ORIGINAL ARTICLE

Occurrence of Portal Vein Thrombosis in Patients with Hepatocellular Cancer on Doppler Ultrasound

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ABSTRACT

Background: Thrombosis in portal vein is a very significant cause of development of the portal hypertension. It is not an uncommon syndrome and mostly patients are asymptomatic. It usually detected during abdominal ultrasound for some other reason.
Method: This Descriptive cross sectional study was conducted from March 2019 to February 2020 in the Radiology Department of Avicenna Hospital, Lahore. 100 patients with age above 30, having cirrhotic liver on ultrasound, including both genders and HCC confirmed on histopathologic examination were included in the study.
Results: The mean age of patients was 54.28±11.50 years, mean size of HCC lesion was 3.96± 0.94 mm and mean diameter of portal vein was 12.64±2.23 mm. The portal vein diameter in hypertensive patients was 12.40 + 0.4mm, and diabetic patients was 12.69 + 0.45. Hepatitis C virus infection was the commonest etiology 67 (67%) followed by Hepatitis B and alcohol of liver cirrhosis.
Conclusion: The conclusion of this study was that the frequency of portal vein thrombosis is common in people above 50 years of age, with hepatitis C as compare to Hepatitis B as cause of Hepatocellular cancer.
Key words: Portal vein thrombosis, portal hypertension, hepatocellular carcinoma, cirrhosis, hepatitis

INTRODUCTION

Portal hypertension can be develop due to presence of thrombosis in the portal vein and thrombosis of portal vein is considered as important cause of portal hypertension. Portal vein thrombosis can develop due to presence of cirrhosis or as the consequence of malignant incursion by the hepatocellular carcinoma and / or even in when there is no disease related to liver is present[1].The prevalence of portal vein thrombosis is increasing with time and these days it can be a prevalent disease as compared to older times. Literature showed that the overall risk of portal vein thrombosis among the general population is around 1% during any stage of the lifetime[2].The most common reasons that lead to portal vein thrombosis are;severe abdominal infection, cirrhosis, liver malignancy, any inflammatory disease and myeloproliferative disorders[3].It can be develop in about 10-25% patients of liver cirrhosis[4]. Thrombus concerning to the main portal vein is thepoorer prognostic factor as compared to the thrombus that develop in the branch of portal vein[5]. Portal vein thrombosis has been observed to develop in around 0.6-15.8% cases who previously diagnosed with chronic liver disease and 38-44% patients who were diagnosed with hepatocellular carcinoma[6].

The hepatocellular carcinoma is the 6th most prevalent type of carcinoma of systemic organ, and it is the 3rd most prevalent cause of cancer-related deaths all over the world[7]. It is accountable for more thansix lac deaths per annum[8].Cirrhosis can be seen in around 20% patients of hepatitis B Virus infection or carriers in countries of Asia and Asian Pacific region. It had incidence among patients of chronic hepatitis B Virus infection in around 1.0 to 2.4% cases per annum[9].

Ultrasonography is thought to be the modality of first choice to screen the hepatocellular carcinoma, as it is non-invasive, appropriate and cost effective imaging modality[10].Ultrasonography can assess the number, size, position and boundary of tumour nodules, and can also monitor the changes in hepatic hemodynamics. Doppler ultrasonography is currently used to identifythe hemodynamic changes, which happens during the growth and manifestation of the hepatic fibrogenesis related to the liver cirrhosis[11]. Previous studies has confirmed that the Doppler ultrasonography can be applied reliably to determine the changes in hemodynamics during different stages of liver fibrosis in patient of cirrhosis[12].Moreover, one study, done by Suk et al[13]. It was proved that the changes in the hepatic hemodynamics may assist as the predictor for clinical phases of hepatocellular carcinoma.
The aim of this study was to determine the frequency of portal vein thrombosis in patients of hepatocellular cancer on Doppler ultrasound. This would help us to assess which age group was most affected in our hospital patients.

METHODOLOGY

This Descriptive cross sectional study was conducted from March 2019 to February 2020 in the Radiology Department of Avicenna Hospital, Lahore. Informed written consent was obtained from patients. A total 100 patients of either gender were included visiting in Radiology Department by using non probability sampling technique. Sample size 100 is calculated with 95% confidence level and 6% margin of error by taking 10% frequency of portal vein thrombosis by using formula:

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All patients with above age 30, with cirrhotic liver on ultrasound, of both genders and HCC proved onhistopathologic were included in the study. Patients with clinical features of jaundice, splenomegaly, ascites & previous ultrasound findings of irregular liver borders were also recruited for the research. Patients of hepatocellular carcinoma, liver metastasis, having history of trauma, or abdominal infection, dehydration, portal vein invasionand acute pancreatitis were excluded from the study.

A proforma was used to get information like with name of patient, age, findings of ultrasound for liver cirrhosis and presence of thrombosis in portal vein, color and flow Doppler ultrasound findings like diameter, size of lesions etc. SPSS version 21.0 was used to enter and analyzed the data. Quantitative data like age, portal vein diameter, size of lesion were presented as means and standard deviation and qualitative data like age groups, PVT etc. wereshown as frequency and percentage. P - value≤ 0.05 was taken as statistically significant.

