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Correlation of CT portography vasculature to child: Pugh classification of cirrhotic patients

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Abstract

Aim: To study CT Portography vasculature in different stages of cirrhosis.

Materials and Methods: Using 16 slice TOSHIBHA acquillon CT scanner machine liver triple phase study was performed in 80 cirrhotic patients. Based on the clinical and lab parameters like serum albumin and prothrombin time the patients were categorized into child “A” (40 patients),”B” (20 patients) and “C” (20 patients) “A” is compensated “B” and “C” are decompensated cirrhosis.

Results: Esophageal and paraesophageal varices are the most common portosystemic collaterals. Ectopic varices, transhepatic shunts and extrahepatic shunts were seen mainly in the decompensated cirrhosis. All patients with child pugh “C” score had hepatic encephalopathy.

Conclusion: Portosystemic collaterals can be correlated with child pugh classification in assessing the progression of liver cirrhosis to decompensated stage. So, from gastroesophageal varices to transhepatic and extrahepatic shunts the child pugh classification tends to increase representing a linear correlation.

Keywords: CT portography, child pugh classification in cirrhosis, portosystemic collaterals

Introduction

The portal hypertension due to cirrhosis results in the formation of porto systemic collateral channels by reopening of collapsed embryonic vessels or reversal of flow in the pre-existing systemic veins^[3].

Child – Pugh classification is used to stratify patients with cirrhosis. Patients with “A” and “B” have a better prognosis; but patients with “C” have a worse prognosis^[4]. The parameters considered are serum bilirubin, serum albumin, prothrombin time, ascites and hepatic encephalopathy. Patients falling under category “A” are compensated and those belonging to “B” and “C” are decompensated^[4]. With the onset of decompensating events like ascites, variceal haemorrhage and hepatic encephalopathy the patient goes in for decompensation stage with reduced median survival of only 1.8 years^[4].

The decompensating events like ascites, variceal bleed and hepatic encephalopathy depends mainly on the porto systemic collaterals and shunt formation^[4, 6].

Aim and Objectives

To study CT Portography vasculature in different stages of cirrhosis.

Objectives

1. **Primary:** Correlation of Porto-systemic vasculature of cirrhotic patients with Child – Pugh classification and to assess the severity of cirrhosis.
2. **Secondary:** To obtain the relationship between hepatic encephalopathy and portal venous collateral channels.

Materials and Methods

A prospective observational study was done using 16 slice TOSHIBHA acquillon CT scanner machine in the Department of Radiodiagnosis, government Mohan Kumaramangalam Medical College, Salem during the period of October to December 2020; Liver triple phase study was performed in 80 cirrhotic patients. Based on the clinical and lab parameters like serum albumin and prothrombin time the patients were categorized into child “A” (40 patients), “B” (20 patients) and “C”(20 patients) “A” is compensated “B” and “C”

are decompensated cirrhosis.

The initial plain CT study was followed by the first phase hepatic arterial phase, portal venous phase and delayed phase.

Results and Analysis

Age and sex distribution in cirrhosis

The average age of the patient included in the study is 40 to 60 years.

The minimum age of the male participant to present with late decompensated cirrhosis (Child -Pugh “C” score) is 29 years and that of female participant is 66years. Of the total participants analysed in the study 62 were male patients and

18 were female patients. Of the total 40 participants with early and late decompensated cirrhosis (Child Pugh “B” and “C” scores) there were only 5 female participants and remaining 35 were male participants.

Gastroesophageal varices in cirrhosis

Among the 80 participants in the study 61 had gastro oesophageal varices and 19 patients were without gastro oesophageal varices. All 20 participants considered in Child “B” and “C” scores had gastro oesophageal varices. Among 40 participants in Child “A” score 21 had GE varices and 19 were without GE varices.

Table 1: Gastroesophageal varices in different stages of cirrhosis

			CTP			Total
			Child A	Child B	Child C	
GE Varices	Present	Count	21	20	20	61
		% within GE Varices	34.4%	32.8%	32.8%	100.0%
		% within CTP	52.3%	100.0%	100.0%	76.3%
	Absent	Count	19	0	0	19
		% within GE Varices	100.0%	0.0%	0.0%	100.0%
		% within CTP	47.5%	0.0%	0.0%	23.8%
fatal		Count	40	20	20	80
		% within GE Varices	50.0%	25.0%	25.0%	100.0%
		% within CTP	100.0%	100.0%	100.0%	100.0%

Ectopic varices in cirrhosis

The ectopic varices included in the study were duodenal, jejunoileal, pericholecystic, colonic, pancreatic, mesenteric, omental and retroperitoneal varices. Ectopic varices were observed in total of 44 participants of the total 80 patients. In Child “A” score only 4 patients had ectopic varices (10%), but all patients with Child “B” and “C” had Ectopic varices.

