

ORIGINAL ARTICLE

Usefulness of Ultrasonography in detection of cases of typhoid fever in children- A clinical study

Pradeep Shankarrao Patil¹, Prithviraj L. Jadhav²¹Professor, ²Assistant professor, Department of Radio diagnosis, Dr. D. Y. Patil Medical College, Hospital & Research Institute, Kadamwadi, Kolhapur, Maharashtra, India**ABSTRACT:**

Background: Typhoid fever is a bacterial disease caused by salmonella typhi. An early diagnosis is difficult because of several spectra of clinical features of the disease. Ultrasonography (USG) is one of the diagnostic tool. **Materials & Methods:** It included 50 pediatric patients aged 5 years to 15 years, who were clinically suspected of having enteric fever. Blood samples of patients were subjected to Widal test and USG was performed in each patients. **Results:** Out of 50 patients, 38 were found to be positive for typhi. It included 20 boys and 18 girls. The difference was non-significant ($P>0.05$). Out of 38 positive cases, 38 showed splenomegaly on 5th day which decreased to 30 on 10th day and 22 on 15th day. Mesenteric lymph nodes were involved in 30 patients on day 5, which decreased to 21 on day 10 and 12 on day 15. 25 showed bowel thickening on day 5 which decreased to 7 on day 10. 20 showed a calculous cholecystitis on day 5, which decreased to 14 on day 10 and 5 on day 15. Fifteen showed hepatomegaly on day 5, which decreased to 5 on 10th day. **Conclusion:** USG is one of the reliable diagnostic tool in the detection of typhoid fever in children. Features such as hepatosplenomegaly, enlarged MLNs, bowel wall thickening, and acalculus cholecystitis should be considered for the diagnosis of typhoid.

Key words: Hepatomegaly, Typhoid fever, Ultrasonography**Corresponding author:** Dr. Prithviraj L. Jadhav, Assistant professor, Department of Radio diagnosis, Dr. D. Y. Patil Medical College, Hospital & Research Institute, Kadamwadi, Kolhapur, Maharashtra, India**This article may be cited as:** Patil PS, Jadhav PL. Usefulness of Ultrasonography in detection of cases of typhoid fever in children- A clinical study. J Adv Med Dent Scie Res 2017;5(11):96-98.

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INTRODUCTION

Typhoid fever, also known simply as typhoid, is a bacterial infection due to *Salmonella typhi* that causes symptoms. An early diagnosis is difficult because of several spectra of clinical features of the disease.¹

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. In severe cases there may be confusion. Without treatment symptoms may last weeks or months. Other people may carry the bacterium without being affected; however, they are still able to spread the disease to others. Typhoid fever is a type of enteric fever along with paratyphoid fever.²

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.³

USG was recognized as the most accepted imaging modality for the evaluation of typhoid fever, being quick, noninvasive, and nonionizing; eventually, it was considered safe for children. Emphasis on the usefulness of detecting MLNs with ultrasound as a diagnostic method during the early stage of typhoid was given. MLNs are vital barriers against the systemic dissemination of *S. typhi* in a mouse model. USG examination of the abdomen is helpful in the diagnosis of typhoid fever during the 1st week of onset of fever. The bowel wall thickening of the ileocecal region with MLNs is not specific for any one causative organism for bacterial enteritis, but a proper diagnosis of typhoid fever could be possible along with the typical USG features described above.⁴

The present study was conducted to analyze the usefulness of USG over the routine Widal test and hemoculture, in the diagnosis of typhoid fever.

MATERIALS & METHODS

The present study was conducted in the department of Radiodiagnosis. It included 50 pediatric patients aged 5 years to 15 years, who were clinically suspected of having enteric fever. Parents of pediatric patients were informed regarding the study and written consent was obtained. Ethical clearance was taken from institutional ethical committee.

General information such as name, age, gender, features of abdominal pain etc. was noted.

Blood samples of patients were used for culture in xylose deoxycholate agar. All patients underwent routine Widal test after 7 days of fever.

A convex transducer with a frequency of 4 MHz and a linear transducer with a frequency of 12 MHz on the ultrasound machine were used for a thorough evaluation of the abdomen with emphasis on liver, spleen, and gall bladder (GB), as well as the small and large intestines. USG Murphy's sign along with pericholecystic edema and fluid collection were evaluated according to the graded compression method in suspected cases of acalculus cholecystitis. A GB wall thickness of 3 mm was considered normal. After the initial USG procedure on Day 1, repeated scans were done with selected patients on 5-day intervals up to 15 days of presentation.

