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Research Article

Relationship between Child-Pough score and late complications in hospital patients with liver cirrhosis

Miroslava Mihailova-Strashilova[1], Pencho Tonchev[1,2]

1 *Department of Gastroenterology, Nephrology and Haematolgy Deseases, Medical University – Pleven, Pleven, Bulgaria*

2 *Univeristy Hospital "G. Stransky", Pleven, Pleven, Bulgaria*

Corresponding author: Miroslava Mihailova-Strashilova (mihailova75.md@gmail.com)

Summary

This study aimed to determine the frequency of available complications in patients with liver cirrhosis and any dependence according to the Child-Pough score. A retrospective study of cases with newly diagnosed liver cirrhosis was conducted in the Gastroenterology Clinic of UMBAL Pleven from 2017 to 2021. Of them, 258 (71.5%) were men and 103 (28.5%) were women. The mean age of the studied population was 57.8 years ± 11.4 years. The leading aetiology was alcohol in 244 (67.6%) of them. All cases were classified according to Child-Pough score system into three groups: Child A 98(27%), Child B 141(39%), and Child C 122(34%). Ours findings show that the occurrence of ascites is most common in the studied population at 232 (64.5%). Esophageal varices were found in 164 (62.4%) patients out of 264 who underwent upper gastrointestinal endoscopy. Portal encephalopathy was found in 170 (47.09%), with a predominance of the minimal in 116 (68.23%) of them. Jaundice was found in 124 (34.34%), and more of them were in Child C. In 65 (18%), renal dysfunction was found, such as acute renal dysfunction in 12.4%. In conclusion, the high frequency of available complications is closely related to late diagnosis.

Key words: Child-Pough, complications, liver cirrhosis

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Introduction

Compensated liver disease is characterized by the absence of symptoms and preserved liver function for a long period of time, which is associated with its clinical underrecognition (Ginès et al. 2021). The occurrence of ascites, hepatic encephalopathy, gastrointestinal bleeding and jaundice are manifestations of decompensated liver disease (D'Amico et al. 2022). They are associated with progression of liver dysfunction and portal hypertension (Amin et al. 2022). The appearance of complications is a common reason for establishing the diagnosis, hospital admission and readmission, and expensive treatment (Amin et al. 2022). Decompensation of the disease is associated with a decrease in survival from 10–12 years before the appearance and to 1–2 after then (D'Amico et al. 2006).

The aim of the present study was to determine the presence and frequency of decompensated events in hospitalized patients with liver cirrhosis at the time of their diagnosis.

Material and methods

Retrospective study of cases with liver cirrhosis admitted for treatment at the Gastroenterology Clinic of University Hospital Pleven from 2017 to 2021. A total of 361 individuals over the age of 18 undiagnosed to date were included. Of them, 258 (71.5%) were men and 103 (28.5%) were women. The mean age of the studied population was 57.8 years ± 11.4 years. The leading etiology was pure alcohol at 244 (67.6%). The diagnosis was established by history, physical examination, a standard laboratory and biochemical panel, screening tests for hepatitis B and C with HBsAg and anti-HCV. Jaundice was defined when the total bilirubin value is over 50 μmol/l with an established reference limit of up to 21 μmol/l. Serum creatinine levels above 130 μmol/l were accepted to identify abnormal renal function. Cases were divided into three categories depending on the type of kidney disorder: Acute kidney injury (AKI), Hepatorenal syndrome (HRS), and Chronic kidney disease (CKD). A conventional abdominal ultrasound was performed on all of them to establish ascites and its amounts, categorized as minimal, moderate and tense. 263 individuals underwent upper gastrointestinal endoscopy (UGE) to detect the presence of esophageal varices (EV). The number of endoscopic examinations was smaller compared to the total number of patients because some of them had temporary contraindications to perform or refused to do it during their first admission. A modified Pocket score system was used to classify varices- Grade I: small, straight esophageal varices; Grade II: Dilated, curved, occupying less than one-third of the lumen; Grade III: Large, coiled varices occupying more than 50% of the lumen that do not flatten with air insufflation. The West-Haven classification was used to grade encephalopathy from grade I to grade IV. The Child-Pough classification was used for staging patients (Table 1). They are divided as follows: in Child A, 98 (27%); in Child B, 141 (39%); and in Child C, 122 (34%). The obtained results were processed using statistical data from SPSS 26 and Exel. The frequency of complications present and their relationship with the sought stage was determined by Crosstabulation and Pearson's Chi-Square test at a statistical significance level of p-value less than 0.05.

