

FETAL ANTERIOR ABDOMINAL WALL HERNIATIONS: ULTRASONOGRAPHIC DIAGNOSIS

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With the increasing attention to ultrasonography of the fetus, congenital abnormalities are being increasingly diagnosed in utero. Two types of anterior abdominal wall herniations have been described: gastroschisis (^{5, 6, 7}) and omphalocele (^{3, 9, 13}). Additional cases of each are presented, and the two entities are reviewed and compared.

CASE REPORTS

Case 1: A 19 year old mother presented for the first time at approximately 37 weeks gestation with premature rupture of membranes. The mother had sickle cell trait and a positive rubella titer.

Ultrasonography demonstrated a single fetus in breech position with cystic areas in the amniotic fluid adjacent to the trunk, both anteriorly and posteriorly. The fetal liver was clearly visualized, with prominent umbilical veins. However, no covering abdominal wall could be identified surrounding the liver, suggesting herniation (fig. 1).

Anteriorly, the cysts presented as multiple separations within the amniotic fluid, representing the walls of herniated bowel (fig. 2).

A posterior cyst was identified in relation to the fetal spine, suggesting a diagnosis of meningocele (fig. 3). The fetal skull was normal, and the examination was otherwise unremarkable. Fetal heart motion was confirmed.

At Cesarean section the next day, a 1.1 kg infant was delivered, who died shortly thereafter. Autopsy findings: almost complete absence of the anterior abdominal wall with herniation of the stomach, large and small bowel, appendix, liver, pancreas, gall bladder, spleen, urinary bladder, gonads; sacral myelo-meningocele; sexual indiscrimination; hypoplasia of the left lung; absent sacrum and pubic rami; bilateral club feet. The heart was normal.

Case 2: A 17 year old mother presented at approximately 35 weeks gestation with vaginal bleeding and contractions.

Prenatal ultrasonography showed a large cystic mass in the fetal abdomen, extending from the diaphragm to the pelvis. The mass was positioned anterior to the aorta and separate from the kidneys. There was also an additional complex mass containing some sonolucent areas adjacent to the fetal abdomen (figs. 4-5). The diameter of the fetal abdomen was 8.0 cm, compared to a biparietal diameter of 8.5 cm. Although the cystic structures were diagnosed as herniated

SUMMARY

Gastroschisis and omphalocele are congenital abdominal wall herniations. Both are characterized by evisceration of bowel loops, and additionally, especially in omphalocele, liver and occasionally other organs. The bowel loops present ultrasonographically as cystic masses in relation to the fetal abdomen. Sometimes the walls are thickened due to the inflammation from exposure to amniotic fluid. Ultrasonographic identification of herniated liver (omphalocele) indicates potential complex abnormalities of other organ systems, as opposed to gastroschisis, which is usually an isolated abnormality.

The two entities are frequently difficult to distinguish ultrasonographically, and in fact, the surgical treatment is the same for both entities. Early diagnosis will facilitate team planning, and probable Cesarean section to avoid damage to exposed bowel loops.

A case of gastroschisis and 2 cases omphalocele are presented.

bowel, no other herniated organs were identified. The fetal liver was in normal position.

Amniocentesis revealed meconium staining. Antibiotics were initiated. Progressive cervical dilatation ensued, and a 2.3 kg male was delivered vaginally. Small bowel and colon had herniated through a right paraumbilical defect, although the cord itself was intact. The herniated bowel was inflamed with thickened walls and was matted together as a mass. There were no other congenital abnormalities.

bilical vein, extended into the fetal abdomen. An abdominal wall defect, probably with herniation of liver, was diagnosed. The findings were consistent with omphalocele. No other fetal abnormalities were ultrasonographically demonstrated.

At autopsy, liver, small bowel, and colon had herniated. The herniated mass was enclosed in a sac, which included an advanced scoliosis, ventricular septal defect, and three lobes of the left lung.



Fig. 1. — Case 1: Sagittal section showing herniated liver with umbilical vein, without covering abdominal wall.

