



## ULTRASOUND IN ASSESSMENT OF DENGUE FEVER

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**ABSTRACT**

The incidence of Dengue fever has increased globally and is endemic in tropical and subtropical areas. Ultrasonographic scan was done on 100 patients who were serologically diagnosed as having dengue fever between June and July 2018. The findings were evaluated. The aim of the study was to describe the ultrasound findings and the role of radiologist in the assessment of patients with dengue fever and its complications in hospitalized and ambulatory patients.

**KEYWORDS :** Dengue Fever, Ultrasound Pattern, Radiologist's Alertness**INTRODUCTION**

The World Health Organization estimates that there may be 50 million dengue infections worldwide every year (1). The resurgence of dengue has been observed in India and dengue outbreaks have been frequently reported from different parts of the country in both urban and rural populations. During June and July 2018, one hundred patients were admitted (55 male and 45 female) in Anil Neerukonda Hospital, Visakhapatnam. The serological investigations for dengue fever were positive in all cases. Ultrasound abdomen scan was performed on all patients with empty stomach. Pleural and pericardial spaces were also evaluated. Follow up scans were done on 5<sup>th</sup> and 7<sup>th</sup> day of illness and observations were analyzed.

**RESULTS**

Out of 100 patients 87% had gall bladder wall thickening, 63% had ascites, 58% had pleural effusions, 25% had hepatomegaly, 5% had a splenomegaly, one had an enlarged mesenteric lymph nodes, and 10% had normal scan findings (Table 1). In this study dengue fever was most commonly seen (90%) in patients below the age of 40 years (Table 2).

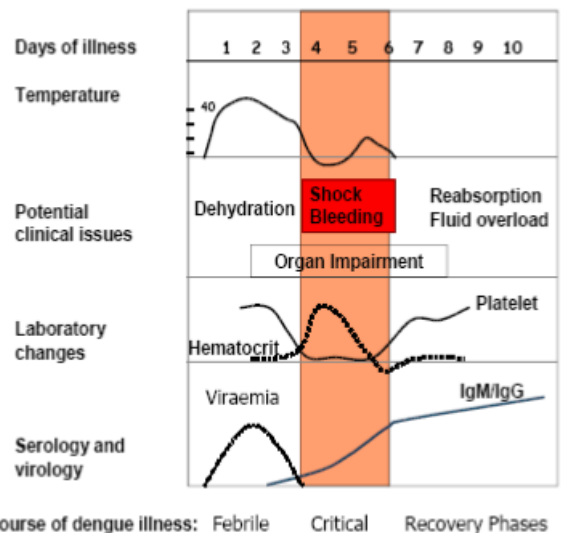
Gall bladder wall thickening was the most common finding noted in 87% in patients with platelet counts less than 80,000 (Table 3). The pattern of gall bladder wall thickening showed symmetrical and striated pattern in 40%, asymmetrical in 30%, bilaminar in 10%, uniformly echogenic in 7% cases. Gall bladder wall thickness pattern of symmetrical stratification was seen in 40% of patients with platelet counts less than 40,000 (Table 4).

The thickness of gall bladder wall was mostly between 3-5mm in 36%, 5-7mm in 30% cases and more than 7mm in 20% cases. No significant correlation could be made with platelet counts and wall thickness measurements. Ascites was noted in 63% patients. In patients with platelet counts less than 40,000, ascites was noted in 40%. The single patient with enlarged mesenteric nodes had a platelet count of 75,000, further evaluation could not be done as patient was lost to study. Ultrasound scan was normal in all patients who had a platelet counts more than 150,000.

One patient developed hypotension during transit from ward to scan room and was shifted to intensive care unit and bedside ultrasound scan was done which showed Gb wall thickening ascites and bilateral pleural fluid, with platelet counts 36,000.

**DISCUSSION**

Dengue virus infection is endemic in tropical and subtropical areas. Symptomatic dengue infection is classified into dengue fever, dengue hemorrhagic fever with a tendency to develop shock syndrome. Dengue hemorrhagic fever is characterized by hemorrhagic manifestations of thrombocytopenia and increased capillary permeability. Dengue shock syndrome presents with findings of hemorrhages with hypotension.<sup>(2)</sup>



**FIG. 1. The course of dengue illness (reproduced from Handbook for clinical management of dengue World Health Organization 2012 page 11)**

Dengue is a single stranded RNA virus with distinct serotypes (DEN 1 to 4). The various serotypes are transmitted through the infected *Aedes aegyptus*. Among the genotypes DEN 2 and DEN 3 are frequently associated with severe disease accompanying secondary dengue infection. After an incubation period of 4-10 days the infection can produce a wide spectrum of illness, asymptomatic to severe life threatening complications. Clinically dengue manifests with sudden onset of high fever with chills and musculoskeletal pains. Fever usually lasts for about 5 days but rarely more than 7 days. Recovery is usually complete by 7-10 days. Dengue hemorrhagic fever represented by leaking of albumin out of the vascular spaces leading to cavity effusions and haemo concentration with increase in the hematocrit value resulting poly serositis associated with thrombocytopenia and hypotension due to increased capillary permeability<sup>(2)</sup>

During the critical phase of dengue, patients with plasma leakage or shock may present with severe abdominal pain when the fever subsides. The severe abdominal pain may mimic as an acute abdominal condition such as in acute appendicitis. Ultrasound studies in these patients have shown fluid collection around the appendix. Other abdominal signs such as right iliac fossa tenderness and rebound tenderness disappear after a few days of conservative management.