Table 1. Child-Pough score system.

Parameters:	1 point	2 point	3 point
Ascites	absent	moderate	tense
PSE	absent	Grade I–II	Grade III–IV
INR	<1.7	1.7–2.2	V
Albumin: g/l	<35	35–28	>28
Total bilirubin: μmol/l	<34	34–50	<50

Child A: 5–6 point compensated diseases;
Child B: 7–9 point moderate disfunction;
Child C: 10–15 point severe decompensation.

Results

Ascites in the study population: Among the 361 individuals examined at the time of diagnosis, 232 (64.3%) had ascites. Of those with ascites, 146 (40.4%) had tense ascites. It was found that with the increase in the stage, the frequen-

cy and amounts of ascites present also increased. The results obtained show a significant dependence between them (Chi-Square test = 139.724; df = 8; p = 0.0001) (Table 2).

Table 2. Relationship between Child-Pough and ascites Crosstabulation.

Ascites:	Child A: count (%)	Child B: count (%)	Child C: count (%)	Total: count (%)
No Ascites	79 (60.9%)	36 (28.1%)	14 (10.9%)	129 (35.5%)
% in Child	79.6%	25.5%	11.5%	
With Ascites	20 (8.6%)	105 (45.25%)	108 (46.55%)	232 (64.5%)
% in Child	20.4%	74.5%	88.5%	
Minimal	11 (31.4%)	13 (37.1%)	11 (31.4%)	35 (9.7%)
% in Child	11.2%	9.2%	9.0%	
Moderate	6 (11.8%)	25 (49.0%)	20 (39.2%)	51 (14.1%)
% in Child	6.1%	17.7%	16.4%	
Tense	2 (1.4%)	67 (45.9%)	77 (52.7%)	146 (40.4%)
% in Child	2.0%	47.5%	63.1%	

Varices in the studied population: EV were found in 164 (62.4%) patients out of 264 who underwent UGE. Cases with small varices in all three stages predominate, without significant dependence, while large ones were often associated with the advanced disease. However, the established correlation of the obtained results does not demonstrate the presence of significance between the presence, size of varices and the stage of the disease (Chi-square test = 8.158; df = 6; p = 0.227) (Table 3).

Table 3. Relationship between Child-Pough and varices Crosstabulation.

Esophageal varices:	Child A: count (%)	Child B: count (%)	Child C: count (%)	Total: count (%)
Without EV	37 (37.4%)	43 (43.4%)	19 (19.2%)	99 (37.6%)
% in Child	45.7%	40.2%	25.3%	
With EV	44 (26.8%)	64 (39%)	56 (34.14%)	164 (62.4%)
% in Child	54.3%	59.8%	74.7%	
Grade I	19 (28.8%)	26 (39.4%)	21 (31.8%)	66 (25.1%)
% in Child	23.5%	24.3%	28.0%	
Grade II	16 (27.6%)	21 (36.2%)	21 (36.2%)	58 (22.1%)
% in Child	19.8%	19.6%	28.0%	
Grade III	9 (22.5%)	17 (42.5%)	14 (35.0%)	40 (15.2%)
% in Child	11.1%	15.9%	18.7%	

Portal encephalopathy in the study population: Of all 361 patients, 170 (47.09%) were with signs of portosystemic encephalopathy (PSE). Most of them, 116 (68.23%), had a minimal one, which was predominated in the studied group. The results show that the largest proportion of patients with present and minimal PSE was in Child C, respectively, and there were no cases of hepatic coma or precoma in Child A. Accordingly, of those without such, the largest share falls on Child A and B. The obtained results establish a signif-

icant relationship between the occurrence and severity of encephalopathy and the stage of the disease (Chi-Square test = 112.655; df = 8; p < 0.0001) (Table 4).

