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Fibroscan in Grading and Prediction of the Risk of Bleeding of Gastro-Esophageal Varices in HCV related Cirrhotic Patients

Mohamed Omar[*3], Zakaria Abdellatif Salama[1], Yasmin Saad [1], Mohammed Mostafa Abdelghaffar[2]
[1]Endemic and Hepatology Medicine, Faculty of Medicine, Cairo University, Egypt
[2]Hepatology and Gastroenterology, Ahmed Maher Teaching Hospital, Egypt
[3]M.B.B.CH, Master of Tropical Medicine, Cairo University, Egypt
Corresponding author: Mohamed Omar Idris, **Mobile:** +201013815363

ABSTRACT

Background: By measuring liver stiffness (LS) with transient elastography (TE), portal hypertension and the presence of oesophageal varices (OV) were investigated. In HCV-related cirrhotic individuals, fibroscan is capable of predicting the presence of esophageal varices. And probable categorization based on degree of hepatic rigidity.

Objective: This research aimed to use fibroscan and a prospective grade based on degree of liver stiffness as a means of diagnosing esophageal varices earlier in people with cirrhosis caused by HCV.

Methods: Ultrasonography was used to evaluate 250 Egyptian HCV-related cirrhotic patients, aged >18, with a BMI of < 35 and no history of ascites, GIT hemorrhage, HCC, abdominal collaterals, portal or splenic vein thrombosis. They classified the varices as group I (no varices), group II (little varices), and group III (big varices).

Results: All Groups were matched for age and BMI. In group III, Platelet count was lower & MELD was higher significantly than in groups I & II (115.4 ± 41.6 vs149.6 ± 60.6 & 132.1 ± 44.9 & 12.1 ± 2.9 vs 9.1 ± 2.5 & 10.1 ± 2.2 respectively. Mean LS in group I vs II & III was 20.5 ± 4.3 vs 40.5 ± 11.9 & 61.4 ± 13.1. Cutoff value for presence of OV: 27.3 Kpa (sensitivity 92.5% & specificity 98%), while LS cutoff value between group II & III: 40.9 Kpa (sensitivity 93% & specificity 52%). LS in bleeding vs none bleeding OV was 66.6 ± 10.5 vs 43.8 ± 18.8), cutoff value 55.7 Kpa (sensitivity 91.7% & specificity 73.5%).

Conclusion: Liver cirrhosis patients may benefit from anticipating the existence of esophageal varices by evaluating liver stiffness using a fibroscan. It may also aid in selecting patients for endoscopic screening because other non-invasive criteria can't compare to its accuracy at predicting the size of esophageal varices.

Key words: Fibroscan, Esophageal varices, Liver stiffness, Splenic stiffness.

INTRODUCTION

The last stage of hepatic fibrosis, liver cirrhosis, combines severe fibrosis with regenerating nodules [(1)]. Liver failure, portal hypertension (PHT), hepatorenal syndrome, and esophageal varices (EV) [(2)] are all indicators of a poor prognosis for cirrhosis. EV, which can cause bleeding, is present in 90% of cirrhotic patients. Up to 15% of patients with big EV (LEV) experience EV bleeding, while only around 5% of those with small EV (SEV) experience EV bleeding [(3)]. 10% to 20% of people die per bleeding episode [(4)].

Cirrhosis of the liver is the last stage of hepatic fibrosis, characterized by severe fibrosis and regenerating nodules [(1)]. Liver failure, PHT, hepatorenal syndrome, and esophageal varices (EV) are all complications of cirrhosis, and they all carry a poor prognosis [(2)]. Up to 90% of cirrhotic individuals have EV, which can hemorrhage. Bleeding EV occurs in around 5% of individuals with small EV (SEV) and up to 15% of patients with big EV (LEV) [(3)]. Approximately 10% to 20% of patients will die from their bleeding episodes every year [(4)]. There is a strong correlation between Fibroscan (Echosens, Paris, France), the primary instrument available for LS-based fibrosis assessment (Echosens), and HVPG. As a result, to evaluate EVs non-invasively, Fibroscan may be used. The goal of this research was to use fibroscan and a prospective grade based on degree of liver stiffness as a means of diagnosing esophageal varices earlier in people with cirrhosis caused by HCV.

PATIENTS AND METHODS

The research included 250 individuals with HCV-induced liver cirrhosis. A total of three groupings of patients were established: Group I included 50 individuals affected by liver cirrhosis who do not have esophageal varices. 100 patients with moderate esophageal varices and hepatic cirrhosis comprised group II. Group III consisted of 100 individuals with hepatic cirrhosis and severe esophageal varices. From March 2013 to September 2015, I attended the Hepatology and Gastrointestinal Outpatient Clinics at Ahmed Maher Teaching Hospital. History, clinical, laboratory, and radiographic data were used to make the diagnosis of liver cirrhosis.