A primary surgical repair was performed with uneventful recovery.

Case 3: The mother presented at approximately 32 weeks gestation with absence of detectable fetal motion. Ultrasound confirmed fetal demise with absent fetal heart motion.

Ultrasound scanning indicated that the fetal abdomen was relatively small in size, and there was a well circumscribed echogenic mass related to the anterior aspect of the fetal abdomen (figure 6). This mass measured approximately 5-6 cm in size and was primarily echogenic. However, some mixed lucent areas were seen, and one elongated lucency, probably the um-

DISCUSSION

Both gastroschisis and omphalocele are anterior abdominal wall herniations. In gastroschisis, the herniation occurs through a para-umbilical defect, usually on the right side, and the umbilical cord is normal. The herniation usually involves only small bowel, and is accompanied by malrotation and occasional intestinal atresia. Abnormalities of other organ systems are unusual⁽⁸⁾. The liver rarely eviscerates and



Fig. 2. — Case 1: Realtime image of prominent septations in amniotic fluid representing the walls of distended herniated intestine.

the defect is usually relatively small⁽¹²⁾. In omphalocele, herniation occurs into the umbilical cord and, if not ruptured, is covered by a sac^(10, 14). The liver frequently herniates and may be detected ultrasonographically by the absence of covering abdominal wall over the liver. Congenital abnormalities of other organs

umbilical cord as a separate entity from the hernia in gastroschisis⁽⁶⁾, but this is a difficult undertaking. Detection of a covering sac is also theoretically helpful, although in all cases reviewed, a sac was not seen and presumably had ruptured.

Both conditions are frequently associated with polyhydramnios^(3, 5, 6, 7). Her-

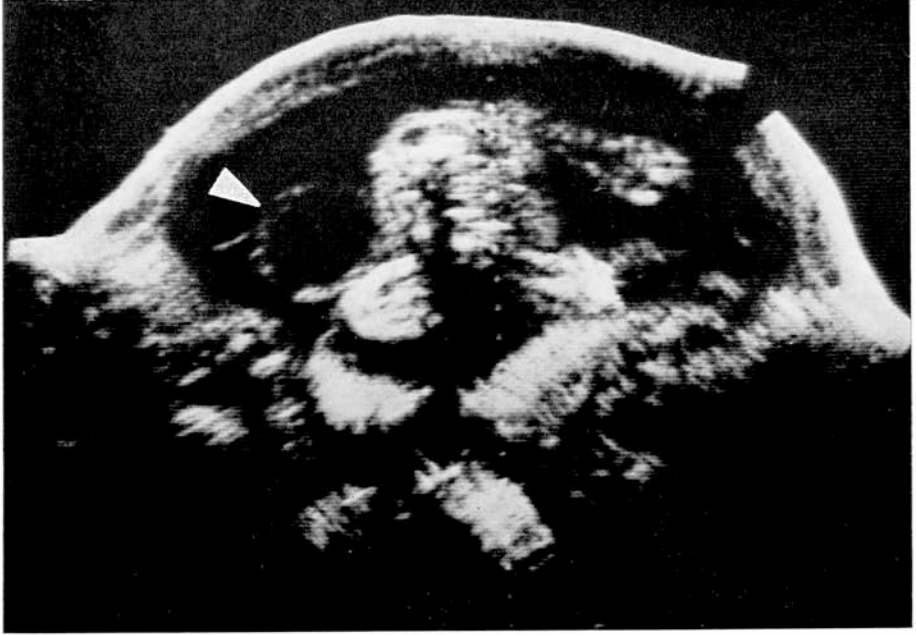


Fig. 3. — Case 1: Transverse projection with cystic structure representing meningocele in relationship to lower spine.

are frequent, and, as in case 1, omphalocele may be a component of complex abnormalities involving other organ systems. Thus, the detection of liver herniation has potentially grave prognostic implications.

