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CASE REPORT

# Pediatric Burkitt lymphoma presenting as acute pancreatitis: MRI characteristics

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**Abstract** Acute pancreatitis is a rare initial presentation of non-Hodgkin lymphoma with few reported cases described in older adults and even fewer in children. MRI features of Burkitt lymphoma of the pancreas are sparse in the radiologic literature. We present a 6-year-old boy who presented with pancreatitis and obstructive jaundice, which was the result of Burkitt lymphoma of the pancreas. The imaging findings of pancreatic involvement of Burkitt lymphoma on MRI are discussed and the contributory role of the radiologist in guiding the appropriate clinical work-up of this disease is highlighted.

**Keywords** Lymphoma · Burkitt · MRI · Children

## Introduction

Burkitt lymphoma comprises 30% of non-endemic pediatric lymphomas [1]. Most patients with Burkitt lymphoma present with large abdominal masses, frequently involving the ileocecal region of the bowel. Other sites commonly involved include abdominal and peripheral lymph nodes, pleura, peritoneum and pharynx [2]. Involvement of the pancreas in childhood Burkitt lymphoma is unusual, with minimal discussion of the MRI characteristics of pancreatic Burkitt in the pediatric population. We present a case of pancreatic involvement by Burkitt lymphoma, which manifested as acute pancreatitis and obstructive jaundice in a 6-year-old boy. The MRI features of Burkitt lymphoma of the pancreas are discussed.

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## Case report

A 6-year-old boy, who complained of nausea for 7 days, presented with jaundice and vomiting. On physical examination he was found to have scleral icterus. Epigastric tenderness was not appreciated by the clinicians. Laboratory investigations demonstrated an elevated amylase of 608 units/L and lipasae of 2484 units/L. The LFTs were elevated, with AST of 203 units/L and ALT of 291 units/L. Total bilirubin was 7.3 mg/dL.

The laboratory tests were highly suggestive of acute pancreatitis; US was performed and showed dilated intrabiliary and common bile ducts. A distended gallbladder was noted, with no evidence of pericholecystic fluid, gallbladder wall thickening, or cholelithiasis. Echogenic material was seen layering within the gallbladder, likely representing sludge. The lack of cholelithiasis made choledocholithiasis less of a consideration. Moderate to severe left-sided hydronephrosis was also noted. The pancreas appeared diffusely enlarged and hypoechoic (Fig. 1) with peripancreatic fluid.

MRI of the abdomen was performed for additional characterization of the pancreas and biliary obstruction. Diffuse enlargement of the pancreas was noted. The signal characteristics of the pancreas were low signal intensity on T1 and T2. The common bile duct was dilated up to 9 mm. Intrahepatic biliary ductal dilatation was noted as well. Two large pelvic masses were seen, each within inguinal lymph node chains (Fig. 2). The signal characteristics of the pancreas (Fig. 2) were identical to the two large pelvic masses. The pancreatic duct was not dilated. The mass in the left hemipelvis was noted to compress the urinary

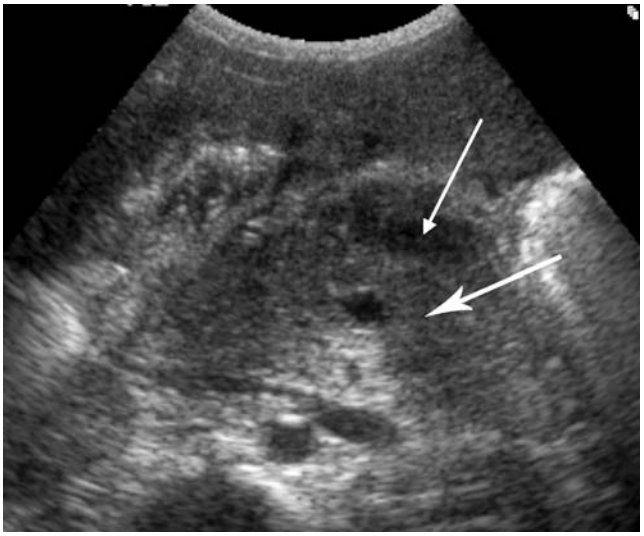

**Fig. 1** Transverse sonogram of the epigastrium demonstrates diffusely enlarged hypoechoic pancreas (*thick arrow*) with peripancreatic fluid (*thin arrow*)

bladder and caused left-sided hydroureteronephrosis (Fig. 3). Gadolinium was not administered as it was refused by the parent. No other organ involvement was apparent. MRCP and PET-CT were not performed.

