

**Evaluation of Decompensated Cirrhosis
using Acoustic Radiation Force Impulse Elastography:
comparisons with Child-Pugh
and model for end-stage liver disease scores**

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Background :

- Limited studies have used liver stiffness measurement (LSM) to **stratify the broad cirrhosis category**.
- Acoustic radiation force impulse (ARFI) elastography is capable of **LSM in presence of ascites**.
- Few studies have compared the diagnostic performances of ARFI, Child-Pugh, model for end-stage liver disease (MELD) and MELD-sodium (Na) scores to stratify cirrhosis.

Aims :

- This study aimed to evaluate the diagnostic performances of **ARFI, Child-Pugh, MELD, MELD-Na scores in stratifying cirrhotic patients**.

Key Literature

- Portal hypertension

Vizzutti Hepatology 2007, Sharma Radiology 2012, ...

- Esophageal varices

Kim AJG 2011, Bota Hepatology 2012, ...

- Decompensation

Foucher EJGH 2006, Kim DigDisSci 2009, Kim Digestion 2012, ...

- HCCs

Kim PLoS One 2012, Wang LI 2013, ...

Methods :

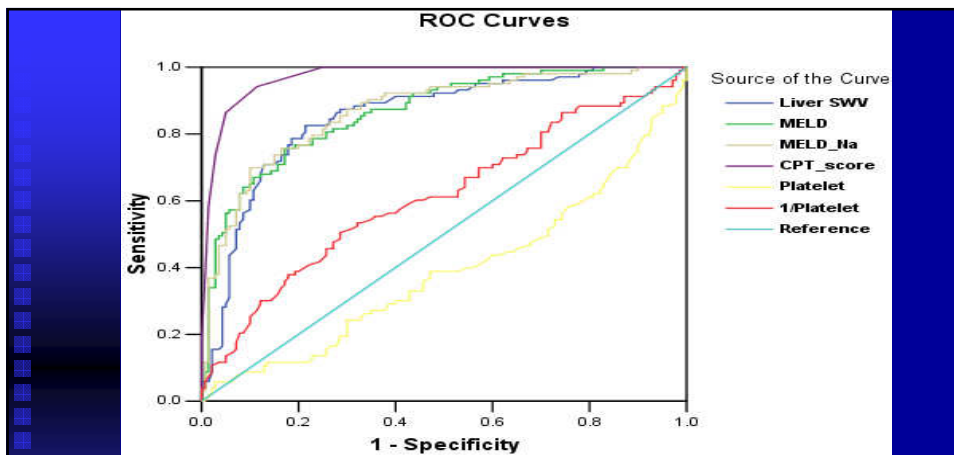
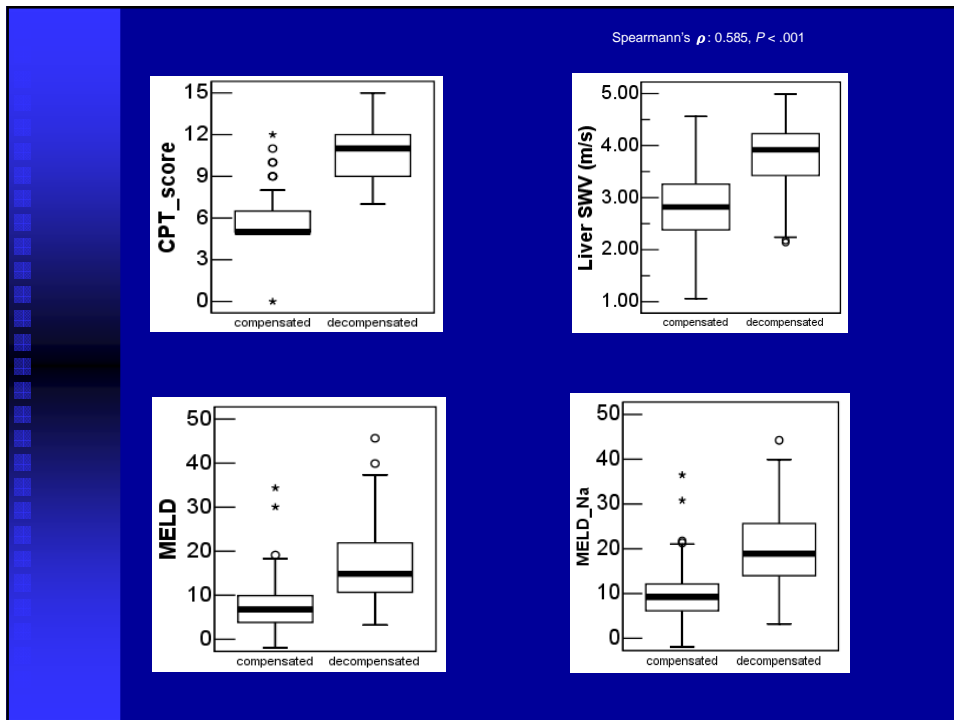
- This prospective cross-sectional study enrolled patients with pathologically or radiologically proven **cirrhosis**.
- Concomitant decompensated status at study entry (**encephalopathy, variceal bleeds or refractory ascites**) was categorized as a **composite variable**.
- Receiver operating characteristics (**ROC**) analysis was used to examine the **diagnostic performances**.

