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Predictive Values of Platelets Count and Spleen Diameter in the Diagnosis of Esophageal Varices in Black African Cirrhotic Patients

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Abstract

Background: Gastrointestinal hemorrhage from ruptured esophageal varices is of concern in Africa where gastrointestinal fibroscopy for diagnosis is lacking. **Purpose:** To determine the performance of the length of the spleen, of the platelet count in the diagnosis of esophageal varices (OVs) by specifying the diagnostic thresholds in order to facilitate the prophylaxis of varicose hemorrhages in black African cirrhotic patients. **Material and Method:** This was a prospective study with a descriptive and analytical aim on cirrhotic patients hospitalized at the university hospital of Bouake (Ivory Coast) from 2017 to 2019. The patients included in the study were the cirrhotic of black race hospitalized having carried out an abdominal ultrasound with measurement of the spleen diameter (SD), an eso-gastro-duodenal endoscopy, and a blood count with platelet count (PC). The first primary endpoint was the diagnosis of esophageal varices in cirrhosis. Cirrhosis was retained by the combination of clinical, biological, ultrasound and endoscopic arguments. The OVs were distributed according to size and the presence of red signs. The platelet count, and the measurement of the spleen to calculate the PC/SD ratio were the second endpoint. The secondary endpoints studied were, the viral and ethyl etiologies of the cirrhosis, the Chlid-Pugh prognostic score. Performance was assessed using the ROC curve. The difference was significant for p less than 0.05. **Results:** The study included 101 patients; they were 79 men (78.2%) and 22 women (21.8%). The mean age of the cirrhotic patients was 48 ± 14. Esophageal varices were present in (n = 93; 92%) of cases. The different etiologies were hepatitis B virus (HBV) (n = 65; 78.3%), hepatitis C virus (HCV) (n = 21; 25, 3%), and alcohol (n = 6; 7.2%). Platelet count (PC) < 100,000/mm^3 was statistically related to the presence of OV with red signs.

Splenomegaly (SD > 130 mm) and PC/SD ratio < 1000 were significantly related to the presence of OVs and large OVs. SD with a cutoff of > 102 mm predicted 75% of OVs (AUROC = 0.797). CP with a cutoff < 131,000/mm^3, predicted 100% of OVs (AUROC = 0.756). The PC/SD ratio < 1205 diagnosed 100% of OV (AUROC = 0.801). The PC/SD ratio < 818 and SD > 129 mm predicted large OVs. **Conclusion:** Platelet count, spleen diamater, and PC/SD ratio were all performant for the diagnosis of OVs in our setting with better diagnostic performance for PC/SD. This report could help initiate prophylactic treatment for OVs rupture in cirrhotic patients in health centers where gastrointestinal endoscopy is lacking.

Keywords

Non-Invasive Methods, Platelets Count, Spleen Diameter, Esophageal Varices

1. Introduction

Cirrhosis, the major stage in the development of hepatic fibrosis induced by most chronic liver diseases is a relatively common and serious condition [1]. Its high mortality in sub-Saharan Africa is partly linked to complications including gastrointestinal bleeding from ruptured esophageal varices (OVs) [2]. This mortality due to varicose hemorrhages remains worrying despite therapeutic advances, leading to 5% to 8% of deaths within 48 hours from uncontrolled hemorrhage [2] [3]. The early diagnosis of esophageal varices is essential because it makes it possible to reduce the risk of bleeding by 50% to 15% with prophylaxis [3]. Gastroscopy is considered to be the gold standard in the detection and diagnosis of esophageal varices [3] [4]. However, the semi-invasive nature of the examination poorly tolerated by patients, its relatively high cost for the living standards of populations in low-income countries, and the lack of functional endoscopy units limit its use [4]. Several studies have reported that platelet count (PC), spleen diameter (SD), ratio platelet count/spleen diamater (PC/SD), portal vein diameter (PVD), and Child-Pugh score were strongly associated with the presence of OV in cirrhotic patients [5] [6] [7]. However, these non-invasive methods would effectively and efficiently diagnose the presence of esophageal varices in black African cirrhotic patients. In fact, in most African countries, the follow-up of cirrhotic patients by gastrointestinal endoscopy remains a challenge for clinicians due to the insufficient endoscopy unit [4]. Ultrasound spleen diameter (SD) and platelet count (PC) are readily available and inexpensive tests already described by Western authors [5] [6] [7] and Africans [8] [9] as being associated with the presence of OV in cirrhotic patients. However, considerable disparities probably due to the heterogeneity of the different study populations persist in the cut-off values for each parameter [9]. To our knowledge, apart from the study by Massahadi [10], no other study in Ivory Coast has been carried out evaluating these non-invasive methods of diagnosing OV in cirrhosis.