CT-guided biopsies of the pancreas and left pelvic mass were performed and demonstrated Burkitt lymphoma involving pelvic lymph nodes and pancreas. The pancreas was biopsied in this case to ascertain that there was indeed Burkitt involvement of the pancreas and not just pancreatitis.

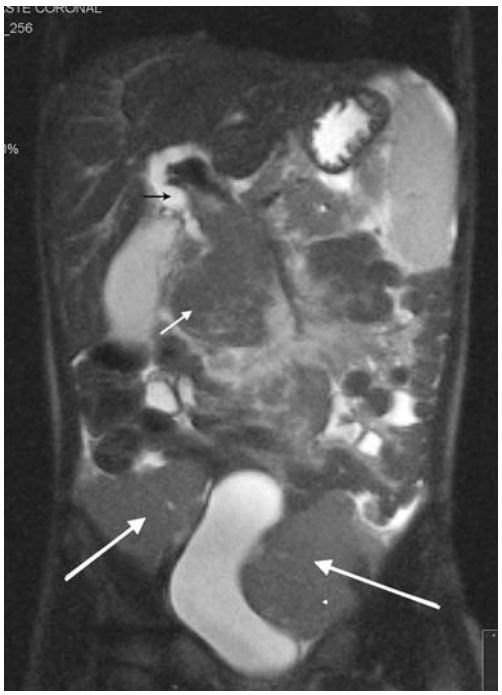

**Fig. 2** Half-Fourier single-shot turbo spin-echo (HASTE) T2-W coronal MRI of the abdomen and pelvis demonstrates low signal intensity within a diffusely enlarged pancreas (*small white arrow*) and dilatation of the common bile duct (*small black arrow*). Two large pelvic masses are also noted (*large white arrows*) with identical signal characteristics as the pancreas

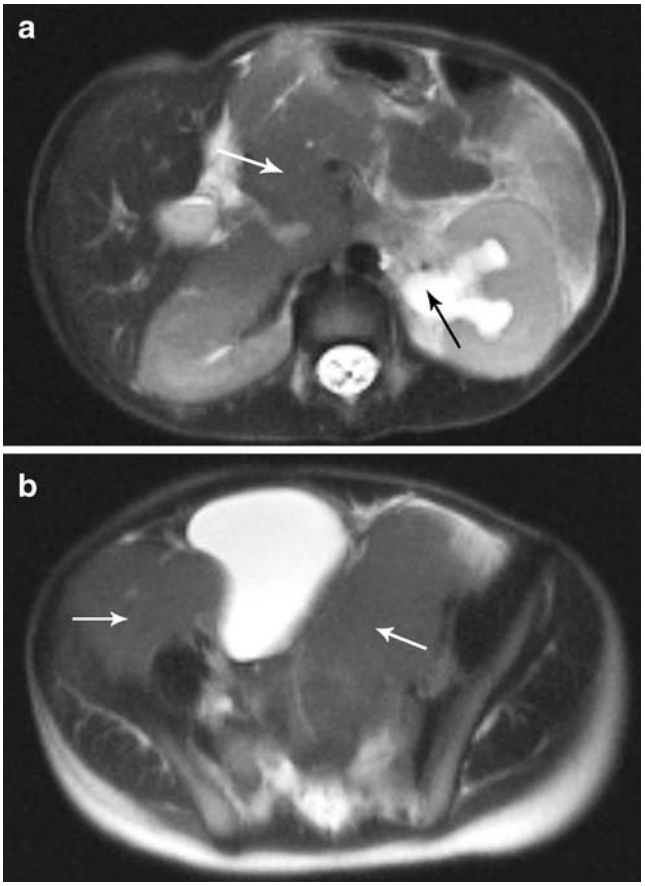


**Fig. 3** HASTE axial images of the abdomen and pelvis. Diffusely enlarged, low signal pancreas and hydroureteronephrosis of the left kidney, secondary to left pelvic mass. Note identical signal intensity of pancreas and pelvic masses. **a** Diffusely enlarged pancreas (*white arrow*) and hydroureteronephrosis (*black arrow*) of the left kidney. **b** Bilateral pelvic masses (*arrows*)

