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Case report

Gallbladder perforation: An uncommon cause of peritonitis in a child

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ABSTRACT

Introduction and importance: Gallbladder perforations are infrequently encountered in the pediatric group but can be a cause of peritonitis with significant morbidity and mortality if not diagnosed and managed promptly.
Case presentation: We present a case of a 10-year-old female who presented with peritonitis due to a perforated gallbladder diagnosed by CT-scan. She was managed surgically successfully.
Clinical discussion: Gallbladder perforation due to cholecystitis is usually seen in the elderly population but is uncommon among the pediatric population. Mortality rate can be as high as 26 % hence early diagnosis is vital. Management is mostly surgical as seen in the index case.
Conclusion: Clinicians should keep gallbladder perforation in mind as a differential diagnosis of acute abdomen in children although uncommon.

1. Background

Gallbladder perforation (GBP) after cholecystitis is usually seen in elderly those over 60 years of age, but uncommon in children [1]. Perforation of the gallbladder is generally rare but usually follows obstructive (calculus) cholecystitis [2,3]. Herein we present a 10-year-old female child who presented with features of peritonitis and an intraoperatively perforated gallbladder was found without stones. This case report highlights that despite higher modalities of radiological investigations, perforation of the gallbladder should be a differential in children and adults who come with abdominal symptoms.

This work has been reported in line with the SCARE 2020 criteria [4].

2. Case presentation

A 10-year-old girl presented to our center with a one-week history of abdominal pain and blood-stained diarrhea. The pain was described as dull and achy more around her epigastric region and this was accompanied by intermitted low-grade fevers nausea and vomiting. She denied trauma to the abdomen and no abdominal distension. She also reported awareness of heartbeats and general body weakness. She denied bleeding disorder or family history and has not been transfused blood products in the past.

Upon initial examination, she was alert and oriented, moderately pale, not jaundiced, and not cyanotic with no peripheral lymphadenopathy. She was estimated to be 30 kg using the Broselow tape. Her vitals were within range with random glucose of 8.8 mmol/L. Her abdomen was flat with an inverted umbilicus and tender around her umbilicus with no obvious organomegaly. Rectal examination and other systems were essentially normal. She was admitted to the pediatric unit with a working diagnosis of amoebic dysentery and was initiated on intravenous Ciprofloxacillin and Metronidazole.

Her initial labs on admission showed INR of 0.96, leucocyte count of 23.6×10^9/L, hemoglobin of 5.8 g/dL, and platelet of 498×10^9/L. Her serum creatinine was 113 μmol/L, BUN of 9.63 mmol/L, and liver enzymes, bilirubin, and electrolytes were within normal range. The alkaline phosphatise was 152 IU/L. She was transfused with 3 units of whole blood during her stay. On the second day in the wards, she developed a high-grade fever (38.6 °C) despite on antibiotics and abdominally had generalized tenderness and guarding. Blood culture, hepatitis B, C, and syphilis were negative. Abdominal-pelvic ultrasound showed echoic free fluid in the Morrisons pouch, Pouch of Douglas, and splenorenal recess, otherwise, other organs appeared normal. CT-scan of the abdomen was urgently done which revealed multiple cystic collections in the peritoneal cavity, the largest one in the right paracolic gutter measuring 11 cm

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(Fig. 1). She was taken for an emergency laparotomy by general surgeons whereby intraoperatively immature small bowel adhesions were encountered and released, multiple pus pockets were seen at the infrahepatic and Pouch of Douglas and a perforated gallbladder at the neck was seen. The pus was drained and taken for culture and sensitivity whereby there was no growth. Cholecystectomy was done and taken for histology analysis. There were no stones in the gallbladder. Thorough abdominal lavage was done, and a drain was placed and closed. She was taken to the general pediatric surgery unit for monitoring.

Post-operatively she faired well with stable vitals, abdominal pelvic ultrasound was done on day 3 which was normal hence drain was removed. She completed five days of antibiotics and was discharged home. Her follow-up to the surgical clinic was uneventful after two weeks with a healed incision scar. Gallbladder biopsy revealed features of chronic cholecystitis, giving us a diagnosis of primary acalculous cholecystitis (Fig. 2).