The objective of this study is to determine the performance of the diameter of the spleen and the platelets count in the diagnosis of OV by specifying the diagnostic thresholds in order to facilitate the prophylaxis of varicose hemorrhages in black African cirrhotic patients.

2. Material and Method

This was a prospective study with a descriptive and analytical aim on cirrhotic patients hospitalized in the hepato-gastroenterology unit of the Bouake (Ivory Coast) university hospital from August 01, 2017 to August 31, 2019, *i.e.* over a period of 2 years. Included in the study were hospitalized black cirrhotic patients who performed abdominal ultrasound with measurement of spleen diameter, esogastroduodenal fibroscopy, complete blood count with platelet count. Cirrhotics, having performed an OV ligation, under beta-blocker treatment, with portal vein thrombosis on ultrasound, hospitalized for primary cancer, with splenomegaly from non-cirrhotic causes, with thrombocytopenia from non-cirrhotic causes, were excluded from the study.

2.1. Study Protocol

The variables studied were divided into primary, secondary and confounding outcomes. Two main judgment criteria were retained:

- The first primary endpoint was the diagnosis of cirrhosis. As the liver biopsy with pathological examination was not performed, the diagnosis of cirrhosis for each patient was retained by the combination of the usual arguments (clinical, biological, ultrasound and endoscopic). Clinical signs included hepatomegaly with a sharp lower edge, signs of portal hypertension (ascites, collateral venous circulation, splenomegaly) and signs of hepatocellular insufficiency (jaundice, digital hippocratism, hepatic encephalopathy). In terms of biological signs, the diagnosis was based on: A prothrombin (PT) rate < 50%, defining hepatocellular insufficiency. The PT assay was performed using a chronometric test using thromboplastin. An albumin level < 35 g/L (hypoalbuminemia) observed on the protidogram produced by the so-called BUIRET colorimetric method. ALT > 45 IU/L determined using a spectrophotometer. In terms of ultrasound signs: The ultrasound was performed for each patient using a base frequency probe (3 to 5 KHz) by an experienced radiologist. The ultrasound diagnosis of cirrhosis was based on: the presence of a heterogeneous liver with homogeneous nodules, enlargement of the Spiegel's lobe, dilation of the portal vein and crenellated contours of the liver. The endoscopic diagnosis was based on the presence of OV, cardiopulmonary varices, with or without a red sign and signs of portal hypertension gastropathy (erosions, petechiae, congestion, mosaic appearance). Gastrointestinal endoscopy was performed by an experienced gastroenterologist using an "Olympus" brand video endoscope. The patients were divided into 02 large groups according to the results of digestive endoscopy: absence of esophageal varices

and presence of oesophageal varices. Patients with esophageal varices were divided into subgroups according to the characteristics of the OV according to the Paris classification.

- According to the grade of OV:
  - Grade I: varicose veins disappear on insufflations;
  - Grade II: varicose veins that do not disappear on insufflation but not confluent;
  - Grade III: varicose veins that do not disappear on insufflation and confluent.

Grade III was considered to be large OV and grades I and II were considered to be small varicose veins.

- Depending on the presence of the red signs on the OVs, two groups were formed: Esophageal varices with red signs and esophageal varices without red signs:
  - The second main endpoint was the definition of the non-invasive methods used for the diagnosis of OV. For each patient, the platelet count was assayed, the diameter of the spleen making it possible to calculate the PC/SD.
  - The platelet count was observed on the complete blood count (CBC) carried out with a "Siemens" brand machine using the flow cytometry technique. Thrombocytopenia was defined as a platelet count < 150,000/mm^3. It was said to be severe when it was <100,000/mm^3.
  - The diameter of the spleen corresponded to the largest diameter measured between the two poles of the spleen and was expressed in millimeters (mm). The patients were classified into 02 groups according to the diameter of the spleen:
- Patient without splenomegaly: spleen diameter ≤ 130 mm.
- Patient with splenomegaly: spleen diameter> 130 mm.

- The PC/SD was calculated using the platelet count (mm^3) observed on the blood count reported from the diameter of the spleen measured on the abdominal ultrasound (mm). The value obtained made it possible to classify the patients into 02 groups:
- PC/SD not lowered: platelet count/spleen diameter ≥ 1000.
- Lowered PC/SD: platelet count/spleen diameter < 1000.

