

ROLE OF IMAGING IN ENTERIC FEVER*¹Dr. Sartaj Hassasn Shah and ²Dr. Arif ahmad Wani¹Consultant Department of Radiodiagnosis and Imaging,²Senior Resident Department of Radiodiagnosis and Imaging, Government Medical College Anantnag Srinagar, Jammu and Kashmir, India.

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ABSTRACT

Objective: To evaluate the role of ultrasound in the diagnosis of enteric fever. Subjects and Methods: This prospective study was done on 160 patients who were clinically suspected of enteric fever. Abdominal Ultrasonography (USG) was done in all patients Computed tomography (CT) was done in cases who were equivocal on USG, to find out complications of enteric fever or some alternative pathology to be ruled out. Results: Out of 160 patients splenomegaly was seen in 52 patients, bowel wall thickening in 44 patients, mesenteric lymphadenopathy in 40 patients, hepatomegaly in 16 patients, thick walled gall bladder in 32 patients, ascites in 10 patients and mesenteric standing in 7 patients. Conclusion: Imaging findings of enteric fever include splenomegaly, ileo-cecal thickening mesenteric lymphadenopathy, hepatomegaly and thick walled GB. USG is a useful first line imaging modality for diagnosis of enteric fever in patients who are clinically suspected for enteric fever. Abbreviations: USG- Ultrasonography, CT- Computed tomography, GB- Gallbladder.

KEYWORDS: USG- Ultrasonography, CT- Computed tomography, GB- Gallbladder.**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.^[1] Definitive diagnosis of typhoid fever is made by hemoculture and serological tests, namely Widal test, both requiring from some days to over a week to show positive results.^[2] 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. The present study was aimed at determining the role of imaging in the early diagnosis of enteric fever.

SUBJECTS AND METHODS

This study was conducted between August 2017 to March 2019 on one sixty patients (M-90, F-70) clinically suspected of having typhoid fever. Age of the patients ranged from 6 years to 58 years. All the one sixty patients were subsequently found to be widal positive. *Salmonella* culture was positive in 64 patients. 52 of these patients were less than 20 years of age. Abdominal US examination was performed within one to three days of hospital admission.

We used a convex transducer with frequency of 3.5 to 5 MHz and a linear transducer with a frequency of 7 to 12 MHz on the US machine (Logic 400, GE; Logic 500, GE; Sonolayer, Toshiba.) All ultrasound examinations were started with the examination of the liver wherein the size and echotexture was noted. The gall bladder was next examined concentrating on its size, luminal contents, mucosal surface, wall thickness, U/S Murphy's sign, pericholecystic edema and collection. The spleen was examined concentrating on the size and echotexture. After examining the upper abdomen, the lower abdomen was examined according to the graded compression method described by Puyleart.^[3] This started with the study of lower right abdominal quadrant where the ileocecal region (Fig.1) and the ascending colon were recognized. From this point the probe was moved upwards along the right flank unto the right hypochondrium, then transversely along the epigastrium to the left hypochondrium and then downwards along the left flank to the hypogastrium and pelvis thus studying the entire colon from cecum to the rectum. Multiple transverse & longitudinal scans of the abdomen and pelvis were then performed for the study of the small bowel to identify any areas of wall thickening. Measurement of the thickness of the bowel wall was performed by positioning the calipers between the outer margin of the inner hyperechoic layer & the outer hyperechoic layer (Fig.2).

The thickness was considered abnormal when it measured more than 3mm. Using a similar technique, enlarged mesenteric lymph nodes were visualized (Fig. 3). Following the initial scan, the ultrasound was repeated in all patients on the fifth, tenth and fifteenth day.

CT was done in cases in whom USG findings were equivocal, to find out alternative pathologies and complications of enteric fever which include gastrointestinal bleed, perforation, splenic abscess, gall bladder perforation, and empyema of gall bladder.

RESULTS

Out of 160 patients, splenomegaly was seen in 52 patients, bowel wall thickening in 44 patients, mesenteric lymphadenopathy in 40 patients, hepatomegaly within 21-28 days in 22 patients.

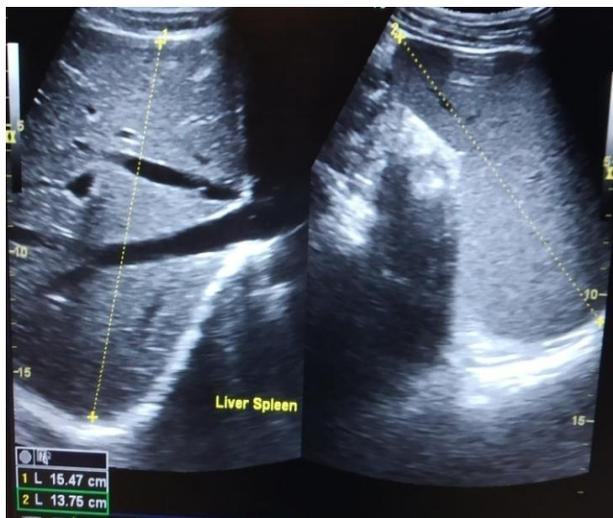


Fig. 1A: Hepatosplenomegaly in a case of enteric fever.

