

Ultrasonography Diagnosis of Acute Appendicitis in a 6 Month Old Infant Coexisting with Ileal Obstruction Caused by an Omental Band

Natalia Kokhanovsky MD, Alicia Nachtigal MD, Nadir Reindorp MD and Abdel-Rauf Zeina MD

Department of Radiology, Hillel Yaffe Medical Center, Hadera, affiliated with Rappaport Faculty of Medicine, Technion-Israel Institute of Technology, Haifa, Israel

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Acute appendicitis is one of the major causes of hospitalization in children and the most common condition requiring emergency abdominal surgery in the pediatric population. The condition typically develops in older children and young adults with the diagnosis being

rare in children under the age of 2 years [1]. Acute appendicitis is infrequently considered in the differential diagnosis of digestive disorders in the first months of life and, indeed, the condition is rare within the first year. In this population, the history and the clinical finding of acute appendicitis are not classic and may be confused with a non-surgical disease. The delayed diagnosis of acute appendicitis can carry serious consequences. Perforation, abscess formation, peritonitis, sepsis, bowel obstruction, and death have been reported [1]. The ideal diagnostic test should be swift, non-invasive, highly accurate, and readily available [2]. The primary imaging technique over the past decade for evaluating children with suspected appendicitis has been graded-compression ultrasound. Ultrasonography with graded compression is an accurate, non-invasive, easily available imaging modality for the diagnosis of acute appendicitis and does not use ionizing radiation [3].

We report here an uncommon case of acute appendicitis associated with small bowel obstruction due to omental band in a 6 month old infant, and discuss the differential diagnosis and the imaging findings that are helpful for early and accurate diagnosis.

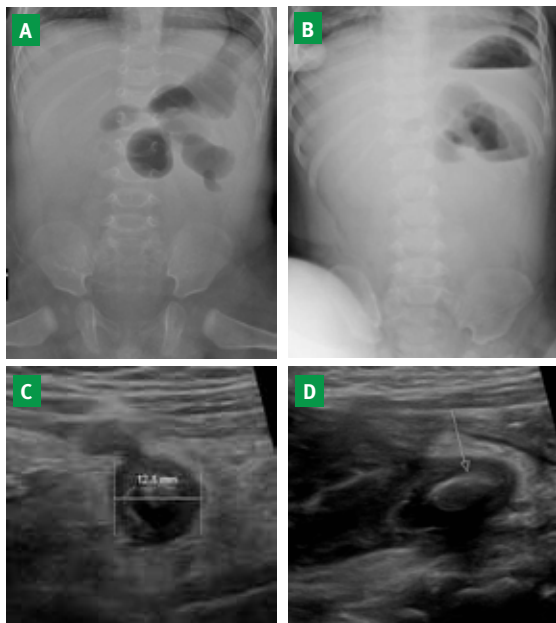
PATIENT DESCRIPTION

A 6 month old male infant was admitted to the pediatric emergency department with a 2 day history of fever, vomiting, irritability, and abdominal distension.

The white blood cell count at admission was 13,600 cells/ml. There was positive bacteriologic culture of *Escherichia coli* from peripheral blood drawn 2 days earlier. Other laboratory tests were unre-markable. The infant was transferred to the pediatric ward for observation. After 2 days of observation, a precise clinical diagnosis was not achieved. At the same time, the patient's condition deteriorated clinically and abdominal tenderness increased. Clinical evaluation was not specific for any surgical emergency. Plain abdominal X-ray was performed, revealing multiple dilated loops of small bowel with air-fluid levels suggestive of small bowel obstruction [Figures A and B]. Abdominal ultrasound was ordered for further evaluation. The scan was performed on a Siemens, Acusons 2000, Diagnostic Ultrasound System with 9L4 transducer (Multi-D). A routine graded-compression technique through the anterior abdominal wall showed an excessive amount of intraabdominal fluid and hyperechoic mesenteric fat; and the appendix was identified as a tubular, blind-ended structure, measuring 12 mm in maximal cross-sectional diameter containing an appendicolith. In addition, extended loops of the small bowel were identified [Figures C and D].