3. Discussion

Gallbladder disease is a rare clinical entity with vague clinical presentation in the pediatric population. It is estimated only 1.3 pediatric cases for every 1000 cases of adult gallbladder disease [5]. A rare complication of which is gallbladder perforation has hardly few documented cases in the past years. The incidence in neonates is estimated to be 1.5 out of every 1,000,000 live births [6]. Due to its critical nature, the mortality rates range from 11 to 26 % necessitating its early diagnosis [7].

GBP is classified into 3 types by Niemeier, with the commonest being type-2 as seen in our case [7]. The causes of GBP include acalculous cholecystitis as seen in the index case, trauma, enteric fever, or sometimes spontaneous. Acalculous cholecystitis is uncommon in children and often occurs during an infection such as pneumonia, otitis media, typhoid fever, or gastroenteritis [8]. Infections promote gallbladder inflammation through the production of proinflammatory and vasoactive mediators [5]. Bile stasis is also thought to cause acalculous

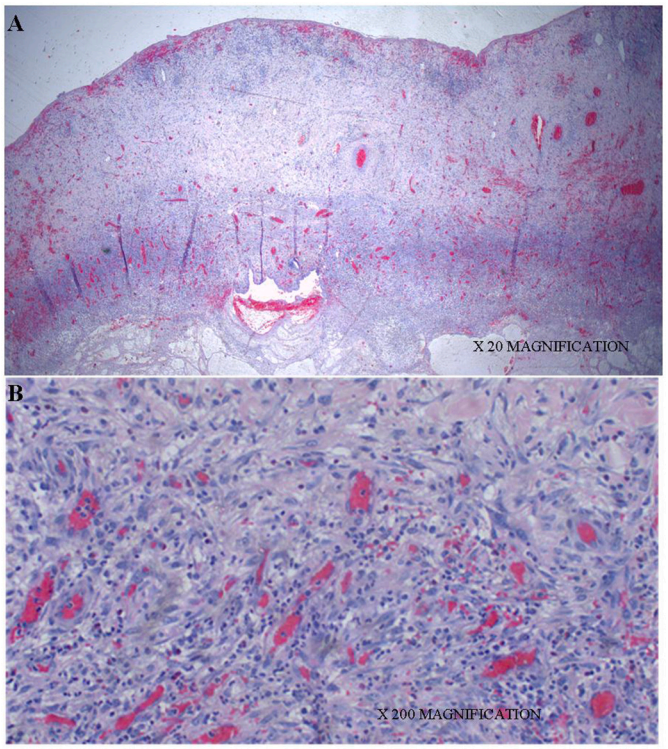

Fig. 2. Sections of gallbladder wall and mucosa showing mononuclear inflammatory cells infiltration and proliferation of blood vessels concerning for chronic granulomatous inflammation. This histological change allows the wall to appear thicker than normal due to fibrosis (H&E stained sections of A and B above with magnification of ×20 and ×200 respectively).

