

Ultrasound of a distended pediatric abdomen in a limited resource setting

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Abstract

Background Abdominal distension among the pediatric population is a frequently encountered diagnostic dilemma. In rural areas, the lack of resources limits the physician's ability to make a definitive diagnosis and initiate appropriate treatment. The use of point-of-care ultrasound as a diagnostic tool has become more widespread due to its safety, portability and relatively low costs.

Case report We present a case of an emergency medicine where physician performed an ultrasound to diagnose the etiology of a child's distended abdomen in a remote area of Tanzania.

Keywords Ultrasound · Pediatrics · Abdomen · International · Tanzania · Lymphoma

A 7-year-old girl presented to a clinic in Shirati, Tanzania. She complained of abdominal distention associated with increasing fatigue, difficulty ambulating and dyspnea on exertion for 3 months. On physical examination, her abdomen was soft and markedly distended with diffuse tenderness (Fig. 1). A large palpable mass was noted. A fluid wave was not appreciated. The treating physician was uncertain of the etiology of the abdominal distension. The differential diagnosis included ascites, schistosomiasis, hepatomegaly, splenomegaly or malignancy. In the limited rural setting, the clinician was at a disadvantage at diagnosing the cause of the abdominal distension because of a lack of electricity and laboratory tests.



Fig. 1 A photograph of a 7-year-old female with a distended abdomen

An emergency medicine physician working in Tanzania at the time used a z.one ultra battery-operated portable ultrasound machine (Zonare, Mountain View, CA) to differentiate the etiology of the abdominal distension. A 9–3 MHz curvilinear probe was used. Ascites and a large 12 cm × 20 cm homogenous mass, likely originating from the ovaries, were visualized (Figs. 2, 3). Internal blood flow of the mass was not assessed, and peripheral vascularity evaluation was limited secondary to its large size. The patient was presumed to have primary ovarian Burkitt's lymphoma (BL), due to its prevalence associated with Epstein Barr virus (EBV) and Human Immunodeficiency virus (HIV) among the pediatric population in Tanzania. The patient was referred to a large tertiary care hospital in Dar Es Salaam, Tanzania for treatment and lost to follow-up.

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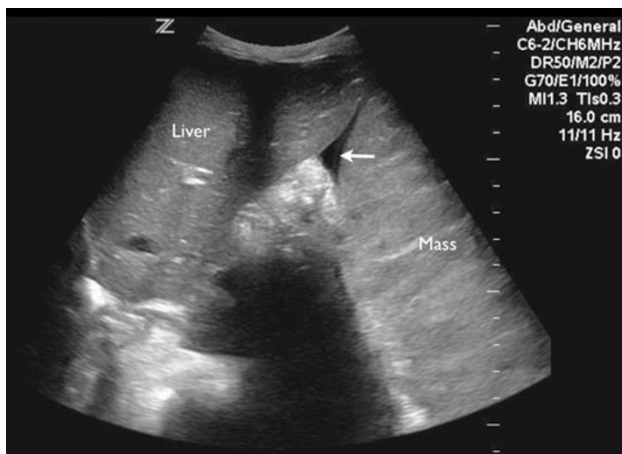


Fig. 2 Two-dimensional B-mode ultrasound. Sagittal view of the right upper quadrant of the abdomen showing the liver, large abdominal mass and ascites (arrow)



Fig. 3 Two-dimensional B-mode ultrasound. Sagittal view of the abdominal mass

Burkitt's lymphoma was first recognized by Dr. Denis Burkitt in Uganda over five decades ago [1]. Since then, BL has been found to be a highly aggressive non-Hodgkin lymphoma. This is especially true in children who account for 32% of BL cases. The incidence of BL has risen dramatically in endemic areas over the past few years. This increased prevalence has been linked to the rise of EBV and HIV, both of which have been linked to the endemic form of BL. BL is the most rapidly growing tumor in children, doubling in size every 22 h. The median age of children afflicted with BL is 8 years [2].

Extranodal involvement of BL is not unusual with the abdomen as the most frequent site of involvement. Malignant lymphomas involving the female genital tract are relatively rare and occur in less than 1% of cases. Primary ovarian lymphoma has been found to account for approximately 0.5% of non-Hodgkin's lymphoma and 1.5% of ovarian tumors [3]. Previous studies have shown

that 19% of cases of adnexal lymphomas are caused by BL [2]. Although ovarian lymphoma has a poor prognosis, early detection can lead to successful resolution with appropriate treatment [4]. The international medical community has recognized the importance of early diagnosis and appropriate treatment.

The differential diagnosis for a large intra-abdominal mass in children include, but is not limited to, neuroblastoma, Wilms' tumor, lymphoma, hepatoblastoma, sarcoma, fecal mass, bowel obstruction, abscess and teratoma. Ultrasound is considered as the initial imaging study of choice for pediatric patients with an abdominal mass. Ultrasound can be used to determine the organ of origin, vascularity and solid versus cystic component of the mass. Previous studies describe typical ultrasound findings in extranodal locations associated with BL. Ultrasound findings in BL involving the intestines include the "doughnut sign" of intussusception, pseudokidney sign with or without intussusception, or target sign when occult cecal tumor invades the ascending colon [2]. One prior study utilized high-resolution pelvic transvaginal ultrasound showed a large homogenous pelvic mass, extending to the uterus, with a mildly enlarged left ovary and minimal free fluid in the pelvic cul-de-sac [4]. In this case, power Doppler showed no blood flow in the mass [4]. Another report described a homogenous, slightly echogenic mass, that had a prominent small cystic areas around the periphery [3].

Computed tomography is the preferred test to identify bowel and visceral involvement, and tumor staging [2]. Definitive diagnosis of BL is done by biopsy or fine needle aspiration of tissue to find uniformly immature cells, cells with vacuolation and a "starry sky" appearance [5]. However, all of these tests utilize an immense amount of expertise, equipment and funding that are often not available in endemic regions with limited resources.

Prior to the advent of advanced imaging studies, there was one case series that examined 22 patients with ultrasound who had biopsy-proven BL. In the study, 15 of the 22 patients had abnormal ultrasound findings that included large, bulky homogenous extranodal tumors without lymph node involvement. The study concluded that ultrasound could be used for tumor size, location and its relationship with adjacent organs [6]. This is similar to the ultrasound findings in our patient with abdominal distension. We were able to discern a large homogenous mass that did not involve other vital organs. We concluded, particularly in a region where BL is prevalent, that the origin of the mass was most likely an ovarian BL.

Abdominal distension among the pediatric population is a frequently encountered diagnostic dilemma. Lack of resources may limit the physician's ability to make a definitive diagnosis and initiate appropriate treatment. Ultrasound is a very useful imaging modality, especially in

settings where emergency physicians may be the first diagnosticians to encounter the patient. Previous studies have also shown that emergency physicians can be quickly trained in bedside ultrasound. Its accessibility, noninvasive nature and lack of ionizing radiation make it an ideal first choice for diagnosis.

Conflict of interest None.

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