The secondary endpoints studied were: alcohol intoxication defined by a patient consuming more than 2 glasses of alcohol per day for women and more than 03 glasses for men, tobacco intoxication defined by a patient who smokes more than 12 packages/year. The following etiologies of cirrhosis were investigated and retained: hepatitis B Virus (HBV) defined by the positivity of HBsAg and total anti-HBC Ab, hepatitis C Virus (HCV) defined by positive anti-HCV Ab and RNA HCV detectable by PCR, Alcoholic hepatitis defined by the concept of chronic ethyl intoxication, clinical and biological signs of ethyl intoxication (varicosity of the cheekbones, tremulation of the tongue, palmar erythrosis, mon-

key hand and AST/ALT > 1, macrocytosis at the CBC), the reasons for hospitalization obtained during the examination (oedemato-ascitic decompensation, jaundice, digestive hemorrhage, pain in the right hypochondrium, anemia, asthenia). The signs found on physical examination were: ascites, jaundice, edema of the lower limbs, hepatomegaly, splenomegaly, hepatic encephalopathy, collateral venous circulation. The selected laboratory abnormalities: Severe anemia defined by hemoglobin level < 8 g/dl at the CBC, cytolysis defined by an increase in transaminases (ALT > 45 IU/L), severe hepatocellular insufficiency defined by a PT < 50%). On ultrasound, the anteroposterior diameter (mm) of the portal vein was measured hepatic. Based on this diameter, two groups of patients were defined (portal vein diameter ≤ 12 mm and portal vein diameter > 12 mm). The complications diagnosed were: Infection of ascitic fluid, Upper gastrointestinal bleeding (hematemesis and/or melena), Hepatocellular carcinoma, Hepatic encephalopathy, Hepatorenal syndrome. The score studied was the Child-Pugh prognostic score classified into Child A, B and C. Confounding factors were socio-demographic characteristics.

2.2. Statistical Analysis of Data

For input and analysis, we used Epi Info 7.2 software, and SPSS version 2.0. The qualitative variables were expressed in proportion. The quantitative variables were expressed as mean, standard deviation and extreme values. The analysis initially consisted of a descriptive analysis (means and frequencies) of the variables studied. The Chi 2 test was then used to search for predictive factors of esophageal varices as well as their characteristics among the variables studied. Finally, the performance of the non-invasive methods studied (PC; SD; PC/SD) in the diagnosis of OVs and their characteristics (grades and presence of red signs) were evaluated using the ROC curves. The diagnostic thresholds were specified as well as their sensitivity, specificity, positive predictive value and negative predictive value. The comparison of the proportions was made by the Fisher, Yates and Chi-2 tests at the $\alpha = 5\%$ threshold.

2.3. Ethical Consideration

Under the investigation practices act, we protected the confidentiality of information that was collected during the investigation by assigning an anonymity number to each investigation sheet. In addition, an authorization was requested and obtained in advance from the administrative and medical authorities of the Bouake University Hospital Center.

3. Result

3.1. Descriptive Study

From August 2017 to August 2019, the hepato-gastroenterology unit recorded 848 hospitalized patients, including 232 cases of cirrhosis, *i.e.* a hospital preva-

lence of 27.35%. Our study involved 101 patients selected according to our inclusion criteria. These were 79 men (78.2%) and 22 women (21.8%) with a sex ratio of 3.59. The mean age of the cirrhotic patients was 48 ± 14 years with the extremes ranging from 20 to 86 years. Oedemato-ascitic decompensation was the main reason for consultation (77.2%). Biologically, the prothrombin level was <50% in 45.5%, ALT > 45 IU in 67.3%, thrombocytopenia was observed in (n = 69; 68.3%). It was severe in (n = 38; 37.6%) and the hemoglobin level was <8 g/dl in 23.8%. Ultrasound abnormalities found a portal vein diameter > 12 mm in (n = 47; 46.5%) and spleen diameter > 130 mm in (n = 68; 67.3%). The PC/SD was <1000 in (n = 24; 56.5%) of the cases. Regarding endoscopic lesions, esophageal varices were present in (n = 93; 92%) of cases. These were OV I (n = 9; 9.7%), OV II (n = 31; 33.3%), OV III (n = 53; 57%) and red signs (n = 68; 45.2%). The different etiologies found were HBV (n = 65; 78.3%), HCV (n = 21; 25.3%), alcohol (n = 6; 7.2%). The score used was that of Child-Pugh. He found Child A (n = 4; 4%), Child B (n = 48; 47.5%) and Child C (n = 49; 48.5%). The main complications retained were upper gastrointestinal haemorrhage (n = 25; 24.7%), hepatocellular carcinoma (n = 22; 21.7%), ascitic fluid infection (n = 14; 13.9%), encephalopathy hepatic (n = 13; 12.9%) and hepatorenal syndrome (n = 2; 2%).

