Original Article

Assessment of Severity of Esophageal Varices by Splenic Index in Cirrhotic Patients

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Objective: To determine the relationship between the splenic index and the severity of esophageal varices in cirrhotic patients.
Material and Methods: Fifty patients who had coarse echotexture of liver on abdominal ultrasound and clinically palpable spleen were selected. Splenic index was calculated using abdominal ultrasound as a product of longitudinal length and transverse width across the hilus of the spleen. These patients were then subjected to upper gastrointestinal endoscopy and esophageal varices were noticed and severity was assessed using grades from 0-3.
Results: Relationship was observed between the splenic index and the severity of esophageal varices.
Conclusion: Splenic index can be a useful non invasive method to determine the severity of esophageal varices in patients suffering from hepatic cirrhosis.
Key Words: Cirrhosis of liver, esophageal varices,splenic Index, splenomegaly

Introduction

The most common causes of liver cirrhosis are alcoholism and viral hepatitis. Data on disease prevalence and incidence are unknown because the disease is often asymptomatic and sometimes discovered at autopsy. Based on autopsy findings, prevalence of cirrhosis is 4-10%, and incidence 240 patients per million of inhabitants annually.[1] Cirrhosis is one of the leading causes of portal hypertension world over with the development of esophageal varices, the possibility of a digestive hemorrhage and worsening of hepatic insufficiency. It is important to identify causal predictive or aggravating factors and if possible to prevent them[2] because esophageal variceal bleeding is a potentially life threatening complication in patients with liver cirrhosis and portal hypertension.[3,4,5] The risk of bleeding from esophago-gastric varices is determined by the extent of portal hypertension, liver dysfunction and endoscopic findings. [6] In patients with cirrhosis, the incidence of esophageal varices ranges from 35% to 80% and approximately a third of patients with esophageal varices experience variceal bleeding, and up to 70% of the survivors have one or more additional episodes of bleeding.[7] Varices appeared to be the source of bleeding in 50 to 90% of cirrhotic patients with upper gastrointestinal bleeding in various reports. [8] The risk of initial bleeding from varices is 25% to 35% in 2 years, with most first-bleeding episodes occurring within a year of detection of varices. The reported mortality from a first episode of variceal bleeding ranges from 17% to 57%. Of patients who survive the initial episode of bleeding and do not receive active treatment, two thirds will have another episode of bleeding within 6 months of the initial episode. It may be more cost-effective to routinely screen only cirrhotic patients at high risk for the presence of varices. Several studies have revealed factors that predict risk for first variceal hemorrhage, namely, high Child-Pugh score, variceal size, signs of variceal wall thinning, presence of gastric varices, presence of portal hypertensive gastropathy, and hepatic vein pressure gradient. However, factors that predict the presence of varices are not as well defined. Screening for esophageal varices represents an important part of the diagnostic work up of cirrhotic patients.[9] Cirrhotic patients frequently undergo screening endoscopy for the presence of esophageal varices.[10] Diagnostic yield of endoscopy is undoubtedly very high if the patient selection is done in a meticulous way.[11] In future, this social and medical burden is expected to increase due to ever increasing number of patients with chronic liver disease and their improved survival.[10] Periodic endoscopic screening for esophageal varices is recommended in patients with cirrhosis, but might be limited to a subgroup of patients if a simple non-invasive test was available to select those at risk of bleeding.[11] The aim of the present study was to determine the relationship between the splenic size and the severity of the esophageal varices which would be determined by grades in cirrhotic patients thereby allowing the clinicians to assess the severity of esophageal varices

gastrointestinal endoscopy in cirrhotic patients.

Material and Methods

Setting:

The study was conducted in Medical unit 4, Services Institute of Medical Sciences, Lahore. 50 patients who had coarse echotexture of liver parenchyma on abdominal ultrasound and had clinically palpable spleens were included in the study, based on the selection criteria. It was a cross sectional descriptive study. Convenient non-probability sampling technique was used.

Inclusion Criteria

1. Patients showing coarse echotexture of liver parenchyma on abdominal ultrasound.
2. Patients with clinically palpable spleen.
3. Age between 18-60years.
4. Both genders.

Exclusion Criteria

1. Patients presenting with variceal bleed.
2. Patients who had received any therapeutic intervention for their varices like banding or injection sclerotherapy.
3. Patients taking non selective beta blockers and/or nitrates.

Method:

Patients who had coarse echotexture of liver parenchyma on abdominal ultrasound and had splenomegaly were selected from the outpatient and emergency departments of Services Hospital, Lahore. An informed consent was obtained from every patient who was included in the study.

The patients were examined clinically for the presence of palpable spleen and appropriate patients were selected accordingly.

In the selected patients, splenic index was calculated by abdominal ultrasound and was categorized as grades as Grade 0 : <45 Grade 1: 45.1-70 Grade 2: 70.1-95.0 and Grade 3: >95.0.

Upper gastrointestinal endoscopy was performed in these patients and the absence or presence of esophageal varices was noted and their grades were documented as Grade 0: no varices Grade 1: straight and small caliber varices Grade 2: moderately enlarged, beady varices Grade 3: markedly enlarged, nodular or tumor- shaped varices.

