



ORIGINAL RESEARCH PAPER

Radiodiagnosis

HONEY COMB SIGN- AN EARLY PREDICTOR FOR DIAGNOSIS OF DENGUE FEVER

KEY WORDS: dengue fever, early ultrasonography, honeycomb sign, gall bladder wall thickening

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ABSTRACT

Aim: To evaluate the usefulness of ultrasonographic finding of edematous GB wall (Honeycomb pattern) in early diagnosis of dengue fever.

Methods and material: A prospective observational study was performed in 100 patients with clinically suspected Dengue Fever, having high-grade fever and abdominal pain. Immediate abdominal USG was performed in all the patients and findings were recorded. A specific change – “Honeycomb” pattern in the thickened gallbladder (GB) wall (mostly in the fundal area) – on USG suggested the diagnosis of Dengue Fever, which was subsequently confirmed by serology in all patients. Associated USG findings like pleural effusion, ascites and splenomegaly were also looked for. The obtained data was summarized into tables and charts, and analysed. Subsequent USG were performed on fourth and seventh day.

Statistical analysis used: prospective observational study was performed and inferential statistics were obtained from the data using chi-square test.

Results: Out of 100 patients in the study, 86 patients had edematous wall of Gall Bladder with the specific “Honeycomb” pattern. Out of 100, 92 patients confirmed to have dengue fever, as confirmed after USG by platelet count and serologic tests, four patients tested positive for viral hepatitis markers and in four patients no definite cause was identified. USG features of Dengue Fever included a thickened GB wall in 84 patients (91.3%), ascites in 76 patients (82.6%), splenomegaly in 40 patients (43.5%), and pleural effusion in 70 patients (76.1%). Reduction in GB wall thickening was noted in clinically improving patients.

Conclusions: Early Abdominal USG in patients with clinically suspected Dengue Haemorrhagic Fever can be used as a first-line imaging modality to detect early ultrasonographic signs that are suggestive of the disease prior to obtaining serologic confirmation test results, especially in a dengue fever endemic area.

INTRODUCTION

Dengue is a viral disease that is transmitted by mosquitos and affects over 100 million people worldwide each year. Those who inhabit or visit tropical or sub-tropical regions, particularly in urban or suburban areas, are most at risk for infection. Symptoms of Dengue include a high fever, intense headache or aching behind the eyes, joint pain, easy bruising, gum or nose bleeds, bone and muscle pain, swollen glands, and a rash. Symptoms usually appear four-ten days after infection and last for two-seven days.

There are four types of dengue virus: DEN-1, DEN-2, DEN-3, and DEN-4. Once an individual has recovered from one of these types, that individual will not develop symptoms from that same type again. When an individual is infected by a different type, however, there is a risk for severe dengue. Symptoms of severe dengue include vomiting (sometimes bloody), tiredness, severe stomach pain, fast breathing, restlessness, and bleeding gums. These symptoms occur after the high fever of dengue has dropped. Severe dengue requires immediate treatment, as it can cause the liquid part of the blood (plasma) to leak from small blood vessels (capillaries). This condition leads to severe loss of blood volume (shock) and can be life-threatening. Other complications may include internal bleeding, difficulty breathing, and accumulation of fluid in the body.

Diagnosis is based on clinical findings and serological investigations. Serological results may take one to two days to give positive result (3). Therefore additional diagnostic modalities may be sought as first-line evaluation for suspected DF patients.

We conducted a prospective study of 100 patients of suspected DHF in an attempt to identify early, specific ultrasonography(USG) features of dengue haemorrhagic fever(DHF). USG is useful as a first-line diagnostic modality for the prediction of DHF (1).

MATERIAL AND METHOD

From 6th August 2018 to 15th October 2018, a prospective observational study was carried out in 100 patients clinically suspected of having DHF. All 100 patients underwent abdominal USG at admission.

No gender bias was followed and the study included all the age

group patients.

