VOLUME - 11, ISSUE - 03, MARCH - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Radio-Diagnosis

ROLE OF USG IN CLINICALLY SUSPICIBLE AND DIAGNOSED CASES OF DENGUE

Dr. Dipen Vaidya	Assistant Professor, Gmers Medical College & Civil Hospital, Gandhinagar, Gujarat.
Dr. Pratik Kaswekar*	Assistant Professor, Gmers Medical College & Civil Hospital, Gandhinagar, Gujarat. *Corresponding Author
Dr. Bhargav Patel	Senior Resident, Gmers Medical College & Civil Hospital, Gandhinagar, Gujarat.

ABSTRACT

This study was performed to find out whether ultrasound is an important adjunct to clinical and laboratory profile in diagnosing dengue fever or dengue haemorrhagic fever. Ultrasound was performed on 110 patients (2–80 years) with clinical suspicion & diagnosed cases of dengue fever between period of 1ST JUNE, 2021 to 31st DECEMBER, 2021. Serological tests were performed to confirm the diagnosis. 30 patients were serologically negative for dengue fever and later excluded from the study. Of the remaining 80 serologically positive cases, 68 patients underwent ultrasound on second to third day, repeated on fifth to seventh day of fever and in 12 patients ultrasound was done only on fifth to seventh day of fever. Of the 68 patients who underwent the study on second to third day of fever, all showed gall bladder wall thickening and pericholecystic fluid, 75% had ascites, 15% had hepatomegaly, 3% had splenomegaly and minimal pleural effusion. Follow-up ultrasound on fifth to seventh day revealed ascites in 58%, left pleural effusion in 25% and pericardial effusion in 18%. Of the 12 patients who underwent the study on fifth to seventh day of fever for the first time all had gall bladder wall thickening, 11% had hepatomegaly, 5% had splenomegaly, 86% had ascites, 67% had left pleural effusion and 13% had pericardial fluid. To conclude, ultrasound features of thickened gall bladder wall, pleural effusion and ascites should strongly favour the diagnosis of dengue fever.

KEYWORDS :

INTRODUCTION:

Dengue is one of the most rapidly spreading arboviral infections in the world. Dengue fever (DF) is endemic in tropical and subtropical areas. Dengue hemorrhagic fever is life threatening, and early identification can help save lives.

Ultrasound is well established in abdomino-thoracic evaluation of patients with dengue infection. The aim of this study was to explore the role of ultrasound in suspicious and diagnosed case of infection & correlation between pathological and radiological findings. Ultrasonography (USG), though not diagnostic, can help in early identification of serositis.

MATERIALS AND METHODS:

Clinically suspicious and serologically proven dengue patients who reported to hospital during the study period from 1stJune, 2021 to 30th November, 2021 were divided into three categories based on the dengue infection severity score. Ultrasound findings of abdomen and chest in these patients were noted in the initial, as well as follow-up scans and inferences drawn.USG findings correlated with serological tests. Findings were compared to determine if any statistically significant difference exists.

INCLUSION CRITERIA:

All patients who presented to hospital with symptoms of an acute febrile illness during the study period and were found to be dengue positive by NS1Ag Card/ELISA test or IgM positive by Card test.

EXCLUSION CRITERIA:

Patients who had any of the following pre-established findings/diagnosis before the onset of their acute febrile illness were excluded from the study:

Pleural effusion
Ascites
GB wall thickening of any other etiology
Cholelithiasis
Hepatomegaly
Splenomegaly
Pericardial effusion
Malaria/Chikungunya (Active/recent (<8 weeks) infection)
Thrombocytopenia

