 | SAN DIEGO, CA

IN PERSON & VIRTUAL

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Aims

- Evaluate correlation between EUS-PPG and clinical markers of portal hypertension, non-invasive markers of liver disease and liver histology.
- Determine the ability of EUS-PPG to diagnose CLD in equivocal clinical situations.

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Methods



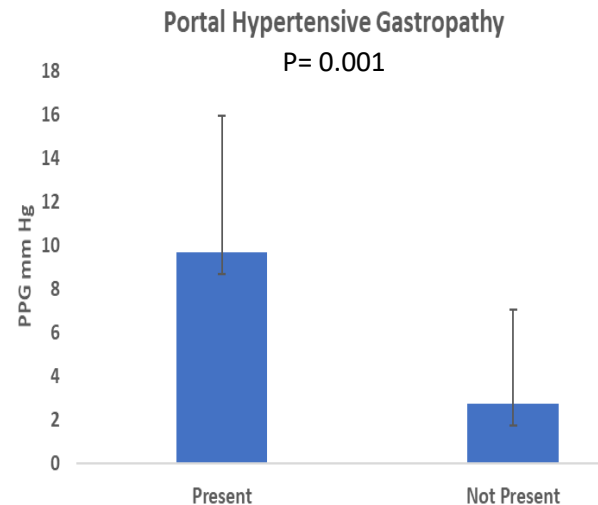
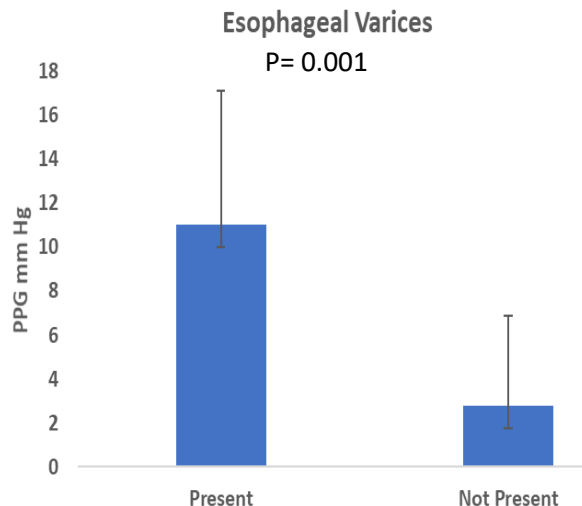
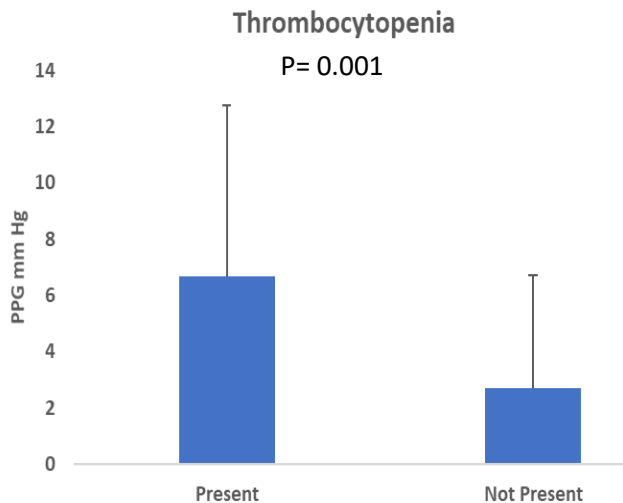
- Multi-center retrospective study
- Patient inclusion from January 2020 to December 2021.
- Patient demographics, liver disease severity, non-invasive markers of liver disease (APRI, FIB4 and MELD), transient elastography (TE) and liver histology.
- EUS- PPG gradients of >5 and >10 mm Hg were compared against non-invasive markers and liver histology.
- Univariate logistic and linear regression models were performed.