Table 4. Relationship between Child-Pough and PSE Crosstabulation.

PSE	Child A: count (%)	Child B: count (%)	Child C: count (%)	Total: count (%)
Without PSE	83 (43.5%)	85 (45.5%)	23 (12.0%)	191 (52.9%)
% in Child	84.7%	60.3%	18.9%	
With PSE	15 (8.82%)	56 (32.94%)	99 (58.23%)	170 (47.09%)
% in Child	15.3%	39.7%	81.1%	
Grade I	14 (12.1%)	42 (36.2%)	60 (51.7%)	116 (32.1%)
% in Child	84.7%	60.3%	18.9%	
Grade II	1 (2.7%)	11(29.7%)	25 (67.6%)	37 (10.2%)
% in Child	1.0%	7.8%	20.5%	
Grade III	0 (0.00%)	1 (7.1%)	13 (92.9%)	14 (3.9%)
% in Child	0.0%	0.7%	10.7%	
Grade IV	0 (0.0%)	2 (66.7%)	1 (33.3%)	3 (0.8%)
% in Child	0.0%	1.4%	0.8%	

Jaundice in the study population: The presence of jaundice is defined as a value of more than 50 μmol/l in blood serum, with an upper reference limit of 21 μmol/l for total bilirubin. At 122 (33.8%), normal values were measured, with the largest share of them being in Child A. At 115 (31.85%) with minimal jaundice, mainly in Child B and C. Jaundice was discovered at 124 (34.23%) individuals with the largest share respectively in Child C: 92 (74.2%). A significant relationship was found between the appearance of jaundice and the stage of the disease (Chi-square test = 176.968; df = 4; p < 0.0001) (Table 5).

Table 5. Relationship between Child-Pough and jaundice Crosstabulation.

Total Bilirubin(μmol/l):	Child A: count (%)	Child B: count (%)	Child C: count (%)	Total: count (%)
Normal	68 (55.7%)	46 (37.7%)	8 (6.6%)	122 (33.8%)
% in Child	69.4%	32.6%	6.6%	
Minimal jaundice	27 (23.5%)	66 (57.4%)	22 (19.1%)	115 (31.9%)
% in Child	27.6%	46.8%	31.9%	
Jaundice	3 (2.4%)	29 (23.4%)	92 (74.2%)	124 (34.3%)
% in Child	3.1%	20.6%	75.4%	

Renal disordes: Normal renal function was found in 296 (82%) of all examined. In the remaining 65 (18%), various deviations were found. AKI had 16 (4.4%), with 11 (68.8%) of them being Child C and no cases in a compensated stage. HRS was found in 29 (8%), with 19 (65.5%) of these being Child C and none in Child A. CKD was established in 20 individuals (5.5%) with a proportional distribution in the three stages of the disease. The obtained results show the existence of a significant relationship between the initial renal deviations and the stage according to Child (Chi-Square test = 31.142; df = 6; p < 0.0001) (Table 6).

Table 6. Relationship between Child-Pough and kidney function Crosstabulation.

Kidney function	Child A: count (%)	Child A: count (%)	Child A: count (%)	Total: count (%)
Normal	92 (31.1%)	117(39.5%)	8 (6.6%)	296 (82.0%)
% in Child	93.9%	83.0%	71.3%	
AKI	0 (0.00%)	5 (31.3%)	11(68.8%)	16 (4.4%)
% in Child	0.00%	3.5%	9.00%	
HRS	0 (0.00%)	10 (34.5%)	19 (65.5%)	29 (8.00%)
% in Child	0.00%	7.1%	15.6%	
CKD	6 (30.0%)	9 (45.0%)	5 (25.0%)	20 (5.5%)
% in Child	6.1%	6.4%	4.1%	

