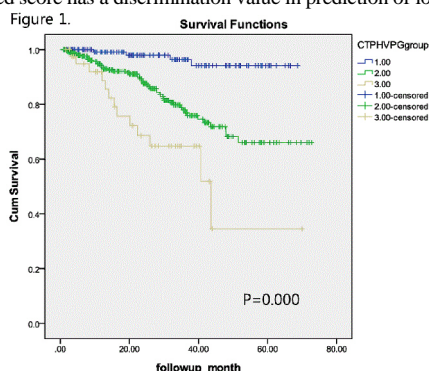


# The Usefulness of CTP Class and HVPG Model in Low and Intermediate MELD Era

<sup>1</sup>순천향의대 부속병원 내과, <sup>2</sup>리하트내과, <sup>3</sup>한림대학교 춘천성심병원 내과, <sup>4</sup>연세대학교 원주세브란스기독병원 내과, <sup>5</sup>한양대학교 구리병원 내과, <sup>6</sup>삼성서울병원 영상의학과, <sup>7</sup>연세대학교 원주과대학 라이프 스타일 연구소

\*류담<sup>1</sup>, 장재영<sup>1</sup>, 김태엽<sup>2</sup>, 석기태<sup>3</sup>, 김문영<sup>4</sup>, 정승원<sup>1</sup>, 김동준<sup>3</sup>, 백순규<sup>4</sup>, 손주현<sup>5</sup>, 정우경<sup>6</sup>, 최은희<sup>7</sup>

**Background/Aims:** We investigated the usefulness of Child-Turcotte-Pugh (CTP) plus hepatic vein pressure gradient (HVPG) model for stratifying prediction of long-term survival in low and intermediate model for end-stage liver disease (MELD) era. **Methods:** Of 1,025 patients with liver cirrhosis, we excluded critically ill cases and those with MELD scores  $\geq 15$ . The data of 494 patients were subsequently collected between 2008 and 2013. We determined the CTP score as follows: score 1 (CTP class A), score 2 (CTP class B), and score 3 (CTP class C). We also determined the HVPG score as follows: score 1 (HVPG <13 mmHg), score 2 (13 mmHg  $\leq$  HVPG <21 mmHg), and score 3 (HVPG  $\geq 21$ ). We determined subgroups using the sum of the CTP and HVPG scores as follows: CTP+HVPG score 2 as group 1, CTP+HVPG scores 3 and 4 as group 2, and CTP+HVPG score 5 and 6 as group 3. **Results:** According to CTP+HVPG score, the cumulative survival rate decreased significantly as the CTP+HVPG score increased, as shown in the Figure 1 (P=0.000). The mortality rates increased significantly according to CTP+HVPG score in patients with low and intermediate MELD score (Group 2 [hazard ratio, HR=4.97] (P=0.004)), (Group 3 [HR=8.84] (P=0.001)). In the comparison between two groups (group 1 vs. 2, 2 vs. 3, and 1 vs. 3), the cumulative survival rate was significantly different between groups 1 and 2, between groups 2 and 3, and between groups 1 and 3 (P=0.000, 0.021, and 0.000, respectively). **Conclusions:** In low and intermediate MELD era, the calculation of the combined score using CTP plus HVPG model can help stratify the long-term prognosis. Also, in compensated and decompensated cirrhosis, the combined score has a discrimination value in prediction of long-term survival.



# Optimal selection of sedative during endoscopy in cirrhotic patients to avoid hepatic encephalopathy

순천향대학교 의과대학 부천병원, 내과

\*황의권, 유정주, 궁현정, 김상균, 김영석

**Background/Aims:** The indiscriminate use of sedative drug during endoscopy can pose a risk of minimal hepatic encephalopathy (MHE) in patients with liver cirrhosis. However, it has not been studied yet which drugs are safest and most inviting on these patients. The aim of this study is to evaluate which one among midazolam, propofol, or combination therapy, was the least likely to cause complications including MHE by using Stroop application in cirrhotic patients. **Methods:** This randomized prospective study included consecutive 32 patients who underwent upper GI endoscopy at tertiary hospitals in Korea. Patients were randomly assigned to one of three groups, midazolam, propofol, or combination group, and underwent Stroop test before endoscopy, and 2 hours after the completion of endoscopy. The vital signs was checked before and after the drug administration and the patient / physician / nurse satisfaction was scored after endoscopy. **Results:** Mean age of the patients was 54.0  $\pm$  9.30 years and 81.3% were male. Fifteen patients (46.9%) were child-pugh class A, and 17 (53.1%) were child-pugh class B or C. Alcohol was the most common etiology (21, 65.6%)(Table 1). Patients did not show significant changes in Ontime, Offtime on Stroop test before and after drug administration, and there was no significant difference between the three treatment groups (Table 2). Also, there was no significant vital sign changes after drug use in all groups. However, with respect to subjective indicators, the satisfaction scores of patient and nursing staff was higher in the combined group than in the other two groups, and time to recovery was shorter in propofol than other groups (Table 3). **Conclusions:** In patients with cirrhosis, sedative endoscopy using midazolam, propofol, or combination therapy is relatively safe, and was not associated with increased risk of MHE. However, since there is subjective satisfaction or recovery time difference among sedative agents, it should be considered according to each individual patient.