Before inclusion in the study, signed informed consent to participate was taken from all patients.

A thickened gall bladder (GB) wall showing a “Honeycomb” pattern was identified. The spleen was measured along its long axis, calculated from the distance from the lower tip of the spleen to the upper tip of the spleen. Splenomegaly was considered when Long axis was greater than 12 cm as opposed to splenic index greater than 20 cm defined as splenomegaly (2, 3). The presence of ascites and pleural effusion were also looked for during the USG.

After initial abdominal USG, all patients underwent serology testing for confirmation of dengue fever. Positive serology is defined as a four-fold or greater change in reciprocal IgG antibody titers to one or more dengue virus antigen in paired serum samples or a positive IgM antibody test on a late acute phase or convalescent-phase serum specimen by an enzyme-linked immunosorbent assay or NS-1 antigen index of >1.00 in early acute phase. All the patients underwent subsequent USG on fourth and seventh day. In all clinically improving cases GB wall thickening was found to be reducing.

Serology was positive for Dengue Fever in 92 out of 100 patients (92%). Four patients (4%) tested positive for viral hepatitis markers and in four patient (4%) no definite cause was identified.

RESULTS

The patients included in the study were found aged between 20 and 60 years. 42 were women (three pregnant) and 58 were men. All patients had high-grade fever, but 46 patients also had chills. All the 100 patients had abdominal discomfort/upper abdominal pain. The GB wall thickness ranged between 6 and 12 mm. Out of 100 patients, 86 patients had edematous wall of Gall Bladder with the specific “Honeycomb” pattern. Ascites was noted in 76 patients (82.6%). A thickened GB wall was more common in patients with ascites. Forty patients (43.5%) had splenomegaly, and 70 patients (76.1%) had pleural effusion. Only Right-sided pleural effusion was more common as compared to only left sided pleural effusion.

It was observed that in all clinically improving cases; GB wall thickening (Honeycomb or onion-peel/laminated pattern) was reduced gradually, almost clearing on the 7th day.

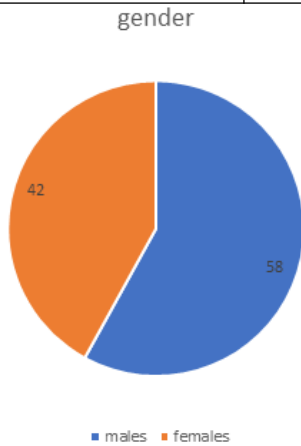
Table 1. Association of finding of Edematous GB wall ("Honeycomb" pattern) with positive serology for Dengue Fever

	Serology for Dengue (Ig G/ Ig M/ NS-1)		Total
	Positive	Negative	
GB wall edematous ("honeycomb" pattern)	84	2	86
Normal	8	6	14
Total	92	8	

Chi square test p=0.000074 i.e. <0.05, significant

Table 2. Etiology of edematous wall of GB in 100 patients included in the study.

Serology	No. of patients
Positive for Dengue Ig M/ Ig G/ NS-1	92
Positive for viral hepatitis	4
No cause identified	4



Graph 1. Male-Female Ratio

Table 3. USG Findings of patients with positive Dengue serology

Finding	No. of patients	Percentage (%)
GB wall edema	84	91.3
Ascites	76	82.6
Splenomegaly	40	43.5
Pleural Effusion	70	76.1

DISCUSSION

Dengue fever has emerged as a major public health problem with increased incidence and severity in the recent years. Dengue fever mimics any viral fever and hence there is a delay in its diagnosis and treatment. Although not specific, the USG findings in DF are obtained more rapidly than the results of serologic tests. The early USG findings of DF have been reported in the literature, with the incidence of GB wall thickening being 33% in mild cases and 94% in severe cases (1). Moreover, the prognosis of Dengue Fever can also be evaluated from GB wall thickness (2). GB wall thickening of more than 5 mm could be adopted as a criterion for identifying DHF patients at high risk of developing hypovolaemic shock (dengue shock syndrome (DSS)) with a specificity of 92% (1).