Discussion

The occurrence of ascites is the most common complication in patients with liver cirrhosis (EASL 2018; Liu and Chen 2022), with 5–10% of compensated cases developing ascites annually. It is associated with reduced life expectancy, with 50% dying in the next two years and 80% within 5 years of its onset (EASL 2018). In our study, ascites was also found to be the most common decompensatory event, present in 64.5% of our patients. The results obtained also align with other researchers showing variations of 50.5% (Cammarota et al. 2021), 54.8% (Lee and Kim 2022), 64.18% (Al Kaabi et al. 2023), and 72.3% (Patel et al. 2019). A significant relationship was established between the appearance of ascites, its amount and stage of the disease according to the Child classification, consistent with previous studies by other authors (Riedel et al. 2018; Baker 2022; Balcar et al. 2022), such as the cases with tense ascites are a manifestation of late decompensation and poor prognosis (Balcar et al. 2022), primarily seen in Child B and C. According to other studies, the amount of ascites was not associated with increasing Child-Pough score (Wang et al. 2017). EVs are associated with the progression of portal hypertension and clinically manifest as life-threatening upper gastrointestinal bleeding in cirrhotic patients. Their average incidence at the time of diagnosis is approximately 50% with a variability ranging from 40% to 85% and an increase in prevalence from Child A to Child C has been reported (Merli 2003). In the group studied by us, 62.4% had EVs, and in Child C there were 74.6% of them. In a number of studies carried out by other authors, a different frequency of the available EVs was found in the studied populations 39.5% (Gunda et al. 2019), 57.4% (Sulaiman et al. 2022), 90.6% (Duah et al. 2018), 77.7% (Cherian et al. 2011). The differences obtained are tied to the characteristics of the studied groups. The presence of small EV is mainly associated with compensated cirrhosis, while large ones are mostly seen in Child B and C, with established significance (Sulaiman et al. 2022; Gunda et al. 2019; Duah et al. 2018; Cherian et al. 2011). Our results found a predominance of cases with small EV at 40.2% with no statistically significant difference among different stages. These results are consistent with other study where the incidence was also reported as 42.3%. (Cherian et al. 2011). Large varices were found in only 24.4%, being mainly associated with Child B and C. The obtained result significantly differs from other authors, who reported a significantly higher frequency of large varices at 61.4% (Gunda et al. 2019), 82. 22% (Duah et al. 2018), 41.1% (Cherian et al. 2011), which are mainly associated with high Child class. It is likely that the significant differences obtained are relat-

