

## RESEARCH ARTICLE

## USEFULNESS OF ULTRASONOGRAPHY IN DIAGNOSIS OF TYPHOID FEVER

Muhammad Saeed\*, Mohamed Alsafy

Department of Radiology, Sahara Medical College, Pakistan.

\*Corresponding Author Email: [muhd.saeed@yahoo.com](mailto:muhd.saeed@yahoo.com)

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## ARTICLE DETAILS

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## ABSTRACT

Definitive diagnosis of typhoid fever is made by hemoculture and serological tests, namely Widal test. The present study was conducted to assess the usefulness of Ultrasonography (USG) in diagnosis of typhoid fever. 74 cases of clinically and laboratory confirmed cases of typhoid fever of both genders underwent USG. Out of 74 patients, males were 44 and females were 30. At day 5 on USG, out of 74 patients, 38 had mesenteric lymph nodes enlargement, 52 patients had splenomegaly, 32 had bowel thickening, 24 had Hepatomegaly and 36 had acalculus cholecystitis. At day 10, 20 had MLNs, 40 patients had splenomegaly, 12 had bowel thickening, 9 had hepatomegaly and 14 had acalculus cholecystitis. At day 15, 8 had MLNs, 23 patients had splenomegaly, 1 had bowel thickening and 5 had acalculus cholecystitis. The difference was significant ( $P < 0.05$ ). USG was useful in assessment of typhoid fever. Most common USG findings were MLNs, splenomegaly, bowel thickening, hepatomegaly and acalculus cholecystitis.

## KEYWORDS

Typhoid fever, Hepatomegaly, Ultrasound

## 1. INTRODUCTION

Enteric fever is caused by Salmonella typhi and paratyphi bacilli and is endemic in many parts of the third world. In India, it is the fifth most common infectious disease with a high rate of complications. Atypical clinical findings make an early diagnosis difficult (Richter et al., 2003). Symptoms may vary from mild to severe and usually begin six to thirty days after exposure. Often there is a gradual onset of a high fever over several days. Weakness, abdominal pain, constipation, and headaches also commonly occur. Some people develop a skin rash with rose colored spots (Germanier and Furer, 1975).

An early diagnosis is difficult because of several spectra of clinical features of the disease. Definitive diagnosis of typhoid fever is made by hemoculture and serological tests, namely Widal test, which requires 4 days and 7 days to show positive results. Improper and inadequate use of antibiotics leads to sterile cultures adding to the difficulty in diagnosis. Imaging techniques have not generally been used in the diagnostic approach to typhoid fever (Cohen et al., 1986).

Ultrasonography (USG) is a useful diagnostic tool in detection of enteric fever. Systemic manifestations such as enlarged mesenteric lymph nodes (MLNs) and mural thickening of the terminal ileum are seen in typhoid patients along with other findings such as splenomegaly, acute acalculus cholecystitis, and hepatomegaly, which are confirmed using the ultrasonography (USG) test (Sharma and Qadri, 2004). The present study was conducted to assess the usefulness of Ultrasonography (USG) in diagnosis of typhoid fever.

## 2. MATERIALS AND METHODS

This study was conducted among 74 cases of clinically and laboratory confirmed cases of typhoid fever of both genders. All enrolled patients were informed regarding the study and their written consent was

obtained. Data such as name, age, gender etc. was recorded. Blood samples of patients were used for culture in xylose deoxycholate agar. Widal test was performed in each case. USG using a convex transducer with a frequency of 4 MHz and a linear transducer with a frequency of 12 MHz on the ultrasound machine were obtained. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

## 3. RESULTS

Table 1: Distribution of patients

Total - 74		
Gender	Male	Female
Number	44	30

Table 1 shows that out of 74 patients, males were 44 and females were 30.

Table 2: Comparison of USG findings in different time interval

USG findings	Day 5	Day 10	Day 15	P value
MLNs	38	20	8	0.03
Splenomegaly	52	40	23	0.05
Bowel thickening	32	12	1	0.01
Hepatomegaly	24	9	0	0.01
Acalculus cholecystitis	36	14	5	0.02

Table 2, graph 1 shows that at day 5 on USG, out of 74 patients, 38 had mesenteric lymph nodes enlargement, 52 patients had splenomegaly, 32 had bowel thickening, 24 had Hepatomegaly and 36 had acalculus cholecystitis. At day 10, 20 had MLNs, 40 patients had splenomegaly, 12

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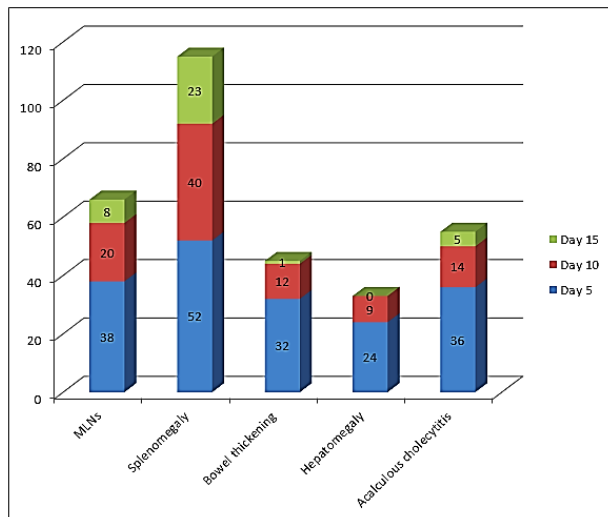


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had bowel thickening, 9 had hepatomegaly and 14 had acalculus cholecystitis. At day 10, 8 had MLNs, 23 patients had splenomegaly, 1 had bowel thickening and 5 had acalculus cholecystitis. The difference ( $P < 0.05$ ).