Common clinical manifestations included fever, severe headache, retro-ocular pain, pain in the muscles and joints and purpuric spots on the body. Blood laboratory investigation revealed thrombocytopenia with concurrent haemocon centration.Based on the clinical and laboratory findings, 55 patients were diagnosed as classical dengue fever (CDF), 21 patients had dengue haemorrhagic fever(DHF) and 4 patients were diagnosed as dengue shock syndrome (DSS). All ultrasound examinations were performed with a machine (Philips affinity 50 model) using 3.5 MHz and 5 MHz probes. Abdominal scanning was done after 6 hr of fasting to allow better distension of gall bladder (GB). GB wall thickening, which was the consistent finding in all the serologically positive cases, was measured by placing the calipers between the two layers of posterior wall [1]. Thoracic scanning was done in either sitting or supine posture. Both the pleural spaces were evaluated through an intercostal approach. Pericardial space was also evaluated for effusion subcostally. In all the patients ultrasound was performed prior to serology.

Serological tests using paired sera was performed to confirm the diagnosis.

The 80 serologically positive patients were then sorted into two groups based on the days of study.

Group A included patients who had symptoms and signs consistent with DF and in whom ultrasound was performed on the second to third day after onset of fever. These patients also had a follow up scan on fifth to seventh day.

Group B included patients who underwent ultrasound only on fifth to seventh day after onset of fever.

For the 30 serologically negative patients ultrasound was performed on an average of 4 days after admission.

RESULTS (tables 1–4)

Ultrasound findings in Group A

Of the 68 patients who underwent the study on second to third day of fever, 10 had hepatomegaly (15%), 68 had GB wall thickening and pericholecystic fluid (100%), 2 had splenomegaly (3%), 51 had ascites (75%) & 2 had pleural effusion. (3%) None had pericardial effusion.

On follow-up scan (days 5–7), hepatomegaly noted in 8 more patients (12%), ascites in 39 more patients (58%), splenomegaly in 4 more patients (7.27%) and pleural effusion in 17 more patients (25%). GB pathology persisted in all the patients.

New findings including pericardial effusion in 12 patients (18%).

Ultrasound findings in Group B

Of the 12 patients who underwent the study on fifth to seventh day of fever, GB pathology was noted in all the patients (100%), 1 patients had hepatomegaly (11%), 6 had splenomegaly (48%), 10 had ascites (20%), 8 had pleural effusion (67%) and 2 had pericardial effusion (12%).

30 serologically negative patients Of the 30 patients who were serologically negative for DF, GB pathology was present in 14 patients initially but disappeared later on follow-up scan.

A clinical review of 10 other patients revealed that their symptoms were not classical of DF. Two patients could not be followed up as they discharged themselves against medical advice.

Our study demonstrated thickened GB wall and peric holecystic fluid (Figure A) as the most common initial ultrasound finding in all the 80 serologically positive cases followed by ascites (FIGURE B) & pleural effusion.

Pericardial effusion, hepatomegaly and splenomegalywere noted in some of patients.

Table 1.Profile of 80 serologically positive cases

Day of examination	Number Of Cases
2nd–3rd day	68
5th–7th day	12 + 68 (FOLLOW UP CASES)

Table 2. Summary of ultrasound findings in Group A

Days of examination	Number Of Patients 2nd–3rd day	5th–7th day
Gall bladder wall thickening with pericholecystic fluid	68 (100%)	68(100%)
Hepatomegaly	10 (15%)	8 (12%)
Splenomegaly	2 (3%)	4 (7.27 %)
Ascites	51 (75%)	39 (58%)
Pleural effusion	2 (3%)	17 (25%)
Pericardial effusion	0 (0%)	12(18%)

Table 3. Summary Of Ultrasound Findings In Group II

Days of examination	Number Of Patients 5th–7th day
Gall bladder wall thickening with pericholecystic fluid	12 (100%)
Hepatomegaly	1 (11%)
Splenomegaly	6 (48%)
Ascites	10 (20%)
Pleural effusion	8 (67%)
Pericardial effusion	2 (12%)

Table 4. Summary Of Ultrasound Findings In Group I And Group II

Days of examination	Number Of Patients 5th–7th Day
Gall bladder wall thickening with pericholecystic fluid	**80 (100%)**
Hepatomegaly	**19 (15%)**
Splenomegaly	**10 (8%)**
Ascites	**50 (61%)**
Pleural effusion	**27 (22%)**
Pericardial effusion	**14 (11%)**

