

EUS Guided Portal Pressure Measurement Predictive of Clinically Significant Portal Hypertension: A Carilion Clinic Experience

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Background & AIM

- Amongst patients with cirrhosis, the presence and degree of portal hypertension has therapeutic and prognostic implications.
- The hepatic venous pressure gradient (HVP) has been previously established to accurately reflect the degree of portal hypertension with clinically significant portal hypertension (CSPH) defined by HVP >10mmHg.
- Endoscopic ultrasound-guided portal pressure gradient measurement (EUS-PPGM) is a novel technique for direct measurement of portal hypertension.¹
- We aimed to assess the safety, technical success of EUS-PPGM and correlation with clinical markers of advanced liver disease.

Methods

- This is a single-center retrospective study of patients with suspected chronic liver disease who have undergone EUS-PPGM with or without EUS-guided liver biopsy (EUS-Bx).
- Consecutive cases were included who underwent the procedure between September 2020 and March 2022 at our tertiary endoscopy center.
- The electronic medical record (EMR) was reviewed for patient demographics, non-invasive markers and clinical indicators of liver disease severity.
- Pearson correlation coefficients and Chi-square analysis were performed using SAS 9.4.

Results

- **119 of 126* (94.4%)** procedures were technically successful, with instances of failure related to inability to cannulate the hepatic or portal vein.
- No post-procedural bleeding or major adverse events were identified.
- Patients with confirmed cirrhosis on biopsy, or clinical signs of portal hypertension (ascites, varices, portal hypertensive gastropathy, or thrombocytopenia) were more likely to have PPG >10 mmHg.

Table 1. Baseline characteristics of patients who underwent EUS-PPGM procedure

Age	Mean (Range)	58.2	(30-82)
Gender	Male	58	46.0%
	Female	68	54.0%
Race	White	100	79.4%
	Other	15	11.9%
	Unknown	11	8.7%
BMI	Mean (Range)	33.2	(16.8 - 59)
	18-24.9	3	2.4%
	25-29.9	38	30.2%
	30-39.9	59	46.8%
	>40	21	16.7%
Indication	Unknown	5	3.9%
	NAFLD/NASH	64	50.8%
	Alcohol related liver disease	11	8.7%
	Elevated LFTs	19	15.1%
	HBV/HCV	10	7.9%
Clinical History	Other	22	17.5%
	Ascites	24	19.1%
	Esophageal Varices	27	21.4%
	Gastric varices	12	9.5%
	Portal hypertensive gastropathy	28	22.2%
Underwent biopsy		79	62.7%
	Primary histologic diagnosis of NASH	56	70.9%
	Histologic confirmation of cirrhosis	19	24.1%

Table 2. Correlation between measured PPG and non-invasive tests

	Pearson's r	p-value
Fib-4	0.42	<0.0001
APRI	0.26	0.0042
Platelet count	-0.41	<0.0001

Results

Table 3. Association between measured PPG and clinical indicators of portal hypertension [n (%)]

PPG (mmHg)	Ascites		Varices		Portal Hypertensive Gastropathy		Thrombocytopenia	
	Yes	No	Yes	No	Yes	No	Yes	No
<5	7 (10)	63 (90)	3 (4)	68 (96)	7 (9)	64 (90)	16 (23)	55 (77)
5-10	9 (25)	27 (75)	8 (22)	28 (78)	12 (33)	24 (67)	16 (44)	20 (56)
>10	8 (42)	11 (58)	11 (58)	8 (42)	10 (56)	8 (44)	11 (58)	8 (42)
	p = 0.0040		p < 0.0001		p < 0.0001		p = 0.0047	

Figure 1. Presence of portal hypertension amongst patients with clinical indicators†

