

Prediction of Capillary Leak Syndrome in Dengue Patients by Congestive Index on Portal Venous Doppler.

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ABSTRACT:

Dengue Fever / Dengue Haemorrhagic fever is increasingly recognized as one of the world's major emerging infectious tropical diseases having the potential of causing large scale outbreaks Early diagnosis of CLS is essential to start volume replacement and avoid progression to DSS. Thus this study is intended to evaluate the ultrasonographic features of capillary leak syndrome and investigate the role of Doppler study of the portal vein as a predictor for capillary leakage in these patients.

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I. Introduction

According to WHO, Dengue fever or Dengue haemorrhagic fever is considered as the second most important tropical disease next to malaria. (1)

It is endemic in >100 countries in the tropical and subtropical regions of the world.

The risk of dengue has shown an increase in recent years due to rapid, urbanization, life style changes and deficient water management. Annually there are 100 million new dengue viral infections reported worldwide with 5 lakh cases of Dengue haemorrhagic fever (DHF) and Dengue shock syndrome (DSS). (2)

Capillary leak syndrome /CLS is the principal pathologic event in causation of DHF and dengue shock syndrome (DSS). CLS broadly is characterized by hypotension with hemoconcentration, hypoalbuminemia without albuminuria and generalized edema. (4)

Ultrasound can be used as an early predictor as well as an important prognostic sign for severe dengue infection especially during an epidemic. The common ultrasonographic features that were significantly associated with severe dengue infection were gall bladder wall thickening, ascites, pleural effusion, pericardial effusion, pericholecystic fluid, hepatomegaly, splenomegaly and mesenteric adenopathy. (3)

In addition to the above features, in view of hepatosplanchnic circulatory dysfunction in acute hepatic infection in cases of dengue hemorrhagic fever, portal venous changes are anticipated.(5)

Thus this study is intended to evaluate the ultrasonographic features of capillary leak syndrome and investigate the role of Doppler study of the portal vein as a predictor for capillary leakage in these patients.(7)

II. Aim:

- To evaluate sonographic features of capillary leak syndrome in dengue serology positive patients.
- To evaluate the role of Portal venous Doppler as a predictor for capillary leakage in dengue serology positive patients.
- To compare and correlate the portal venous Doppler findings with the laboratory findings and clinical outcome.

III. Materials and Methods:

A Prospective Cohort Study was conducted in 50 Patients with fever, clinical symptoms and signs of dengue with laboratory evidence of thrombocytopenia, NS1 and IGM positive report for a period of 12 months in Department of Radiodiagnosis, GEMS & Hospital, Srikakulam, Andhra Pradesh.

INCUSION CRITERIA: Acute Fever patients with thrombocytopenia, IGM positive and NS1 positive

EXCLUSION CRITERIA: Patient with Chronic liver disease, MP/Mf positive, known case of Hypoalbuminemia, and Hypotension.

Study Technique:

▪ Ultrasonography of the abdomen and chest wall was performed in grey scale and color Doppler modes, using 3.5- 5 MHz convex curvilinear probe in PHILIPS Affinity 50G machine after positive dengue serology report. The patient was usually scanned in 4 -6 hours fasting, in supine or left decubitus position.

Grey scale:

- Gall bladder wall edema & thickness.
- Ascites
- Pleural effusion
- Splenomegaly.

Portal Doppler Study:

▪ Portal vein was examined either in subcostal approach pointing postero-cephalad or in right intercostal approach pointing medially.

▪ Grey scale assessment of portal vein was done and the following were recorded: ▪ Portal vein diameter ▪ Cross sectional area.