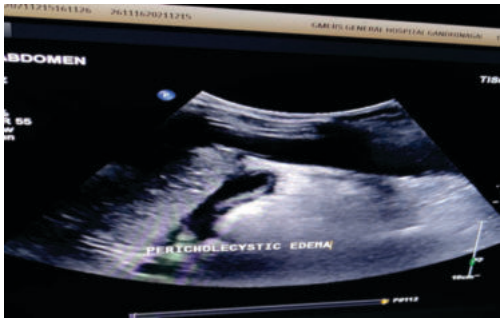

Figure A : Usg Showing Gall Bladder Wall Thickening &pericholecysticedema

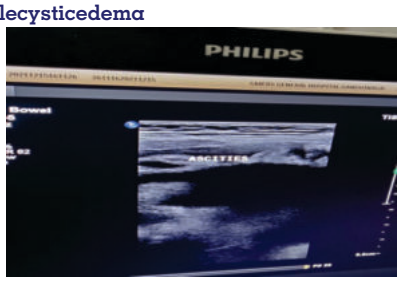

Figure B : Usg Showing Free Fluid In Peritoneal Cavity.

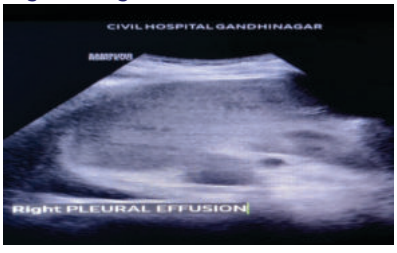

Figure C: Usg Showing Mild Free Fluid In Right Pleural Cavity.

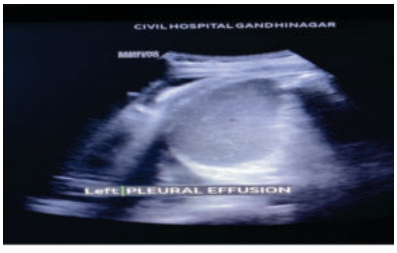

Figure D: Usg Showing Mild Free Fluid In Left Pleural Cavity.

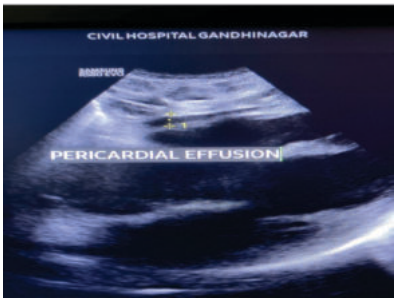

Figure E: Usg Showing Mild Free Fluid In Pericardial Cavity.

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 **(2).**This study was conducted between June and November of 2021. This was a prospective study of serologically confirmed dengue patients, which was undertaken with the aim of evaluating the role of ultrasound in the prediction of severe dengue, predicting disease progression in patients with non severe dengue, and the possible role of ultrasound in secondary prevention of severe dengue.

