STUDY OF ULTRASOUND FINDING IN DENGUE FEVER

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ABSTRACT

BACKGROUND

Dengue fever (DF) is a viral haemorrhagic fever causing severe morbidity and mortality in affected patients. The aim of the study is to describe the role of ultrasonography (USG) in the assessment of patients with Dengue fever, and its complications and to prove ultrasound is useful in the diagnosis during an epidemic.

MATERIALS AND METHODS

It is a prospective study was conducted in 2016 comprising of 178 patients who were serologically positive for dengue, radiological investigations were conducted in all cases.

RESULTS

Out of 178 patients Males (N=117) are more effected subjects in the study. female: Male ratio is 1:2. Hepatomegaly 74.1% which is most common findings in study, 113 (63.4%) had GB wall thickening 98 had ascites (55%), 32 had pleural effusion (17.9%). most commonly seen in the age group of 20-39 years. Hepatomegaly was the most common finding noted in 67 patients (37.6%), followed by GB wall thickening in 65 patients (36.1%). Hepatomegaly was more common in 0-19 is 56 patients with 31.4% years age group Ascites in >40 years age group (16.8%). Hepatomegaly was seen in most of the patients whose platelet count was <40,000. (94.7%). GB wall thickening (88.5%) common findings seen in patients whose platelet count was <40,000. In patients with platelet count of 40,000-80,000, Ascites is most common finding (87.5%), followed by Splenomegaly (60.7%). In patients whose platelet count was 80,000-150,000, Ascites (50%) was more common than Splenomegaly (45.8%). In three patients with platelet count more than 150,000, no sonological abnormality was detected.

CONCLUSIONS

Ultrasound findings of hepatic changes, GB wall oedema, splenomegaly, ascites and pleural effusion in patients presenting with signs and symptoms of Dengue fever during an epidemic are diagnostic. Contributing in the differential diagnosis with other causes of febrile disease.

KEYWORDS

Dengue Fever, Ultrasound, Pleural Effusion.

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BACKGROUND

Dengue fever is widely distributed in many countries in Southeast Asia.[1] The incidence of DF has increased 30-fold in the last four decades, and more than half the world's population are now threatened with infection from dengue virus.[2] it is a mosquito-borne tropical disease caused by the dengue virus.[3] Dengue is emerging as one of the most important mosquito borne diseases in India. Aedes aegypti mosquitoes that transmit the disease breed in man-made containers such as tanks, pitchers, discarded containers etc. in which water has stagnated for over a week.

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Thus, the success of control measures have become a reflection of sanitation and hygienic practices achieved. The cases of dengue peak in the monsoon season in most parts of the country but have become perennial in the southern states. Symptoms typically begin three to fourteen days after infection.[2] This may include a high fever, headache, vomiting, muscle and joint pains, and a characteristic skin rash. Recovery generally takes less than two to seven days.[4] In a small proportion of cases, the disease develops into the life-threatening dengue haemorrhagic fever, resulting in bleeding, low levels of blood platelets and blood plasma leakage. Haemorrhagic diathesis and thrombocytopenia with concurrent haemoconcentration are a constant finding.

Our study was done to describe role of ultra-sonography (USG) in the assessment of patients with Dengue fever, and its complications and to prove ultrasound is useful in the diagnosis during an epidemic.

MATERIALS AND METHODS

It is a prospective study comprising of 178 patients who were serologically positive for dengue, radiological investigations were conducted in all cases. Patients were serologically diagnosed as having DF between January to April 2015 were referred for ultrasound scanning of the abdomen and thorax, and the findings were analysed. Institutional ethical clearance and informed consent was obtained. All ultrasound examinations were performed with an ultrasound machine using 3.5 MHz and 5 MHz probes. Gallbladder (GB) wall thickening, which was the consistent finding in serologically positive cases, was measured by placing the callipers between the two layers of the anterior wall. Thoracic scanning was done in either sitting or supine posture. Both the pleural spaces were evaluated through an intercostal approach. Liver measuring more than 15 cm was taken as hepatomegaly and spleen measuring more than 12 cm was taken as splenomegaly. The serological tests for dengue including non-structural protein-1 (NS-1) Ag test and dengue immunoglobulin G/immunoglobulin M test were performed to confirm the diagnosis. NS-1, undergoes least antigenic variation and is a glycoprotein present in high concentration in the serum of dengue infected patients. Sonography was performed by radiologists having a minimum of 5 years' experience in abdominal sonography. Scanning was performed only once so there is no inter-observer variation. Qualitative variables such as the presence of various ultrasound features were expressed as percentages.

