ORIGINAL ARTICLE

Comparison of MELD and CTP scores to predict mortality in patients with acute variceal bleeding

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Abstract

Objective:To determine the effectiveness of MELD score in predicting mortality in cirrhotic patients who presented with acute variceal bleeding to our unit.

Study design: Descriptive cjross sectional

Place and duration of study: Study was conducted at the department of Gastroenterology, Ayub Teaching Hospital, Abbottabad from August 2013 to April 2017.

Material and methods: 207 cirrhotic patients who presented with acute variceal bleeding to the department of gastroenterology, Ayub Teaching Hospital, Abbottabad were enrolled in this study. The MELD and CTP scores were calculated at the time of admission and the patients were managed as per department protocols. Patients were followed up for a 4-week period and mortality in patients was recorded on a proforma.

Results: Out of 207, 38(18.4%) patients died during the study period. Hepatitis C (57; 27.5%), Hepatitis B (54; 26.1%), combined Hepatitis B and C infection (51; 24.6%) and other causes (45; 21.7%) were identified as the cause of CLD. Esophageal varices were the most frequent source of bleeding (77; 37.2%). Mean Child pugh scores were 10.47±2. SD and mean MELD scores were 25.11±7.3 SD in patients underwent mortality (p=0.000).

Conclusion: MELD score were found to be more effective as CTP score in predicting mortality following acute variceal bleeding in cirrhotic patients.

Keywords: MELD, CTP, mortality, cirrhosis, hepatitis, chronic liver disease, variceal bleeding, Child pugh

Introduction:

Chronic liver disease is dreaded for its complications which develop in the course of the disease and these include acute upper gastrointestinal bleeding most commonly from varices, hepatic encephalopathy, hepato-renal syndrome, hepato-pulmonary syndrome and porto-pulmonary hypertension.[1] The presence of these complications increases the mortality in patients with chronic liver disease.[2] Acute bleeding from varices present at the lower end of esophagus or in the fundus in patients with CLD is a frequent and severe complication.[3] About 70% of all UGIB in patients with portal hypertension is due to acute variceal bleeding.[4] In patients with CLD Mortality due to acute variceal bleeding is still high despite advances in management of chronic liver disease in recent years and ranges from 16%5 in patients treated for acute variceal bleeding to upto 32% in untreated patients.[6,7]

The outcome of acute variceal bleeding is affected by the presence of a number of factors with a high child-pugh class, increased model for end-stage liver disease (MELD) score, presence of active bleeding at endoscopy, concomitant infection at the time of hospital admission, hepatocellular carcinoma (HCC), imparting a poorer outcome in patients who present with acute variceal bleed.[5,8-10]

Other factors that have been identified in association with an increased risk of mortality in acute variceal bleeding include the hematocrit at the

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time of presentation, venous pressure gradient in liver (HPVG), serum aminotransferase level, portal vein thrombosis, serum albumin and bilirubin level and hepatic encephalopathy.[8]

The Child-Pugh (CP) scoring system is a well-known and tested scoring system that has been employed for a quite a while to evaluate the prognosis of CLD as well as to predict mortality following acute variceal bleeding.[11] It consists of five criteria i.e., ascites, hepatic encephalopathy, serum bilirubin (total), serum albumin, and prothrombin time or international normalized ratio (INR).[11,12]

The Model for Endstage Liver Disease or MELD as it is commonly known is based on three objective reproducible bio-chemical variables such as the international normalized ratio (INR) of prothrombin time (PT), serum creatinine and serum bilirubin.[13] Though MELD score was initially used to predict the outcome of TIPS in patients with CLD, it has now been validated in chronic liver disease with a diverse etiologic factors.[14-16]

The MELD score has also been used to predict mortality in patients with acute variceal bleeding.[10,17,18] This study was designed with an aim to determine the effectiveness of MELD score in predicting mortality in cirrhotic patients who presented with acute variceal bleeding to our unit. Variceal bleeding was identified on initial endoscopy in a patient presenting with hematemesis as Blood oozing or spurting from a varix in lower esophagus or the gastric fundus, a varix with a "white nipple" or an adherent clot in the aforementioned areas, and presence of esophageal / gastric varices and blood in stomach in the absence of other possible sources of bleeding. Following admission and initial resuscitation, any new episode of bleeding which had a significant hemodynamic impact and required transfusion of at least 2 units of whole blood or red blood cells at least 24 hours after the control of presenting bleed was termed as rebleeding.

