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Ultrasound In Dengue Hemorrhagic Fever- An Observational Study

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ABSTRACT

Objective: To note ultrasonographic findings used for diagnosing plasma leakage in dengue haemorrhagic fever patients.

Methods: The observational retrospective study was conducted at the tertiary care hospital in central India from April 1, 2013 to December 31, 2014.

Results: Of the 240 patients, 166 (69.2%) were men. The overall mean age was 28.9±12.4 years. Of the total, 215 (89.5%) had ultrasonographic abnormalities, suggestive of plasma leakage.

Conclusion: Mild ascites and mild right pleural effusion were the commonest pattern of ultrasonographic leak in dengue haemorrhagic fever patients.

KEYWORDS : Dengue, Ultrasonography

Introduction

Dengue fever (DF) is an important arthropod-borne viral disease.[1] The incidence of dengue is on the rise all over the world.[2] Over 2.5 billion people that make more than one-third of the world›s population are at risk of dengue infection.[2] Every year 50-100 million people suffer from dengue.[2] Dengue haemorrhagic fever (DHF) is the more serious version of dengue infection.[3,4] Up to 5% mortality is associated with DHF.[3,5] There are 4 serotypes (1-4) of dengue virus.[6] Generally, first infection or primary infection is associated with DF, while reinfection with another serotype causes DHF.[6] Plasma leakage differentiates DHF from DF.[7-12] Diagnosis of plasma leakage can be made in a number of ways. These include haemoconcentration, presence of pleural or pericardial effusion, ascites or gall bladder wall thickness [GBWT], hypoproteinaemia, and hypocholestrolaemia in a suggestive clinical scenario.[6-11] Of these, haemoconcentration is the most widely used criteria for confirming plasma leakage. A number of factors may affect these diagnostic criteria which include not frequently knowing baseline haematocrit (Hct), individual and racial differences in Hct, and effect of fluid administration and bleeding on Hct.[12] In order to improve outcome in dengue infection, early diagnosis of plasma leakage and, thus, of DHF are important.[13,14] Clinical and radiological examination for detection of ascites and pleural effusion can›t diagnose leakage in initial stages.[14] Ultrasound is a sensitive technique for the detection of minimal pleural effusion and ascites.[12,15] This study was planned to note ultrasonographic (USG) findings used for diagnosing plasma leakage in patients managed with diagnosis of DHF. Additionally, DHF patients were compared in terms of severity of illness and the diagnostic basis of leak.

Methods

The observational study was conducted at a tertiary care hospital in central India, from April 1, 2013 to December 31, 2014. All patients with confirmed dengue infection were screened for DHF. These patients had febrile illness of 2-10 days, leucocyte count <3000 mm3, platelets count <100000/mm3, or rapidly falling platelets, and pos­itive dengue serology.[6,7] Serological evidence of dengue infection was based on positive nonstructural protein 1 (NS1) antigen or dengue specific immunoglobulin M (IgM), or >4 time rise in paired dengue-specific IgG levels if IgM and NS1 were negative.[6-10]

Results

Out of 811 patients managed with diagnosis of confirmed dengue infection, 255 (31.4%) met the DHF criteria. Of them, 240 (94%) patients comprised the study sample as USG findings of 15 (6%) patients were incomplete or missing. Of the 240 subjects, 166 (69.2%) were men. Overall mean age was 28.9±12.4 years; 229 (95.4%) were diagnosed as DHF and 11 (4.6%) as Dengue Shock Syndrome (DSS); 221 (92.1%) patients improved & were discharged and 8 expired; and outcome of 11 (4.6%) patients was not known as they were discharged on request or left against medical advice (LAMA). Mean age of patients with USG leakage was less (28.1±11.4 years) compared to patients without it (36.4±18 years). Gender and outcome wise, patients with and without USG leakage were comparable. Details in this regard are given in (Table-1).