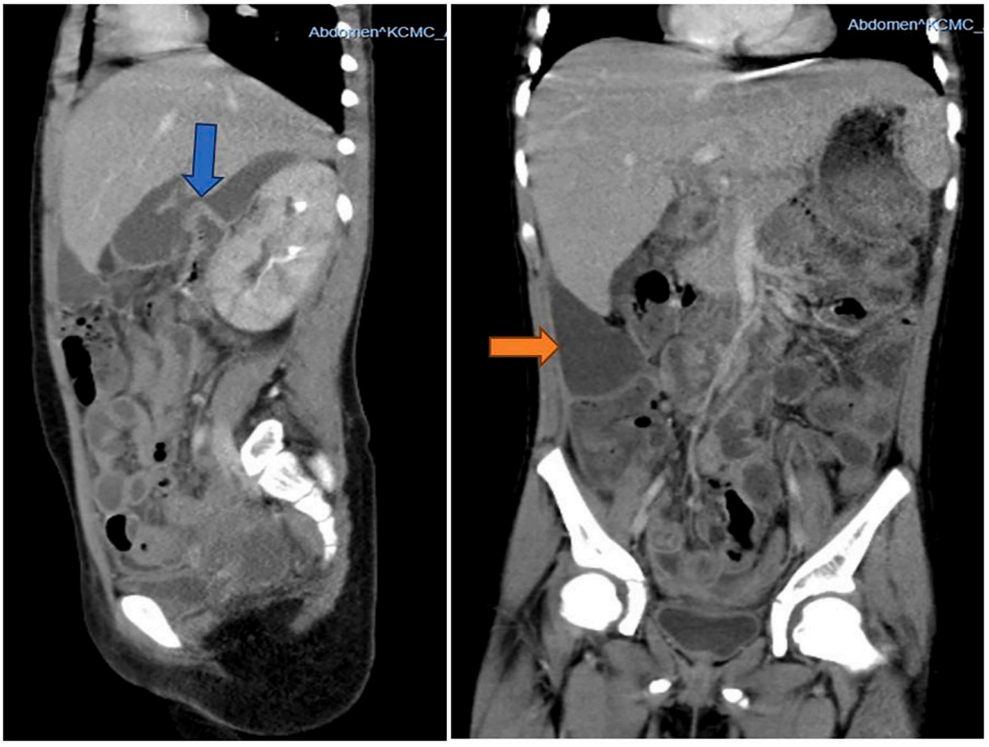

Fig. 1. Contrast sagittal view of the abdomen shows perforation of the gall bladder as shown by blue arrow. Coronal view of the abdomen shows a subhepatic and right paracolic gutter peritoneal abscess (orange arrow) secondary to gall bladder perforation.

cholecystitis due to volume depletion, high concentration of bile, opiod analgesia, or gastrointestinal hypomotility. Bile products such as lysophosphatidyl choline and beta-glucuronidase are thought to cause gallbladder mucosal injury leading to perforation [5,9]. Traumatic gallbladder perforations are exceeding rare and consist of only 1.9 to 2 % of all abdominal traumas [10,11]. Enteric fever accounting for 27 million cases worldwide, found in poor sanitation areas has also contributed to cholecystitis leading to gallbladder perforation [12]. Rare cases of GBP include gallbladder cysts [13] and foreign body ingestion as reported in a case of a 3-year-old child with 3 weeks of ingestion of a pin leading to perforation of the gallbladder on the transit of the pin in the alimentary tract [14].

The diagnosis is made through the clinical presentation, with patients presenting with localized or diffuse abdominal pain owing to biliary peritonitis and often diagnosed intra-operatively as seen in our case and most cases of GBP published [13]. Imaging modalities include USS and abdominal CT scans which are more sensitive as confirmed in the index case. More recently, contrast-enhanced ultrasound (CEUS) has been developed with a diagnostic accuracy for detecting solid organ injuries comparable to that of CT-scans, and has the capability of giving a more detailed description of traumatic cases [10]. Other modalities include Magnetic Resonance Cholangiopancreatography (MRCP) and drip-infusion cholangiography (DIC-CT) depending on the availability.

Most cases are managed according to the cause, mostly through a surgical approach than conservative as a means of clearing the biliary peritonitis as well as cholecystectomy as seen in our case. Cases with sealed type-2 perforations have been managed by tube cholecystostomy under ultrasound guidance [7]. Patients diagnosed with acalculous cholecystitis can be managed conservatively with analgesics and antibiotics and close monitoring of clinical symptoms and signs [15].

Moving forward in medicine, the use of artificial intelligence (AI) will aid clinicians to detect pathologies more accurately and hence come up with an accurate diagnosis, therefore, avoiding delays in management. Currently, the use of robotic surgery is rising to perform surgeries like cholecystectomy and microsurgery. This benefits both surgeons and patients, however, challenges include projecting an overlay on markerless deformable organs and tissue deformation therefore sensors and algorithms need to be advanced and updated regularly [16].

4. Conclusion

Gallbladder perforation although rare, but a life-threatening clinical condition with high mortality and should always be suspected in patients with acute abdomen, early diagnosis via imaging modalities and early management prompted to reduce ongoing morbidity and enhance recovery.

Consent

Written informed consent was obtained from the patient's mother for publication of this case report; additionally, accompanying images have been censored to ensure that the patient cannot be identified. A copy of the consent is available on record.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Ethical approval

Approval was obtained from the department of General Surgery and the appropriate hospital institutional review board has approved the publication of this case report.

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Guarantor

JL accepts full responsibility for the work and the conduct of the study had access to the data and controlled the decision to publish.

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CRediT authorship contribution statement

MS and JL reviewed medical records, conceptualized and drafted the manuscript. JL performed the surgery. AS and PA reviewed and reported the radiology and histology films respectively. All authors have read and approved the final script.

Declaration of competing interest

The authors declare they have no competing interests.

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