

RDW Levels and Clinical Value in Decompensated Liver Cirrhosis Patients

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Abstract

Objective: This study aims to analyze the levels of RDW in decompensated liver cirrhosis patients and further explore the influencing factors of death in decompensated liver cirrhosis patients. **Methods:** A single center retrospective analysis method was used in this study. 145 patients with decompensated cirrhosis admitted to the Second Affiliated Hospital of Dali University from March 2021 to March 2023 were selected as the research objects. According to the 30 day survival in the hospital, they were divided into survival group (n=116) and death group (n=29). The clinical data within 24 hours of admission in each group were recorded, including age, gender, RDW, ALT, AST, TBIL and γ -GGT and other laboratory examination indicators were recorded, while the MELD score of the study subjects at admission was recorded. Univariate binary logistic regression analysis was used to analyze the independent risk factors for death in decompensated liver cirrhosis patients. **Results:** In patients with decompensated liver cirrhosis death group RDW, MELD score, AST, TBIL is significantly higher than live group, differences were statistically significant ($P < 0.05$); ALT, γ -GGT is similar between the two groups has no statistical significance ($P > 0.05$). Single factor logistic regression analysis results showed that RDW, MELD score, TBIL is decompensation period the influence factors of prognosis of 30 day mortality in patients with liver cirrhosis. **Conclusion:** RDW has the advantages of convenient detection and low cost, and has good application prospects in evaluating the prognosis of decompensated liver cirrhosis patients in the future.

Keywords

RDW, MELD score, Decompensated cirrhosis

1. Introduction

Decompensated cirrhosis is a stage in the progression of cirrhosis, accompanied by a series of complications, including as cites, gastroesophageal varices bleeding, Hepatic encephalopathy and Liver failure, which are the main causes of death. Samonakis found that compared to compensatory cirrhosis, patients with decompensated cirrhosis had a median survival time of only 65 months and a poorer prognosis [1]. Therefore, early recognition and timely treatment are of great significance for improving the survival rate of decompensated liver cirrhosis patients.

Red blood cell distribution width (RDW) is an indicator of heterogeneity in red blood cell size. Some studies suggest that RDW is a new independent predictor of mortality and major adverse events in decompensated liver cirrhosis patients, and high levels of RDW are also significantly associated with mortality in decompensated liver cirrhosis patients [2-3]. In view of the above, this study further explores the level and clinical value of RDW in de-

compensated liver cirrhosis patients by analyzing the 30 day survival indicators in the hospital.

2. Materials and Methods

2.1 Study Population

In this study, a single center retrospective study method was used. 145 patients with decompensated liver cirrhosis were selected from the Second Affiliated Hospital of Dali University from March 2021 to March 2023 as the research objects. According to the 30 day survival, they were divided into survival group and death Group. Inclusion criteria: Patients who comply with the EASL Clinical Practice Guidelines: Management of Patients with Decompensated Liver Cirrhosis published by the European Society for Liver Research [4], aged ≥ 18 years old; Exclusion criteria: Age < 18 years old; Pregnant women. This study has been approved by the hospital ethics committee. All sample collection and data investigation have obtained informed consent and signed confirmation from patients and their families, and patient privacy has been strictly protected during the research process.

2.2 Clinical and Laboratory Assessments

Collect general clinical data of patients, such as age and gender; Record relevant laboratory indicators of decompensated cirrhosis patients within 24 hours after admission, such as RDW, AST, ALT, TBIL, γ -GGT; Simultaneously complete the Model for End-Stage Liver Disease (MELD) score for decompensated liver cirrhosis patients.

2.3 Statistical Analysis

This study used SPSS22.0 statistical software to analyze the data. The measurement data were expressed by the median (Quartile) [M (Q1, Q3)], and the Mann Whitney nonparametric U test was used for comparison between groups; The Categorical variable is expressed in frequency (percentage), and X² test is used for comparison between groups. Using binary logistic regression analysis to identify independent risk factors for death in decompensated liver cirrhosis patients, $P < 0.05$ suggests a statistically significant difference.

3. Results

3.1 Comparison of General Information between Two Groups of Patients

This study identified 145 decompensated liver cirrhosis patients who met the inclusion criteria, of which 47 were female (40.5%) and 98 were male (59.5%) in the survival group (n=116), with an average age of 57.73 years; In the death group (n=29), there were 10 females (34.5%) and 19 males (65.5%), with an average age of 69.00 years; The RDW, MELD scores, AST, and TBIL in the death group were significantly higher than those in the survival group, and the differences were statistically significant ($P < 0.05$); The differences in other indicators were not statistically significant ($P > 0.05$), shown in Table 1.