Inclusion criteria: Adult patients over the age of 18. Infection with hepatitis C virus. Cirrhosis of the liver without severe ascites and modest pelvic ascites. No family history of either hepatocellular carcinoma or upper GI haemorrhage. BMI < 35.

Exclusion criteria: Patients must be at least 18 years old. BMI ≥ 35. History of upper GIT hemorrhage. Hepatocellular carcinoma in the past. Splenic vein thrombosis or portal vein thrombosis. Patients with abdominal collaterals. Schistosomiasis.

Methods: Full clinical examination, full history taking, laboratory investigations, abdominal ultrasonography, upper gastrointestinal endoscopy, liver stiffness measurement (LSM), splenic stiffness measurement.

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Ethical Approval:

Cairo University Ethics Board approved the study, and the patients were given all of the information they required about the trial. All study subjects provided signed consent forms before taking part. The Declaration of Helsinki, a code of ethics for medical research involving humans, was followed throughout the course of this study.

Statistical analysis

Statistical analysis: The SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version Fifteen for Microsoft Windows (2006) was employed for all statistical analyses.

RESULTS

Regarding modified Child-Pugh score showed that among group I patients, A represented 96%, B represented 4%, and C represented 0%. In group II, A was 89%, B was 11% and no patients with C. In group III, A was 79%, B was 20% and only one patient 1% with C. In comparison with groups I and II, group III had significantly higher MELD scores (12.11 ± 2.899 vs 9.14 ± 2.474 and 10.06 ± 2.169, p < 0.001) as shown in table (1).

Table (1): demographic features of the patients examined

	Group I (N=50)		Group II (N=100)		Group III (N=100)		
	Mean ± SD	**Range**	**Mean ± SD**	**Range**	**Mean ± SD**	**Range**	*** P-value**
Age (years)	49.7 ± 7.38	60-32	50.3 ± 6.04	63-37	51.35 ± 4.98	62-36	0.249
BMI (kg/m²)	28.31 ±3.18	34.4-17.3	28.65±2.35	34.7-23.8	27.8±2.67	34.7-23	0.084
	N	**%**	**N**	**%**	**N**	**%**	
Sex Female/Male	28/22	56/44	33/67	33/67	23/77	23/77	< 0.001
Child classification							
Child A	48	96%	89	89%	79	79%	0.0
Child B	2	4%	11	11%	20	20%	44
Child C	0	0.0%	0	0.0%	1	1%	
MELD score (mean ± SD)	9.14 ± 2.474		10.06 ± 2.169		12.11 ± 2.899		< 0.001

Table (2) displayed the patients' clinical findings; splenomegaly was more common in group III (27%) than in groups I and II (14% and 10%, respectively; p = 0.005). Lower limb edema, hepatomegaly, jaundice, or ascites were not significantly different.

Table (2): Clinical features of the studied patients

Clinical Features	**Group I**		**Group II**		**Group III**		***P-value**
	N	**%**	**N**	**%**	**N**	**%**	
Hepatomegaly	3	6%	9	9%	7	7%	0.744
Splenomegaly	7	14 %	10	10%	27	27%	0.005
Jaundice	0	0.0%	4	4%	6	6%	0.210
Ascites	0	0.0%	1	1%	1	1%	0.777
Lower limb Oedema	0	0.0%	0	0.0%	0	0.0%	

In terms of ultrasonographic results, group III had the most dilated portal vein (p-value 0.001), and splenomegaly was more common in group III than in groups I and II (p-value 0.001) as shown in table (3).

Table (3): The Ultrasonographic findings of the studied groups **Ultrasound Findings**

Ultrasound Findings		**Group I**		**Group II**		**Group III**		**P-value**
		N	**%**	**N**	**%**	**N**	**%**	
Liver size	Shrunken	1	2%	1	1%	2	2%	0.245
	Average	33	66%	67	67%	79	79%	
	Hepatomegally	16	2%	32	32%	19	9%	
Portal vein diameter	Not dilated	44	8%	76	76%	59	59%	< 0.001
	Dilated	6	12%	24	24%	41	41%	
Spleen size	Not enlarged	23	46%	20	20%	6	6%	< 0.001
	Enlarged	27	54%	80	80%	94	94%	
Ascites		1	2%	3	3%	11	11%	0.010

Transient elastography revealed that group III had greater significant values for liver stiffness than groups I and II. (61.43 ± 13.06 vs 20.5 ± 4.29, 40.5 ± 11.91) respectively (Table 4).