3.2. Predictors of OVs, Large OVs and Red Signs

Age, sex, reason for hospitalization, and clinical signs were not statistically related to the presence of OVs. There was also no statistical association between the etiologies of cirrhosis, Child-Pugh score, and the presence of OV. Also esophageal varices were more observed in cirrhotic patients presenting complications in insignificant ways (Table 1). Severe thrombocytopenia < 100,000/mm^3 was statistically related to the presence of OV. Splenomegaly (SD > 130 mm) and lowered PC/SD (< 1000) were significantly related to the presence of OV (Table 2). SD > 130 mm and PC/SD < 1000 were significantly associated with the presence of large varicose veins. PC < 100,000 and PC/SD < 1000 were significantly associated with the presence of OV with red signs (Table 3).

3.3. Diagnostic Performance of VO, Large VO and Red Signs

The performances of spleen diameter, platelet count and PC/SD in the diagnosis of OV are summarized in Table 4. The spleen diameter with a threshold of >102 mm predicted 75% of the OV with a diagnostic efficiency of 85% and AUROC = 0.797. The platelet count with a threshold of <131,000/mm^3, predicted 100% of the OV with a diagnostic efficiency of 67.3% and an AUROC = 0.756. PC/SD < 1205 diagnosed 100% of OV with a diagnostic efficiency of 70.3% and AUROC = 0.801. The performance of spleen diameter, platelet count and PC/SD in the diagnosis of large varicose veins and red signs are summarized in Table 5.

PC/SD < 818 and spleen diameter > 129 mm predicted respectively 73.5% and 57.5% of large OVs. The platelet/spleen ratio and the platelet count predicted 40% and 52.4%, respectively, of the red signs associated with OV.

Table 1. Demographic, clinical characteristics of the 101 patients.

	All	OV	Without OV	p
Male	79	74 (93.7%)	5 (6.3%)	0.37
Female	22	19 (86.4%)	3 (13.6%)	0.37
Age < 50 years	58	52 (89.7%)	6 (10.3%)	0.46
Age ≥ 50 years	43	41 (95.3%)	2 (4.7%)	0.46
Clinical findings:				
Ascites	90	83 (92.2%)	7 (7.8%)	1.00
Jaundice	35	31 (88.6%)	4 (11.4%)	0.44
Large spleen	21	21 (100%)	0 (0%)	0.12
Large liver	28	26 (92.9%)	2 (7.1%)	1.00
Collateral venous circulation	14	14 (100%)	0 (0%)	0.59
Haematemesis-Melaena	11	11 (100%)	0 (0%)	0.59
Hepatic encephalopathy	2	1 (50%)	1 (50%)	0.15
Etiology of cirrhosis:				
HBV	65	59 (90.8%)	6 (9.2%)	0.67
HCV	21	18 (85.7%)	3 (14.3%)	0.24
alcohol	6	6 (100%)	0 (0%)	1.00
Complications:				
Haematemesis-Melaena	25	25 (100%)	0 (0%)	0.19
hepatocellular carcinoma	22	21 (95.5%)	1 (4.5%)	0.68
Liquid ascite infection	14	13 (92.9%)	1 (7.1%)	1.00
Hepatic encephalopathy	13	12 (92.3%)	1 (7.7%)	1.00
Hepatorenal syndrome	2	2 (100%)	0 (0%)	1.00

Table 2. Biological and ultrasound parameters predictive of esophageal varices.

	All	OV	Without VO	p
Biology:				
ALT > 45 UI	68	64 (94.1%)	4 (5.9%)	0.43
Prothrombin < 50%	46	42 (91.3%)	4 (8.7%)	0.59
Hemoglobin < 8 g/dl	24	24 (100%)	0 (0%)	0.19
Platelet count < 150,000/ mm^3	69	66 (95.7%)	3 (4.3%)	0.11
Platelet count < 100,000/mm^3	38	38 (100%)	0 (0%)	**0.028**
Ultrasound:				
Spleen diameter > 130 mm	53	52 (98.1%)	1 (1.9%)	**0.026**
Portal vein diameter > 12 mm	47	45 (95.7%)	2 (4.3%)	0.28
PC/SD ratio < 1000	56	56 (100%)	0 (0%)	**0.001**

Table 3. Predictors of large varicose veins and red signs.