To determine the presence of the causative bacterium, a 1-ml blood sample taken from each patient was serially diluted to 1:10 in 0.1% peptone water, and an aliquot of 0.5 ml was plated on xylose deoxycholate agar; one or two drops of Tween 80 were added to the first of each dilution with each blood sample. Plates were incubated at 37°C for 24 hours. In each trial, a few presumptive colonies were picked and were confirmed as *S. typhi*. At the end of 4 days, the growth of *S. typhi* was confirmed. Results were subjected to statistical analysis using chi-square test. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 50		
	Boys	20
Typhi positive- 38	Girls	18

Table I shows that out of 50 patients, 38 were found to be positive for typhi. It included 20 boys and 18 girls. The difference was non-significant ($P > 0.05$).

Table II USG findings in patients

Follow up scan	Splenomegaly (38)	MLNs (30)	Bowel thickening (25)	Acalculous cholecystitis (20)	Hepatomegaly (15)
Day 5	38	30	25	20	15
Day 10	30	21	7	14	5
Day 15	22	12	0	5	0

Table II shows that out of 38 positive cases, 38 showed splenomegaly on 5th day which decreased to 30 on 10th day and 22 on 15th day. Mesenteric lymph nodes were involved in 30 patients on day 5, which decreased to 21 on day 10 and 12 on day 15. 25 showed bowel thickening on day 5 which decreased to 7 on day 10. 20 showed a calculous cholecystitis on day 5, which decreased to 14 on day 10 and 5 on day 15. 15 showed hepatomegaly on day 5, which decreased to 5 on 10th day.

DISCUSSION

The cause is the bacterium *Salmonella typhi*, also known as *Salmonella enterica* serotype Typhi, growing in the intestines and blood. Typhoid is spread by eating or drinking food or water contaminated with the feces of an infected person. Risk factors include poor sanitation and poor hygiene. Those who travel to the developing world are also at risk and only humans can be infected. Diagnosis is by either culturing the bacteria or detecting the bacterium's DNA in the blood, stool, or bone marrow. Culturing the bacterium can be difficult. Bone marrow testing is the most accurate. Symptoms are similar to that of many other infectious diseases. Typhus is a different disease.⁵ The present study was conducted to analyze the usefulness of USG over the routine Widal test and hemoculture, in the diagnosis of typhoid fever.

We found that out of 50 patients, 38 were positive for typhi. It included 20 boys and 18 girls. We observed that 38 paediatric patients showed splenomegaly on 5th day, 30 on 10th day and 22 on 15th day. This is in agreement with Cohen et al.⁶ We observed that mesenteric lymph nodes were involved in 30 patients on day 5, 21 on day 10 and 12 on day 15. Similarly 25 patients showed bowel thickening on day 5, 7 on day 10. This is in accordance to Sharma et al.⁷

We found that 20 showed acalculous cholecystitis on day 5, 14 on day 10 and 5 on day 15. Similarly, 15 showed hepatomegaly on day 5 and on day 10, 5 patients were found positive of hepatomegaly as diagnosed by USG. This is similar to Johnson et al.⁸

The Widal test is time-consuming, and prone to significant false positive results. The test may be also falsely negative in the early course of illness. However, unlike Typhidot test Widal test quantifies the specimen with titres.

Ultrasound findings are diagnostic in areas endemic for Typhoid fever. In cases with atypical clinical findings, abdominal ultrasound provides a rapid and effective tool in differentiating from conditions like appendicitis,

abscesses and diverticulitis. In endemic areas of typhoid fever where yersinia and campylobacter enteritis is almost unknown, the clinical picture and ultrasound findings are almost diagnostic even when widal test is inconclusive and blood cultures are sterile or not available.⁹

Abdominal ultrasonography (also called abdominal ultrasound imaging or abdominal sonography) is a form of medical ultrasonography (medical application of ultrasound technology) to visualise abdominal anatomical structures. It uses transmission and reflection of ultrasound waves to visualise internal organs through the abdominal wall (with the help of gel which helps transmission of the sound waves). For this reason, the procedure is also called a transabdominal ultrasound, in contrast with endoscopic ultrasound, the latter combining ultrasound with endoscopy through visualize internal structures from within hollow organs. Abdominal ultrasound examinations are performed by gastroenterologists or other specialists in internal medicine, radiologists or sonographers trained for this procedure.¹⁰

CONCLUSION

Features such as hepatosplenomegaly, enlarged MLNs, bowel wall thickening, and acalculus cholecystitis should be considered for the diagnosis of typhoid. USG is one of the reliable diagnostic tool ion the detection of typhoid fever in children.

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