Procedure Outcomes

- Technical success: 98.7%
- Adverse events: 1.3%

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PPG correlation with Clinical parameters



PPG correlation with FIB-4 and APRI

FIB-4	PPG > 5	PPG ≤ 5	p-value
N	58	78	0.0002
Median	3.134	1.276	
SD	4.636	1.272	

FIB-4	PPG > 10	PPG ≤ 10	p-value
N	28	108	0.0003
Median	4.858	1.405	
SD	5.753	1.881	

APRI	PPG > 5	PPG ≤ 5	p-value
N	58	78	0.001
Median	0.7301	0.3333	
SD	2.1148	0.4358	

APRI	PPG > 10	PPG ≤ 10	p-value
N	28	108	0.0001
Median	0.874	0.378	
SD	2.921	0.546	

Results

PPG correlation with MELD

MELD Score	PPG > 5	PPG ≤ 5	p-value
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N	62	76	0.0002
Median	10.5374	8	
SD	4.7655	3.1679	

MELD Score	PPG > 10	PPG ≤ 10	p-value
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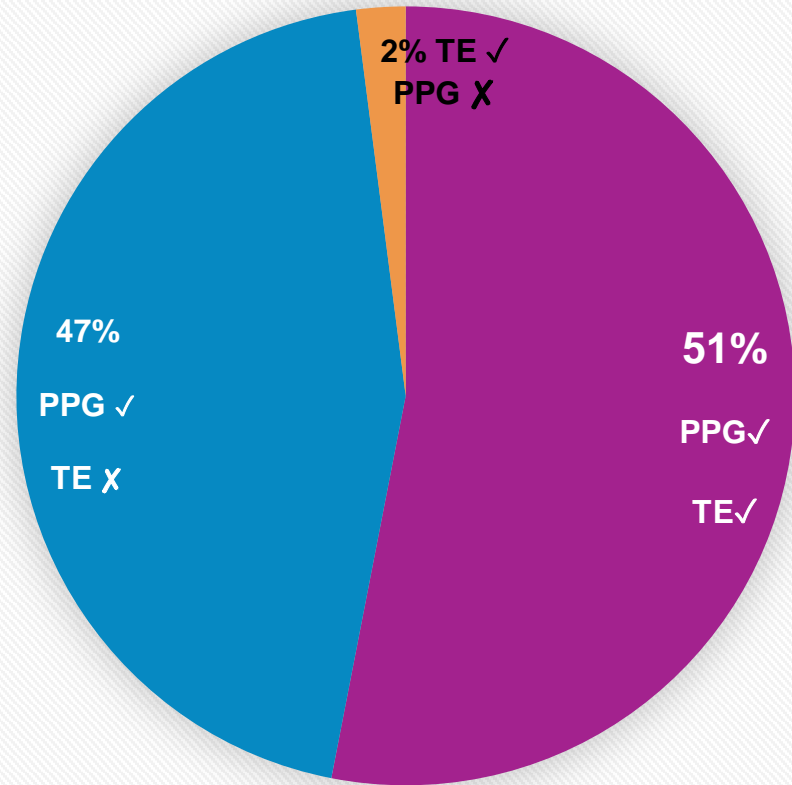
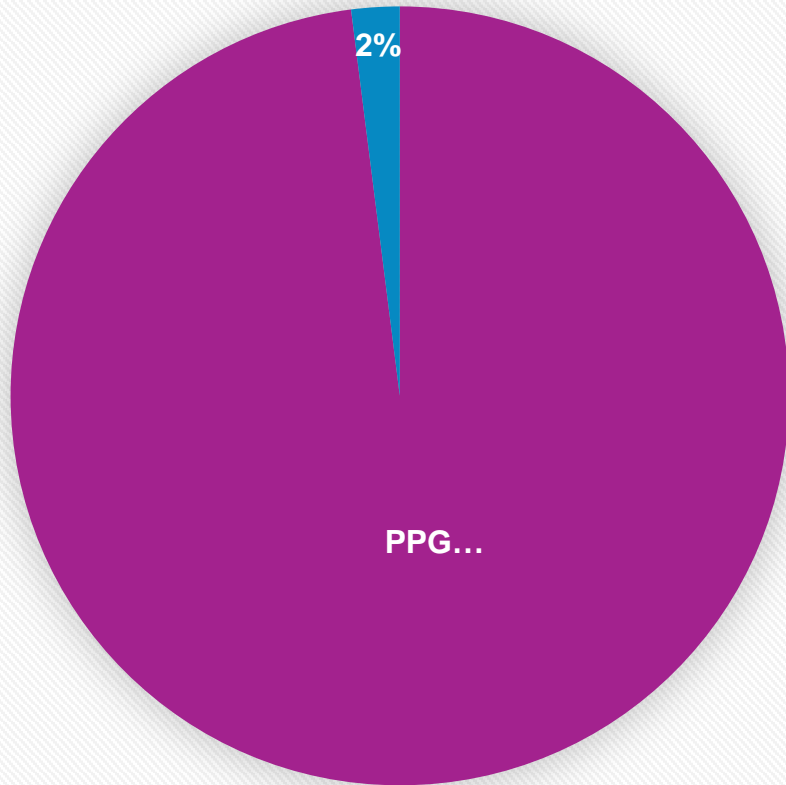
N	27	111	0.0023
Median	11	8.109	
SD	5.3483	3.635	

