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LETTER TO THE EDITORS

Endoscopic ultrasound guided portal-systemic pressure gradient measurement to determine candidacy for kidney transplant alone versus combined liver kidney transplant in patients with advanced fibrosis or cirrhosis

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Dear Editors,

In patients with end stage renal disease (ESRD) and suspected portal hypertension (PHTN), the decision to recommend kidney transplant (KT) versus combined liver KT (CLKT) is complex [1]. Assessment of these patients requires multiple diagnostic procedures including determination of portal-systemic pressure gradient (PPG).

In this retrospective, single-center series, we determined feasibility, safety, and utility of endoscopic ultrasound-guided direct PPG measurement (EUS-PPG) in such patients who had previously undergone this procedure at their practitioner's discretion. The Institutional Review Board determined the protocol (without study-specific interventions or patient contact) exempt from review. The password-protected server/encrypted database was only accessed by investigators who assured data integrity.

Endoscopy and EUS preceded in triplicate direct pressure measurements with Echo Tip™ Insight (Cook Medical, Winston-Salem, NC) [2] and EUS-liver biopsy (EUS-LB). A blinded pathologist reviewed biopsies. The primary outcomes were reproducibility (three pressure measurements varying < 2 mm Hg) and safety.

Between July 30, 2020 and February 28, 2021, 11/25 (44%) EUS-PPGs performed were in ESRD patients suspected of advanced liver disease based on imaging or unexplained thrombocytopenia (Table 1). Median age was 61 (58, 65.5) years; most were African American. Diabetes and hypertension were the most common kidney diseases; liver etiologies were mixed.

New endoscopic and EUS findings were discovered with successful/reproducible EUS-PPG in 10/11 (91%) subjects. Maximum portal vein pressure was 21 mm Hg. PPG was ≤5 in 8 and <10 mm Hg in all. Biopsies contained 22.5 (14.3, 29.8) portal tracts. Cirrhosis was confirmed in one (10%) and suspected in two (20%) fragmented biopsies. There was no bleeding related to venous punctures, transfusions or EUS-PPG-related hospitalizations. Based on the EUS-PPG results, hepatology cleared 9 (82%) for KT and referred one (9%) for CLKT.

Table 1. Clinical data concerning for portal hypertension and EUS–PPG hemodynamic findings.

Parameter	Subjects (N = 11)
Clinical data concerning for portal hypertension	
Abnormal liver contour on imaging	7 (64%)
CT	5 (45%)
MRI	1 (9%)
Ultrasound	1 (9%)
Platelet count	
Platelet count (IQR) × 10^3/μl	149.5 (118.75, 202.75)
Platelet count < 140 × 10^3/μl	4 (36%)
Hemodynamic findings	
Hepatic vein pressure (IQR), mm Hg	12.8 (10.6, 15.8)
Portal vein pressure (IQR), mm Hg	16.5 (14.5, 19.4)
Portal-systemic gradient (IQR), mm Hg	2.8 (1.6, 4.8)

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Literature regarding candidacy for CLKT emphasizes patients fulfilling usual criteria for liver transplant who also have renal failure with little focus on ESRD patients with advanced fibrosis or compensated cirrhosis. While wedged hepatic vein pressure gradient (WHVPG) $\geq$ 10 mm Hg predicts decompensation in cirrhosis [3], advocating this threshold to recommend KT versus CLKT [4] has not been tested prospectively.

While transjugular WHVPG is the gold standard to estimate PPG, indirect portal pressure estimates are inaccurate in pre-sinusoidal disease and underestimate portal pressure in NASH [5]. Besides directly measuring pressures, EUS-PPG paired with endoscopy and EUS-LB enables a comprehensive, one-stop assessment rather than separate sedated procedures. Moreover, WHVPG may not be feasible in renal patients with catheter-related suprahepatic thromboses.

In our study, despite the hemostatic dysfunction in ESRD, EUS-PPG, and EUS-LB were safe without significant complications. Moreover, the paired endoscopy and EUS discovered new, clinically significant diagnoses in 10/11 (91%) subjects. EUS-LB specimens were ample, although fragmented biopsies occurred, an issue also confounding percutaneous and transjugular biopsies.

Limitations of our series include the controversial impact of general anesthesia on pressures and, as a new technology, forthcoming post-transplant outcomes. Still, we uniquely and safely applied an innovative technology providing a "one stop" assessment of PHTN in an important patient population. Future studies should correlate EUS-PPG with WHVPG, assess patient experience and analyze cost/benefit of one-stop versus piecemeal procedures.

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Conflicts of interest

MM is a consultant for Cook Medical, Winston-Salem, NC. The other authors of this manuscript have no conflicts of interest to disclose.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

1. Chadban SJ, Ahn C, Axelrod DA, *et al*. KDIGO clinical practice guideline on the evaluation and management of candidates for kidney transplantation. *Transplantation* 2020; **104**(4S1): S11.
2. Huang JY, Samarasena JB, Tsujino T, *et al*. EUS-guided portal pressure gradient measurement with a simple novel device: a human pilot study. *Gastrointest Endosc* 2017; **85**: 996.
3. Ripoll C, Groszmann R, Garcia–Tsao G, *et al*. Hepatic venous pressure gradient predicts clinical decompensation in patients with compensated cirrhosis. *Gastroenterology* 2007; **133**: 481.
4. Eason JD, Gonwa TA, Davis CL, Sung RS, Gerber D, Bloom RD. Proceedings of consensus conference on simultaneous liver kidney transplantation. *Am J Transplant* 2008; **8**: 2243.
5. Ferrusquia-Acosta J, Bassegoda O, Turco L, *et al*. Agreement between wedged hepatic venous pressure and portal pressure in non-alcoholic steatohepatitis-related cirrhosis. *J Hepatol* 2021; **74**(4): 811.