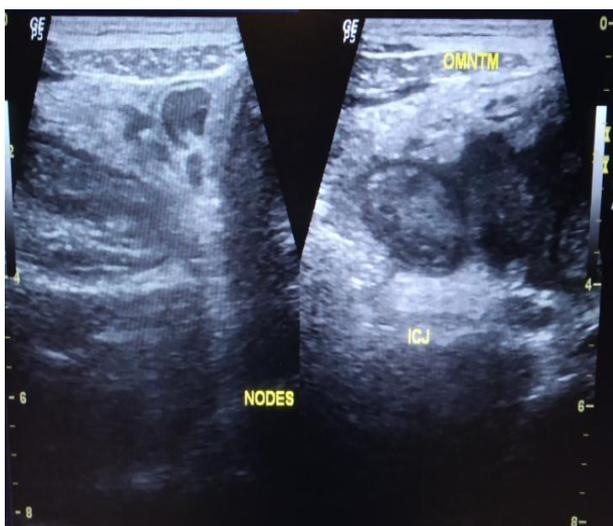


Fig. 2: Enlarged ileo-cecal mesenteric lymph nodes and mesenteric thickening in a case of enteric fever.

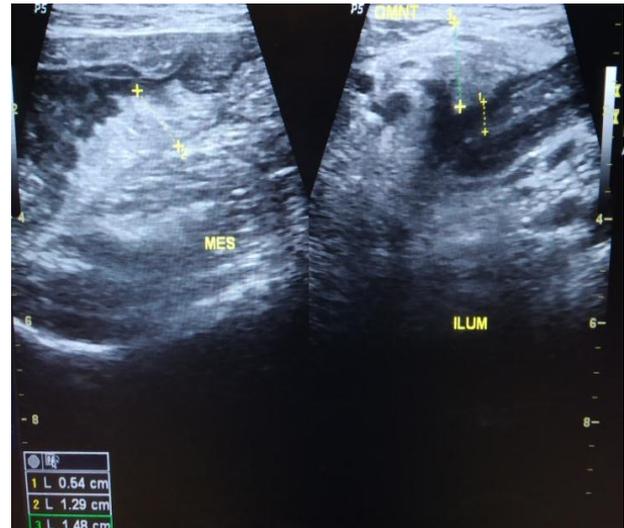


Fig. 3: Mesenteric thickening, oedema and terminal ileal thickening in a case of enteric fever.

DISCUSSION

Salmonella typhi, introduced by the oral route, multiplies in the intestinal lymphoid tissue, mainly in the ileo-cecal area and then disseminates systemically by either lymphatic or hematogenous route to localize in the liver, spleen or other organs.^[2] The clinical features of Typhoid fever, while characteristic and suggestive of the diagnosis are, however, not pathognomonic. Inappropriate and inadequate administration of antibiotics, which is a common occurrence in our country, diminishes the possibility of culturing *Salmonella* from the blood and stool. The serological test, Widal, is the only diagnostic test widely available. Widal test is usually positive only in the second week and rising widal titres are required to make a definitive diagnosis. Therefore, clinically atypical cases are difficult to diagnose early. US examination of the abdomen is helpful in the diagnosis of Typhoid fever in the first week. The common US findings are hepatosplenomegaly, thickening of the walls of the terminal ileum, cecum and ascending colon, mesenteric lymphadenopathy and acute acalculus cholecystitis. The advent of high resolution and high frequency transducers has helped in measuring the bowel wall thickness in healthy subjects and in intestinal disorders. Increase in thickness of the walls of terminal ileum and enlargement of the regional nodes in Typhoid fever was first reported by Puyleart in 1989.^[4] In 1997 Terantino *et al* reported similar findings in 95 patients of confirmed Typhoid.^[5]

Inflammatory bowel diseases, Ulcerative colitis and Crohn's disease are differentiated from Typhoid enteritis based on the extent and location of the thickened bowel wall. 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.

CONCLUSION

Ultrasonography is a non invasive, high resolution imaging technique which plays a very important role in the initial assessment of patients of enteric fever. CT should be reserved in patients with severe clinical manifestations or complications and for patients with unusual findings.

Limitations of the study

Low proportion of patients is a limitation of our study.

Conflicts of interest

Both the authors declare that they have no conflict of interest in this research.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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REFERENCES

1. Gerald T. Keusch. Salmonellosis. In Fauci AS, Braunwald E, Isselbacher KJ et al eds. Harrison's Principles of Internal Medicine, 14 th ed. New York: McGraw Hill, 1998; 950-956.
2. Hook EW, Guerrant RL. Salmonella infections. In Braunwald E, Isselbacher KJ et al, eds. Harrison's Principles of Internal Medicine, 11 th ed. New York: McGraw Hill, 1987; 592-596.
3. Puyleart JBMC. Mesenteric adenitis and acute terminal ileitis: US evaluation using graded compression. Radiology, 1986; 161: 691-695.
4. Puyleart JBMC, Kristjansdottir S, Golterman KL, Gerard MJ, Nelly MK. Typhoid fever: Diagnosis by using Sonography. AmJ Radiol, 1989; 153: 745-746.
5. Tarantino L, Giorgio A. Value of bowel ultrasonography in the diagnosis of typhoid fever. EurJ Ultrasound, 1997; 5: 77-83.