Dengue is an acute febrile viral disease caused by flavivirus. It occurs in two forms: DF, a milder form of the disease and DHF, the most severe form. Dengue has become a major international public health concern in recent years. It is now endemic in more than 100 countries and threatens the health of 40% of the world's population. It is estimated that 50 million dengue infections occur each year with 5,00,0000 cases of DHF and at least 12,000 deaths annually mainly among children. The increase of DF is due to uncontrolled population growth and urbanization in the absence of appropriate water management, global spread of dengue strains via travel and trade and due to erosion of vector control programmes. In India the problem is even more acute because since 1963, more than 50 outbreaks have been reported by the National Institute of Communicable diseases, New Delhi **(3).** Dengue viruses are transmitted to humans through the bites of infective female aedes mosquito. The incubation period of the disease is 3–14 days. The onset of the disease is recognized by the sudden onset of high fever, retro-orbital pain, thrombocytopenia and haemorrhagic manifestations. Common laboratory findings include pancytopenia, neutropenia, increased haemoconcentration, thrombo cytopenia and prolonged bleeding time. These findings are consistent with increased vascular permeability, plasma leakage, abnormalities of haemostasis and protein losing shock syndrome, which commonly occur in DF pathogenesis. Serology is the mainstay in the diagnosis of DF. Haemagglutination inhibition antibodies usually appear at detectable level by day 5 to 6 of febrile illness. The diagnosis of DF is often delayed owing to time taken for availability of results. The aim of our study was to evaluate the ultrasound findings in DF, to find whether ultrasound of the abdomen is an important adjunct to clinical and laboratory profile in diagnosing DF and further if ultrasound is useful in predicting the severity of the disease. The ultrasound findings in early milder form of DF include GB wall thickening, pericholecystic fluid, minimal ascites, pleural effusion, pericardial effusion and hepatosplenomegaly. Severe forms of the disease are characterized by fluid collection in the perirenal and pararenal region, hepatic and splenic subcapsular fluid, pericardial effusion, pancreatic enlargement and hepatosplenomegaly. These findings have been demonstrated in studies carried out by the Department of Child Health in Indonesia **(4)** and by Joshi et al **(5)** in Army Hospital, Delhi Cantt. They had also found abnormal liver parenchyma, which has been attributed to intraparenchymal and subcapsular haemorrhages. In our study however we could not appreciate any significant change in the echotexture of the liver except for some patients having grade I fatty changes. None of these studies suggested GB wall thickening as the initial finding in DF (100%) as observed in our study, followed by ascites and pleural effusion. GB wall thickening in DF may be due to decrease in intravascular osmotic pressure.

These findings may also occur in other viral infections and enteric fevers. However, in other viral infections, the historical profile, symptom complex evolution, and physical findings, do not mimic those of dengue fever **(6,7)** Therefore, USG can be used as a first-line imaging modality in patients with suspected dengue fever to detect early signs suggestive of the disease, prior to obtaining serologic confirmation test results, which may take 2-4 weeks, especially in an area experiencing dengue fever epidemic **(8).**

In other viral infections the historical profile, symptom complex evolution and physical findings do not mimic those of DF. Ultrasound features of enteric fever include splenomegaly, intra-abdominal lymphadenopathy, bowel abnormalities in the form of intramural thickening of the terminal ileum and caecum, renal abnormalities like arteriectasis and perinephric fluid collection in addition to GB wall thickening and polyserositis. Leptospirosis also shows gross abnormalities involving hepatic and renal parenchyma. GB wall thickening also occurs in association with other conditions such as ascites, hypoalbuminaemia, congestivecholecystopathy and in patients with cirrhosis of liver and portal hypertension. It is a very non-specific finding when considered in isolation and is therefore a major limitation of this study. To conclude ultrasound of the abdomen is an important adjunct to clinical profile in diagnosing DF and may help to direct further confirmatory investigations. Further diagnosis can be made early in the course of disease compared with other modes of diagnosis. During an epidemic the ultrasound findings of GB wall thickening with or without polyserositis in a febrile patient should suggest the possibility of DF/DHF.

CONCLUSION:

Ultrasound is a time-tested diagnostic modality with an unmatched safety profile that can reliably detect the presence of organomegaly and plasma leakage. In our study, we have established that there is a definite role of ultrasound in patients with nonsevere dengue wherein it can be used to identify that subset of DF patients who are more likely to deteriorate clinically, and thus, play an important role in the secondary prevention of severe dengue. The widespread availability of ultrasound machines provides us with this unique opportunity and ability to screen dengue patients at the initial point of care, thereby reducing morbidity and mortality associated with severe dengue. Early ultrasound examination in dengue patients can therefore be used to guide treating physicians toward a more proactive approach and timely management of these "at-risk" patients while at the same time ensuring optimal resource utilization.

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