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Leukaemic Infiltration of the Gallbladder Wall in a Paediatric Patient with Imaging Features of Acute Cholecystitis

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Abstract Computed tomography findings of diffuse gallbladder wall thickening and pericholecystic soft tissue strandings are often present in acute cholecystitis. However, they are nonspecific. A paediatric patient suffered from leukaemic infiltration of the gallbladder, which was mimicked by acute acalculous cholecystitis both clinically and radiologically.

Key words Cholecystitis; Gallbladder; Leukaemic infiltration; Paediatric

Case Report

A 15-year-old girl was diagnosed to suffer from acute lymphoblastic leukaemia (ALL) since she was eight. Treatment was completed when patient was 11 years old but leukaemic relapse was confirmed when she was 13. This girl had been on palliative chemotherapy since diagnosis of relapsed leukaemia. She was admitted because of acute onset of epigastric pain and fever for a few days two weeks after chemotherapy (vincristine and dexamethasone) was given. Physical examinations showed she had tachycardia, tenderness over the right upper quadrant of the abdomen and hepatosplenomegaly. No lymphadenopathy was found. Blood tests on admission found marked neutropenia with absolute neutrophil count as low as 0.2 x 10^9/L (normal reference range 2-7 x 10^9/L). Serum leukocyte count on admission was normal but 40% blast cells were found. Liver and renal function tests were unremarkable. An urgent contrast-enhanced computed tomography (CT) of the abdomen was arranged for suspected intra-abdominal sepsis causing neutropenic fever. CT abdomen found diffuse gallbladder wall thickening, pericholecystic soft tissues strandings and hyperdense debris within the gallbladder lumen (Figures 1a & 1b). No gallstone was found. No abscess could be detected over the abdomen or pelvis. The CT diagnosis was acute acalculous cholecystitis. Multiple empiric antibiotics, which included cefepime, amikacin and meropenem were prescribed. Granulocyte colony stimulating factor was also given. The patient continued to have high swinging fever and persistent right upper quadrant abdominal pain. Serum C-reactive protein was as high as 351.0 mg/L (normal reference range <8 mg/L). Serial blood tests showed marked leukocytosis for consecutive three days with white blood cell count as high as 27.8 x 10^9/L. Blast cells elevated to 93%. Neutropenia persisted since admission. Microbiological culture of the midstream urine, blood culture for bacteria and fungus were negative. Culture of the sputum and throat swabs found commensals only. Follow-up CT of the upper abdomen one week after the initial study showed persistent inflammatory changes over the gallbladder. Cholecystectomy was subsequently performed around one week after admission as conservative management failed. Gallbladder mucosa was found to be gangrenous with inflammatory changes during the operation. Histological examination of the gallbladder found atypical cells with mildly enlarged and irregular nucleus (Figures 2a & 2b). Immunohistochemical studies of the atypical cells were positive for TdT and CD99

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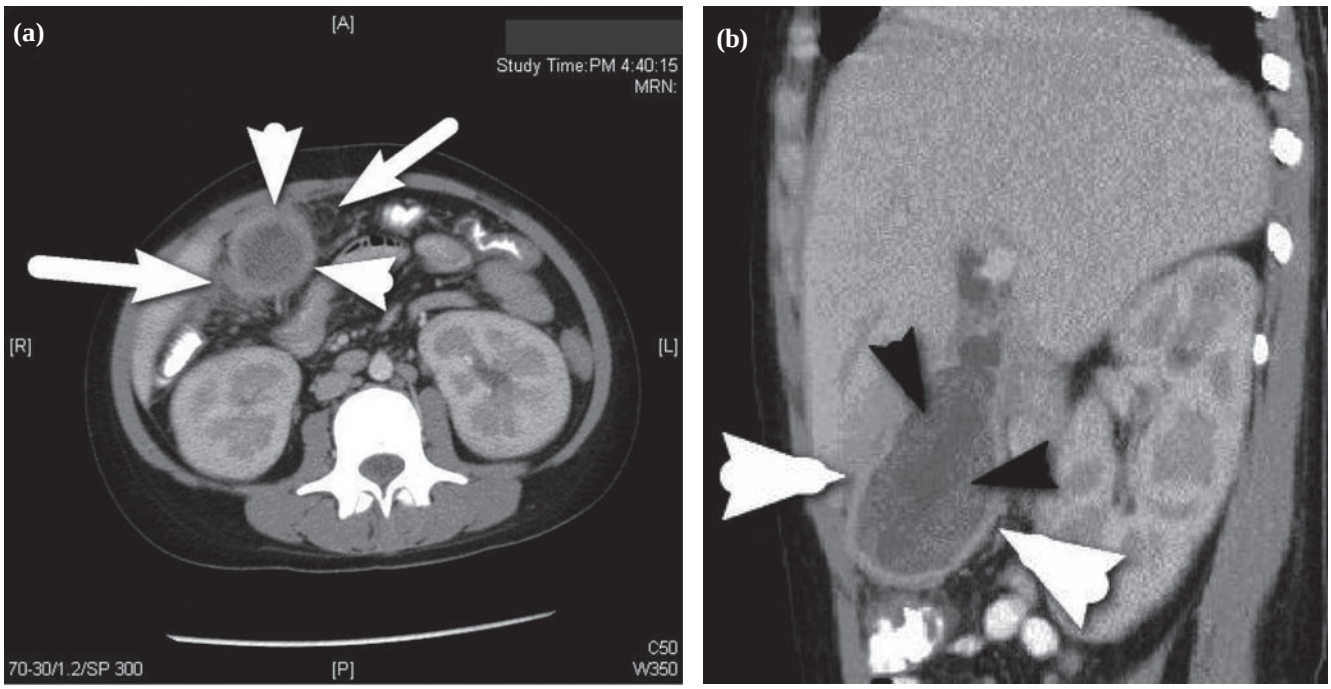

