ORIGINAL ARTICLE

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Meconium peritonitis in utero

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Abstract To clarify the relationship between clinical features in utero and postnatal prognosis, 20 fetuses who underwent ultrasonic (US) evaluation for meconium peritonitis (MP) over a 17-year period were reviewed. According to final US findings in utero, patients were classified into three types. Type I (massive meconium ascites) was noted in 5 cases, type II (giant pseudocyst) in 4, and the other 11 were classified as type III (calcification and/or small pseudocyst). Abdominal calcifications were identified in only 5 cases (2 type I, 1 type II, 2 type III). Seven fetuses who had associated polyhydramnios (1 Type I, 1 Type II, 2 Type III) and fetal hydrops (3 Type II) were delivered before 36 weeks’ gestation. Cardiopulmonary resuscitation at birth was required in 9 cases (5 type I, 4 type II) who underwent abdominal drainage before delivery and/or immediately after birth. Although dilatation of the intestine was identified in 10 fetuses (2 type II, 8 Type III), 18 had intestinal atresia and 2 had fecal obstruction of the distal ileum. Four infants (2 type I, 1 type II, 1 type III) died of respiratory failure and postoperative complications. These results indicated that careful fetal US may be useful for perinatal management of MP.

Key words Prenatal diagnosis · Meconium peritonitis · Meconium ascites · Intestinal atresia · Fetal ultrasound

Introduction

Recently, increased numbers of fetuses with meconium peritonitis (MP) have been prenatally diagnosed by ultrasonography (US). Despite the early diagnosis, the mortality seems to be higher than previously reported.

Although many studies [1, 2, 4, 5, 7, 10, 12] have indicated various sonographic findings including bowel dilatation, ascites, polyhydramnios, fetal hydrops, intra-abdominal calcification, and meconium cyst, the relationships between sonographic features in utero and postnatal prognosis have not been clarified. We examined the clinical significance of US findings in the outcome of patients with MP.

Patients and methods

Between 1983 and 1998, fetuses who underwent evaluation for MP at the Osaka University Hospital and affiliated hospitals were retrospectively analyzed. MP was defined as intestinal perforation during fetal life. US diagnosis of MP was made by peritoneal calcification, meconium pseudocyst, and meconium ascites (MA), which were postnatally confirmed by the operative findings and abdominal X-ray examination. Patients were classified into three groups according to the final US findings in the abdomen (Fig. 1): type I, massive MA that occupied nearly all of the abdominal free space; type II, giant pseudocyst and/or MA that occupied more than one-half of the abdominal free space; and type III, peritoneal calcification and small meconium pseudocysts/ascites.

Results

Within a 17-year period, US was performed on 20 fetuses with MP (11 males and 9 females). Initial admission was at 20 to 39 weeks’ gestation (mean 32.6 ± 4.1) and the mean follow-up was 3.7 ± 4.6 weeks. Twelve patients were delivered vaginally and 8 by cesarean section. Mean gestational age at birth was 36.3 ± 2.6 weeks and mean birth weight was 2746 ± 524 g. All neonates had associated intestinal obstruction.

According to the final US findings in utero, type I (massive MA) was noted in 5 patients, type II (giant pseudocyst) in 4, and type III (calcification and/or small pseudocyst) in 11 (Table 1). Abdominal calcifications were identified in only 5 cases (2 type I, 1 type II, 2 type III), polyhydramnios in 5 (2 type I, 1 type II, 2 type III), and oligohydramnios in 1 (type I). Fetal hydrops was
abdominal drainage before delivery and/or immediately after birth. Although dilatation of the intestine was identified in 10 fetuses (2 type II, 8 type III), 18 had intestinal atresia and 2 had fecal obstruction of the distal ileum (meconium-related disease). Four infants (2 type I, 1 type II, 1 type III) died of respiratory failure and postoperative complications. Postoperative follow-up of between 6 months and 13 years revealed all but 1 survivor doing well; 1 infant developed biliary atresia after the initial hospitalization and died.

**Discussion**

This study was performed under different conditions from those previously reported in English. No patients had cystic fibrosis because of the hereditary characteristics of Japanese. In addition, only 25% of the patients had abdominal calcifications in utero. Although some cases have been reported to be diagnosed without calcification [13], nearly all have exhibited peritoneal calcification in large series [3, 6]. Dirkes et al. [6] reported that only 22% of fetuses with MP defined by abdominal calcification develop complications that require postnatal surgery [8]. Intestinal dilatation may be an indication of postnatal surgery except in type I patients.

Our findings revealed that type I and II patients are at higher risk than type III patients. Long-term US follow-up in some cases revealed that even massive MA due to intestinal perforation was gradually absorbed and then cystic wall formation, calcifications, and intestinal dilatation developed (Fig. 1). Therefore, US features may change from type I to type II and then to type III [3], and the final features at delivery may be useful for clinical evaluation.

One reason for the high risk in types I and II may be an elevated diaphragm, resulting in ventilatory failure immediately after birth. The association of hypoplastic lungs due to persistent abdominal distension prior to lung development was not, however, considered in this study. The second reason may be fetal hydrops, which was observed in type II patients in the present series, although massive MA may sometimes cause circulatory failure.

![Fig. 1 Serial US changes in a fetus with meconium peritonitis. Top](image)

Nearly coronal section at 23 weeks showing massive meconium ascites, classified as type I, including high-echoic meconium fragments occupying nearly all free space in abdomen. Middle Nearly sagittal section at 27 weeks shows giant meconium pseudocyst occupying more than one-half of abdominal free space, classified as type II. Bottom Nearly coronal section at 36 weeks shows pseudocysts classified as type III. Giant meconium pseudocyst shrank and divided (MA meconium ascites, GPS giant pseudocyst, PS pseudocyst, L liver, S stomach, I intestine)