Material and Methods:

The study was a descriptive cross-sectional study conducted at the department of Gastroenterology, Ayub Teaching Hospital, Abbottabad from August 2013 to April 2017. A sample size of 207 was chosen using 16% mortality secondary to acute variceal bleeding in treated patients using a 95% confidence interval and 5% margin of error. All patients with cirrhosis liver who present with acute variceal bleeding for the first time were included in this study. Patients with GI Bleed other than esophageal varices, HCC, and portal vein thrombosis were excluded from the study. Patients aged between 20 and above were included in the study. Patients who had a previous episode of bleeding were also excluded from the study. The study was conducted after approval from hospital ethical and research committee. All patients presenting to Gastroenterology Unit and meeting the selection criteria were included in the study after obtaining a written informed consent. Patients were subjected to a detailed history and clinical examination. The child-Pugh score and MELD score was calculated for each patient at the time of admission to assess the liver function. The following formula was used to calculate MELD score:

3.8loge (serum bilirubin mg/dL) + 9.6 loge (serum creatinine mg/dL) + 11.2 loge (INR) + 6.4

The patients were managed as per department protocols and were observed for re-bleeding during their stay in the hospital. Over-all mortality as well as mortality during an acute episode was recorded for the study cohort. The patients were discharged and were asked for a follow-up visit at 4 weeks time. Patients were also contacted through telephone if they didn't arrive for a follow up visit. All the above mentioned information including name, age and address were recorded on pre-designed pro forma. Care was taken during extraction of information from all patients to avoid responder bias. Confounders and other bias were controlled by strictly following the exclusion criteria. The data obtained was entered into and analyzed using SPSS 20.0. Quantitative variables were described as mean+SD. Categorical variables were described as frequencies and percentages. Student t test was used to compare mortality with

Table-1: Clinical outcomes

Clinical outcomes	Number (N=207)	Frequency (100%)
Mortality		
Yes	38	18.4%
No	169	81.6%
Source of bleeding		
Fundal Varices	64	30.9%
Esophagal Varices	77	37.2%
Fundal and Esophageal Varices	66	31.9%
Ascites		
Yes	51	24.6%
No	156	75.4%
Hepatic Encephalopathy		
Yes	66	31.9%
No	141	68.1%

Table-2: Comparison of Mortality scores in Child Pugh and MELD scoring system

Mortality	n=207	Scores		T value	P value
		Child Pugh	MELD		
Yes	38	10.47± 2.SD	25.11±7.3SD	7.31	0.000
No	169	7.57±2.0SD	18.13±5.3SD	6.77	0.000

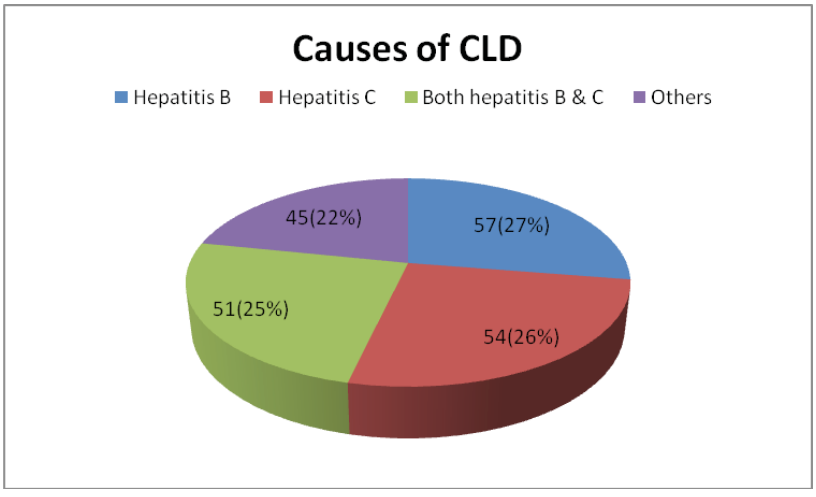

Figure. 1: Causes of CLD

MELD score and child pugh score.

Results:

Total 207 patients were included in study. There were 144(69.6%) male and 63(30.4%) females. Mean age of patients was 47.5±6 SD. Mean white blood cell count was 9.7±1.1 SD. Mean hemoglobin level was 9.3±0.73SD. Mean platelets were 123.1±7.6 SD. Mean serum urea was 59.5±11.6 SD. Mean serum creatinine was 1.81±0.54 SD. Mean Prothrombin time was 1.78±0.2 SD. Mean INR was 1.97±0.42 SD. Mean AST 147.1±53.2 SD. Mean ALT was 117.9±41.5 SD. Mean serum bilirubin was 3.02±1.2 SD. Mean Child pugh scores were 8.10±2.4 SD. Mean MELD scores were 19.41±6.3 SD. Causes of CLD are shown in figure 1.

