CLINICAL ARTICLE

In utero progression of mild fetal ventriculomegaly

B.V. Parilla a,*, L.K. Endres b, M.J. Dinsmoor c, L. Curran a

a Departments of Obstetrics and Gynecology, Section of Maternal-Fetal Medicine, Lutheran General Hospital, Park Ridge, IL 60068, USA
b University of Illinois Medical Center at Chicago, USA
c Evanston Northwestern Healthcare, Evanston, IL, USA

Received 29 December 2005; received in revised form 24 January 2006; accepted 25 January 2006

Abstract

Objective: To evaluate the progression in utero of mild isolated fetal ventriculomegaly (defined as a transverse diameter of the atrium of the lateral ventricle measuring between 10 and 15mm), and to estimate the proportion of fetuses that normalize (diameter decreasing to less than 10mm), stabilize (remaining between 10 and 15mm), or progress to more severe ventriculomegaly (becoming greater than 15mm). Methods: The obstetric databases of 3 institutions were queried for any studies mentioning ventriculomegaly or hydrocephalus. Reports and original images were reviewed to verify cases of isolated mild ventriculomegaly, with no other anomalies on comprehensive ultrasonographic examination. Fetuses that had 2 or more evaluations more than 3 weeks apart were included. Results: A total of 63 fetuses met the criteria for isolated mild ventriculomegaly. The mean gestational age and ventricular measurements were 24.7 ± 3.7 weeks and 11.8 ± 1.1 mm, respectively, at the initial scan and 34 ± 2.9 weeks and 12.1 ± 3.8 mm, respectively, at the final scan. The mean number of scans was 3.75 per fetus (range, 2–6). Amniocentesis revealed the deletion of 5p, which causes the cri du chat, in 1 of 21 fetuses; 26 fetuses (41%) showed normalization of the lateral ventricles; 10 fetuses (16%) showed progression; and 27 (43%) appeared stable. Three of the fetuses that stabilized improved from 15mm to 11, 11.5, and 11.7mm, respectively. Two worsened from 10.2 to 14mm and from 11.4 to 13mm. Conclusions: More than 40% of the cases of mild isolated fetal ventriculomegaly resolved in utero. The significant overlap in measurements for the different groups precludes prediction in individual cases. However, of the 13 cases where the transverse diameter measured 13mm or more, only 1 normalized, while 9 of the remaining 12 cases stabilized and 3 progressed.

© 2006 International Federation of Gynecology and Obstetrics. Published by Elsevier Ireland Ltd. All rights reserved.

* Corresponding author. 1875 W. Dempster, Suite 325, Park Ridge, IL 60068. Tel.: +1 847 723 8610; fax: +1 847 723 2290.
E-mail address: Barbara.Parilla-MD@advocatehealth.com (B.V. Parilla).

0020-7292/$ - see front matter © 2006 International Federation of Gynecology and Obstetrics. Published by Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.ijgo.2006.01.026
1. Introduction

The lateral ventricular atrium normally remains less than 10mm in diameter throughout gestation [1]. Mild ventriculomegaly, defined as a transverse diameter of the atrium of the lateral ventricle measuring between 10 and 15mm, occurs bilaterally in 0.15% to 0.7% of fetuses, and unilaterally in 0.07% of fetuses [2]. Mild ventriculomegaly is associated with an increased risk of fetal chromosomal abnormalities, congenital anomalies, infections, various syndromes, perinatal death, and developmental delay [2,3]. Prenatal evaluation includes targeted sonographic examination to rule out associated anomalies such as chromosomal analysis, and other studies to rule out infectious disease. Such findings clearly would affect prognosis. In cases of isolated ventriculomegaly, reports suggest that mild developmental delay may occur in about 9% to 36% of cases [4—7]. Very few data exist concerning the natural history in utero of isolated mild ventriculomegaly [8,9]. Women who are carrying a fetus diagnosed with ventriculomegaly are extremely anxious, and are greatly concerned about the health of their unborn child. Having information on how often ventriculomegaly improves, worsens, or remains stable would greatly facilitate counseling these women.

The present study sought to evaluate what proportion of cases of mild isolated ventriculomegaly normalize (transverse diameter decreasing to less than 10mm), stabilize (remaining between 10 and 15mm), or progress to more severe ventriculomegaly or hydrocephalus (becoming greater than 15mm).