Differentiation between the two entities by ultrasound may be difficult. Identification of herniated structures, especially the liver, is helpful. Grossman *et al.* suggested possible identification of the

herniated loops of bowel, exposed to amniotic fluid, may develop an inflammatory reaction⁽¹¹⁾, which thickens the walls and be seen ultrasonographically as an echogenic matrix surrounding the cysts, or as a matted mass⁽⁵⁾. Fetal abdominal measurements may be reduced with larger herniations.

Once diagnosed ultrasonographically, Cesarean section should be considered for both entities, to avoid potential injury to



Fig. 4. — Case 2: Sagittal section with fetal spine anteriorly. Scale marks extend through dilated intra-abdominal bowel loop and through cluster of smaller cysts which are herniated intestine.

Fig. 5 A (Sagittal section) and Fig. 5 B (Realtime). — Case 2: In the uterine fundus, a cluster of thick walled herniated intestinal loops are demonstrated surrounded by amniotic fluid.



Fig. 5 B

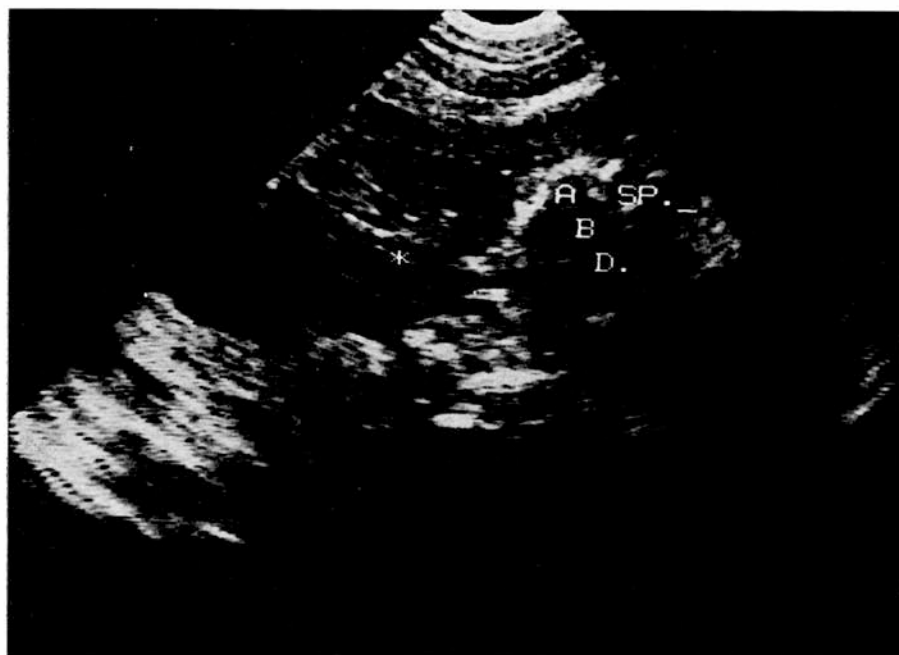


Fig. 6. — Case 3: An oblique scan throughout the region of the fetal abdomen (ABD) shows position of the fetal spine (SP). The herniated mass is located anteriorly (*). The lucency entering the fetal abdomen along the posterior aspect of the mass represented the site of herniation and umbilical vasculature.

Table 1. — *Summary of findings in Abdominal Wall Herniations.*

	Gastroschisis	Omphalocele
Herniated structures . .	Usually bowel only	Bowel and other organs, including liver
Site	Paraumbilical	Umbilical
Other abnormalities . .	Infrequent except for intestinal atresia, malrotation	Complex abnormalities involving other organ systems are common
Polyhydramnios	Yes	Yes
Sac present	No	Yes, but frequently ruptured
Prematurity	Common	Common

the exposed bowel (⁵). The surgical repair is usually the same (²), consisting of primary reduction and repair when possible, or temporary covering, usually with a silastic prosthesis, for larger herniations (^{1, 4}).

Table 1 summarizes the findings:

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