	All	Large OV	p	Red signs	p
Platelet count < 100,000/mm³	38	26 (28.4%)	0.06	23 (60.5%)	**0.01**
Spleen diameter > 130 mm	52	35 (67%)	0.02	27 (51.9%)	0.14
PC/SD ratio < 1000	56	38 (67.9%)	0.001	30 (53.6%)	**0.05**

Table 4. Performance of SD, PC and PC/SD in the diagnosis of esophageal varices.

	All	AUROC	p	Cut off	Se (%)	Sp (%)	PPV	NPV	DA
Spleen diameter	101	0.797	0.005	>102 mm	86%	75%	97.6%	31.6%	85.1%
Platelet count	101	0.756	0.003	<131,000/mm³	64%	100%	100%	19.5%	67.3%
PC/SD ratio	101	0.801	0.001	<1205	67.7%	100%	100%	21.14%	70.3%

AUROC: area under receiver operating characteristic curve, PC/SD: platelet count-spleen diameter ratio, PPV: positive predictive value, NVP: negative predictive value, DA: diagnostic accuracy.

Table 5. Performance of SD, PC and PC/SD in the diagnosis of large esophageal varices and red signs.

	All	AUROC	p	Cut off	Se (%)	Sp (%)	PPV	NPV	DA
Large OV:									
SD	93	0.632	0.004	>129 mm	66	57.5	67.3	56.1	62.4
PC/SD	93	0.654	0.001	<818	67.5	73.5	73.5	61.4	67.7
Red Sign:									
PC/SD	93	0.687	0.012	<578	54.9	40.0	71.9	68.9	69.9
PC	93	0.645	0.017	<84,000 mm³	52.4	82.4	71.0	67.7	68.8

AUROC: area under receiver operating characteristic curve, PC/SD: platelet count-spleen diameter ratio, PPV: positive predictive value, NVP: negative predictive value, DA: diagnostic accuracy.

4. Discussion

The hospital prevalence of cirrhosis 27.35% in this study was comparable to that of previous studies [2] [11]. These were predominantly 48-year-old men of average age as reported in African literature [11] [12]. In this series, the main reason for hospitalization was oedemato-ascitic decompensation reflecting the course of cirrhosis, the diagnosis of which in Africa is most often made at the late stage as indicated by some authors [2] [12]. The biological parameters studied in this series were the level of prothrombin (PT), transaminases, hemoglobin, and the level of platelets. They were all upset. The PT was less than 50% in 45.5% of the patients with severe hepatocellular insufficiency associated with an advanced stage of the disease [2]. Thrombocytopenia (platelets < 150,000 mm³) was observed in 68.3% of cases. This result is close to those of Qamar and Mahassadi [10] [13]. This thrombocytopenia is due on the one hand to a drop in thrombopoietin by possible bone marrow toxicity related to certain aetiology of cirrhosis such as alcohol, hepatitis virus B and C and on the other hand, hyper-

splenism as a result of the Portal hypertension also causes a decrease in the number of circulating platelets by splenic sequestration [10]. In this study, we found dilation of the portal vein in almost half of cases (46.5%) and splenomegaly on abdominal ultrasound in 67.3% of cases. The dilation of the portal vein during cirrhosis has been reported by authors [14] [15] and splenomegaly described in the literature as a consequence of portal hypertension [15] [16]. In our series, 92.0% of the patients had esophageal varices. This prevalence was close to previous work [8] [9] [10]. The esophageal varices were mainly grade III (57.0%), as in the Ghanaian, Togolese, and Ivorian series [8] [9] [11]. The etiologies of cirrhosis vary depending on geographic location and socio-economic conditions. The cirrhosis is mainly of viral cause in Africa and of ethyl etiology in the West [8]. In this study, viral hepatitis B, viral hepatitis C and ethyl poisoning were the main causes of cirrhosis in 78.3%, 25.3% and 7.2%, respectively. These three etiologies are found in the studies of Duah and Mahassadi [9] [10]. In this present study, gastrointestinal bleeding was the most common complication as reported by African authors [2] [12] and patients had advanced stage Child Pugh C score disease in 48.5% of cases. These results are similar to those found by Duah [9] in Ghana (48.3%) and by Tapouh [8] in Cameroon (54.08%), Mahassadi in Ivory Coast [10].