Mortality was reported in 38(18.4%) patients. Source of bleeding was fundal varices 64(30.9%), esophageal varices 77(37.2%) and both esophageal, fundal varices 66(31.9%). Ascites were reported in 51(24.6%) while hepatic encephalopathy was reported in 66(31.9%) as shown in table 1.

Mean Child pugh scores were 10.47± 2. SD and mean MELD scores were 25.11±7.3 SD in patients underwent mortality (p=0.000). Mean Child Pugh cores were 7.57±2.0 SD and mean MELD scores were 18.13±5.3 SD in patients who remained alive in study duration (p=0.000) as shown in Table 2

Discussion:

The model for end-stage liver disease (MELD score was originally designed to predict mortality in patients undergoing trans-jugular intrahepatic portosystemic shunts or TIPSS.[18] However, over the passage of time, it has found utility in a number of scenarios revolving around chronic liver disease.[19-23]

Even though the CTP scoring system is easier to use when at bedside, its scoring system as well as the disease severity grades have not been validated statistically in addition to some serious limitations of the method itself.[18,24] On the other hand, calculation of MELD score is complicated

and requires computers or calculators despite the fact that it uses objective variables that are easy to measure and the score is reproducible. A number of studies have compared MELD score with CTP score in a number of situations,[19-23] and both scores were found to have comparable predictive efficacy except in liver transplant patients in whom MELD has been found to be better at predicting prognosis.[25,26]

The results of this study show that there is no difference between both MELD and CTP score when it comes to predicting mortality in patients with acute variceal bleeding and these results are similar to those found in literature.[10,17]

Recently, MELD score was found to be comparable with other prognostic models used in the intensive-care settings for predicting mortality in patients with severe acute variceal bleeding.[27]

In another study MELD score far better than other scores in terms of predicting mortality from upper gastrointestinal bleeding in cirrhotic patients.[28] The authors compared MELD with Glasgow-Blatchford and pre-endoscopic Rockall scores. The mortality rate was 16.0% (19/119). Model for end-stage liver disease score performed better with an area under the curve (AUC) of 0.736 (95% confidence interval [CI], 0.629-0.842; P = .001) compared with other scoring systems.[28]

A study from Peshawar recently reported that MELD-Na score was a strong predictor of mortality following acute variceal bleeding in cirrhotic patients. However, the researchers did not compare the MELD-Na score with CTP or any other scoring system.[29] It is interesting to note that the mortality rate in the study was 74.8% compared to 18% in this study. While we followed up the patients for 4 weeks, the above-mentioned study followed up the study participants for 3 months. Perhaps this can be cited as the reason for a higher mortality rate in their study.

A study from Egypt reported that a high MELD Score was associated with increased risk of rebleeding and death in patients with acute variceal bleeding.[30] The authors reported that the mean MELD score was higher in patients who had died within 5 days of an episode of acute bleeding. Patients with death within 10 weeks of acute variceal bleed had also a high mean MELD score.[30]

Interestingly, while in our study, both scores are comparable in predicting mortality in cirrhotic patients with acute variceal bleeding, a recently published multi-center prospective study has reported that CTP score has the best overall performance in the prediction of 6-week mortality and is best at stratifying risk.[31] The study reported a mortality rate of 26% with 18 deaths in a study sample of 70 patients.

The researchers concluded that the MELD or CTP scores at the time of admission (separately) were independent predictors of survival. The discriminative values of CTP (area under receiver operating characteristic: 0.75) and MELD (area under receiver operating characteristic: 0.79) were good and not significantly different (P=0.27). However, calibration (correlation between observed and predicted mortality) test was significantly better for CTP than for MELD.[31]

Conclusion:
MELD score were found to be more effective as CTP score in predicting mortality following acute variceal bleeding in cirrhotic patients. It is evident in light of above evidence that more research is needed to ascertain the role MELD score can play in predicting mortality in cirrhotic patients with acute variceal bleeding.

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Role and contribution of authors:
Dr. Adil Naseer Khan, collected the data, referenes and wrote the initial write up.

Dr. Muhammad Arshad, collected the references and helped in introduction writing.

Dr. Rubina Rafique, critically review the article and made the final changes

Dr Anam Altaf, helped in collecting the data and references and also helped in discussion writing.

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