PEDIATRIC CYSTIC ABDOMINAL MASSES

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Pediatric cystic abdominal masses can be of many origins. Consideration of age, location and imaging findings aids in the differential diagnosis. We review various causes and imaging findings of cystic masses in children and adolescents and present here one case with choledochal cyst and another with mature cystic ovarian teratoma.

INTRODUCTION

Abdominal mass in children is a common finding. Ultrasound is an easy noninvasive method that can help differentiate cystic from solid mass lesions and determine the origin of the mass in these patients.

CASE REPORTS

Case 1
A 15-month old girl presented with frequent vomiting and fever 6 hours before admission. Physical examination revealed no jaundice. There was a palpable mass of cystic consistency at left abdomen. Plain abdomen showed ill-defined mass lesion at mid and left upper abdomen (fig.1) CT was done from other medical center before admission and showed a large well-defined cystic mass clearly separable from the liver and other upper abdominal organs, but it was not possible to predict the pathologic diagnosis. US done after CT showed a cystic mass size 7x11x11 cm medial to the gallbladder (fig.3a) with short communication between the mass and the gallbladder (fig.3b). By US findings, a choledochal cyst was highly suggested. The final diagnosis was a choledochal cyst type I after cystectomy and cholecystectomy.

Fig.1 Plain abdomen showed ill-defined mass lesion at mid and left upper abdomen.
**Fig. 2** CT showed a large well-defined cystic mass clearly separable from the liver and other upper abdominal organs (arrows).

**Fig. 3** (a) US showed a cystic mass (C) size 7x11x11-cm medial to the gallbladder (GB). (b) A short continuation with the gallbladder (arrow).
Case 2

A 12-year-old girl presented with palpable mass at mid abdomen for about 3 months. Physical examination revealed large palpable mass of rubbery consistency at mid abdomen. Plain abdomen showed an ill-defined mass at mid abdomen with multiple small calcifications (fig.4). The calcifications were not teethlike. Ultrasound revealed a large complex cystic mass with echogenic component which showed distal acoustic shadowing (fig.5). Uterus and right ovary were seen to be normal whereas the left ovary was not identified. Bilateral mild hydronephrosis was also found. CT was done and showed a large complex cystic mass with calcifications and fat content (fig.6). By ultrasound and CT, an ovarian teratoma was suggested. After tumor removal and left salpingectomy, pathological diagnosis was mature cystic ovarian teratoma.

Fig.4 Plain abdomen showed an ill-defined mass at mid abdomen with multiple small calcifications (arrows)
Fig. 5 Ultrasound showed a large complex cystic mass and echogenic component with distal acoustic shadowing (arrow).

Fig. 6 CT showed a large complex cystic mass with calcifications (arrow) and fat content (open arrowhead).
DISCUSSION

Cystic abdominal masses in children and adolescents may arise from many organs. If the masses are clearly separable from the liver and spleen and do not distort identifiable extraperitoneal structures, they are probably intraperitoneal. In children, most cystic intraperitoneal masses are related to the mesenteries, omentum, ovary, or bile ducts (8). Retroperitoneal cystic masses which arises outside the major organs within that compartment are uncommon (19).

Retroperitoneal cystic masses are divided into neoplastic and nonneoplastic subgroups. Most of the neoplastic masses are uncommon and rare, except for retroperitoneal cystic teratomas which is commonly diagnosed in female new-borns who are usually asymptomatic. A mature teratoma of the retroperitoneum manifests as a complex mass containing a well-circumscribed fluid component, adipose tissue, and calcification (19). Among the nonneoplastic cystic retroperitoneal masses, pancreatic pseudocyst is a possible entity in children and should be included in the differential diagnosis (18,19).

Pancreatic pseudocysts are most often peripancreatic in location but may also be seen nearly anywhere in the abdomen and in the mediastinum (11,19). Pseudocyst formation is a potential complication of pancreatitis regardless of etiology. Pseudocysts may be large enough to identify on plain films. They frequently cause a mass effect on adjacent structures, especially the stomach and duodenum. On ultrasound, they are typically anechoic, although some may contain debris (11). Their effects on adjacent organs may be identified on ultrasound but CT can better define the location and contiguous anatomic relations of the lesion (9,11).

Ureteropelvic junction obstruction can present as mass lesion in both upper quadrants of neonates and children (11,18). It actually is the most frequent cause of neonatal abdominal mass (11). It can be differentiated from other cystic masses by the demonstration of dilated calyces in addition to the huge renal pelvis (18).