Table (4): Liver stiffness value in the studied groups:

Group	Liver stiffness Mean±SD	P value
Group I	20.5±4.29	**< 0.001**
Group II	40.5±11.91	
Group III	61.43±13.0	

Moreover, the sensitivity and specificity of the LS value for predicting the existence of esophageal varices was calculated to be 92.5% and 98.7% respectively (Table 5 & figure 1). While, the LS value for grading small and big varices was calculated to be 93.3% and 52.6% respectively (Table 6 & figure 2).

Table (5): The cut off value of liver stiffness by fibroscan in prediction of the presence of O.V

Fibroscan	Cut off	Sensitivity	Specificity
Liver stiffness	27.3	92.5%	98%

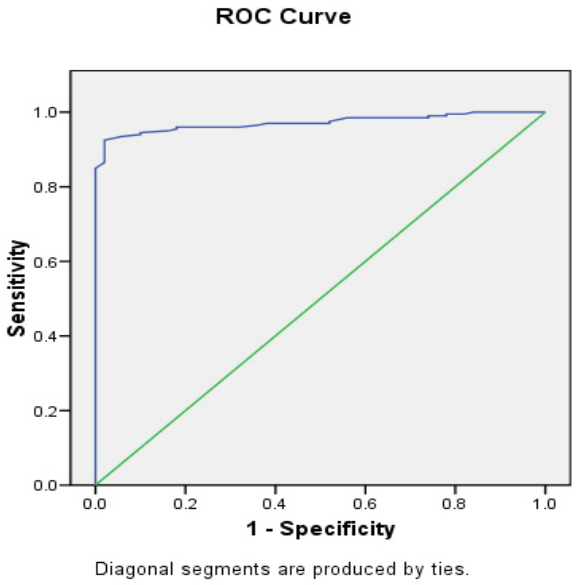

Figure (1): ROC curve of the cut off value of liver stiffness by fibroscan in the prediction of O.V.

Table (6): Cutoff value of liver stiffness in differentiating small & large O.V

Fibroscan	Cut off	Sensitivity	Specificity
Liver stiffness	40.9	93%	52%

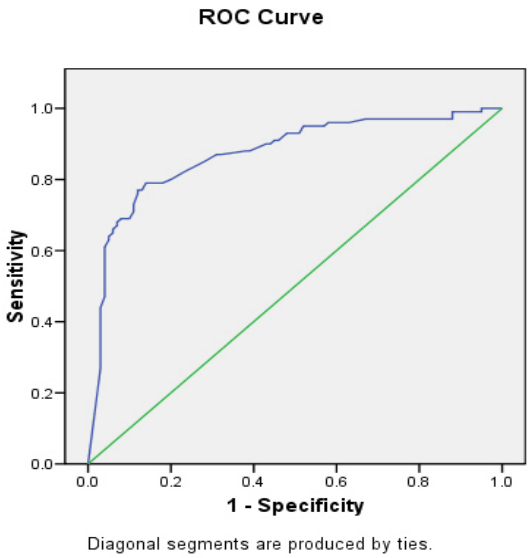

Figure (2): ROC curve of the cutoff value of liver stiffness by fibroscan in differentiating small & large O.V.

The stiffness of the liver increased noticeably, as evaluated by fibroscan in patients presented with bleeding events (66.6 ± 10.45) than those who didn't present with bleeding events (43.79 ± 18.78) with a cut off value 55.7Kpa (sensitivity 91.7% and specificity 73.5%) (Table 7 & figure 3).

Table (7): Cutoff value of liver stiffness in predicting bleeding of O.V:

Fibroscan	Cutoff	Sensitivity	Specificity
Liver stiffness	55.7	91.7%	73.5%

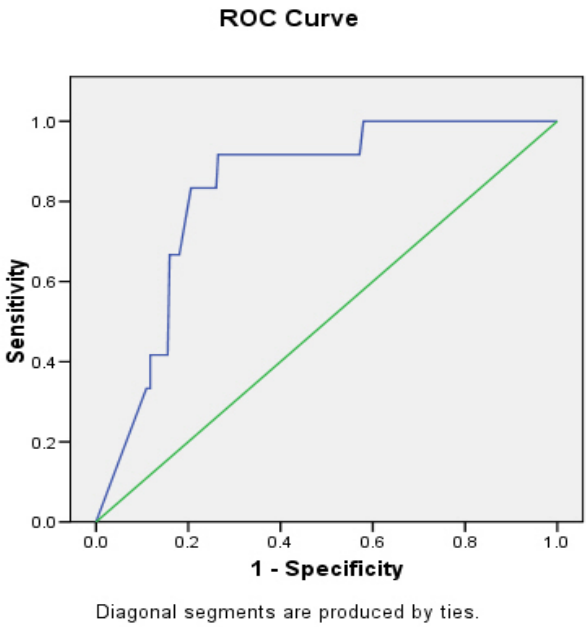

Figure (3): ROC curve of the cutoff value of liver rigidity by fibroscan in prediction of bleeding of O.V.