The pathophysiology of DF is that the virus especially attacks the capillary endothelium, resulting in increased permeability and causing plasma leakage and serous effusion with a high protein content (mostly albumin) (4). Immune complexes are deposited on capillary endothelium, causing further damage by increasing capillary fragility that can be shown by a positive tourniquet test.

When DF is combined with right upper quadrant pain, the differential diagnosis includes acute acalculous cholecystitis (5,

6). Radiological findings of acalculous cholecystitis includes distended GB with mild thickening of the wall with stratification and peri-cholecystic fluid. In cases of acute cholecystitis with stones, classic appearance is distended GB with wall thickening and stone with or without sludge. The USG findings between gangrenous cholecystitis and the thickening of the GB wall in DHF differ in a way that in the latter the GB wall is much more evenly thickened with a Honeycomb pattern whereas in gangrenous cholecystitis, there is a sloughed membrane appearing as a linear intra-luminal echo. Streak of fluid is often seen around the GB wall. In xathogranulomatous cholecystitis, there is irregular diffuse or focal gallbladder wall thickening usually associated with stones. In adenomyomatosis of the gallbladder, there is diffuse or segmental gallbladder wall thickening with intramural comet tail foci. A diffuse gall bladder wall thickening is not specific for primary GB disease. Several USG studies have reported GB wall thickness of more than 3 mm with various non-biliary conditions, including ascites, hypoalbuminemia, portal venous hypertension, and end-stage cirrhosis, various types of hepatitis, pancreatitis, chronic heart failure, and renal insufficiency (7, 8 and 9). But the character of GB wall thickening is different in these diseases. Thulkar et al. (10) reported USG findings in 40 patients with DHF, including pleural effusion, ascites, and GB wall thickening. (Splenomegaly was not cited.) In this study, the incidence of splenomegaly was 43.5% on USG.

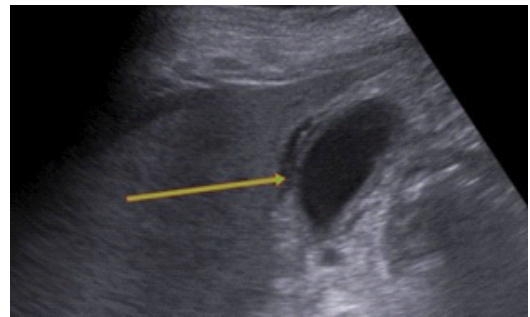


Image 1- typical honeycomb pattern of edematous gall bladder wall with concentric wall thickening.



Image 2- diffuse gall bladder wall thickening in acalculous cholecystitis

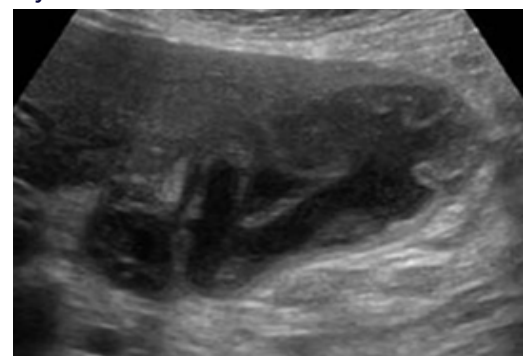


Image 3- edematous wall of gall bladder in gangrenous cholecystitis. A distinct pattern of thickening is observed with sloughed walls.

CONCLUSION

Edematous wall of GB with specific honeycomb pattern has proven to be a useful sign in early diagnosis of Dengue Fever as confirmed by serology moreover if associated with finding of ascites, pleural effusion and splenomegaly. Hence, it can be used as a first line screening test for Dengue Fever for early treatment and reduced morbidity and mortality in endemic areas.

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