Table 1. Baseline characteristics of enrolled patients

Characteristics	All (N=42)	Midazolam (N=14)	Propofol (N=14)	Combination (N=14)	P
<b>Demographics</b>					
Age (years)	52.29 $\pm$ 9.70	48.85 $\pm$ 10.07	54.29 $\pm$ 1.14	57.9 $\pm$ 8.10	0.064
Sex (male)	33 (80.5)	10 (71.4)	12 (85.7)	11 (84.6)	0.572
ASA class					0.927
I	16 (38.0)	5 (35.7)	6 (42.9)	5 (38.5)	
II	26 (61.0)	9 (64.3)	8 (57.1)	9 (68.5)	
Education level					0.202
Low-educated	8 (19.0)	3 (21.4)	1 (7.1)	4 (30.8)	
High-educated	34 (80.5)	11 (78.6)	13 (92.9)	9 (69.2)	
<b>Etiology</b>					0.453
HBV	12 (28.3)	4 (28.6)	3 (21.4)	5 (38.5)	
HCV	1 (2.4)	0 (0)	0 (0)	1 (7.7)	
Alcohol	24 (57.5)	9 (64.3)	10 (71.4)	5 (38.5)	
Others	4 (9.5)	1 (7.1)	2 (14.3)	1 (7.7)	
<b>Liver function</b>					0.501
Aspartate	21 (50.1)	8 (57.1)	7 (50.0)	6 (46.2)	
Albumin	13 (31.0)	4 (28.6)	3 (21.4)	6 (46.2)	
Serum	7 (17.1)	2 (14.3)	4 (28.6)	1 (7.7)	
MELD score	10.74 $\pm$ 4.00	11.28 $\pm$ 4.65	11.87 $\pm$ 4.26	9.91 $\pm$ 2.39	0.139
Child-Pugh class					0.542
Class A	19 (45.2)	5 (35.7)	6 (42.9)	8 (61.5)	
Class B	23 (54.8)	9 (64.3)	8 (57.1)	6 (46.2)	
<b>Endoscopic findings</b>					0.108
Esophageal varices	35 (83.4)	13 (92.9)	13 (92.9)	9 (69.2)	
Gastric varices	9 (22.0)	1 (7.1)	4 (28.6)	4 (30.8)	0.254
<b>Sedative drug</b>					<0.001
Midazolam (mg)	1.7 $\pm$ 1.4	3.0 $\pm$ 0.8	0	2.2 $\pm$ 0.6	
Propofol (mg)	25.2 $\pm$ 25.8	0	44.5 $\pm$ 15.1	31.9 $\pm$ 19.8	

Table 2. Results of stroop test

Outcomes	All (N=42)	Midazolam (N=14)	Propofol (N=14)	Combination (N=14)	P
<b>On-time (min)</b>					
Pre	86.4 $\pm$ 33.5	80.0 $\pm$ 22.1	83.7 $\pm$ 36.4	90.2 $\pm$ 36.0	0.435
Post	84.5 $\pm$ 36.4	87.9 $\pm$ 31.4	79.3 $\pm$ 26.8	87.4 $\pm$ 26.9	0.740
$\Delta$ Post-Pre	-1.9 $\pm$ 36.0	7.9 $\pm$ 36.7	-14.4 $\pm$ 41.1	-12.8 $\pm$ 26.3	0.400
<b>Off-time (min)</b>					
Pre	113.9 $\pm$ 42.8	103.1 $\pm$ 36.0	118.3 $\pm$ 42.2	120.9 $\pm$ 48.2	0.755
Post	133.6 $\pm$ 133.9	90.8 $\pm$ 26.2	175.3 $\pm$ 252.0	134.8 $\pm$ 71.3	0.337
$\Delta$ Post-Pre	197.7 $\pm$ 157.1	-12.2 $\pm$ 34.7	57.0 $\pm$ 262.8	13.9 $\pm$ 37.3	0.511
<b>On/Off-time <math>\times</math> On-time (min)</b>					
Pre	200.4 $\pm$ 96.6	103.1 $\pm$ 53.4	202.0 $\pm$ 125.0	217.2 $\pm$ 83.9	0.631
Post	218.1 $\pm$ 161.7	179.8 $\pm$ 253.7	253.7 $\pm$ 255.2	222.3 $\pm$ 97.3	0.481
$\Delta$ Post-Pre	17.7 $\pm$ 165.8	-4.3 $\pm$ 52.3	51.6 $\pm$ 274.9	5.0 $\pm$ 68.6	0.646

Table 3. Subjective satisfaction measurement

Outcomes	All (N=42)	Midazolam (N=14)	Propofol (N=14)	Combination (N=14)	P
<b>Time-to-recovery (min)</b>	10.0 $\pm$ 12.6	24.2 $\pm$ 14.5	14.7 $\pm$ 11.6	14.9 $\pm$ 9.3	0.071
<b>Doctors (points/10)</b>					
Overall satisfaction	7.9 $\pm$ 1.4	7.6 $\pm$ 1.2	7.6 $\pm$ 1.7	8.6 $\pm$ 0.8	0.115
<b>Nurses (points/10)</b>					
Overall satisfaction	7.5 $\pm$ 1.4	7.2 $\pm$ 1.3	7.2 $\pm$ 1.7	8.0 $\pm$ 1.1	0.237
<b>Patients (points/10)</b>					
Overall satisfaction	8.4 $\pm$ 2.5	8.2 $\pm$ 2.8	8.2 $\pm$ 2.7	8.6 $\pm$ 2.0	0.809
Recall of pain or discomfort	1.6 $\pm$ 2.0	1.2 $\pm$ 2.5	2.0 $\pm$ 3.3	1.0 $\pm$ 1.6	0.231
Arousal time	4.2 $\pm$ 4.1	3.3 $\pm$ 3.8	7.6 $\pm$ 5.3	1.4 $\pm$ 2.8	<0.001
Morosity	4.3 $\pm$ 4.4	3.2 $\pm$ 4.1	7.3 $\pm$ 5.5	2.7 $\pm$ 4.3	0.000