RESULTS

Of 178 patients serologically positive for dengue, radiological investigations in all cases. patients were serologically diagnosed as having DF for a period of 4 months were referred for ultrasound scanning of the abdomen and thorax, and the findings were analysed.

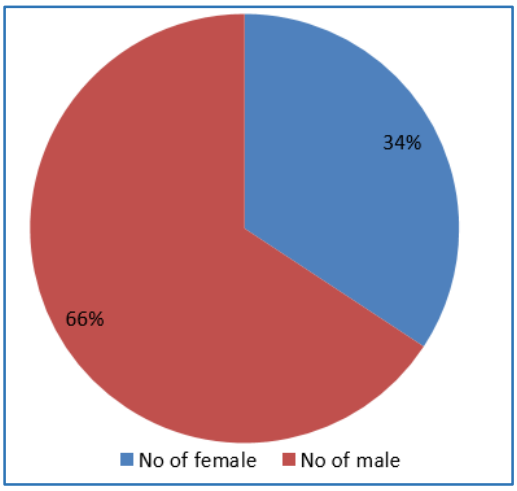

Figure 1. Gender Distribution in Study

Males (N=117) are more effected subjects in the study. female:Male ratio is 1:2

USG findings	No of Patients	Percentages
GB wall thickening	113	63.4
Splenomegaly	67	37.6
Hepatomegaly	132	74.1
Ascites	98	55
Pleural effusion	32	17.9
No sonographic Abnormality	24	13.4

Table 1. Incidence of different Ultrasound findings

Total number of cases 178. Hepatomegaly 74.1% which is most common findings in study, 113 (63.4%) had GB wall thickening 98 had ascites (55%), 32 had pleural effusion (17.9%).

USG Findings	0-19 Years	20-39 Years	>40 Years
GB wall thickening	19	65	29
Splenomegaly	45	16	6
Hepatomegaly	56	67	9
Ascites	31	37	30
Pleural effusion Unilateral Bilateral	 5 8	 4 7	 3 5
No sonographic Abnormality	11	9	4

Table 2. Incidence of USG Findings in Relation to Different Age Groups

In our study, DF was most commonly seen in the age group of 20-39 years. Hepatomegaly was the most common finding noted in 67 patients (37.6%), followed by GB wall thickening in 65 patients (36.1%). Hepatomegaly was more common in 0-19 is 56 patients with 31.4% years age group Ascites in >40 years age group (16.8%).

USG Findings	<40,000	40,000-80,000	80,000-1,50,000	>1,50,000
Total	96 (53.9%)	56 (31.4%)	24 (13.4%)	2 (1.1%)
GB wall thickening	85 (88.5%)	21 (37.5%)	4 (16.6%)	1 (0.5%)
Splenomegaly	22 (22.9%)	34 (60.7%)	11 (45.8%)	0
Hepatomegaly	91 (94.7%)	32 (57.1%)	9 (37.4%)	0
Ascites	37 (38.5%)	49 (87.5%)	12 (50%)	0
Pleural effusion	13 (13.5%)	12 (21.4%)	7 (29.1%)	0
No sonographic Abnormality	8 (8.33%)	9 (16%)	7 (29.1%)	0

Table 3. Correlation of USG Findings with Platelet Count

Hepatomegaly was seen in most of the patients whose platelet count was <40,000. (94.7%). GB wall thickening (88.5%) common findings seen in patients whose platelet count was <40,000.

In patients with platelet count of 40,000-80,000, Ascites is most common finding (87.5%), followed by Splenomegaly (60.7%). In patients whose platelet count was 80,000-150,000, Ascites (50%) was more common than Splenomegaly (45.8%). In three patients with platelet count more than 150,000, no sonological abnormality was detected.