Another misdiagnosis is acute (alithiasis) cholecystitis, with the abdominal ultrasonography showing thickening/edema of the wall of

the gallbladder. This is associated with pain in the sub hepatic region, mainly during defervescence. Plasma leakage, not inflammation, is responsible for these clinical features. Patients who underwent surgery as a result of misdiagnosis with an acute surgical abdominal condition have been found to have life-threatening bleedings, with death of some patients. Failure to recognize severe abdominal pain as a warning sign that heralds severe dengue has led to the misdiagnosis of renal lithiasis and delayed intravenous fluid treatment for dengue shock. A differentiating feature of an acute surgical abdomen and the severe abdominal pain of dengue shock is that the abdomen in dengue shock is soft and the pain subsides with fluid resuscitation. Many of the complications seen in dengue are preventable if clinical team members are alert to the physiological problems of the three different phases.

Patients who present with severe abdominal pain are referred for ultrasound studies which further delay in initiating fluid resuscitation and may compound the morbidity and clinical outcome. Evaluate the patient's history for fever that preceded the onset of abdominal Pain. Assess the patient for signs of shock. At this stage the clinical outcome is extremely time-dependent; any delay in fluid resuscitation such as a detour to the ultra sound scan or computer tomography (CT) scan will lead to cardiorespiratory collapse and irreversible shock. Patients with compensated shock may be critically ill despite being alert and having a "normal" systolic BP.

The ultrasound findings in dengue fever include GB wall thickening, pericholecystic fluid, minimal ascites, pleural effusions and hepatosplenomegaly. Severe forms are associated with pericardia, perineal and para renal effusions and pancreatic enlargement also. But none of the findings of severe forms are found in this study.

In a similar study conducted by Venkatasai et al, gall bladder wall thickening was the most common finding (100%), followed by pleural effusion (93%) and ascites (53%)<sup>(2)</sup>

In a study conducted by Santhosh et al , out of 96 seropositive dengue cases 66.7% patients showed edematous GB wall thickening ,64.5% patients showed ascites and 50% patients had pleural effusions.<sup>(3)</sup>

In another study conducted by Vedaraju et al gall bladder wall thickening was found in (83%) followed by pleural effusion (59.8%), and ascites (53.9%).<sup>(4)</sup>

In this study 87% had gall bladder wall thickening, 63% had ascites, 58% had pleural effusions, 25% had hepatomegaly, 5% had a splenomegaly, one had an enlarged mesenteric lymph nodes, and 10% had normal scan findings. The thickness of gall bladder wall was mostly between 3-5mm in 36%, 5-7mm in 30%cases and more than 7mm in 20% cases. No significant correlation could be made with platelet counts and wall thickness measurements. The pattern of gall bladder wall thickening showed symmetrical and striated pattern in 40%, asymmetrical in 30%, bilaminar in 10%, uniformly echogenic in 7% cases. Gall bladder wall thickness pattern of symmetrical stratification seen in 40% of patients with platelet counts less than 40,000. The single patient with enlarged mesenteric nodes had a platelet count of 75, 000, further evaluation could not be done as patient was discharged against medical advice. Ultra sound scan was normal in all patients who had a platelet counts more than 150,000. One patient developed hypotension during transit, from ward to scan room. This cautions us to check vital data before shifting the patient to scan room and avoid prolonged delays in scan waiting lounge.

**CONCLUSION**

A Simple Ultrasound examination will effectively expedite the diagnosis and justifies the initiation of specific treatment for dengue fever pending serological confirmation. USG scan also helps in estimating the severity of the disease. "Acute abdomen" is also another common presentation of dengue; in fact it is an important warning sign of severe dengue especially during the critical phase. It is not surprising for a clinician to misdiagnose this as acute cholecystitis or even acute appendicitis. It is important to note that the ultrasound findings of pericholecystic fluid collection and thickened (edematous) gall bladder wall are often reported by radiologists as acalculous cholecystitis, but in actual fact these are well recognized features of dengue, especially in those with plasma leakage.

**Table 1:** Incidence of diferent sonographic findings dengue fever in 100 patients

S.NO	USG FINDINGS	No OF PATIENTS
1	Gbwall thickening 87	87
2	Ascites	63
3	Pleural effusion	
	Bilateral	20
	Right	36
	Left	2
4	Hepatomegaly	25
5	Splenomegaly	5
6	Mesenteric nodesl	1
7	Normal	10

**Table 2 :**Incidence of ultrasonographic findings in relation to age group

S.NO	USG FINDINGS	0-19 YRS	20-39 YEARS	ABOVE 40
	No of Patients	40	50	10
1	GB WALL THICKENING	36	45	6
2	Ascites	33	25	5
3	Pleural effusion	30	25	3
4	Hepatomegaly	10	15	0
5	Splenomegaly	2	3	0
6	Mesenteric nodesl	1	0	0
7	Normal	2	5	3

**Table 3:** Sonographic findings in relation to platelet count

S.NO	USG FINDINGS	<40,000	40,000-80,000	80,000-1,50,000	>1,50,000
	No of Patients	45	50	3	2
1	GB WALL THICKENING	42	44	1	0
2	Ascites	40	22	1	0
3	Pleural effusion	38	20	0	0
4	Hepatomegaly	21	4	0	0
5	Splenomegaly	3	2	0	0
6	Mesenteric nodesl	0	1	0	0
7	Normal	0	6	2	2

**Table 4:** Pattern of GB Wall Thickening in realtion to Platelet Count

S.NO	USG FINDINGS	No of Patients	<40,000	40,000-80,000	80,000-1,50,000	>1,50,000
1	Symmetrical Stratification	40	25	15	0	0
2	Assymetrical Thickness	35	10	25	0	0
3	Bilaminar Thickness	15	10	5	0	0
4	Uniform Thickness	10	0	5	3	0
TOTAL		100	45	50	3	0

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