**Graph 1:** Comparison of USG findings in different time interval

#### 4. DISCUSSION

Enteric fever is caused by *Salmonella typhi* and *paratyphi* bacilli and is endemic in many parts of the world. It has remarkable predominance in India. It is the fifth most common infectious disease in India. Atypical clinical findings make an early diagnosis difficult. The clinical presentation of typhoid fever varies from a mild illness with low-grade fever, malaise, and slight dry cough to a severe clinical picture with abdominal discomfort and multiple complications. Many factors influence the severity and overall clinical outcome of the infection. They include the duration of illness before the initiation of appropriate therapy, the choice of antimicrobial treatment, age, the previous exposure or vaccination history, the virulence of the bacterial strain, the quantity of inoculum ingested (Gerald et al., 1998). Bacilli occupying the liver and biliary ducts cause bacteremia and get excreted into the bile, and remain concentrated in the GB in high titers during the progress of the infection (Hook and Guerrant, 1987). Thus, enlarged MLNs, bowel wall thickening, acalculus cholecystitis, and hepatosplenomegaly are the typical pathophysiological changes seen with the infection during USG procedures. The present study was conducted to assess the usefulness of Ultrasonography (USG) in diagnosis of typhoid fever.

We found that out of 74 patients, males were 44 and females were 30. Mateen et al in their study abdominal ultrasound was performed within three days of the onset of fever in 80 cases suspected to be having Typhoid fever (Mateen et al., 2006). Subsequent follow-up scans were performed at five days, ten days and fifteen days. Subsequently, all 80 cases were found to be Widal positive and *Salmonella* culture was positive in 32 cases. The US findings were as follows: splenomegaly (n-26, 100%); Bowel wall thickening (n-22, 85%); mesenteric lymphadenopathy (n-20, 77%); hepatomegaly with normal parenchymal echotexture (n-8, 31%); thickened gall bladder (n-16, 62%); biliary sludge (n-6, 23%); positive US Murphy's sign (n-7, 27%); pericholecystic edema with increased vascularity (n6, 23%); mucosal ulceration in the wall of the gall bladder (n-1, 3.8%).

We found that at day 5 on USG, out of 74 patients, 38 had mesenteric lymph nodes enlargement, 52 patients had splenomegaly, 32 had bowel thickening, 24 had Hepatomegaly and 36 had acalculus cholecystitis. At day 10, 20 had MLNs, 40 patients had splenomegaly, 12 had bowel thickening, 9 had hepatomegaly and 14 had acalculus cholecystitis. At day 15, 8 had MLNs, 23 patients had splenomegaly, 1 had bowel thickening and 5 had acalculus cholecystitis. A group researcher assessed the usefulness of abdominal ultrasound in the diagnosis of typhoid fever in 350 cases (Younis, 2014). Clinical findings were hepatomegaly (31.4%), prominent intrahepatic bile ducts (64.85%), splenomegaly (100%), mesenteric lymphadenopathy (42.85%), bowel wall thickening (35.71%), acalculus

cholecystitis (16.28%), perforations (1.14%), and ascites in (3.4%).

Mural thickening of the bowel may be an inflammatory response triggered by systemic infection from bacilli, which was observed after the onset of typhoid fever (Puyleart et al., 1988; Lee, 1993). Enlarged MLNs should have given rise to the described systemic manifestations in patients with typhoid fever. Splenomegaly and a moderately large liver are the main USG features for the diagnosis of malaria (Tarantino and Giorgio, 1997). A group researcher found that all 80 cases were found to be Widal positive and *Salmonella* culture was positive in 32 cases (Nakachi et al., 2003). The US findings were as follows: splenomegaly (n 26, 100%); Bowel wall thickening (n-22, 85%); mesenteric lymphadenopathy (n-20, 77%); hepatomegaly with normal parenchymal echotexture (n-8, 31%); thickened gall bladder (n-16, 62%); biliary sludge (n-6, 23%); positive US Murphy's sign (n-7, 27%); pericholecystic edema with increased vascularity (n 6, 23%); mucosal ulceration in the wall of the gall bladder (n-1, 3.8%). The shortcoming of the study is small sample size.

#### 5. CONCLUSION

Authors found that USG was useful in assessment of typhoid fever. Most common USG findings were MLNs, splenomegaly, bowel thickening, hepatomegaly and acalculus cholecystitis.

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