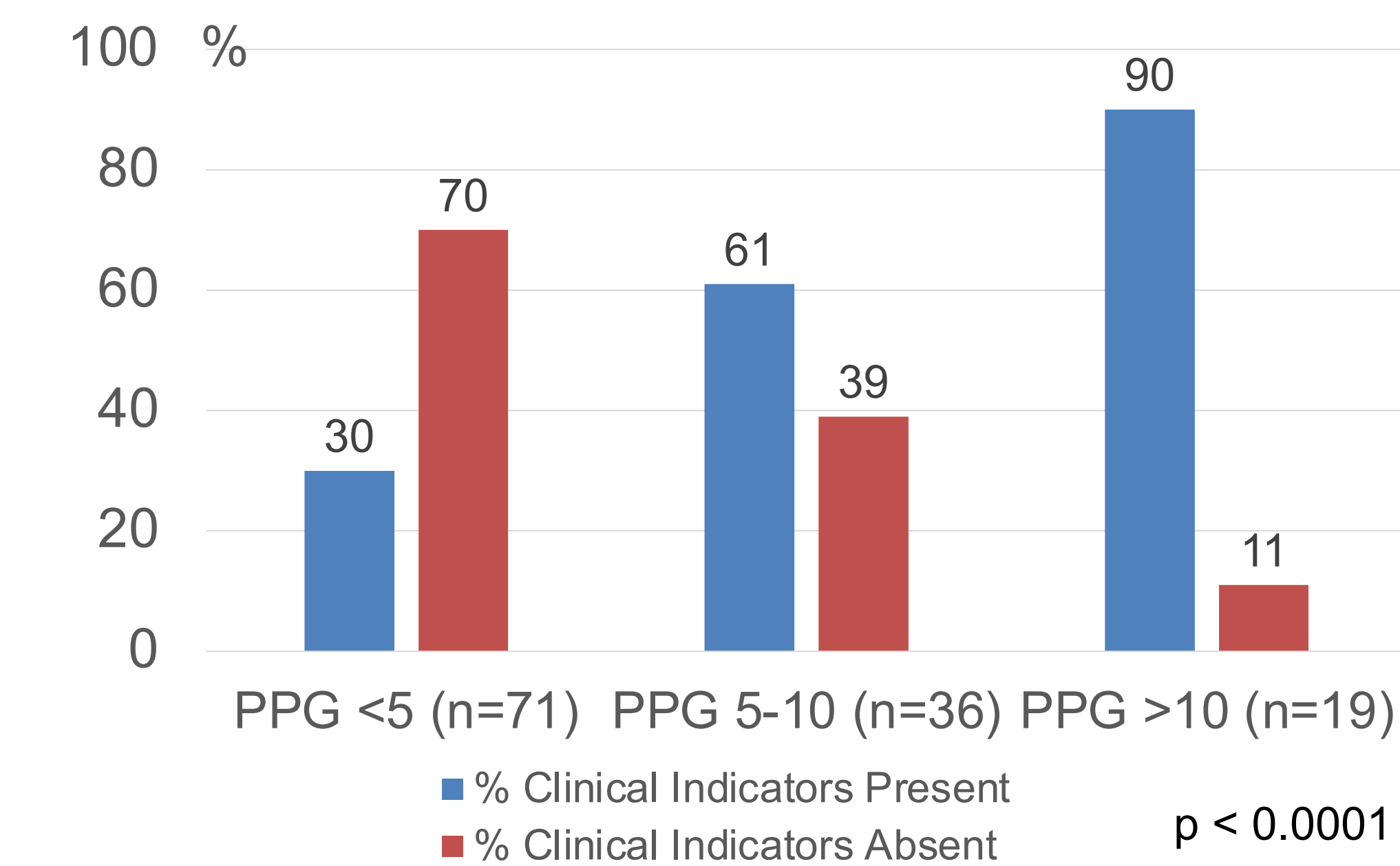
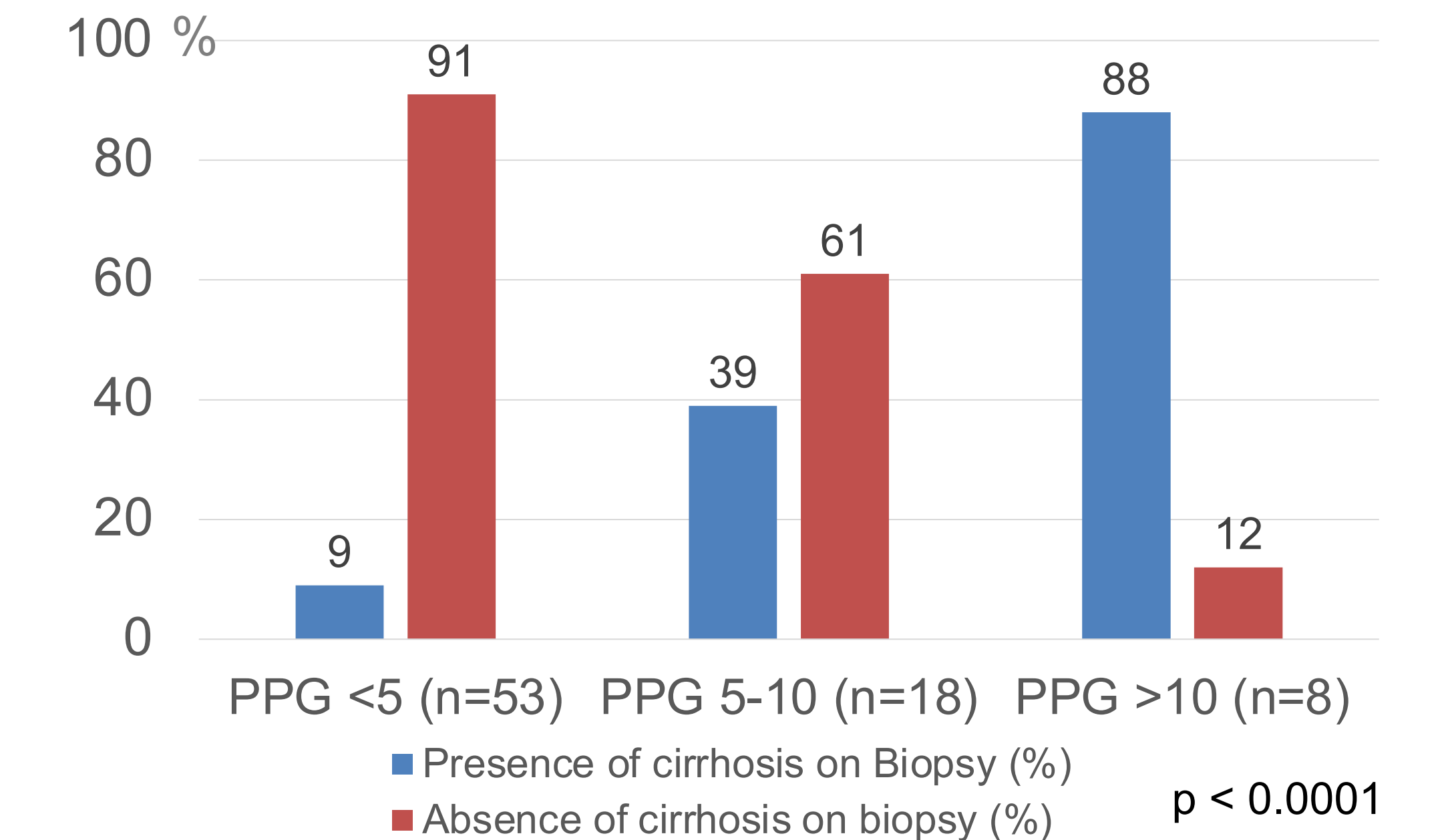


Table 4. Characteristics of PPG measurement among technically successful procedures

Pressure	Mean	SD (Range)
Hepatic vein	13.4	4.0 (5-25)
Portal vein	18.6	5.7 (7-33.3)
Gradient (PPG)	5.5	4.4 (-0.3-17.3)
Measured PPG (mmHg)	Frequency	
	Frequency	%
	<5	65 (54.6)
	5-10	33 (27.7)
>10	21 (17.6)	

Figure 2. Presence of portal hypertension amongst patients who underwent EUS-guided liver biopsy



Conclusions

- Our findings are consistent with recent reports, suggesting that EUS-PPGM is a safe and effective method with good correlation to noninvasive and clinical indicators of advanced liver disease.
- It has the added advantage of allowing EUS-Bx and endoscopic assessment of clinical features of portal hypertension during the same procedure.
- Future research is needed to assess how EUS-PPG measurements can best be utilized in routine clinical practice.