Transhepatic shunts in cirrhosis

The transhepatic shunts were detected in 31 patients of the total 80 participants. Of the 31 patients 2 patients are with Child “A”, 12 patients with child “B” and 17 patients with Child “C” score. The transhepatic shunts were seen mainly in decompensated cirrhosis.

Table 2: Transhepatic shunts in different stages of cirrhosis

			CTP			Total
			Child A	Child B	Child C	
Transhepatic	Present	Count	2	12	17	31
		% within Transhepatic	6.5%	38.7%	54.8%	100.0%
		% within CTP	5.0%	60.0%	85.0%	38.8%
	Absent	Count	38	8	3	49
		% within Transhepatic	77.6%	16.3%	6.1%	100.0%
		% within CTP	95.0%	40.0%	15.0%	61.3%
Total		Count	40	20	20	80
		% with in Transhepatic	50.0%	25.0%	25.0%	100.0%
		% within CTP	100.0%	100.0%	100.0%	100.0%

Extrahepatic shunts in cirrhosis

These shunts are of two types:

1. Draining into SVC are Spleno – azygous/phrenic and Pancreaticoduodenal – hemiazygos
2. Draining into IVC are Gastro renal, Gastrocaval, Gastro/ Spleno gonadal, Spleno renal and Splenoadreno renal

The extrahepatic shunts are seen in 42.5% of the total participants.

Among 80 participants, 1 patient in Child “A” had extrahepatic shunt

18 patients of Child “B” and 15 patients of Child “C” had extrahepatic shunts.

Table 3: Extrahepatic shunts in different stages of cirrhosis

			CTP			Total
			Child A	Child B	Child C	
Extrahepatic	Present	Count	1	18	15	34
		% within Extrahepatic	2.9%	52.9%	44.1%	100.0%
		% within CT?	2.5%	90.0%	75.0%	42.5%
	Absent	Count	39	2	5	46
		% within Extrahepatic	84.8%	4.3%	10.9%	100.0%

		% within CTP	97.5%	10.0%	25.0%	57.5%
Total		Count	40	20	20	80
		% within Extrahepatic	50.0%	25.0%	25.0%	100.0%
		% within CTP	100.0%	100.0%	100.0%	100.0%

Hepatic encephalopathy in cirrhosis

Of the total 80 participants included in the study 36 patients had hepatic encephalopathy and 44 patients were not associated with hepatic encephalopathy

Discussion

In our study of the total participants 77.5% were male patients and 22.5% were female patients. The incidence of cirrhosis with portal hypertension is more common in males because of the increased prevalence of Hepatitis B virus infection in them and also the life style factors. The average age of the total participants included in the study are 40 to 60 years. The male participant compared to the female participant presented with decompensated cirrhosis at a very young age.

The oesophageal and paraesophageal varices are the most common portosystemic collateral observed in our study contributing to 76.25% of the total participants.

The ectopic varices, transhepatic shunts and extrahepatic shunts were associated with the Child Pugh "B" and "C" score. The patients with late decompensated cirrhosis are mostly associated with transhepatic and extrahepatic shunts. So, from gastro oesophageal varices to transhepatic shunts and extrahepatic shunts the Child Pugh classification tends to increase. The most common transhepatic shunt observed in our study was the recanalized left umbilical vein traversing from the left branch of portal vein to drain into the paraumbilical region. The predominant extrahepatic shunts observed in this study was gastro renal and splenorenal shunts draining into IVC. All patients with severely decompensated Child Pugh "C" score had hepatic encephalopathy contributing to 56% of the total incidence.

As large amount of blood flows through these shunts and with associated progressive increase in intrahepatic resistance results in increased mixing of blood between portal and systemic venous system [1, 6, 8] Therefore, these patients with severely decompensated cirrhosis child "C" had persistent hepatic encephalopathy with association of recurrent episodic hepatic encephalopathy due to underlying precipitating factors.

Conclusion

Multidetector CT Portal venography is the best imaging technique due to its high spatial resolution, faster image acquisition and precise post processing techniques. The incidence of hepatic encephalopathy increases as we progress from Child "A" to "B" and then to "C" which can be correlated with formation of transhepatic and extrahepatic shunts. The volume of extrahepatic and transhepatic shunts is directly correlated with hepatic encephalopathy.

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