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EUS PPG and Transient Elastography Agreement with Liver Histology

- 39 patients had concomitant EUS-PPG, TE and Liver biopsy
- 19 patients (49%) with PPG < 5 mmHg accurately characterized patients with stage 0,1 or 2 fibrosis while TE was falsely positive

EUS PPG and Elastography Agreement with Liver Histology



High PPG In Absence of Features of CLD

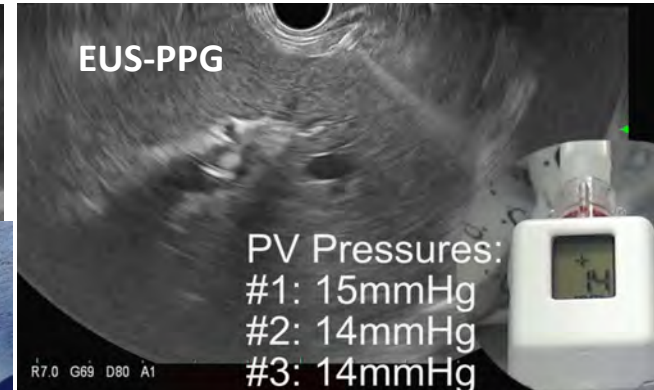
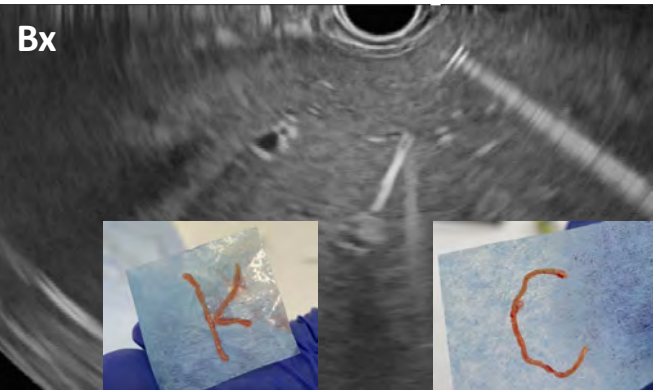
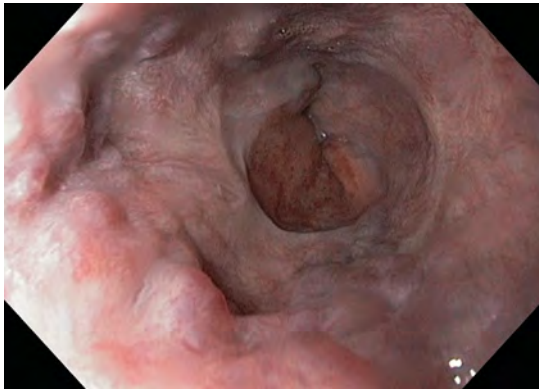
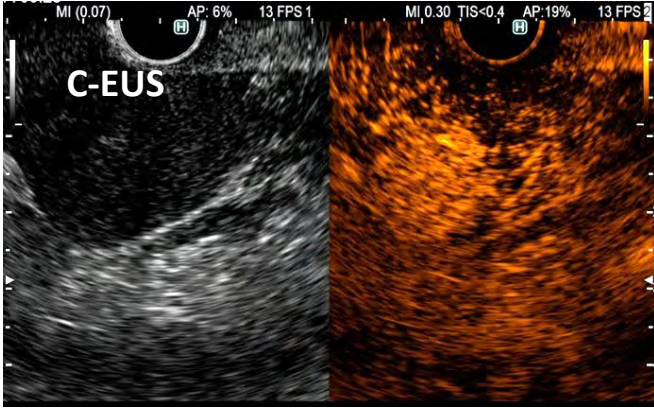
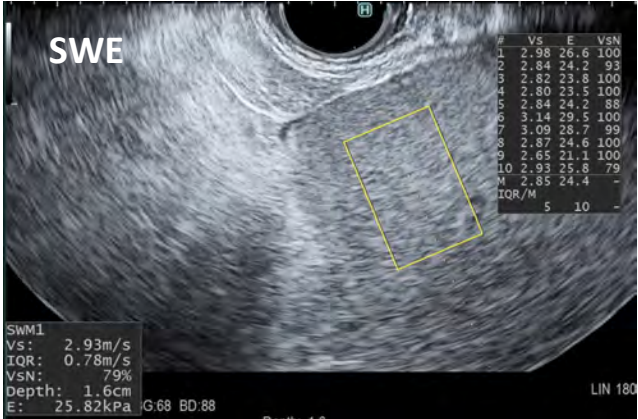
	EV	PHG	Thrombocytopenia	APRI	FIB4	MELD	TE (Kpa)	PPG	Histology
1	No	No	No	0.613	1.21	8	N/A	6	Grade 3
2	No	No	No	0.565	1.33	12	N/A	8	Grade 3
3	No	No	No	0.214	1.12	8	8	6	Grade 4
4	No	No	No	0.223	0.7	10	7	7	Grade 3
5	No	No	No	0.727	1.32	N/A	7	7	Grade 3

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EUS-PPG Take Home Points

- EUS-PPG provides direct measurement of both hepatic and portal veins
 - HVPG is not accurate in Pre-sinusoidal portal HTN
 - In NASH-cirrhosis, HVPG may underestimate PVP
- EUS-PPG is more accessible and repeatable than HVPG
- EUS-PPG may be more accurate than current non-invasive markers of fibrosis
- Commercially available device with a short learning curve with formal training courses

One-stop shop Endoscopic liver evaluation



Case MW

- 56-year-old female with a long history of biopsy proven Non-Alcoholic Fatty Liver Disease (NAFLD), Diabetes Mellitus II, Obesity (BMI 35). She had undergone her first liver biopsy in 1983 and was notified at that time that she has a fatty liver. In recent history, she has had elevated liver enzymes for the past 3 years.
- She underwent a CT scan of abdomen with contrast which revealed nodular hepatic contour and peri-splenic varices. A follow-up shear wave elastography (SWE) reported a mean kPa of 11.2, suggestive of F4 fibrosis. Her serologies were notable for a positive anti-mitochondrial antibody (AMA) titer 1:320, but a normal Alkaline Phosphatase (ALP) level.
- Work up for viral and other auto-immune and metabolic abnormalities was otherwise unremarkable. Her platelet count has been on a slow but steady decline, most recently 137k/microliter. Other labs were T-bili 1.2, ALT 30, AST 36.