▪ Colour and spectral Doppler assessment of portal vein was done with appropriate machine settings to evaluate: ▪ Flow velocity ▪ Flow direction

▪ **Congestive Index** was then calculated with the formula:

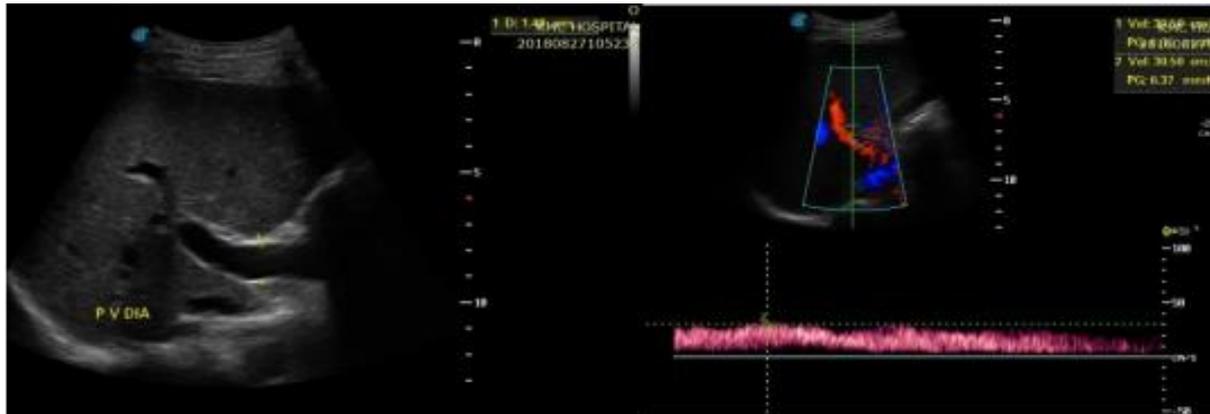
Cross sectional area (cm²) / portal venous velocity (cm/sec)

IV. OBSERVATIONS :



Grey scale sonographic image showed portal vein diameter measured 15.7 mm.

Portal vein doppler showed normal respiratory variation with velocity measured 7.32 cm/sec.



Grey scale image showed Portal vein diameter measured 14.8 mm
 Portal vein doppler showed normal hepatopetal flow and normal respiratory variation with normal velocity measured 30.5 cm/sec.

V. RESULTS :

There is no sex distribution, common age group was between 15-24years.
 Capillary leak syndrome was found in 41 patients out of 50 patients (80.7%).
 Majority of them were between 15-24 years 34 patients (57.6%).
 Gall bladder wall thickening and pericholecystic fluid was found in majority 41 patient's (82%) followed by ascites in 24 (48%), whereas bilateral pleural effusion was observed in 6 (12%) cases only.
 Splenomegaly was present in 24 (48%) subjects.

FEATURES	NO OF CASES	PERCENTAGE
GALL BLADDER WALL EDEMA	41	82%
ASCITES	24	48%
BILATERAL PLEURAL EFFUSION	6	12%
SPLENOMEGALY	24	48%
INCREASED PORTAL VENOUS DIAMETER (>13mm)	31	62%

Mean value	CLS POSITIVE PATIENTS	CLS NEGATIVE PATIENTS
Portal vein diameter	14.4MM	9.6mm
PSV of portal vein	16.5cm/sec	29.2cm/sec
CSA of portal vein	1.41cm ²	1.06cm ²
Congestive Index	0.095	0.035

PSV of PV has higher sensitivity and significance.

Congestion index shows highest specificity.

Present study shows that USG along with portal venous Doppler has increased sensitivity and more PPV.

VI. DISCUSSION AND CONCLUSION:

In our study, commonly recognized abdominal sonological abnormalities include thickening of gall bladder wall, ascites, pleural effusion and Splenomegaly.

Edematous thickened gall bladder wall was the most common finding in our study.

Sensitivity of GB wall thickening with pericholecystic free fluid, ascites and pleural effusion were 76%, 46% and 42.5% with specificity of 91%, 93% and 100% respectively.

Sensitivity of PV diameter, CSA, PV velocity and congestive index were 76%, 92%, 56% and 61% with specificity of 72%, 70%, 82% and 100% respectively. Thus

Thus, comparing the sonographic and portal vein Doppler features, it was found that sonographic features had an increased specificity, but low sensitivity, than portal venous doppler which showed an increase in sensitivity, thus revealing a reduction in false-negative rates.

Thus the diagnostic accuracy has increased when ultrasonography is combined with portal venous Doppler (Diameter, CSA, velocity and congestive index) to predict the capillary leak syndrome in dengue patients.

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