Gastrochisis: are prenatal ultrasonographic findings useful for assessing the prognosis?

Abstract  Objective. The objective of this study was to assess various prenatal patterns in correlation with survival and the occurrence of complications of antenatally recognized gastrochisis (G).

Materials and methods. We retrospectively studied 34 cases of G. Mortality and morbidity in the postnatal period were assessed and correlated with the prenatal presence or absence of: (1) bowel and/or stomach dilatation, (2) thickening and/or hyperechogenicity of the intestinal wall, (3) meconium peritonitis (in the abdomen) before 20 weeks of gestation, (4) asymmetrical bowel dilatation, and (5) associated malformations. Morbidity took into account the length of hospitalization and the number of surgical procedures.

Results. The overall survival rate was 94 %. Neither bowel nor stomach dilatation was significantly correlated with mortality. However, evidence of intestinal dilatation greater than 17 mm had a positive predictive value of 67 % for atresia, with a negative predictive value of 86 %. Thickening and/or hyperechogenicity of the bowel wall were not significantly associated with mortality. Meconium peritonitis before 20 weeks and asymmetrical bowel dilatation were not statistically significant because of the small sample size. Twelve patients (35.3 %) had postnatal complications, with a mean hospital stay of 127 days. Outcome was not modified by the mode of delivery. Associated extradigestive anomalies were present in 20.6 % of cases. Chromosomal anomalies were not seen.

Conclusion. The prognosis of prenatally detected G is excellent despite the frequency of small bowel atresia (67 %) in the group with postnatal complications. Meconium peritonitis before 20 weeks of gestation and/or asymmetrical bowel dilatation also appear to be indicators of atresia (2/4, 50 %) or high morbidity (3/4, 75 %).

Introduction

Gastrochisis (G) is a right paraumbilical defect that involves all layers of the abdominal wall and usually measures between 2 and 4 cm [1]. The bowel loops are herniated because of this defect. The diagnostic sonographic features of G are the presence of multiple bowel loops within amniotic fluid not contained by a membrane in association with a normally inserted umbilical cord (Fig.1). The survival rate is about 90 % (91 % according to Bond et al. [2], 92 % according to Babcock et al. [3]) because of better surgical techniques and hyperalimentation. The prognosis for these infants is related to intestinal complications (bowel obstruction, perforation or atresia) which lead to intestinal resection and delayed oral feeding. Many have tried to identify the fetal bowel sonographic features associated with poor outcome [2-4]. The purpose of our retrospective
Materials and methods

Thirty-five cases of G were recognized antenatally in Sainte-Justine Hospital from January 1985 to March 1994. Our retrospective study included the 34 cases that we delivered. One case was excluded because the pregnancy was terminated at 17.5 weeks.

All sonographic examinations were performed with commercially available scanners (Siemens Quantum 2000, Mark 5 ATL, Sonoline SI 450 Siemens, Ultramark 9 ATL) and a 3.5 or 5 MHz probe. Initial examinations were conducted at our institution during the second trimester in 15 cases and during the third trimester in 19 cases. The spectrum of US features used for prenatal diagnosis has been described previously [1].

In all cases, the following criteria were recorded: maternal age, gestational age (GA) at the time of each examination, location of the abdominal wall defect and its relation to insertion of the umbilical cord, location of the stomach (intra-abdominal or intra-amniotic) and its dilatation, bowel dilatation (internal diameter greater than 6 mm for the small bowel and greater than 23 mm for the colon) [1], maximum bowel wall thickness, hyperechogenicity of the bowel wall, meconium peritonitis (in the fetal abdomen), which was recognized if bowel wall thickening and hyperechogenicity were associated with bowel dilatation and asymmetrical bowel dilatation. This last aspect of small bowel dilatation (SBD) was defined as: (1) dilatation of intra-abdominal loops without dilatation of intra-amniotic loops, and (2) decreasing SBD during gestation. Intrauterine growth retardation (below the 10th percentile) was noted. Associated malformations were registered. Through medical records, the following data were recorded: time and route of delivery, birth weight, length of hospital stay, number of surgical procedures, and outcome.

Outcome was divided into three categories: death, occurrence of complications, and uneventful follow-up after surgery. Complications were defined as bowel atresia, bowel perforation, and duration of hospitalization exceeding 30 days. Mortality and morbidity were calculated. The association with previously defined sono- graphic criteria was analysed using the chi-square test with Yates's continuity correction. Sensitivity, specificity, and positive and negative predictive values of a 17 mm threshold for bowel dilatation as an indicator of bowel atresia were calculated.

Results

We studied 34 cases of G with a mean maternal age of 24 years. The first US examination was performed between 12 and 37.5 weeks of gestation. Delivery occurred between 31 and 39 weeks of GA by the vaginal route in 14 cases (14/34, 41 %) and by caesarean section in 20 cases (20/34, 59 %). All children (18 males and 16 females) were born alive, with a mean birth weight of 2371 g. Mean follow-up was 35 months (range 4 days to 6 years). Intrauterine growth retardation below the 10th percentile was seen in 10 patients (29.3 %).

The overall survival rate was 94 % (32/34). Two babies died during the neonatal period (2/34, 6 %). All ultrasound patterns studied were statistically correlated with mortality (P < 0.05). The first baby died of respiratory distress at day 4 after difficult surgery for closure; the second died on day 117 of intestinal necrosis after four surgeries. None had bowel atresia. Morbidity in the postnatal period was 35.3 % (12/32), with a favourable outcome in 22 patients (64.7 %). The characteristics of the two populations (with and without complications) are shown in Table 1.

The first US pattern studied was the location and dilatation of the stomach. Neither criterion was statistically significant (P > 0.05). SBD was then studied. It was greater in the group with postnatal complications than in the group with a favourable outcome. Mean SBD (MSBD) was 20 mm and 11 mm respectively. A 17 mm threshold of intestinal dilatation has been proposed by Spear et al. (RSNA 1990). In our population, this cutoff value was statistically significant (P < 0.01), with more intestinal complications in the group with MSBD greater than 17 mm.

Two asymmetrical SBD patterns were recognized: (1) Dilatation of the intra-abdominal loops without dilatation of the intra-amniotic loops was seen only in one fetus which postnatally had atresia, two surgeries, and a