

Research Article

Comparative study of ultrasound findings in seropositive pediatric and adult patients with dengue fever[☆]

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Abstract

Introduction: Dengue fever (DF) is endemic in tropical and subtropical areas. Dengue hemorrhagic fever is life threatening, and early identification can help save lives. Ultrasonography (USG), though not diagnostic, can help in early identification of serositis.

Objective: To compare USG findings in seropositive pediatric and adult patients with DF.

Materials and methods: 110 in-patients with clinical suspicion of DF were evaluated with USG of the abdomen and thorax. USG findings correlated with serological tests. Seropositive patients were grouped into pediatric and adult age. Findings were compared to determine if any statistically significant difference exists.

Results: 67 Patients – seropositive, 43 – seronegative. USG findings in seropositive pediatric patients (n = 32) were GB wall edema –27, hepatomegaly in 12, ascites in 16, splenomegaly in 15, right pleural effusion in 14, left and bilateral pleural effusion in 7 patients. The USG findings in seropositive adult patients (n = 35) were GB wall edema in 31, hepatomegaly in 14, ascites in 12, splenomegaly in 9, right pleural effusion in 13, left and bilateral pleural effusion in 5 patients.

Conclusion: There is a statistically significant difference between ultrasound findings of dengue fever in adult and pediatric patients. Ascites and splenomegaly more were common in the pediatric patients as compared to the adult patients.

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Keywords: Ultrasound; Dengue; GB wall edema; Seropositive

1. Introduction

India is among the seven [India is considered South Asian] Asian countries that report epidemics of dengue fever. In recent years, it has become a major public health problem in India. Community awareness, early diagnosis, management, and vector control measures, need to be strengthened to control the infection rate [1].

Symptomatic dengue infection presents as nonspecific febrile illness in classical dengue; however, dengue hemorrhagic fever (DHF)/dengue shock syndrome may be fatal. Though ultrasonography findings are nonspecific, they are useful for early diagnosis and differential diagnosis of other febrile diseases [2].

Despite the fact that two-fifths of the world population is living in endemic areas, imaging findings of dengue are not yet clearly defined in relation to clinical and serological findings [3].

2. Materials and methods

Our institutional review board approved this study. Data was collected prospectively, but analysis was done after the outbreak, in September and October of 2012. 110 patients,

[☆] Human studies were conducted with the patient's informed written consent.

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who were suspected clinically of having dengue fever and dengue-like illness and referred for ultrasound scanning of both abdomen and thorax, were taken in our study. Ultrasound examinations were done using curvilinear probes (1.5–6 MHz) of the abdomen and pelvic examinations and linear probes (6–10 MHz) were used for thoracic examinations. All the patients were examined for GB wall edema, pleural effusion, ascites, hepatomegaly and splenomegaly. USG examinations were done by experienced radiologists with at least five years of experience in abdomen and pelvic ultrasonography. A liver span of 15 cm or more in mid clavicular line, or extension of right lobe of liver inferior to the lower pole of right kidney was considered as hepatomegaly. A spleen size of more than 12 cm in anterior to posterior plane is considered splenomegaly [4]. Serological tests were done using a rapid solid phase immunochromatographic test for qualitative detection of dengue NS1 antigen and differential detection of IgM and IgG antibodies to dengue virus in serum samples. The images were archived in the DICOM compatible hard disk along with the reports. Both the images and the reports were retrieved later into an external hard drive for analysis. Seropositive patients were divided into paediatric and adult age groups. Ultrasound findings were compared in both these groups. Statistical analysis was done using SPSS Software, version 17.0.