In univariate or bivariate analysis, in this study, the presence of OV was neither related to age nor related to sex. This observation was made in previous work carried out in the West [6], the East [17] and Africa [8] [9]. No clinical signs were significantly associated with OV as reported by some studies [5] [18]. There was no statistical association between the etiologies of cirrhosis and the presence of OV as described by Tapouh and Massahadi [8] [10]. In this present study, esophageal varices were not associated with the Child-Pugh Prognostic Score with the presence of OV in Child-Pugh A score patients. Mahassadi explained the presence of OV in Child A score patients by the practice of traditional medicine responsible for impaired liver function [10]. In this series, the biological and ultrasound factors associated with the presence of OV were PC < 100,000/mm^3 ($p = 0.026$), spleen diameter on ultrasound > 130 mm ($p = 0.026$) and PC/SD < 1000 ($p = 0.0001$). These parameters have already been identified by some authors as being associated with OV [6] [7] [9] [19]. The study showed that the PC < 100,000/mm^3 was more observed in the case of large varicose veins (grade III) vs small varicose veins (grade I and II) and the significant presence of red signs on the varicose veins in the case of PC < 100,000 mm^3. Abd-Elsalam *et al.* [20] also found a significant link between thrombocytopenia and large VOs. This present study also showed that the diameter of the spleen > 130 mm) was significantly associated with the presence of large OV (grade III) but not with the red signs. This result agrees with those of Cherian, Sarangapani and Alempijevic [7] [18] [21]. PC/SD < 1000 was significantly associated with large OV and the presence of red signs as reported by Alempijevic and Plestina [21] [22]. Several studies have focused on the performance of clinical, biological and radio-

logical parameters in the diagnosis of OV as well as their characteristics [6] [9] [10] [18]. Our study evaluated the diagnostic performance of three parameters namely: PC, SD, and PC/SD in the diagnosis of OV and their characters. Also the cirrhotic patients in this study were mainly Child-Pugh B and C class unlike the studies by Giannini and Abu where the cirrhotic patients were mostly classified Child A or B [6] [20]. In the diagnosis of OV traits, PC/SD was the only parameter significantly associated with both large OVs and the presence of red signs in our series. The best cutoff for diagnosing large OV was PC/SD < 818. At this cutoff, PC/SD diagnosed 73.5% of large OVs with 67.7% diagnostic accuracy, 67.5% sensitivity and specificity at 73.5%. Massahadi [10] with a similar threshold (897) better predicted large varicose veins with an accuracy of 78.4% and a PPV of 84.6%. For the diagnosis of red signs, the best cutoff in our series was PC/SD < 578. At this cutoff, PC/SD predicted OV in cirrhotics with an accuracy of 67.7%, a sensitivity of 54.9%, 73.5% specificity, 73.5% PPV and 28.2% NPV. As the bleeding complications of cirrhosis are potentially serious, PC/SD has advantages: From a practical point of view, the ratio is easy to calculate and inexpensive, from a financial point of view, the semi-annual evaluation of the report does not incur costs in the management of cirrhotic patients because CBC is systematically assessed and abdominal ultrasound is usually performed at least once a year for monitoring of HCC. In low-income countries where functional digestive endoscopy units are lacking, this report could be suggested for prophylaxis to prevent cataclysmic gastrointestinal bleeding in patients awaiting gastric endoscopy.

5. Limits of Work

As limits to this study, we can mention that: abdominal ultrasound and biological tests were not carried out by the same operators, the etiologies of the cirrhosis were diverse (HBV, HCV, alcohol, others undetermined), the diagnosis since cirrhosis is not based on histology, this might be less precise because other causes of PH such as Budd-Chiari syndrome, early stage schistosomiasis that can lead to OV might be included. These factors could constitute selection biases; however this study showed interesting results.

6. Conclusion

Cirrhosis remains a public health problem in Ivory Coast, like the countries of sub-Saharan Africa where viral hepatitis B is endemic. It affects young adults representing the active segment of the general male population. Gastrointestinal bleeding from ruptured esophageal varices is a serious complication. Platelet count, spleen diameter, and PC/SD all performed well for OV diagnostics in our setting with better diagnostic performance for PC/SD. PC/SD could help physicians start prophylactic treatment for OV rupture in cirrhotic patients in health centers where gastrointestinal endoscopy is not available due to the high mortality from this complication. However, their performance remains limited for the

diagnosis of large OV and red signs so the diagnostic thresholds still remain variable. As a result, digestive fibroscopy remains the gold standard for the diagnosis of OV and especially its characteristics.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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