The infant was operated on, and the sonographic diagnosis of acute appendicitis was confirmed surgically. At laparotomy an inflamed appendix was visualized with signs of acute peritonitis. An additional finding was that a congenital omental band caused tension on the small bowel by obstructing

Supine [A] and upright position [B] plain abdominal radiographs showing multiple dilated loops of small bowel with air-fluid levels suggestive of small bowel obstruction. Transverse [C] and longitudinal [D] ultrasound images show an inflamed appendix with appendicolith (arrow)



it. An appendectomy and excision of the omental band were performed. The postoperative course was uneventful and the patient was discharged 3 days later.

COMMENT

Acute appendicitis is the most common surgical emergency in childhood, representing 10% of all children admitted to the pediatric emergency ward [4]. Appendicitis may present at any age, but it is an uncommon entity during the first 3 years of life. The initial symptoms of appendicitis in children younger than 3 years of age are often ill-defined and non-specific. Moreover, since young children are frequently unable to accurately communicate, appendicitis in this population is characterized by delay in diagnosis and perforation. The clinical diagnostic challenge necessitates effective diagnostic tools to decrease the morbidity associated with acute appendicitis in early childhood.

Since a report by Puylaert et al. [5] of a graded-compression sonographic technique to diagnose acute appendicitis, several studies have validated the high sensitivity and specificity of sonography. The sonographic diagnosis of acute appendicitis is made on demonstration of a sausage-shaped, blind-ended structure on longitudinal images and a target lesion on transverse images. A

non-compressible appendix measuring > 6 mm in maximal diameter suggests acute appendicitis. This is the sole sonographic sign specific for appendicitis. Additional findings include an appendicolith that appears as echogenic focus with acoustic shadowing, pericecal or periappendiceal fluid, and increased periappendiceal echogenicity representing edematous inflamed mesenteric fat. The principal advantages of ultrasound in the evaluation of the acute abdomen in children are its availability, low cost, and lack of ionizing radiation. The main drawback is operator dependence. An inexperienced examiner might not be able to recognize the appendix.

In our literature review, we found numerous studies evaluating the accuracy of ultrasound in the diagnosis of appendicitis in a pediatric population [3]. However, acute appendicitis in very young infants and neonates remains a very rare condition that can be found mainly in case reports. We describe the preoperative sonographic diagnosis of acute appendicitis in an infant with the use of well-established sonographic criteria for the disease. Using a proper technique, we were able to make the diagnosis despite the unclear clinical presentation. Of additional interest in our case was the coexistence with another very rare condition – congenital omental band, which caused a clinically signifi-

cant ileal obstruction. We are unaware of other such cases in the literature. Possible interactions of these two conditions should be further investigated.

In conclusion, although once believed rare, acute appendicitis in a very young infant, with or without intestinal obstruction, should be considered in the differential diagnosis of acute abdomen. Ultrasound can accurately identify the inflamed appendix and the distended bowel loops, shorten the diagnostic workup, and provide useful information for surgical planning.

Corresponding author:

Dr. A-R. Zeina

Dept. of Radiology, Hillel Yaffe Medical Center, P.O. Box 169, Hadera 38100, Israel

Phone: (972-4) 630-4621

Fax: (972-4) 6340-4884

email: raufzeina3@hotmail.com
raufzeina@yahoo.com

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Capsule

A live impaired-fidelity coronavirus vaccine protects in an aged, immunocompromised mouse model of lethal disease

Live, attenuated RNA virus vaccines are efficacious but subject to reversion to virulence. Among RNA viruses, replication fidelity is recognized as a key determinant of virulence and escape from antiviral therapy; increased fidelity is attenuating for some viruses. Coronavirus (CoV) replication fidelity is approximately 20-fold greater than that of other RNA viruses and is mediated by a 3'5' exonuclease (ExoN) activity that probably functions in RNA proofreading. In this study Graham and colleagues demonstrate that engineered inactivation of severe acute respiratory syndrome (SARS)-

CoV ExoN activity results in a stable mutator phenotype with profoundly decreased fidelity in vivo and attenuation of pathogenesis in young, aged and immunocompromised mice. The ExoN inactivation genotype and mutator phenotype are stable and do not revert to virulence, even after serial passage or long-term persistent infection in vivo. ExoN inactivation has potential for broad applications in the stable attenuation of CoVs and, perhaps, other RNA viruses.

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Eitan Israeli