ed to differences in the studied groups and differences regarding the staging of the studied patients. It has been found that 50–80% of all with cirrhosis during chronological follow-up develop manifestations of PSE, with the frequency of minimal being observed in up to 80% of cases with one present (Nardone et al. 2016). Ours results indicate that 47.1% of the examined persons had present encephalopathy manifested in varying degrees, with minimal occurring in 68.24% of them. The same is more often associated with alcohol aetiology, which is also associated with other neurological deficits (Tapper et al. 2019). The high frequency in the patients studied by us may be associated with underlying alcohol aetiology, which was predominant in our research group. A significant relationship was found between the occurrence, the degree of PSE present and the stage according to Child-Pough. The result is consistent with other authors (Riggio et al. 2023), according to which it is also the most common reason for readmission in cirrhotics. Severe Grade III–IV PSE is associated with other organ complications and can indicate acute on chronic liver failure (Long et al. 2021). In our study, it was found that only 10% are present, and the patients were classified as Child C and Child B. This aligns with another study were the frequency was found to be 9% (Long et al. 2021). The minimal PSE was prevalent in our cirrhotic population with a total frequency of 32.1%,which is proven by other authors as well (Li et al. 2004; Barbosa et al. 2015; Bamidele et al. 2019). Our results show a lower frequency compared to other research group, with rate of 34% (Barbosa et al. 2015), 43.8% (Bamidele et al. 2019), 50.9% (Li et al. 2004), and 52.2% (Bale et al. 2018). The difference in study groups, as well as the methodology of case classification, can be discussed as a possible reason for the differences obtained. The possibility of insufficient diagnosis with the conducted psychometric tests, as well as the lack of additional studies specifying the neurological status of the patients, is also allowed. However it was found that the appearances are associated with high Child-Pough score (Li et al. 2004; Yoshimura et al. 2016; Bale et al. 2018; Bamidele et al. 2019). The appearance of jaundice is a laboratory predictor of fulminant liver failure, which occurs late in its course and is an important indicator of poor prognosis (Guerra et al. 2021). The rise in total bilirubin, particularly the direct fraction is used as a prognostic marker for six-month survival in cirrhosis (Lee et al. 2021), as well as for the recognition of acute decompensation and superimposition of acute on chronic liver failure (López-Velázquez et al. 2013) associated with the development of other complications such as ascites, coagulopathy, encephalopathy and abnormalities in renal function (López-Velázquez et al. 2013). In the conducted research, it was found that 34.34% have jaundice, and 74.2% of them are in Child C. In another study conducted, the frequency of jaundice was 22.8% with an established threshold value of total bilirubin above 60 μmol/l with a smaller number of decompensated cases in their group, Regardless of the established differences, the increase in total bilirubin values is associated with the occurrence of hepatic decompensation (Guerra et al. 2021). It has been found that 18% to 39% of cases with liver cirrhosis have abnormalities in renal function during a 5-year follow-up (Jamil et al. 2019). Our results show a low incidence of abnormalities in renal function in 18% of subjects, with 88% showing no abnormalites. The obtained result is significantly different from a predictive study conducted in America, where 66% had no renal deviations available (Cullaro et al. 2022). AKI is one of the most common life-threatening complications with a mortality rate of about 50% within one month and 65% within one year of onset (Duah et al. 2022). It is

associated with a high Child score and has a negative impact on patient survival, confirmed in various studies (Arora et al. 2019; Gomes et al. 2019; Duah et al. 2022). Our results found a low frequency of AKI in the study population in 12.4% of the patients, which correlates with results from other studies, where their frequency was reported at 14% (Cullaro et al. 2022) and 12.9% (Choi et al. 2014). Of the studied cases, the most deviations were found in Child C, 67.1%, which is also consistent with other studies, that found 78% (Jamil et al. 2019), and 58% (Cullaro et al. 2022) in Child C. No case was reported in Child A, which aligns with results from other studies (Siregar and Gurning 2018; Cullaro et al. 2022). Patients with CKD in our group showed a very low frequency of 5.5%, and their distribution does not depend on the stage of the Child. In various studies, their frequency varies from 4% to 43% and is associated with comorbid condition such as arterial hypertension and diabetes mellitus, which can further worsen renal function and increase the risk of acute and chronic renal failure (Kumar et al. 2021). The divergent results obtained from the studies carried out are related to differences in the research groups, both in terms of aetiology and in terms of staging and the use of different criteria for their definition. The possibility of a lack of a sufficiently precise diagnosis on our part is due to a lack of a sufficient set of laboratory tests, which could be considered as a disadvantage.

Conclusion

The high frequency of available complications in the studied cirrhotic population is related to their late diagnosis, which is due to the most likely dominant alcoholic aetiology. Long-term alcohol abuse is associated with a change in the individual's behaviour and a lack of critical attitude associated with health condition. The most common complication in the cirrhotic population is the finding of ascites, which is also the most common reason for their diagnosis.

Statements

The authors declare no conflict of interest. Without financial support.
The authors declared that no clinical trials were used in the present study.
The authors declared that no experiments on humans or human tissues were performed for the present study.
The authors declared that no informed consent was obtained from the humans, donors or donors' representatives participating in the study.
The authors declared that no experiments on animals were performed for the present study.
The authors declared that no commercially available immortalised human and animal cell lines were used in the present study.

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