Figure 1 (a) An axial contrast enhanced CT image of the abdomen showed diffuse gallbladder wall thickening (white arrowheads) and pericholecystic soft tissue strandings (white arrow). (b) A sagittal reformatted contrast enhanced CT image showed gallbladder wall thickening (white arrowheads) and dense filling defects (black arrowheads) suggestive of sludge within the distended gallbladder. No gallstone was found.

(Figures 2c & 2d). Findings were consistent with leukaemic infiltration of the gallbladder. Fever and abdominal pain gradually subsided after the operation and the serum C-reactive protein level returned to normal level.

Discussion

ALL is the malignant transformation of a B-lineage or T-lineage lymphocytic precursor. It is the commonest diagnosis in paediatric oncology. Around 10% of patients with leukaemia suffer from significant gastrointestinal (GI) complications.[1] The possible mechanisms include direct leukaemic infiltration, immunodeficiency, coagulation disorders and toxicities from the chemotherapeutic drugs.[2] With direct leukaemic infiltration, obstruction and diffuse mucosal ulceration can occur along the bowel. Hepatosplenomegaly, hepatic and splenic rupture and infarction are possible. Acquired immunodeficiency predisposes patients with ALL to common as well as opportunistic infections, which include esophageal and hepatic candidiasis and colonic cytomegalovirus infection. Altered immune status may contribute to typhlitis, which involves inflammation of the cecum, ascending colon and sometimes the terminal ileum. The exact causes of typhlitis are not well established but it typically manifests after intensive chemotherapy in neutropenic patients. Abdominal ultrasonography and CT scans can show mural thickening and peri-colonic fluid collections. Treatment of typhlitis includes broad spectrum antibiotics, bowel rest, supplemental nutrition and granulocyte transfusions. Surgery is indicated only when complications like perforation occurs. Coagulation defects can cause intramural haematoma of the bowel. Gastrointestinal haemorrhage is a life-threatening condition secondary to profound thrombocytopenia, although infectious lesions and leukaemic infiltration may also contribute.

The exact incidence of leukaemic infiltration of the gallbladder is unknown, probably due to its rarity. To the best knowledge, it has never been described in English literature in paediatric patients under 16 years old. Leukaemic gallbladder infiltration in adults has been rarely reported: one regarding a 35-year-old man who suffered from ALL and underwent bone marrow transplantation;[3] the other was about a 49-year-old man with cholecystitis as the presenting manifestation of acute myeloid leukaemia.[4]