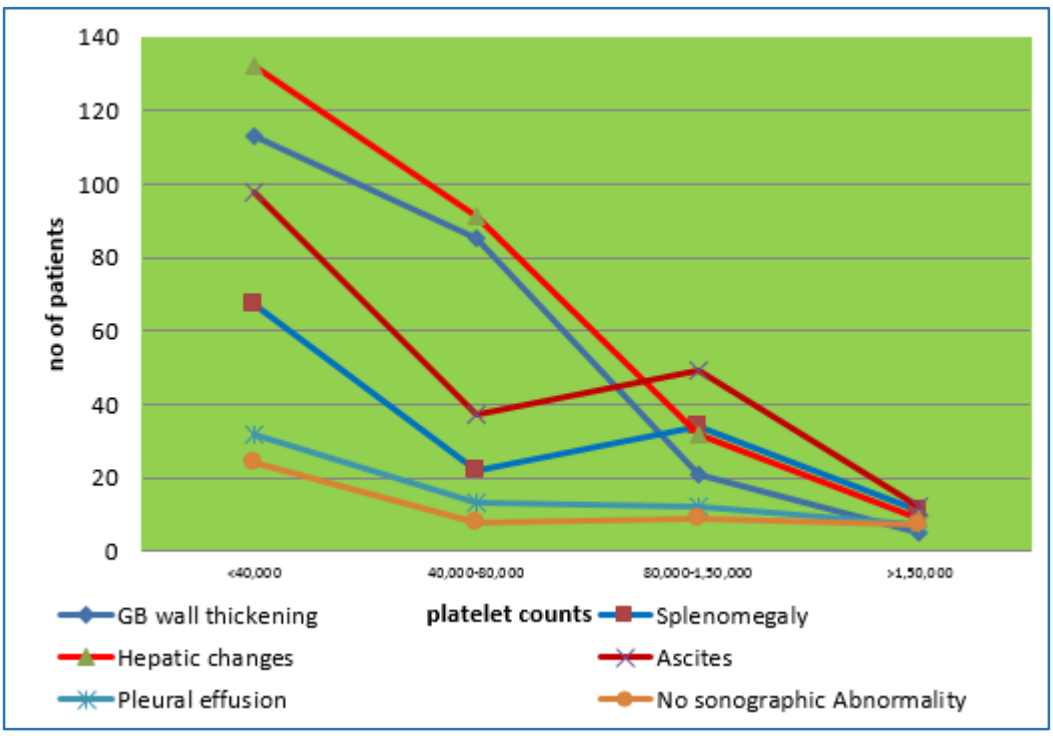

Figure 2. Graphical Representation of Sonographic findings in Patients with Different Platelet Count

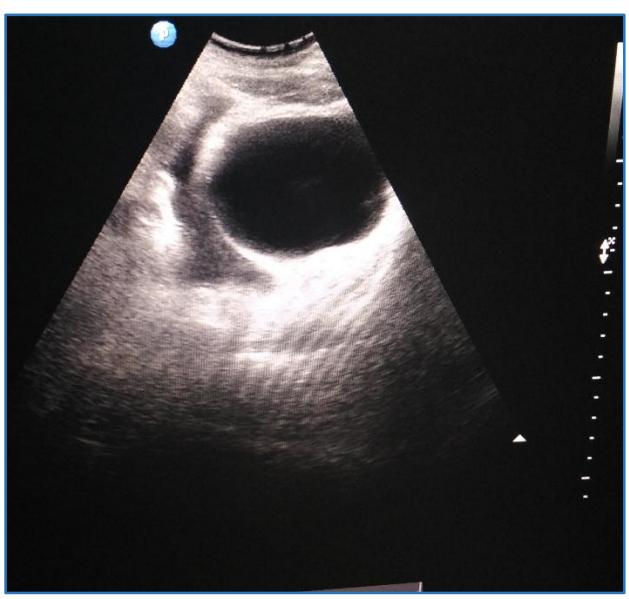

Figure 3. Ascites

Figure 4. Gb wall thickening

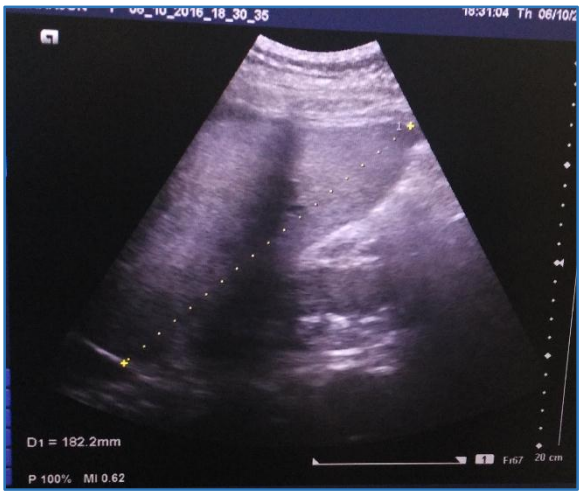

Figure 5. Hepatomegaly

Figure 6. Pleural effusion

DISCUSSION

Dengue fever is one of the most important emerging diseases of tropical and sub-tropical areas. In a pandemic in 1998, 1.2 million cases of dengue fever and dengue haemorrhagic fever (DHF) were reported from 56 countries. It is estimated that each year, 50 million people world-wide get infected, with 500,000 cases of DHF and at least 12,000 deaths get infected.[5]