All the subjects were assessed by the same ultrasonologist and endoscopist to minimize operator dependent variability.

Data analysis:

All data was entered on SPSS 10 and analyzed. The variables that were analyzed included demographic (age, gender), grades of esophageal varices and grades of splenic index. The data was correlated for the grade of varices and grade of splenic index. Any association between grade of varices and splenic index was observed and associations were subjected to Chi Square test as these variables were converted into nominal groups. $p<0.05$ was considered significant.

Results

Amongst the 50 patients, 60% were male and 40% were females and their mean age was 46.74 $\pm$ SD of 8.55.

One patient had grade 0 esophageal varices (02%), nine patients had grade 01 esophageal varices (18%), 24 patients had grade 02 esophageal varices (48%) and 16 patients had grade 03 esophageal varices (32%). 15 patients had grade 01 splenic index (30%), 19 patients had grade 02 splenic index (38%) and 16 patients had grade 03 splenic index (32%). In table 1, a cross tabulation has been shown between grades of splenic index and grades of esophageal varices. This table shows the frequency of different grades of esophageal varices with respect to the grades of splenic index along with their percentage. The table shows that in 15 patients with splenic index grade 01, 01 patient had grade 0 esophageal varices (6.7%),08 patients had grade 1 esophageal varices (53.3%), 06 patients had grade 2 esophageal varices (40%) and there was no patient having grade 3 esophageal varices (0%). Similarly 19 patients were found to have grade 02 splenic index amongst whom, no one had grade 0 esophageal varices (0%), 03 patients had grade 1 esophageal varices (15.8%), 11 had grade 2 esophageal varices (57.9%) and 05 patients were found to have grade 3 esophageal varices (26.3%).

As far as grade 3 splenic index patients were concerned, their number was 16 in total out of which no one had grade 0 and grade 1 esophageal varices (0%), 05 patients were diagnosed having grade 2 esophageal varices (31.3%) and 11 patients were noticed to have grade 3 esophageal varices (68.8%).

The association between these two variables was calculated using Chi-square test. The value of chi-square was found to be 26.104 with p-value of 0.000. These results suggested that grades of splenic index were significantly associated with grades of esophageal varices.

Table-1: Association of Grades of Splenic Index with Grades of Esophageal Varices n=50.

	Grades of Esophageal Varices (Percentage %)				
Grades of Splenic Index	**0**	**1**	**2**	**3**	**Total**
1	1 (6.7%)	8 (53.3%)	6 (40%)	0 (0%)	15
2	0 (0%)	3 (15.8%)	11 (57.9%)	5 (26.3%)	19
3	0 (0%)	0 (0%)	5 (31.3%)	11 (68.8%)	16
Total	1	11	22	16	50

Chi-square 26.104, df 6, P value, 0.000

Discussion

It is important to determine the presence of esophageal varices in cirrhotic patients because variceal bleeding is one of the most dreaded complications of portal hypertension. Although with recent advancements, the prognosis and outcome of variceal bleeding has improved**,** it still carries a substantial mortality. Patients who have liver cirrhosis should undergo upper gastro-intestinal endoscopy to detect esophageal varices. This will enable us to diagnose esophageal varices sooner than later, so that early treatment could be initiated and life threatening complications could be withheld.[13]

It is unclear how often patients should be screened endoscopically for varices, and there are few data on the relationship of varices to non-endoscopic variables. In view of this, efforts have been made to identify clinical, laboratory and imaging characteristics that may non-invasively predict the presence or absence of large EV with a high degree of accuracy, either reducing or eliminating the need for screening endoscopy.[14]

In this study an attempt was made to define a relationship between the esophageal varices and splenic size expressed as splenic index in cirrhotic patients. It was found that there is a significant relationship between these two variables in cirrhotic patients. This study showed that in the cirrhotic patients the severity of esophageal varices expressed as grades increases with the increasing size of spleen measured as splenic index and expressed as grades. The findings of the study are comparable with the results of different studies conducted in the past in which different variables along with splenomegaly have been taken into consideration as the non invasive markers to see the relationship with the presence and severity of esophageal varices. Various parameters found to be important for this purpose in different studies have included splenomegaly. [14,15] serum albumin concentration, thrombocytopenia, portal vein diameter,[16] ascites, spider naevi, hepatic encephalopathy, serum bilirubin levels, prothrombin time, Child-Pugh score, etiology of liver disease, and derived measures like ratio of platelet count to splenic size.[17] In this context an important study is worth mentioning that studied the role of color Doppler ultrasonography of the portal vein in predicting EV in cirrhotic patients. Their results suggested that color Doppler ultrasonography is a useful non invasive method for evaluating the risk of esophageal variceal bleeding in cirrhotic patients.[18] This current study is useful in the sense that only one variable is considered. It is easy to use and had comparable accuracy with other models used in the past, which also comprised of multiple variables combined together and were similarly used in predicting severity of esophageal varices.[16,17] This study has several different features. Our data indicated that it may be possible to predict the severity of esophageal varices using simple and non-invasive tools like clinical examination and abdominal ultrasound which is a cheap and readily available diagnostic modality with a fairly high degree of accuracy. Another major advantage of the study was its simplicity. Splenic index could be measured easily at the bed side by abdominal ultrasound without undergoing complicated procedures. The complete noninvasive nature was also an added advantage which favored the use of this marker. Splenic index could easily be applied to generalized clinical practice for determining severity of esophageal varices.