3. Results

The total number of patients in the study was 110. Males constituted 69.4% and females constituted 29.7% of the patients. The youngest patient age was 2 years old and the eldest was 80 years old. The average age was 41 years old. 26% of patients were in the age group of 0–10 years old, 26% were in the age group of 11–20 years old. 22.7% were in the age group of 21–30 years old. The least number of patients were in the age group of 60–80 years old (6.4%). The majority of patients were in the age group of 0–20 years old (52%) [Table 1]. Seropositivity was seen in 60.9%. Serology was negative in 39.11%. Out of the seropositive patients, NS1 test positivity was seen in 50.9%. IgM positivity was seen in 44.5%. IgG positivity was seen in 28.2%. All three serological tests in combination were positive in only 20 cases. All patients were subjected to ultrasound examination. Ultrasound findings in seropositive patients were as follows: GB wall edema in 86.5%, right pleural effusion in 40.2%, ascites in 41%, hepatomegaly in 38.8%, splenomegaly in 35.8%, and bilateral

pleural effusion in 17.9% [Table 2]. Out of 110 patients, 67 (61%) were found to be serologically positive for NS1, IgG or IgM and the remaining 43 (39%) were negative. The seropositive patients (n = 67) were then sorted into two groups based on age. Patients who were below 18 years of age (pediatric) were included in Group I (n = 32–47.7%) and patients who were older than 18 years of age (adult) were included in Group II (n = 35–52.3%). The ultrasound findings in the seropositive pediatric patients (n = 32) were gall bladder wall edema (Fig. 1) in 27 (84.3%), hepatomegaly (Fig. 2) in 12 (37.5%), ascites (Fig. 3) in 16 (50%), splenomegaly in 15 (46.8%), right pleural effusion (Fig. 4) in 14 (43.7%), left pleural effusion in 7 (21.9%) and bilateral pleural effusion in 7 (21.9%). The findings in seropositive adult patients were (n = 35) gall bladder wall edema in 31 (88.6%), hepatomegaly in 14 (40%), ascites in 12 (34.3%), splenomegaly in 9 (25.7%), right pleural effusion in 13 (37.1%), left pleural effusion in 5 (14.3%) and bilateral pleural effusion in 5 (14.3%) cases [Table 3]. Ascites and splenomegaly were more common in the seropositive pediatric patients, when compared to the adult patients in our study.

In cases of acute infection (NS1 and/or IgM positivity, n = 55), gall bladder wall edema was seen in 49 (89.1%), ascites in 24 (43.6%), hepatomegaly in 22 (40%), splenomegaly in 19 (34.54%), right pleural effusion in 28 (50.9%), left pleural effusion in 11 (20%), and bilateral pleural effusion in 11 (20%). In all the groups, GB wall edema was found to be statistically significant in acute infection (p value 0.032).

Ultrasound findings in the 43 (39%) seronegative patients are similar to those in the patients with seropositive dengue fever [Table 4].

4. Discussion

Dengue is one of the most rapidly emerging global health problems. Many outbreaks are reported all around the world. In the event of epidemics, early diagnosis is the key to successful management of dengue cases [5]. This study was conducted during an epidemic of dengue between September and October of 2012.

Classic Dengue infection has an incubation period ranging from three to 14 days, with its average period being five to eight days. After this phase, a fever develops abruptly with temperatures in the 39–40 °C range. Other symptoms include chills, heavy and widespread osteomuscular pain, especially in the lumbar region, neck and shoulders, as well as in the knees

Table 1
Age distribution.

Age group	No. of patients (%)
0–10	29 (26%)
11–20	29 (26%)
21–30	25 (22.7%)
31–40	11 (10%)
41–50	3 (2.7%)
51–60	6 (5.5%)
61–70	6 (5.5%)
71–80	1 (0.9%)

Table 2
Ultrasound findings in seropositive patients.

USG Findings	No. of cases (%)
GB wall edema	58 (86.5%)
Ascites	28 (41.7%)
Right pleural effusion	27 (40.3%)
Hepatomegaly	26 (38.8%)
Splenomegaly	24 (35.8%)
Left pleural effusion	12 (17.9%)
Bilateral pleural effusion	12 (17.9%)

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