Results :

- From September 2010 to November 2012, this study enrolled **243** eligible cirrhotic patients.
- One hundred and sixty were male. One hundred and two were hepatitis B virus (HBV)-infected and 90 were HCV-infected. Eighty were chronic alcoholics.
- One hundred and forty had compensated cirrhosis and **103 had decompensated cirrhosis**(103/243, 42.39%).

Table 1. Patient characteristics

Variables	Compensated	Decompensated	P value
	n = 140	n = 103	
Age, year	58.51(1.03)	54.05(1.22)	.006
Sex (n)			.132
Male	87(62%)	74(72%)	
Female	53(38%)	29(28%)	
BMI, kg/m ²	24.42(0.33)	23.30(0.30)	.018
CHB (n)	62	40	
CHC (n)	68	22	
ALD (n)	23	57	
ALT, IU/L	64.90(5.64)	44.23(4.36)	.024
Bilirubin, umol/L	27.25(2.91)	129.91(16.86)	<.001
Cr, umol/L	77.43(2.65)	107.91(8.33)	.001
INR	1.18(0.02)	1.63(0.07)	<.001
Na, meq/L	137.11(0.27)	138.00(0.27)	<.001
Platelet, x 10 ⁹ /L	110.32(4.50)	94.00(5.66)	.023
Child-Pugh score	5.9(0.12)	10.8(0.19)	<.001
Liver SWV, m/s	2.80(0.06)	3.80(0.06)	<.001
MELD	7.24(0.44)	16.97(0.84)	<.001
MELD-Na	9.48(0.49)	20.00(0.82)	<.001



- The optimal **cut-off** values were 8.5 for Child-Pugh, **3.64** m/s for ARFI, 10.54 for MELD, and 16.18 for MELD-Na scores.
- To stratify the cirrhosis (compensated versus decompensated), the areas under ROC curves (AUCs) were (0.953; 95% confidence interval, CI: 0.922-0.984) for Child-Pugh, (**0.853; 95% CI: 0.803-0.902**) for ARFI, (0.865; 95% CI: 0.820-0.910) for MELD, and (0.868; 95% CI: 0.822-0.914) for MELD-Na scores.
- **Pair-wise comparisons (DeLong method)** of the AUCs revealed that the Child-Pugh score was superior to ARFI (Child-Pugh score versus ARFI, $P = .0008$), MELD ($P = .0017$), and MELD-Na scores ($P = .0032$). ARFI alone performed as well as MELD (ARFI versus MELD, $P = .7239$), and MELD-Na scores ($P = .6651$).

Table 2. Diagnostic performances of the modalities

Modalities	Sensitivity	Specificity	PPV	NPV	+LR	-LR	DOR
CPT (8.5)	.8640	.9500	.9271	.9047	17.28	.14	120.71
ARFI (3.64)	.7090	.8710	.8017	.8027	5.50	.33	16.45
MELD (10.54)	.7570	.8290	.7651	.8226	4.43	.29	15.10
MELD _{Na} (16.18)	.6990	.9000	.8372	.8025	6.99	.33	20.90

Limitations

- Cross-sectional or baseline rather than time-dependent predictive analysis of the decompensation
- Larger sample sizes for validation of cutoffs and for examination of accuracies of the competitor diagnostic indices
- Diverse patient characteristics
- Clinical validity of the composite category (encephalopathy, variceal bleeds or refractory ascites)
- Child-Pugh scoring: 5-15 ordinal grades
- MELD scoring: originally feasible for 90-day mortality estimation
- SAAG not applicable in all cases
- Analyses not adjusted for other relevant covariates e.g. standards of anti-viral or cirrhosis care

Conclusions :

- ARFI LSM alone is a promising and useful indicator to identify decompensated cirrhosis as compared with MELD and MELD-Na scores.