3.2 Univariate analysis of 30 day survival outcomes in decompensated liver cirrhosis patients

Incorporating various indicators into univariate logistic regression analysis, the results showed that RDW, MELD score, and TBIL were influencing factors for the prognosis of 30 day mortality in decompensated liver cirrhosis patients (all $P < 0.05$), shown in Table 2.

4. Discussion

Early identification of the prognostic outcomes of decompensated liver cirrhosis patients is an important task in clinical practice. Currently, the MELD score is one of the most commonly used scoring systems for assessing the severity of end-stage liver disease and predicting mortality. The results of this study indicate that the MELD score of non surviving patients is significantly higher than that of surviving patients. In addition, univariate logistic regression analysis shows that the MELD score is an independent influencing factor for short-term mortality in decompensated liver cirrhosis patients, which is consistent with the report by Zaydudim [5]. They believe that the MELD score is associated with mortality in liver disease patients and may have useful clinical value in predicting the survival outcomes of patients with liver cirrhosis; Other studies have also shown a significant correlation be-

tween MELD scores and the severity of decompensated liver cirrhosis patients, and have shown high accuracy in predicting the survival outcomes of decompensated liver cirrhosis patients [6-7]. However, the score need into bile red element, creatinine, international standardization and biochemical indexes such as ratio of clinical operation inconvenience.

Table 1. Comparison of baseline data of study subjects

variable	survival group (n=116)	death group (n=29)	z/X^2	P
Age	57.73 (49.89, 69.80)	69.00 (59.50, 79.33)	-2.193	0.004
Gender				
female	47 (40.5%)	10 (34.5%)	0.354	0.552
male	69 (59.5%)	19 (65.5%)		
RDW	53.40 (48.70, 60.30)	58.00 (54.53, 62.95)	-2.583	0.010
ALT (U/L)	27.55 (18.05, 47.25)	43.00 (16.38, 84.93)	-1.597	0.110
AST(U/L)	46.65 (27.07, 80.65)	84.00 (42.63, 161.58)	-3.082	0.002
TBIL (umol/L)	26.95 (15.80, 58.75)	55.40 (28.25, 187.75)	-3.322	0.001
γ -GGT(umol/L)	71.0 (32.25, 148.50)	119.00 (31.38, 264.25)	-1.112	0.266
MELDscore	63.51 (59.84, 67.80)	71.47 (65.02, 82.73)	-4.740	0.000

Table 2. Single factor logistic regression analysis

variable	β	SE	OR	95%CI	P value
RDW	-0.041	0.019	0.960	0.925-0.996	0.031
ALT	-0.001	0.001	0.999	0.998-1.001	0.418
AST	-0.002	0.001	0.998	0.995-1.000	0.102
TBIL	-0.005	0.002	0.995	0.991-0.998	0.005
γ -GGT	-0.001	0.001	0.999	0.996-1.001	0.193
MELDscore	-0.144	0.031	0.866	0.816-0.920	0.000

RDW is a simple and economical parameter, which is usually used as an indicator to measure the size heterogeneity of red blood cells, and is traditionally used for the differential diagnosis of anemia in Hematology. However, the evaluation range of this parameter goes far beyond the differential diagnosis of anemia. Recent studies have observed an association between RDW and poor prognosis in liver disease patients, such as an increased risk of death and various complications [8-10]. The biological mechanism between RDW and the prognosis of liver disease patients has not yet been fully clarified. The increase of this parameter may be caused by a variety of potential metabolic imbalances in the body, such as inflammatory factors, iron metabolism disorders and Portal hypertension. Yang believed that inflammatory factors can increase RDW by affecting iron metabolism, inhibiting the production of Erythropoiesis and reducing the survival rate of red blood cells [11]. In addition, Nafady confirmed that Portal hypertension can lead to hypersplenism, accelerate the destruction of red blood cells, and shorten the life of red blood cells may promote the release of a large number of immature red blood cells from bone marrow into the blood, leading to an increase in RDW [12]. It is worth noting that Li proposed the relationship between RDW and short-term mortality in patients with decompensated cirrhosis [13]. Prior to this, a retrospective study by Turcato, which has shown that evaluating RDW, can help predict the 30-day mortality rate in patients with acute decompensated cirrhosis [14]. Among the 145 decompensated cirrhosis patients in this cohort, 29 (20%) died, which is similar to the 16.3% mortality rate reported in previous studies for liver disease patients [15]. Jin reported that RDW helps to determine prognostic risk stratification in liver disease patients and is considered an independent predictor of mortality in end-stage liver disease patients. This study also confirmed this through univariate binary logistic regression analysis [16].

In conclusion, RDW has the advantages of convenient detection and low cost, and has good application prospects

in evaluating the prognosis of decompensated liver cirrhosis patients in the future. Of course, this study also has some limitations. The retrospective study of a single center may lead to selection bias, which needs further verification by more centers and Prospective cohort study in the future further verification.

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