## Discussion

Burkitt lymphoma is a highly aggressive B-cell neoplasm characterized by translocation and deregulation of the c-myc gene on chromosome 8. There are three distinct clinical forms of Burkitt: endemic, sporadic, and immunodeficiency associated. Immunodeficiency-associated Burkitt lymphoma is usually associated with HIV infection or other immunocompromised individuals. Sporadic, also known as American Burkitt lymphoma, in contrast to endemic (African) Burkitt, has a lower incidence of jaw involvement and usually occurs in the abdomen, with the ileocecal region being the most common site of involvement. It presents most often with massive disease and ascites, involving the distal ileum, stomach, cecum and/or mesen-

tery, kidney, testis, ovary, breast, bone marrow, or central nervous system. Presenting symptoms can include those related to bowel obstruction or gastrointestinal bleeding, often mimicking acute appendicitis or intussusception. Pancreatic involvement in Burkitt lymphoma is rare [3], and may be a manifestation of widely disseminated preterminal disease [2, 3].

Given the low incidence of Burkitt lymphoma, acute pancreatitis as the initial presentation of Burkitt lymphoma is unusual. When acute pancreatitis does present in children, it is usually caused by trauma, infection, structural anomalies, and some medications (such as tetracycline, L-asparaginase, valproic acid, and steroids) [4] .

Burkitt lymphoma is one of the most rapidly growing pediatric tumors, with a cellular doubling time of about 24 hours [5]. Because of its very rapid growth rate, it requires prompt diagnosis for initiation of proper treatment. Burkitt lymphoma is particularly responsive to intensive combination chemotherapy, and is one of the first human tumors that has been shown to be curable by chemotherapy alone. While not at the forefront of the differential, due to its responsiveness to chemotherapy, it is important to consider Burkitt lymphoma when confronted with a pediatric presentation of any pancreatic mass.

A definitive diagnosis requires a biopsy; however, imaging plays an important role in the diagnosis and staging of pancreatic masses. In general, when appearing in the pancreas, lymphomas can manifest as focal lesions or can diffusely infiltrate the gland. On US, focal or diffuse hypoechoic areas of enlargement may be seen [6].

MR imaging findings in pediatric patients with Burkitt lymphoma have not been well described in the literature. In the adult population, pancreatic involvement with Burkitt lymphoma has been described as focal or infiltrative [7]. Focal lesions may appear as a low-signal-intensity homogeneous mass on T1 and a more heterogeneous mass on T2 with low-intermediate signal amplitude. There is subtle enhancement after administration of gadolinium on T1. The diffuse infiltrating type of pancreatic involvement is seen as diffuse enlargement of the gland with diffuse low signal intensity on unenhanced T1-weighted (T1-W) and T2-weighted (T2-W) images, and mild enhancement after gadolinium injection [7].

The findings of pancreatic involvement with Burkitt lymphoma in the adult population are consistent with the MR findings in our case, in which the pancreas appeared diffusely enlarged and of low signal intensity on T1- and T2-W imaging. Interestingly, the low signal characteristics of the pancreas on T1- and T2-W images matched those of the nodal disease in the pelvis, which we feel were clues to the diagnosis. Gadolinium was not administered, as it was refused by the patient's parent. However, prior reports of Burkitt lymphoma involvement of the pancreas in the adult population have shown little or no enhancement of the pancreas with this disease process.

US is the accepted standard of care as the imaging modality for the evaluation of the gallbladder and the biliary tree and can be used in mild, uncomplicated cases of acute pancreatitis. However, it cannot clearly delineate the extent of pancreatic disease, such as spread or extent of involvement, and frequently results in an incomplete exam because of the high frequency of overlying bowel gas. In adults, characterization of pancreatic disease processes is generally assessed by CT. In light of the recent attention to radiation dosages to children from CT, it is our opinion that MR is the modality of choice for evaluation of pancreatic disease in children. With respect to tumor involvement of the pancreas, MR imaging is possibly slightly better than CT in assessing pancreatic vessel and lymph node invasion [8]. In addition, bile and pancreatic ductal dilatation can be easily assessed with MR imaging using MR cholangiopancreatography. However, because of longer imaging times needed, some children may require sedation for the study.

In conclusion, Burkitt lymphoma of the pancreas may be considered one of the causes of pancreatitis in children. Burkitt lymphoma, despite the rarity of occurrence in the pancreas, needs to be recognized because of its rapid growth and its positive response to chemotherapeutic treatment. Our case suggests that lymphomatous involvement of the pancreas may display the identical MR signal characteristics as the nodal disease, which, if present, may aid in the diagnosis. We feel that after the initial US study, MR imaging of the pancreas is the study of choice in characterizing pancreatic involvement with Burkitt lymphoma in light of the attention made to radiation doses in children from CT.

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