In India, the risk of dengue fever has increased in recent years due to rapid urbanization, life-style changes and poor water management. Poor water management is often coupled with lack of awareness in the general public about the breeding of mosquitoes and protection from their bites. [6] During 2011-12, dengue was endemic in 23 states. [7] In 2008, a total of 12,561 cases and 80 deaths were reported. In 2009, about 15,509 cases and 89 deaths were reported. In 2010, 28,292 cases and 110 deaths were reported. In 2011, 17,273 cases and 112 deaths were reported.[8]

Serological diagnosis is confirmatory of dengue and includes direct methods such as virus isolation and NS1 antigen detection and indirect methods such as IgM and IgG antibody detection. It is in the recognition of the complications occurring in the critical phase that sonography has an increasingly important role. Sonography is a readily available, cost-effective method for the recognition of above complications and directly impacts the management of patients with dengue. The commonly recognized sonological abnormalities in the abdomen and thorax of patients in the present study include from thickening of gall bladder wall, ascites, perirenal collection, pleural effusion, hepatomegaly and splenomegaly. Hepatomegaly was found to be the most frequent finding in our study.

In present study out of 178 patients. Hepatomegaly was the most common finding noted in 67 patients (37.6%), followed by GB wall thickening in 65 patients (36.1%) in USG scan. Studies conducted by Balasubramian et al[9] and Srikiatkachorn et al[10] have shown that Ultrasonographic findings of plasma leakage are seen before significant changes in the Haematocrit. Hence, ultrasonography has a high negative predictive value in the diagnosis of dengue haemorrhagic fever. A study by Venkata Sai and Krishnan R[11] concluded that during an epidemic of dengue, presence of thickened gall bladder wall, pleural effusion and ascites strongly favour the diagnosis of dengue fever.

In our study Hepatomegaly 74.1% which is most common findings in study, 113 (63.4%) had GB wall thickening 98 had ascites (55%), 32 had pleural effusion (17.9%). In a study conducted by Santhosh et al. (2014).[12] out of 96 cases, 66.7% patients showed oedematous GB wall thickening, 64.5% patients showed ascites and 50% patients had pleural effusion. The study by Pramuljo and Harun SR.[13] states that pleural effusion can be found on the right and in bilateral pleural spaces but no isolated left pleural effusion, our study agrees with Pramuljo and Harun SR et al[13]. Setiawan et al[14] states that increased gall bladder thickening associated with increased severity of disease, our study agrees with Setiawan et al.[14]

Chandak S et al[15] study shows hepatomegaly that was seen in 62% of the patients. Other findings were splenomegaly (45%), gallbladder (GB) wall oedema (45%), right-sided pleural effusion (37%), bilateral pleural effusion (22%), and ascites (36%).

In a similar study conducted during the epidemic by Joshi et al[16] the most common age group affected was 20-40 years and right-sided pleural effusion was the most common finding, like in our study. In their study, the most common finding was pleural effusion (66%), ascites was seen in only 50% of cases.

Hepatomegaly was seen in most of the patients whose platelet count was <40,000. (94.7%). GB wall thickening (88.5%) common findings seen in patients whose platelet count was <40,000. In patients with platelet count of 40,000-80,000, Ascites is most common finding (87.5%), followed by Splenomegaly (60.7%). In patients whose platelet count was 80,000-150,000, Ascites (50%) was more common than Splenomegaly (45.8%). In three patients with platelet count more than 150,000, no sonological abnormality was detected. Study by V. R. Santhosh et .al[12] reveals that Oedematous GB wall thickening was seen in 97.8% of patients with platelet count of less than 40,000 along with ascites (86.9%) and pleural effusion (58.6%). In patients with platelet count between 40,000 and 80,000 ascites was more common than oedematous GB wall

thickening. Significantly no abnormal sonographic finding was detected in patient with platelet count more than 150,000.

The severity of the course of the disease, which is directly linked to the platelet count, can also be assessed by sonography. If a patient shows all ultrasound features associated with dengue fever it indicates the platelet count is likely to be less than 40,000 and the patient may require blood transfusion. This allows the treating physician to arrange for blood after an ultrasound exam before platelet count values are available. The relationship of sonographic findings across age groups is also established in this study.

CONCLUSIONS

Sonographic features of GB wall oedema, hepatosplenomegaly, ascites and pleural effusion in patients presenting with signs and symptoms of Dengue fever during an epidemic are diagnostic .Contributing in the differential diagnosis with other causes of febrile disease. USG is a relevant and important tool for the early diagnosis of plasma leakage signs and for prediction of the disease severity. A simple ultrasound examination will effectively expedite the diagnosis and justifies initiation of specific treatment for dengue fever pending serological confirmation. Ultrasound also helps substantially in estimating the severity of the disease.

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