Case MW

- Her clinical examination did not reveal any abdominal ascites. Liver edge was palpated 3cm below the right hemi-diaphragm.
- She was referred to Bariatric Surgery clinic as it was felt that she may benefit from a surgical weight loss procedure, however, the surgery team was concerned about her operative risk.
- After discussion with the patient the plan was made to proceed with Endo-Hepatology work up to further clarify her operative risk.

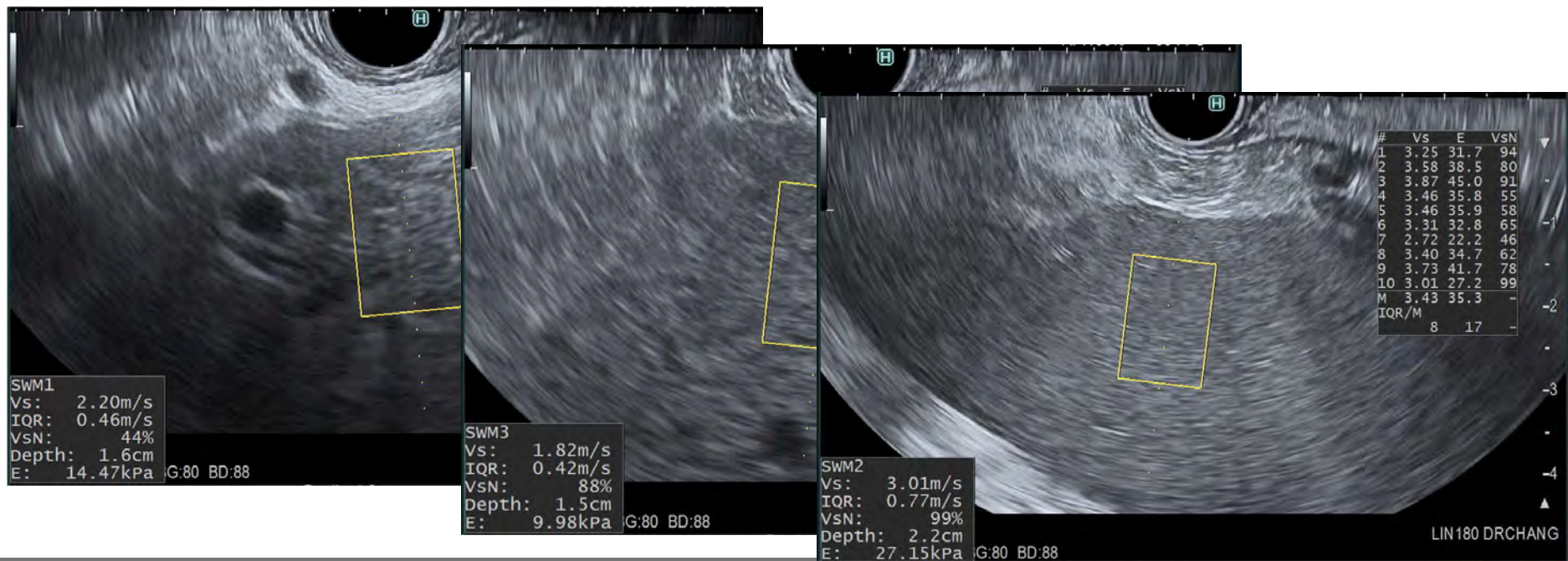
Case MW

- The patient underwent an EGD and revealed normal gastric mucosa without evidence of portal hypertensive gastropathy (PHG). There was no evidence of either esophageal or gastric varices.
- EUS revealed mild blunting of liver edge, and the liver appeared to have a slightly uneven surface. This can be seen in advanced fibrosis.



