ROLE OF DOPPLER ULTRASONOGRAPHY IN PATIENTS WITH PORTAL HYPERTENSION

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ABSTRACT
The aim of this study was to measure portal hemodynamic parameters with Doppler ultrasonography in healthy individuals and assess the role of Doppler ultrasound parameters in the diagnosis of portal hypertension & Cirrhosis. We studies 50 normal subject and 24 patients of cirrhosis. Congestion index of portal vein of healthy persons were compared with the patients of cirrhosis. Congestion index is the ratio between the cross-sectional area (cm²) and blood flow velocity (cm/sec) of the portal vein, as determined by a duplex Doppler system. Significant difference is observed between the congestion indices from the normal subject group and indices obtained from patients with portal hypertension our cirrhosis. Congestion index reflect the pathophysiological hemodynamics of portal venous system in portal hypertension.

KEYWORDS: Doppler ultrasonography, Portal hypertension

INTRODUCTION
Portal hypertension (PHT) is a pathologic increase in hydrostatic pressures in the portal venous system. 90% of Patients with PHT have sinusoidal or post sinusoidal PHT. Portal hypertension is mainly caused by liver cirrhosis, such as post-hepatitis B or C, cirrhosis. Clinically, PHT is suspected in patients with splenomegaly and ascites, and the diagnosis is confirmed when porto systemic collateral channels are presents.
Fibrotic parenchyma increased the resistance of hepatic and portal blood flow. A decrease in the portal venous flow velocity is a characteristic feature of PHT. Doppler ultrasonography may be an ideal method for diagnosing PHT because it is noninvasive and can be used to visualize liver, hepatic and portal vascular hemodynamics.[2,3]

MATERIAL AND METHODS

We studied 50 normal subjects & 24 patients with cirrhosis during one year period (2014). Hitachi duplex system & GE-V5 duplex system machines used. The frequency of B-mode transducer is 3.5 MHz to 5.0 doppler angle fix at 45°. All subjects & patients were studied during fasting and at rest.[4-6] To decrease the effect of respiration on the portal blood flow, all measurements, were obtained during quits respiration, avoiding deep respiration or breath-holding. Doppler data were obtained while scanning the portal vein along its longitudinal axis, and with the sample volume on the middle of the portal vein trunk. Just after the Doppler signals were recorded. The portal vein cross-sectional area was measured from the B-mode image of the portal vein while scanning perpendicular to the long axis of the portal vein. The cross – sectional area was calculated from the formula for the cross- sectional of an ellipse. The angle between the Doppler –mode ultrasound beam and the blood vessel was kept of 45°. The inclusion criteria were cirrhosis, spleenomegaly, Ascitis, laboratory finding & liver Biopsy.[7]

RESULTS

Table 1: Mean and range PV Velocity, diameter, area and congestion index

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mean/Range</th>
<th>PV Velocity cm/sec</th>
<th>PV Diameter cm</th>
<th>PV Area cm²</th>
<th>Congestion index cm x sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal (n=50)</td>
<td>Mean - Range -</td>
<td>12.86±1.9 SD</td>
<td>0.97±0.15 SD</td>
<td>0.75±0.02 SD</td>
<td>.04±0.017SD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maximum-18.9</td>
<td>Maximum-1.3</td>
<td>Maximum-0.32</td>
<td>Maximum -18.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minimum-9.6</td>
<td>Minimum-0.64</td>
<td>Minimum-0.3</td>
<td>Minimum -0.02</td>
</tr>
<tr>
<td>Patient (n=24)</td>
<td>Mean - Range -</td>
<td>8.28±0.79 SD</td>
<td>1.42±0.08 SD</td>
<td>1.5±0.19 SD</td>
<td>0.16±0.03SD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maximum - 9.5</td>
<td>Maximum-1.59</td>
<td>Maximum-1.98</td>
<td>Maximum - 0.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minimum - 6.0</td>
<td>Minimum-1.21</td>
<td>Minimum- 1.14</td>
<td>Minimum - 0.11</td>
</tr>
</tbody>
</table>

The cross sectional area of portal vein in normal subjects (n=50) was (0.75± 0.19cm²) and in cirrhosis (n=24), cross sectional area (1.58±0.19 cm³). There is significant difference in normal subjects and in patients of cirrhosis. Blood flow velocity in normal subjects was 12.86±1.9 cm/sec and in patients of cirrhosis 8.2±0.79 cm/sec. There was significant
difference exists between two groups. Congestion index in normal subjects was 0.04±0.01 cm/sec and in patients of cirrhosis 0.16±0.03 cm/sec (Table-1).

DISCUSSION
Number of previous studies has shown that increase in portal vein diameter in patients of cirrhosis, our study also confirm an increase in the cross-selection area of the portal vein in patients with portal hypertension. In our study there is marginal decrease in portal vein velocity diseases patients than in normal subjects.\[8-10\]

In this study congestion index (CI) is significantly higher in patients than in controls. Several factor are responsible for the increase in CI.\[11-12\] There are portal blood flow, portal vascular resistance, developments of Porto systemic collateral pathways and duration of abnormal hemodynamic, as the pathological changes in portal vein pressure are progressive. There are other parameters for portal hemodynamic, like hepatic artery resistive index, spleen artery pulsatility index, hepatic buffer index, liver vascular index and portal hypertension index. These parameters increases the sensitivity to diagnose patient of PHT, but they need lot of time to acquire data and need technical skill, in comparison CI is easy to obtain and results are reproducible, with a sensitivity ranges from 67 to 75%.\[13\]

CONCLUSION
Our study has shown that Doppler ultrasonography has the advantage of providing functional as well as anatomic information and congestion index reflects pathophysiological hemodynamics of the portal venous system in PHT.

REFERENCES