DISCUSSION

Many liver illnesses have a different incidence and natural history depending on whether or not they are diagnosed as male or female. In our study, most cases of esophageal varices were observed in males than in females of all sizes. However, there were no discernible variations in age or body mass index (BMI) across the three groups. One possible explanation is that liver disease in men is more severe and carries a higher risk of complications and death than in women. However, several recent research have failed to find a correlation between gender and esophageal varices [(9)]. Additionally, there was a correlation between the size of the esophageal varices and the patient's age, with larger OV being linked to elderly patients and smaller OV to younger persons. This could be because portal hypertension has more time to develop in the elderly [(10)].

Many prognostic models have been presented to predict the prognosis of end-stage disorders of the liver. The Child-Pugh score is now implemented in predicting the likelihood of death from cirrhosis in patients with advanced liver disease for nearly three decades. The Child-Pugh score is nevertheless a good predictor of its outcomes (bilirubin, albumin, and prothrombin time), despite these caveats, as was revealed in a recent large systematic review [(11)]. In our research, we discovered that esophageal varices are strongly linked to more severe liver disease as measured by the Child and MELD scores. This is consistent with previous research, these findings confirmed a link between severe liver illness and the emergence of varices [(12, 13, 14)].

One of the telltale signs of cirrhosis and portal hypertension is splenomegaly. Splenomegaly was the only clinical characteristic associated with the presence and severity of esophageal varices in our investigation, which was validated by ultrasonographic testing. Several investigations have found that splenomegaly can predict LEV in cirrhotic individuals [(15, 16, 17)]. This is consistent with **Hassan *et al.*** [(18)], who concluded that ultrasound examination revealed that the PVD of patients with OV was substantially greater than that of patients without OV.

In our investigation, patients with oesophageal varices had considerably higher liver stiffness measurements than those without varices. At the optimum cutoff value of 27.3 Kpa, the diagnostic accuracy for measuring hepatic stiffness was 95% sensitive and 98% specific. In addition, the liver stiffness measures of patients with large varices were much greater than those of patients with small varices. At the optimal cutoff value of 40.9 Kpa, the sensitivity of the liver stiffness test was 93% and its specificity was 52%. Consistent with our results, **Li *et al.*** [(19)] concluded that fibroscan measurements of liver stiffness can predict oesophageal varices stage in patients with liver cirrhosis, using cutoff values of 22.8 Kpa for oesophageal varices prediction and 30.6 Kpa for differentiating between moderate and severe oesophageal varices. Using the same factors but on a smaller sample size, **Pár *et al.*** [(20)] found that large oesophageal varices are a strong predictor of variceal bleeding. Hence, patients at high risk of these varices may benefit from an endoscopic screening with transient elastography**.** Levels of liver stiffness more than 19.2 Kpa (sensitivity 85% and specificity 87%) indicate the necessity for upper endoscopy to rule out the existence of big oesophageal varices, whereas liver stiffness values less than 19.2 Kpa rule out the presence of large oesophageal varices. The difference in cutoffs between this study and ours could be attributed to our study's larger patient population. They also included patients with and without cirrhosis**.**

We discovered that the mean value of fibroscan-measured liver stiffness 55.7 Kpa (cutoff value with sensitivity 91.7% and specificity 73.5%) could predict risk of bleeding from esophageal varices and that those with bleeding episodes had a considerably higher liver stiffness threshold than those without bleeding events.

Our figure is greater than the value published by a recent study involving 113 patients, which showed that measuring liver stiffness at a cutoff of 26.0 Kpa (sensitivity 84% and specificity 80%) might predict the risk of bleeding. **Büchter *et al.*** [(21)]**.**

Furthermore, **Sporea *et al.*** [(22)] concluded within their research that transient elastography is a dependable noninvasive approach for EV detection and predicting variceal bleeding based on comparable cutoff values of 31 Kpa (sensitivity 83% and particularity 62%) and 50.7 Kpa (sensitivity 53.33% as well as specificity 82.67%), which is close to our deadline value for bleeding.

CONCLOSION

In individuals with liver cirrhosis, when determining who should have an endoscopic screening, evaluating liver stiffness with a fibroscan is helpful in predicting the existence of esophageal varices and has a stronger diagnostic relevance than other non-invasive indicators in predicting the dimension of esophageal varices. Additionally, fibroscan could forecast the possibility of an oesophageal varices hemorrhage.

DECLARATIONS

- **Publication approval: I confirm that all listed authors have given their approval for this work to be published.**
- **Information and resources are easily accessible.**
- **No competing interests exist.**
- **There is no funding.**
- **Disputes of interest: there are none.**

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