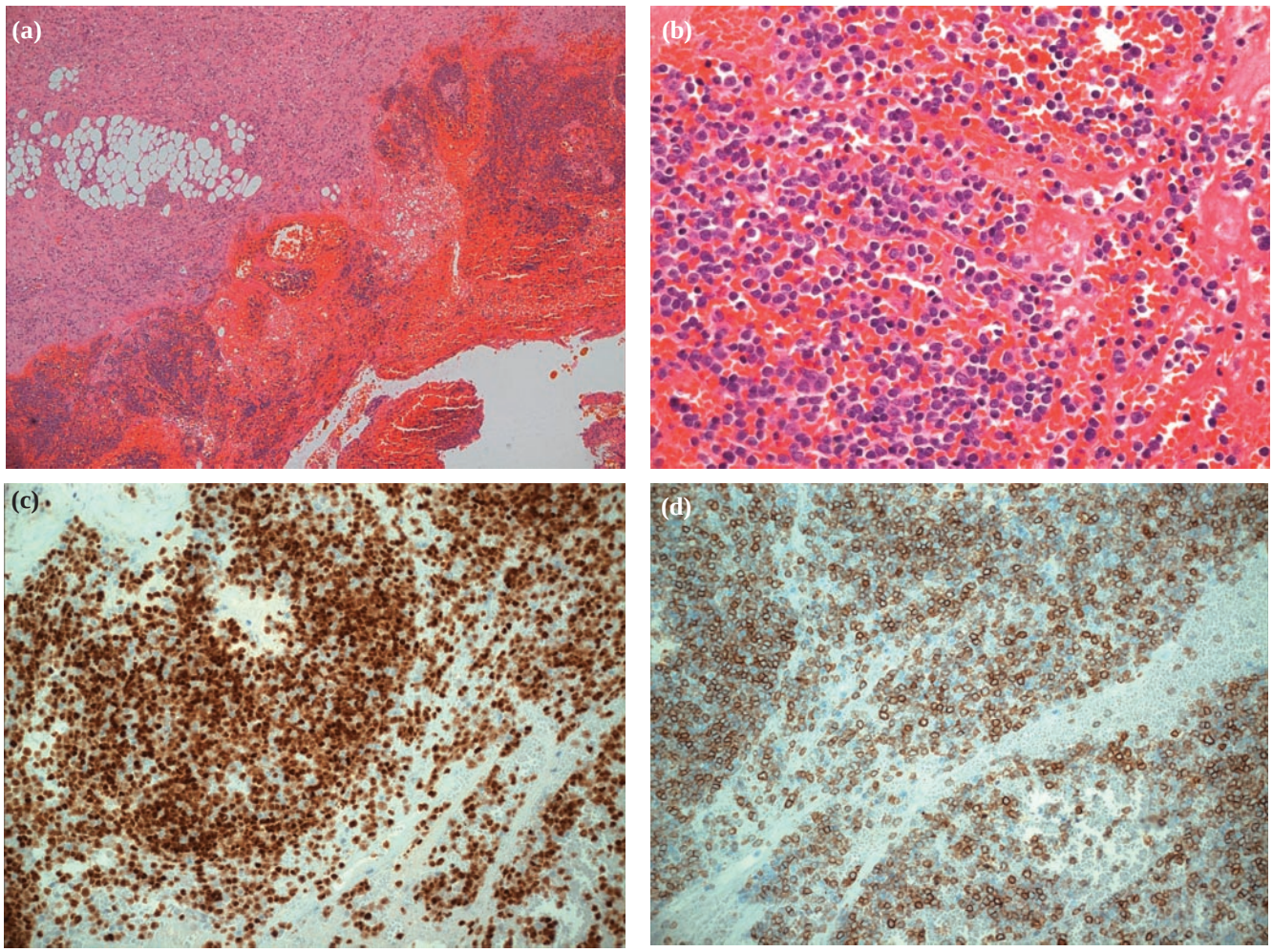

Figure 2 (a) A light microscopic image using haematoxylin & eosin (H&E) staining showed gallbladder wall was infiltrated by large number of inflammatory cells. (b) A light microscopic image of higher magnification showed the atypical cells have mildly enlarged and irregular nuclei. (c) & (d) Immunohistochemistry showed the atypical cells were positive for TdT (c) and CD 99 (d). Findings were compatible with leukemic infiltration of the gallbladder wall.

Acute acalculous cholecystitis may be associated with stress, such as major surgery, severe trauma, burns and sepsis. It is uncommon in paediatric patients and has been reported to be associated with hepatitis A.[5] Clinical features of acute acalculous cholecystitis and leukaemic gallbladder infiltration can be similar. During CT and ultrasound examinations, diffuse gallbladder wall thickening (>3 mm) and pericholecystic fluid may be found in both acute acalculous cholecystitis and leukaemic gallbladder infiltration. Ultimate diagnosis requires histological examination. In summary, a paediatric patient with relapsed ALL developed leukaemic infiltration of the gallbladder during chemotherapy mimicking acute cholecystitis has been reported. In addition to acalculous cholecystitis, leukaemic infiltration of the gallbladder should be considered as a differential diagnosis in a leukaemic patient with clinical and imaging evidence of gallbladder inflammation in absence of gallstones.

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