Tables:

1. Comparison of patients with and without the USG leakage

	Patients with USG leakage (n=215)	Pateints without USG leakage (n=25)
Mean age	28.1 ± 11.4	36.4 ± 18
Gender Male Female	149 (69.3%) 66 (30.7%)	17 (68%) 8 (32%)
Outcome Recovered Expired	197 (91.62%) 7 (3.3%)	24 (96%) 1 (4%)

Ascites 144 (66.9%) was the most frequently noted USG finding followed by pleural effusion 110 (51.1%), and Gall Bladder Wall Thickening (GBWT) 51 (23.7%) (Table-2).

2. Pattern of USG leakage in patients with DHF (N=215)

Ascites		144 (66.9%)
Amount	Pelvic ascites	39 (27%)
	Mild abdominal ascites	68 (47.2%)
	Moderate abdominal ascites	33 (22.9%)
	Massive abdominal ascites	4 (2.7%)
Pleural effusion		110 (51.1%)
Distribution	Right pleural effusion	82 (74.5%)
	Left pleural effusion	1 (0.9%)
	Bilateral pleural effusion	27 (24.5%)
Amount	Mild pleural effusion	98 (89%)
	Moderate pleural effusion	12 (11%)
Gall bladder wall thickness (GBWT)	-	51 (23.7%)
Pericardial effusion	-	0 (0%)

Besides, 57 (26.5%) patients had combined ascites and pleural effusion; 27(12.5%) had combined ascites and GBWT; 13(6%) had combined pleural effusion and GBWT; and 7 (3.2%) had combined ascites, pleural effusion and GBWT. In terms of findings suggestive of USG leakage, 144 (61.6%) DHF patients had ascites compared to 4 (36.3%) DSS patients. Pleural effusion and GBWT were noted in 103 (45%) and 50 (21.8%) DHF patients compared to 7 (63.7%) and 1 (9.1%) DSS patients (Table-3).

3. Comparison of USG leakage findings based on disease severity.

	DHF (N=229)	DSS (N=11)
Ascites present	140 (61.1%)	4 (36.3%)
Ascites absent	89 (38.9%)	7 (63.7%)
Pleural effusion present	103 (45%)	7 (63.7%)
Pleural effusion absent	126(55%)	4 (36.3%)
GBWT present	50 (21.8%)	1 (9.1%)
GBWT absent	179 (78.2%)	10 (90.9%)

Discussion

Our study stands distinct as it focuses on regional dengue epidemic, comparatively higher number of patients are included and GBWT was included in the analysis of patients with USG leakage. We noted USG findings suggestive of plasma leakage in 89.5% DHF patients. USG leakage in the form of pleural effusion, ascites and GBWT has been noted in up to 100% patients with DHF.16-17 A study noted that 91.42% (32/35) DHF paediatric patients had USG findings suggestive of plasma leakage.17 In a study 72.72% (48/66) DHF patients who were 14 or more years of age had USG evidence of leakage.18 In a study focusing natural history of plasma leakage in DHF, 76% patients (16/21) had USG plasma leakage.19 In DHF, USG-based detection of leak is considered to have high sensitivity and predictive value.17,18,20 Our results are comparable in this regard. Ascites was the most common USG finding in DHF patients in our study. Variable results have been noted in studies regarding this. A study on sonographic findings of adults with grade III DHF found that only 15% patients had ascites.20 It included 40 patients. In another study, 92% (11/12) patients had ascites.21 One study noted ascites in 91.4% (32/35) DHF patients.17 In one study, sequential ultrasonography showed ascites in 52% of 21 DHF patients.19 In another study 36.3% (24/66) patients had USG evidence of ascites.18 Mild abdominal ascites was most frequently, and massive abdominal ascites was least frequently noted in our study. In some studies mild and in other moderate to massive ascites have been noted in DHF patients.20,21 Pleural effusion has been considered a more reliable marker of plasma leakage compared to ascites in DHF patients.15,20 In an Indian study, 88.5% of 35 DHF patients had pleural effusion.17 In a study

from Thailand, 62% of 21 DHF patients had pleural effusion.19 In two other studies; 82% and 97.9% of DHF patients had pleural effusion respectively.20,21.It should, however, be noted that not all DHF patients during the epidemic were treated at the hospital where the study was conducted, and the study sample represents mainly adults.

Conclusion

Ultrasound was found to be an important tool for diagnosing plasma leakage in DHF patients.

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