One study assessed the presence and severity of esophageal varices by splenic index in cirrhotic patients in which CT scan of the abdomen was used as a diagnostic modality to calculate splenic index. The study concluded that the SI in patients with esophageal varices was greater than in patients without esophageal varices.[19] Moreover a study used platelet count and splenic size as two variables to assess the severity of esophageal varices. The study used the ratio of platelet count / splenic size ratio as a non invasive parameter.

That study came up with the conclusion that platelet count/splenic size ratio was an important and an

independent parameter associated with the presence of esophageal varices.[20] To make this non invasive technique more reliable, platelet count, portal vein diameter and anteroposterior splenic measurements have been used in the past as non invasive parameters to detect esophageal varices in cirrhotic patients.[21] The study also concluded that the platelet count, portal vein diameter and splenic diameter can be used as non invasive predictors of the presence of esophageal varices with a fair degree of specificity and sensitivity. Recently a study conducted showed that three non invasive markers, a prothrombin index below 60%, alkaline phosphatase activity over 110 IU/l, and hyaluronate over 100 g/l were the best markers for the prediction of esophageal varices. The diagnostic accuracy for medium to large esophageal varices using these three factors was 86%.[22] A local study suggested that platelet count less than 65,000/mm^3, serum albumin less than 2.2 g/dl and portal vein diameter more than 13 mm on ultrasound are independent and significant predictors of EV on endoscopy. Therefore screening endoscopy must be done in all patients with liver cirrhosis who have no history of GI bleeding but any of these predictors.[23] Comparing the results of the previous and objectively similar studies, the results of this study is pretty much encouraging. It can be inferred from the current study that splenic size can be used to assess the severity of esophageal varices.

Conclusion

Our study shows that size of spleen as assessed by using abdominal ultrasound can predict the severity of esophageal varices in patients with cirrhosis of the liver. This parameter can be used to calculate a predictor function, which showed moderate efficacy in predicting the presence of Esophageal Varices. This predictor function needs further study in one or more prospective cohorts of patients with liver cirrhosis to validate its efficacy. If its efficacy is confirmed, it may permit institution of prophylactic measures like beta-adrenergic antagonists for preventing primary variceal bleeding in patients with liver cirrhosis, without the need for costly and invasive investigations like gastrointestinal endoscopy.

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Answer Picture Quiz

Findings: A radiograph of both hands and an AP radiograph of the spine were obtained. The radiograph of the hand demonstrates osteopenia. Multiple lytic and somewhat expansile lesions with well-defined borders, that are in part sclerotic, are present bilaterally. These lesions are present in the distal aspects of the metacarpals and in the proximal, mid and distal phalanges. Subperiosteal resorption is present along the radial aspect of the proximal and mid phalanges bilaterally involving the first through fifth fingers. Generalized thinning of the cortices is present of all the metacarpals suggestive of endosteal bone resorption.

The radiograph of the spine demonstrates extensive erosions of both SI joints, which are widened bilaterally and symmetrically.

Diagnosis: Secondary hyperparathyroidism related to renal osteodystrophy.

Discussion: Renal osteodystrophy results from chronic renal failure by abnormal metabolism of vitamin D. The kidney is unable to hydroxylate vitamin D to form the active compound. This results in sustained hypocalcemia resulting in secondary hyperparathyroidism. Secondary hyperparathyroidism can also result from malabsorption of vitamin D, osteomalacia, and pseudohyperparathyroidism. Clinical findings in hyperparathyroidism are related to renal, skeletal and gastrointestinal changes. Symptomatic bone disease is present in 25% of patients and often progress to pain, swelling, and deformity.

Secondary hyperparathyroidism results in bone resorption from the osteoclastic activity. Subperiosteal bone resorption is often found at the radial aspect of the phalanges of the hand. Subperiosteal resorption of bone also occurs near articular surfaces, particularly at the acromioclavicular joint, sternoclavicular joint, and sacroiliac joints as well as the pubic symphysis. Bone resorption also occurs at subligamentous and subtendinous areas. Brown tumors, which are lytic lesions, occur related to accumulation of fibrous tissue as well as giant cells. These can be single or multiple and can also be expansile. Bone sclerosis also occurs in secondary hyperparathyroidism at the superior and inferior end plates of the spine resulting in "Rugger Jersey" spine. The mechanism of bony sclerosis is not well established. Chondrocalcinosis is another finding, resulting from calcium pyrophosphate dihydrate crystal deposition. This often results in CPPD arthropathy. Pathologic fractures occur, particularly in the spine and in regions of Brown tumors. Both soft tissue and vascular calcification may also occur.