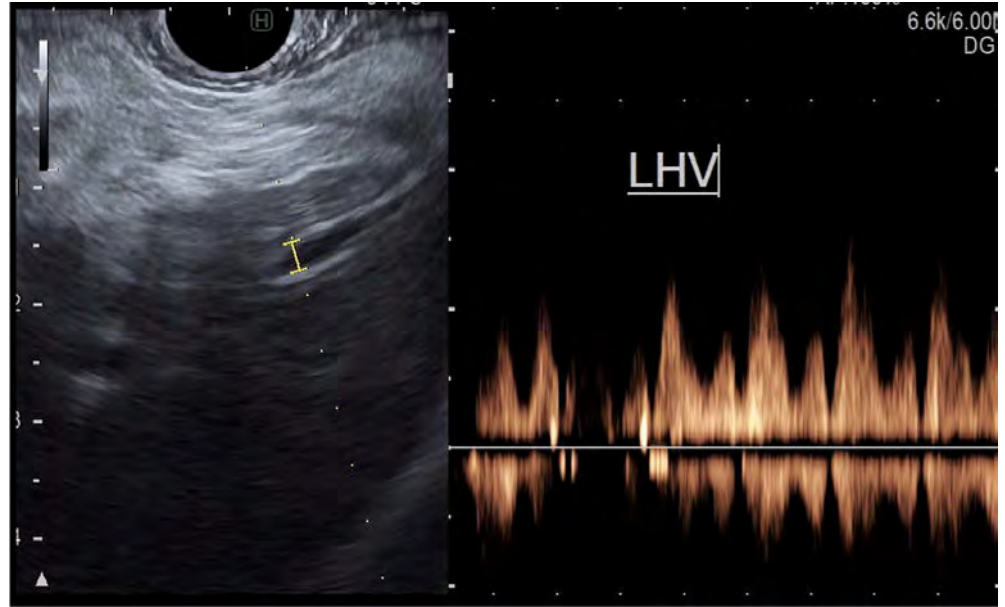
Case MW

- EUS-SWE revealed a mean kPa of 13.4 in left liver, mean kPa of 16 in the right liver, and mean kPa of 35.3 in spleen