Large adrenal cysts may present as a cystic upper quadrant mass and may be found in older children (11,18). If they have a thin, smooth wall without any solid components, and there is no evidence of endocrine dysfunction, hypertension, infection, or metastatic disease, they are unlikely to be adrenal neoplasms (11).

A choledochal cyst can present as upper abdominal mass in infants and children (3,7,11,18). It is usually detected in the first decade of life and is four times more common in females than males with a predominance in Japanese (14). In infancy, choledochal cyst may present with cholestatic jaundice and may be clinically inseparable from neonatal hepatitis or biliary atresia (11). In older children and young adults, the clinical presentation is variable and nonspecific, including upper abdominal pain, jaundice, and a palpable mass. In most cases, ultrasound is adequate and a specific diagnosis can be made by its characteristic location in the porta hepatic separate from the gallbladder and the identification of the cystic or common bile duct entering the cystic mass (3,7). However, when a huge choledochal cyst lacks an intrahepatic involvement, abdominal cystic lesions such as mesenteric, omental, ovarian, renal, adrenal, and hepatic cysts; gastrointestinal duplications; hydropnephrotic kidneys; and pancreatic pseudocysts could be important differential diagnoses (1).
Cystic masses associated with the gastrointestinal tract can occur anywhere in the abdomen (18). Duplication cysts of intestinal tract most frequently locate in the region of terminal ileum and ileocecal valve though they can be located anywhere in the GI tract (11). Presenting symptoms depend on the location and size of the duplication with obstruction as the most frequent cause (11). Duplication cysts may communicate with the GI tract and contain intraluminal debris differentiating them from mesenteric cysts. Cysts of mesentery and omentum usually present as asymptomatic abdominal masses or with progressive abdominal distension, although rarely more acute symptoms of pain and obstruction may occur secondary to torsion, infection, hemorrhage, or rupture of the cyst (9). Mesenteric cysts may be unilocular or multilocular. While duplication anomalies are ovoid, mesenteric cysts are flatter in anteroposterior diameter and conformed more closely to the anterior abdominal wall instead of distending it. The mesenteric cysts change configuration with changes in position, which may help differentiate it from ovarian cysts (18).

Ovarian masses in children consist of functional cysts in approximately 60% of cases and neoplasms in 40% of cases (5). Functional cysts, although are usually asymptomatic, may cause pain related to pressure or hemorrhage (17). On ultrasound, a nonhemorrhagic functional cyst appears as a smooth, unilocular cystic mass. With extensive hemorrhage, the cyst may appear predominantly echogenic but will have increased sound transmission reflecting its underlying cystic nature (17). Benign mature teratomas account for two-thirds of ovarian neoplasms and are the most common ovarian neoplasm in pediatric patients (5,13,17). They are less common in children and therefore more typically found in the adolescent or after puberty (11, 15). On ultrasound, approximately two-thirds of teratomas are seen as complex masses containing echogenic and hypoechoic components. The remaining one-third are either echogenic or anechoic (11,17). The most characteristic ultrasound appearance is a hypoechoic mass with an echogenic mural nodule, which often is associated with distal acoustic shadowing. Acoustic shadowing may represent either calcification or matted mixture of sebum and hair (17). Fat-fluid level in a mass on ultrasound strongly suggests a cystic teratoma (10). CT is helpful both in demonstrating fat and subtle calcifications in those instances when plain films and ultrasound are nondiagnostic and in delineating the effect of the mass on surrounding structures (4). The presence of fat inside an ovarian tumor appears to be specific to ovarian cystic teratoma (2).

CONCLUSION

Although CT can provide an excellent anatomic depiction of cystic abdominal masses in children, it is not generally possible to predict the pathologic diagnosis, particularly with large mass. Ultrasound, with its noninvasiveness, should remain as a screening examination for any child or adolescent presenting with abdominal mass. Ultrasound can help delineating the extent of the mass and defining its relationship with normal intra-abdominal structures. Associated findings such as ascites or hydronephrosis are easily detected. Often, correlation of ultrasound findings with clinical information, a provisional diagnosis can be suggested and proper treatment can be considered. Otherwise, ultrasound can be used as an adjunct to other cross-sectional imaging techniques such as CT to help predict the pathologic diagnosis.
References: