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The role of abdominal ultrasound in the diagnosis of typhoid fever: An observational study

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KEYWORDS
Typhoid fever;
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Summary *Objectives:* To study the usefulness of abdominal ultrasound in the diagnosis of typhoid fever and to determine the common ultrasound findings early in the course of the disease.
Methods: Abdominal ultrasound examination was performed within the first week of initiation of symptoms in 350 cases with clinical diagnosis of typhoid fever. Subsequent ultrasound follow-up examination was done 15 days later (beginning of the third week). All the patients proved to have positive Widal test and Sallmonella culture. The study was performed in Erbil-Iraq from the period January 1993 to October 2010.
Results: The following ultrasound findings were reported: hepatomegaly (31.4%), prominent intrahepatic bile ducts (64.85%), splenomegaly (100%), mesenteric lymphadenopathy (42.85%), bowel wall thickening (35.71%), acalculous cholecystitis (16.28%), perforations (1.14%), and ascites in (3.4%).
Conclusion: The current study showed that the findings are typical enough to justify initiation of treatment for typhoid fever when serology is equivocal and culture is negative, and is fairly safe to say that normal ultrasound examination early in the course of febrile illness rules out typhoid fever.

Introduction

Typhoid fever is a special form of salmonellosis that is confined to humans and characterized by prominent systemic symptoms [1]. The pathology of typhoid fever as a feco oral disease has been described as far back as 1870 by William Jenner [2]. Typhoid has been estimated to cause 33 million infections per year. Community-based studies of typhoid transmission in areas of high endemicity have shown annual incidences reaching 1200 per 100,000 of the population [3]. Although the course of the illness is typical enough in majority of cases to reach a presumptive clinical

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diagnosis, variations from classical pattern are not uncommon. Furthermore, the clinical picture may change with inadequate treatment and atypical clinical findings make an early diagnosis difficult. Definitive diagnosis of typhoid fever is made by blood culture and serological tests, namely Widal test, both requiring from some days to over a week to show positive results. Improper and inadequate use of antibiotics leads to sterile cultures adding to the difficulty in diagnosis [4]. Despite modern effective treatment of typhoid fever, the complications of the disease continue to be potentially dangerous. Therefore every effort should be made for early diagnosis. (Figs.1—3)

The aims of this study were to highlight the usefulness of abdominal ultrasound examination in early diagnosis of typhoid fever and to demonstrate ultrasonographic changes associated with typhoid fever. (Table 1)

Materials and methods

Prospective study carried out at Erbil & Rizgari Teaching Hospitals between January 1993 and October 2010. The study population consisted of 350 consecutive patients (M-227, F-123; age ranged between 7 years and 70 years with mean age of 28 years), with a proven diagnosis of typhoid fever based on positive Widal and blood culture for *Salmonella typhi*. Abdominal ultrasound examination carried out within one week of initiation of symptoms and a follow-up examination fifteen days later (after commencement of treatment). A convex transducer with frequency of 3.5—5 MHz and a linear transducer with a frequency of 7—10 MHz ultrasound probes (Siemens G60, Toshiba SAL 32B, and Shimadzu) were used.

All ultrasound examinations included the examination of the liver wherein the size and echo texture and bile ducts were noted. The gall bladder was next examined concentrating on its size, luminal contents, mucosal surface, wall thickness, pericholecystic fluid collection. The spleen was examined concentrating on the size and echotexture. Spleen was considered enlarged when its longitudinal diameter exceeded 13 cm. After examining the upper abdomen, the lower abdomen was examined according to the graded compression method described by Puylaert [5]. 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.

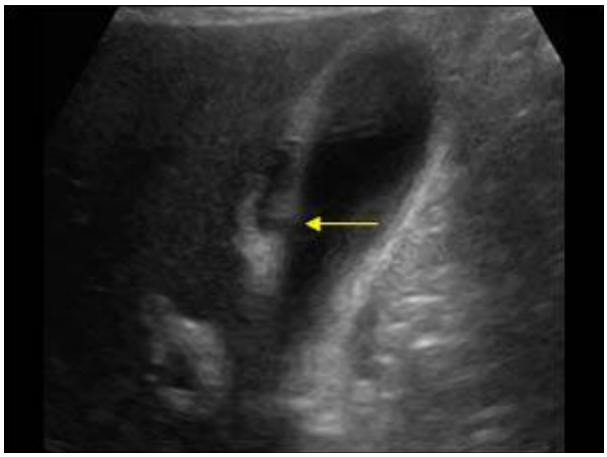

Figure 2 Gallbladder perforation.

Measurement of the thickness of the bowel wall was performed .The thickness was considered abnormal when it measured more than 3 mm.

Using a similar technique, enlarged mesenteric lymph nodes were visualized. Follow-up ultrasound examination of the abdomen was repeated in all patients after two weeks.

Results

All 350 patients were studied by ultrasound on the first week of initiation of symptoms and a follow-up examination was done on day 15 after initiating therapy.

Liver was enlarged but with no focal hepatic lesion in 110 cases. Prominent intrahepatic bile ducts but normal extra hepatic bile ducts were seen in 227 cases.

Spleen was enlarged in 350 cases with maximum longitudinal diameter ranged between 17 cm and 31 cm with a mean of 21.8 cm. No focal spleen lesion noticed.

The gallbladder was distended in (40) cases with longitudinal dimension of more than (12 cm). The gallbladder wall measured more than 4 mm with increased vascularity in (35) cases. Pericholecystic edema noticed in (25) cases with one case of gallbladder perforation.

Increased bowel wall thickness ranging from 4 to 9 mm was noticed in (125) cases. The wall thickening was clearly

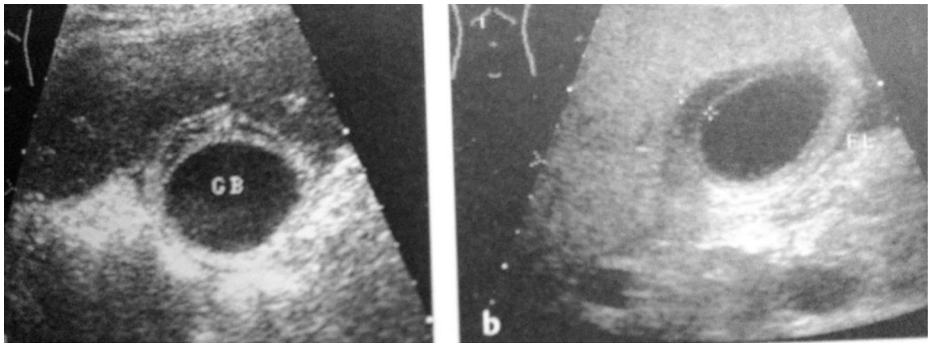

Figure 1 Thick wall acalculous cholecystitis.

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