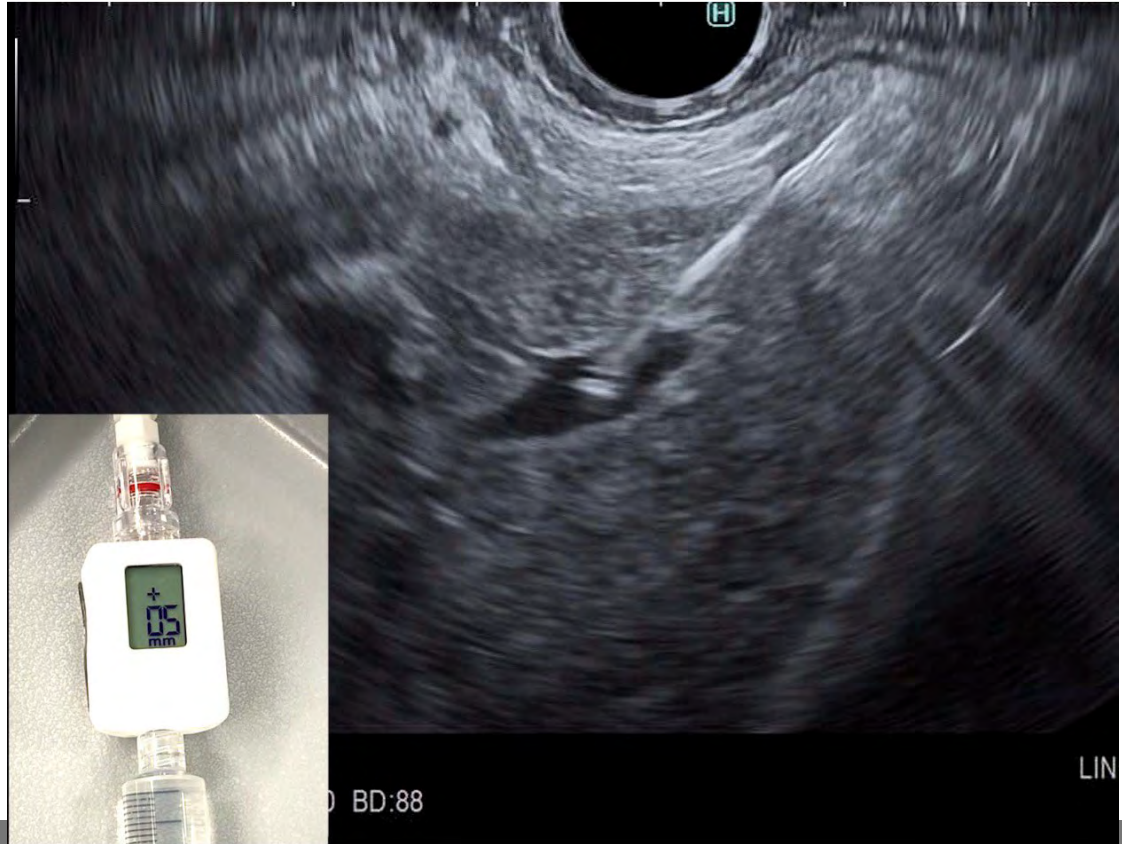
Case MW

- EUS-PPGM was performed



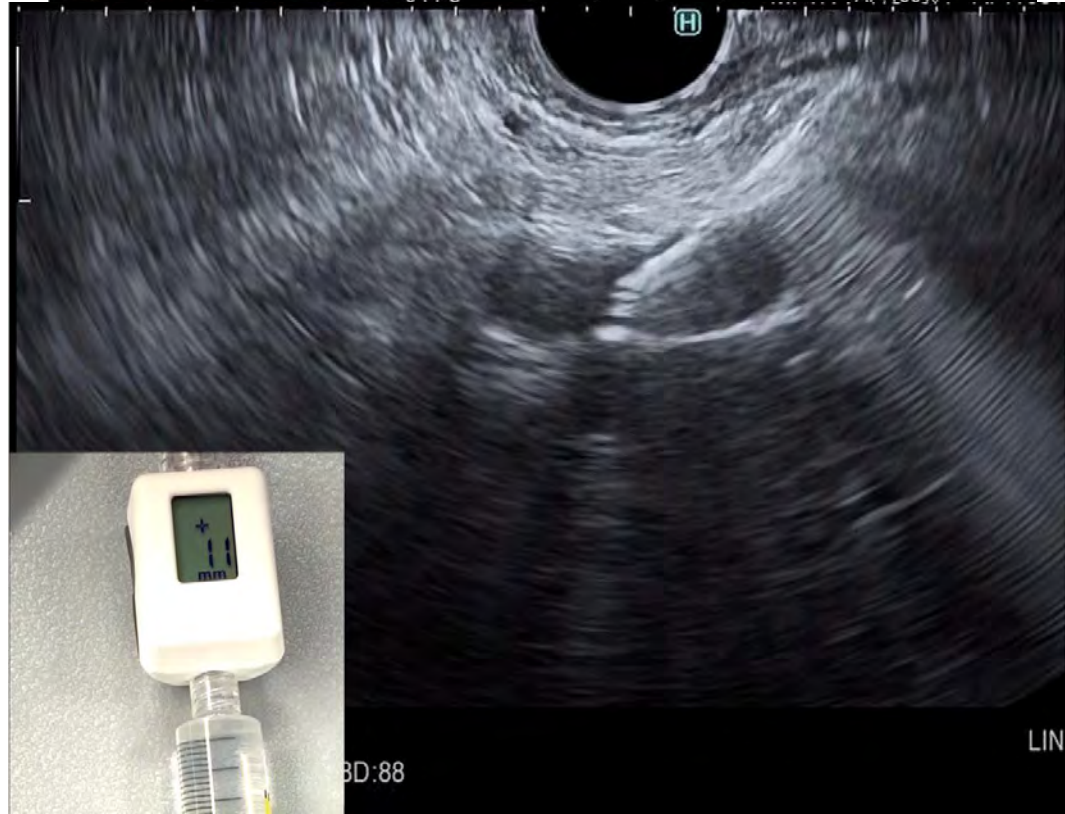
Case MW

- EUS-PPGM was performed:
- LHV



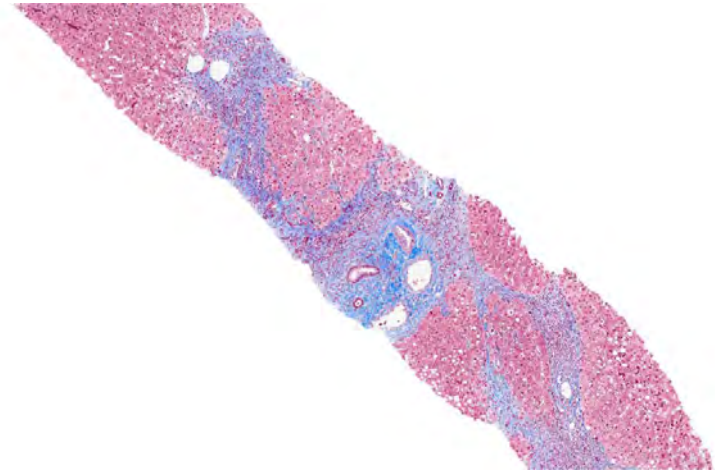
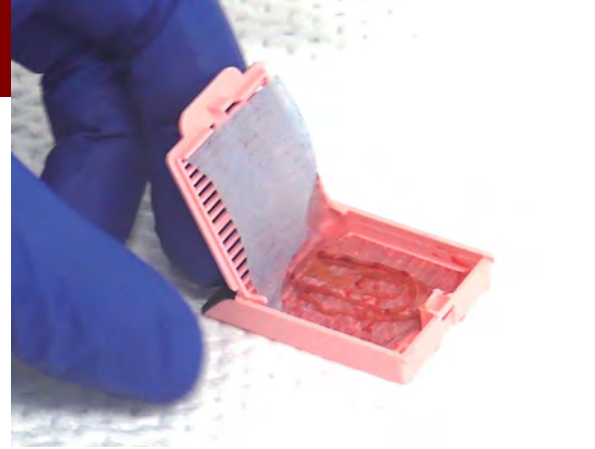
Case MW

- EUS-PPGM was performed:
- LPV



Case MW

- Liver Biopsy of the right and left lobe revealed mildly active steatohepatitis (Grade 1 of 3)
- Mild portal inflammation with focal lymphocytic cholangitis, and Cirrhosis (stage 4 of 4).
- In further comments by pathologist, there was mild macrovesicular steatosis with several hepatocytes showing ballooning degeneration. The main abnormality was steatohepatitis, but also showed focal lymphocytic cholangitis.
- Due to this finding and an elevated anti-mitochondrial Ab titer, a minor component to patient's was likely due to Primary Biliary Cholangitis (PBC).



Case MW

- With the supplemental Endo-Hepatology results, we had a multi-disciplinary discussion about patient's care.
- She has tried diet, lifestyle changes, and has been following up in our Bariatric Medicine clinic, where she's had limited response to these interventions.
- We felt that the patient's active steatohepatitis may benefit from a weight loss procedure, as improvement in steatohepatitis may improve portal hypertension and overall decrease her cardiac and liver related mortality.
- The surgery team remained concerned about CT scan findings of varices. The patient agreed to proceed with an Endobariatric procedure to help with weight loss.



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Thank you!

jsamaras@hs.uci.edu