Meconium Peritonitis Presenting as a Solitary Calcified Mass on Ultrasound at Mid-trimester and Identified with Fetal Magnetic Resonance Imaging

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Meconium peritonitis usually results from perforation of the intestine occurring in utero or shortly after birth. The common features of meconium peritonitis on prenatal ultrasonography are a solitary calcified mass or disseminated intraperitoneal calcifications, ascites, pseudocyst, and occasionally polyhydramnios and fetal hydrops. We report a case where prenatal ultrasound revealed a calcified mass in the right upper quadrant of the abdomen. Subsequent magnetic resonance imaging (MRI) suggested simple meconium peritonitis. Fetal MRI is considered to be reliable for demonstrating meconium peritonitis. Prenatal diagnosis of meconium peritonitis and identification of associated malformations facilitate planning of delivery, earlier surgical counseling, and better neonatal outcome.

KEY WORDS — fetal disease, intrauterine diagnosis, magnetic resonance imaging

Case Report

A 26-year-old, gravida 1, para 0, woman received regular prenatal examinations at our hospital. Two ultrasound examinations performed before 20 weeks of gestation did not show significant abnormalities. At 22 weeks of gestation, she requested a level II ultrasound for detailed survey. Growth parameters, including abdominal circumference, head circumference, and femur length, were all in the normal range; the volume of amniotic fluid was adequate. However, a solitary calcified mass (about 20 × 20 mm) in the right upper quadrant of the abdomen without

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ascites was found (Fig. 1). Amniocentesis, 46,XY, showed no chromosome abnormalities.

In order to clearly delineate the calcification and its surrounding structures, the patient was transferred to Linkou Chang-Gung Memorial Hospital, a tertiary medical center, for further counseling. At 26 weeks of gestation, fetal MRI was performed and revealed an extrahepatic ovoid lesion (approximately 1.6 × 1.6 × 1.5 cm in size) with slight T2-hyperintensity and peripheral hypointensity (Fig. 2), and slight T1-hyperintensity (suggesting mineralization) in the right upper quadrant of the abdomen.

No abnormalities were noted in bilateral kidneys, liver, and gallbladder. There was neither definite dilatation of the intestine nor ascites. So, simple meconium peritonitis without associated gastrointestinal (GI) tract abnormalities was suspected.

After parental counseling and close follow-up, a male baby, weighing 3595 g, was born at 39 weeks of gestation by vaginal delivery on December 8, 2005. The neonate was admitted to the neonatal intensive care unit for further study. Plain abdominal radiographs showed right upper quadrant calcification, with upper GI series revealing patency of the GI tract (Fig. 3). After being released from intensive care, the baby was fed uneventfully without the need for exploratory surgery.

**Discussion**

Meconium peritonitis usually results from perforation of the intestine, mainly the small bowel, occurring *in utero* or shortly after birth. The possible etiologies are vascular accident, meconium plug extrusion and intussusception. The incidence of meconium peritonitis ranges from 1 in 1500 to 1 in 2000. Without prenatal diagnosis and planned postnatal treatment, mortality is as high as 62% [1,2].

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*Fig. 1. Fetal sonography shows a solitary calcified mass (approximately 20 × 20 mm) in the right upper quadrant of the abdomen, without ascites.*

*Fig. 2. Fetal T2-weighted magnetic resonance imaging shows slight hyperintensity with peripheral hypointensity in the right upper quadrant of the abdomen (arrow).*

*Fig. 3. Neonatal plain abdominal radiography shows calcification (arrowhead) in the right upper quadrant of the abdomen, without intestinal obstruction.*
Although various sonographic findings are associated with meconium peritonitis, including bowel dilatation, ascites, and polyhydramnios, the most common feature is intra-abdominal calcifications with acoustic shadowing [3]. Some authors have classified this disease into simple and complex types according to the absence or presence of bowel dilatation, ascites, and polyhydramnios to predict the prognosis and possibility of postnatal surgery [4,5]. Only 22% of fetuses with a prenatal diagnosis of meconium peritonitis defined by intra-abdominal calcifications develop complications that require postnatal surgery. Fetuses with complex meconium peritonitis have higher risk for postnatal bowel obstruction and perforation [4].

Although ultrasound is the preferred method of fetal evaluation, a calcified mass in the right upper quadrant of the abdomen is hard to distinguish from calcification of vascular lesions such as hemangioma, solid tumor originating from the hepatobiliary system, or true intra-abdominal calcification of meconium peritonitis. In recent years, the application of MRI in the diagnosis of fetal central nervous system abnormalities has been well documented [6], but there are fewer reports on its application in the diagnosis of fetal abdominal abnormalities. MRI has some advantages for diagnosing fetal abdominal anomalies: it can provide better demonstration of normal or dilated bowel, its location and the aspect of the post-atretic bowel. In addition, meconium pseudocyst would have a high signal on T2- and intermediate signal on T1-weighted imaging, which would permit the differentiation of cystic structures such as the urinary bladder, gallbladder, intestinal duplication cyst, and choledochal cyst [7,8]. Further, it has been reported that the prenatal diagnostic yield for meconium peritonitis improved from 42% using ultrasound to 57.1% using MRI [9]. Fetal MRI is considered to be reliable for demonstrating meconium peritonitis.

In the West, the incidence of meconium peritonitis in cystic fibrosis patients has been reported to be between 15% and 40% [10]. Cystic fibrosis mutations were identified in five of 171 fetuses with echogenic bowel. Prenatal gene mutation screening was not done for our patient because of the rare occurrence of cystic fibrosis in the Asian population. Autosomal trisomy was diagnosed in five cases (3.6%) of echogenic bowel [11]. In our case, normal 46,XY karyotype was determined by amniocentesis.

Prenatal diagnosis of GI tract disorders has proven its impact on postnatal outcome [12]. It is generally accepted that meconium peritonitis associated with GI tract malformations, such as bowel atresia or large meconium pseudocysts, predicts unfavorable outcome. The application of MRI for fetuses suspected of having meconium peritonitis can increase the accuracy of prenatal diagnosis and detection of associated GI tract malformations. For the obstetrician, the information derived from fetal MRI facilitates improved planning of delivery, either by cesarean section or vaginal delivery. Postpartum neonatal care can also be improved through planning in advance for earlier surgical intervention, if required. All fetuses suspected of having meconium peritonitis with poor prognosis should be transferred to a tertiary referral center in utero for prenatal care and delivery [9]. If an accurate diagnosis of meconium peritonitis, with or without GI tract malformation, can be made prenatally, parents of affected neonates could then be provided with better counseling and subjected to less anxiety. Fetal MRI has become an important complement to ultrasound for prenatal diagnosis in cases of meconium peritonitis [8].

References


