



Case Report

Pediatric subhepatic appendicitis with elevated lipase

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ABSTRACT

Appendicitis is the most common surgical emergency in children, of which most are located in the retrocecal space or pelvis. Appendicitis occurring in the subhepatic space is uncommon and may present with atypical features such as right upper quadrant pain, leading to delayed diagnosis and complications. We present a rare case of subhepatic appendicitis in an 11-year-old female, who presented with a three-day history of both right upper quadrant (RUQ) and right lower quadrant (RLQ) abdominal pain and serum lipase elevated four times the upper normal limit. The abdominal ultrasound was normal, except for prominent RLQ abdominal lymph nodes. Hours later, a computed tomography scan revealed a non-ruptured subhepatic appendicitis and normal pancreas. Our patient encounter demonstrates the need to be aware of the atypical presentations of pediatric appendicitis in general and subhepatic appendicitis in particular. Moreover, to our knowledge, this is the first reported case of elevated lipase (with a radiographically normal pancreas) in association with subhepatic appendicitis. Providers should be aware elevated serum lipase levels may be due to conditions other than pancreatitis and further evaluation should be considered if the elements of the clinical picture are incongruent.

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1. Clinical narrative

A healthy 11-year-old female presented to our pediatric emergency department (ED) with a 3-day history of intermittent periumbilical pain migrating to the right upper quadrant (RUQ) and right lower quadrant (RLQ). She endorsed non-bilious and non-bloody emesis on the day of presentation. She had no fever or other complaints. Initial vital signs were normal except for a blood pressure of 131/78 mm Hg and pulse of 114 bpm. The physical examination was significant for tenderness to palpation of both the RUQ and RLQ of the abdomen. Labs were normal except for a white blood cell count of $15.8 \times 10^9/L$ and lipase of 1655 IU/L (upper limit normal is 393 IU/L). Formal ultrasound of the abdomen revealed prominent RLQ lymph nodes, non-visualization of the appendix, and normal liver, gallbladder and pancreas. She was admitted and the patient's abdominal pain soon worsened. A contrast-enhanced computed tomography (CT) scan hours after admission revealed an acute inflamed tip of the appendix, measuring 1.1 cm, which was located in the subhepatic region with the cecum located in the RLQ (Figs. 1 and 2). Of note, the pancreas was radiographically normal three days after the onset of pain. After pre-operative antibiotics, the patient underwent an uncomplicated exploratory laparotomy with appendectomy on hospital day (HD) two. The patient demonstrated improved symptoms and was discharged home on HD three with

symptomatic treatment. Upon follow up appointment two weeks later, the patient was symptom free.

Appendicitis is the most common reason for abdominal surgery in children [1]. The incidence of acute appendicitis is 1.1/10,000 among preschoolers, 6.8/10,000 in children aged 5–9 years, and 19.3/10,000 in children aged 10–14 years [2]. The appendix is commonly located in the retrocecal position (65.3%), pelvis (31%), subcecal (2.3%), preileal (1%) and postileal (0.4%). Rarer locations of the appendix include subhepatic, lateral pouch, mesocolic, left-sided (associated with situs viscerum inversus), and intraherniary [3]. During normal fetal gut rotation, the cecum and appendix rotate into the subhepatic region and subsequently descend into the RLQ by 4 months of age [4]. In patients with subhepatic appendicitis, the cecum does not completely descend out of the subhepatic space [5]. Subhepatic appendicitis was first reported in 1863 [6] and is rare, accounting for 0.08% of all appendicitis [7] of appendicitis in all age groups. Typical features of appendicitis include fever, anorexia, and migration of pain to the RLQ, although these findings may be absent, especially in younger children [8]. Atypical presentations may account for higher rates of misdiagnosis of appendicitis: 28 to 57% in 2 to 12 year olds and approaches to nearly 100% in children younger than 2 years [2]. Clinical scoring systems, such as the Pediatric Appendicitis Score [9] (4–15 years old), and the Pediatric Appendicitis Risk Calculator [10] (5–18 years old), may be helpful. However, patients with subhepatic appendicitis often present with pain to the RUQ and epigastrium of the abdomen [11,12]. Pediatric emergency physicians have demonstrated ability to identify appendicitis using ultrasound with 60–96% sensitivity and 68–98% specificity [13]. However, ultrasound has not demonstrated reliability in diagnosing appendicitis in

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Fig. 1. Transverse view demonstrates an inflamed appendix (arrow) in the subhepatic space with a diameter of 1.1 cm.

the subhepatic position [11,14]. False negative ultrasound mimics of subhepatic appendicitis include liver abscess [15,16] and subdiaphragmatic abscess [17]. Currently, CT scan is the most reliable modality for identifying subhepatic appendicitis, although mimics occur, such as perforated gallbladder [16] and liver abscess [3]. Delays in diagnosis of subhepatic appendicitis may lead to complications, such as appendix perforation and abscess formation [12]. Laparoscopic appendectomy is generally considered safe for treatment of non-perforated subhepatic appendicitis [18].

Our patient presented with pain to both RUQ and RLQ pain, and vomiting, but no fever. The markedly elevated lipase initially suggested pancreatic inflammation, which may have accounted for the RUQ pain.

Other causes of elevated serum lipase >3 times the upper limit of normal (ULN) include disorders of the liver and biliary tracts, inflammatory bowel disease, multi-system trauma, and medications [19]. The ultrasound did not demonstrate pancreatic inflammation (or hepatobiliary abnormalities), but pancreatitis may be radiographically absent in children in early or mild cases [20]. Additionally, the patient's RLQ pain may have been explained by the enlarged RLQ lymph nodes, although typical appendicitis was still possible. After a short period of observation, her increasing abdominal pain warranted a CT scan, revealing subhepatic appendicitis without pancreatitis. To our knowledge this is the first reported case of elevated lipase in association with appendicitis and a radiographically normal pancreas. Our patient encounter prompts consideration that pediatric appendicitis, including subhepatic appendicitis, may present without typical features of appendicitis. Concerning pediatric abdominal pain, whose source is not reasonably explained by history and physical examination, laboratory results, or ultrasound findings, should prompt consideration for advanced imaging or pediatric surgical consultation. Further, elevated lipase levels may be due to extra-pancreatic causes, including appendicitis.

Conflict of interest

None.

Sources of support

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Fig. 2. Coronal views show the dilated appendix (arrow) with surrounding inflammation in close proximity to the liver.

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