RESULTS

One hundred patients were included in this study. The mean age was 54.28+ 11.50 years. Out of 100 patients, 11(11%) patients had age range 30-40 years, 32(32%) had age between 41-50 years, 25 (25%) were in 51-60 years of age, 20 (20%) were aged between 61-70years and 12 (12%) had age range between71-80 years (Table 1).

The mean size of hepatic lesion was 3.72± 0.96 mm and mean portal vein diameterwas12.5±1.94 mm. The portal vein diameter in hypertensive patients was 12.40±0.4 mm, and diabetic patient was 12.69 ± 0.45 mm.The mean portal veindiameter and size of hepatic lesion was 12.64± 2.23, 3.96± 0.944. Table: 1

Table:1Baseline characteristics of patients (n = 100)

Age (years)	54±11.50		
Size of hepatic Lesion	3.72±0.96		
PV Diameter	12.59±1.94		
Mean portal vein diameter distribution by age	**Frequency (n)**	**Mean PVD ±SD**	**P value**
30-40 years	11 (11%)	12.27±1.48	0.039
41-50 years	32 (32%)	11.81±2.48	
51-60 years	25 (25%)	12.84±1.54	
61-70 years	20 (20%)	13.25±1.71	
71-80 years	12 (12%)	13.33±0.98	
Portal Vein Thrombosis	**Yes**	**No**	
	53(53%)	47(47%)	
Size of hepatic lesion	3.96±0.944	3.46±0.93	
PV diameter	12.64±2.23	12.95±1.48	

The mean diameter of portal vein increases with the increasing age of patients. So in our study, mean diameter was high in 61-70 years of age group among all the age groups. Furthermore, the statistical difference regarding the mean portal vein diameter was significantly (P value < 0.01) (Table:1)

The etiology of liver cirrhosis in all patients included in this study was determined which revealed that out of 100 patients, 67(67%) were suffering from hepatitis C, 17(17%) hepatitis B, 11(11%) patients were taking alcohol . Hepatitis C virus infection 67(67%) was the commonest among all the etiology variables followed by Hepatitis B and alcohol for cirrhosis of liver (Table: 2)

Table: 2 Etiology of Cases

Aetiology	**No of Cases**
Hepatitis B	17(17%)
Hepatitis C	67(67%)
Tumor Number	
Single	52 (52%)
Multiple	48 (48%)

DISCUSSION

Portal vein thrombosis is comparativelynot a prevalent disease in the general population worldwide, but it is more commonin patients with liver cirrhosis,particularlyin patients with advanced liver disease. It may present as an imperative complication in natural development of the liver disease. Chronic Hepatitis B & C are very important known causes of liver cirrhosis all around the world. As mostly the patients are asymptomatic, the diagnosis become late and usually detected accidently on abdominal ultrasonography by using Doppler analysis[14].

The normal diameter of portal vein can usually differfrom 7 to 15 mm while normal pressure of portal vein fall in range between 5 to 10 mmHg (14 cm H2O). If pressure of portal vein is higher than 15 mmHg (30 cm of H2O), then it may be indicativeof portal hypertension[15].The diameter of portal vein that is more than 13 mm, it is considered to be the best cutoff value for the diagnosis of portal hypertension in proper clinical venue[16]. While in previous study, which had controversial cut off for portal vein diameter and pressure showed that the diameter of portal vein more than 10 mm is also thought to be the diagnostic for portal hypertension [17, 18]. But, the mean normal portal vein diameter is higher than 10 mm, which is also similar to those studies conductedbefore: 13 mm, higher than 11mm in Nigeria[17].

The portal vein diameter in hypertensive patients was 12.40 ± 0.41 mm, and diabetic patient was 12.69 ± 0.45 mm. So we can say that mean portal vein diameter was high in diabetic patient as compare to hypertensive patients[18]. With the pathogenesis of the portal hypertension, there is the progressive loss of distinction with the phases of respiration. The reliability of detectingthe portal hypertensionis 90% if there is less than 20% rise in the portal vein diameter.When the age and single or multiple hepatocellular carcinoma were examined, it was observed that the thrombosis in portal vein was is more common in patients of age fifty to sixty years. The prevalence is also high in patients who had history of hepatitis C patients and onehepatocellular carcinoma may

be present in the portal vein thrombosis than similar findings also recorded in other studiesdone by Rossi et al.,[19] &Aman etal[14].

In our study, the mean portal veins diameter was 12.59 mm± 1.94 as compare to other studies done in Nigeria (11.45±1.49 mm) 17, and Kolkata (11.54 mm) 20 and Ethiopia (7.9 ±2mm)18.Furthermore, the mean portal vein diameter was observed to differ significantly with increasing age (F-value =2.63, P-value <0.001) as compare to Ethopian study was also significant mean portal diameter with the age (F=8.20, P<0.001) and gender (t=3.60, P<0.001)21. There were constantobservationin regard tovariation in the mean portal vein diameter by growing age in previousepidemiological studies those conducted in India [15], Nigeria [17]& Addis Ababa, Ethiopia [18]. Previous surveys conducted in West Bengal, India & Addis Ababa, Ethiopiaobserved that the mean portal vein diameter has no variation with respect to any gender and both; males and females have equal differences for portal vein diameter, however it was nottested statistically.[15, 18, 20]

CONCLUSION

The conclusion of this study is that the frequency of portal vein thrombosis is common in people above 50 years of age, with hepatitis C patients as compare to Hepatitis B.

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