2. Materials and methods

The obstetric ultrasonographic databases of 3 institutions were queried for any studies mentioning ventriculomegaly or hydrocephalus. Reports and original images were reviewed to verify cases of isolated ventriculomegaly. Indications for the examination are routinely listed on ultrasonographic reports. All fetuses underwent a detailed fetal survey, including targeted imaging for fetal anomalies and markers of aneuploidy. Fetuses with no other abnormalities on comprehensive ultrasonographic examination but with 2 or more examinations more than 3 weeks apart were included. The measurement at the final scan was used when more than 2 scans were available. This study was approved by the internal review boards of the 3 participating institutions.

Measurements were obtained in the axial plane at the level of the thalami in the hemisphere distal to the transducer, and cursors were placed at the smooth caudal termination of the glomus of the choroid plexus according to standard technique [10]. All examinations were completed and analyzed by maternal—fetal medicine specialists. Mild cerebral ventriculomegaly was defined by a transverse diameter of the atria of the lateral ventricles measuring between 10 and 15mm. The main variables analyzed included gestational age and ventricular measurement at initial and final scan.

3. Results

Between October 1999 and October 2004, 63 fetuses met the criteria for isolated ventriculomegaly, with 2 or more examinations at least 3 weeks apart. All 3 centers are referral centers which, combined, perform more than 30,000 obstetric scans annually. In 23 cases, the initial indication was a referral for suspected abnormality on routine scan. Additional indications included routine growth evaluation or dating (n=16), advanced maternal age (n=9), abnormal maternal serum alpha feto protein (n=4), twin pregnancy (n=3), triplet pregnancy (n=1), family history of congenital anomalies (n=4), suspected growth restriction (n=2), and follow-up for pelviectasis (n=1).

The mean gestational age and ventricular measurements were 24.7 ± 3.7 weeks and 11.8 ± 1.1 mm, respectively, at the initial scan and 34 ± 2.9 weeks and 12.1 ± 3.8 mm, respectively, at the final scan. The mean number of scans was 3.75 per fetus (range, 2—6). Amniocentesis revealed the deletion of 5p, which causes the cri du chat, in 1 of 21 fetuses; 26 fetuses (41%) showed normalization of

| Table 1: Findings for the 3 categories of ventriculopathy during their in utero course |
|-----------------------------------------|----------------|----------------|
| GA initial scan (week)                  | 24.3 ± 4.7 (16.7—35.9) | 24.5 ± 4.6 (18.3—33.1) | 25 ± 4.9 (19—34) |
| Atrium initial scan (mm)                | 11.3 ± 1.0 (10—13) | 12.6 ± 1.8 (11—15) | 12 ± 1.4 (10—15) |
| GA final scan (week)                    | 33.6 ± 4.3 | 34.9 ± 3.5 | 34 ± 3.5 |
| Atrium final scan (mm)                  | <10 | 21 ± 5.3 (15—31) | 11.9 ± 1.0 (10.2—13) |

GA: gestational age.
Values are given as mean ± S.D. (range) unless otherwise indicated.
the lateral ventricles; 10 fetuses (16%) showed progression; and 27 (43%) appeared stable. Table 1 shows the statistics of the individual groups. Three of the fetuses that "stabilized" improved from 15 mm to 11, 11.5, and 11.7 mm, respectively. Two worsened from 10.2 to 14 mm and from 11.4 to 13 mm.

Of the fetuses that "stabilized," 3 improved from 15 mm to 11, 11.5, and 11.7 mm, respectively. Two worsened from 10.2 to 14 mm, and from 11.4 to 13 mm. The fetus diagnosed with cri du chat had an initial measurement of 11 mm at 20 1/7 weeks, which was unchanged at 24 5/7 weeks of gestation. Fig. 1 shows the distribution of the initial atrial measurements grouped by 0.5-mm intervals according to the final categorization of the course of ventriculomegaly in utero.

4. Discussion

According to these findings, more than one third of the cases of sonographically isolated mild fetal ventriculomegaly resolved in utero. The significant overlap in measurements among the different groups precludes prediction in individual cases. However, of the 13 cases measuring 13 mm or more, only 1 normalized, while 9 of the remaining 12 stabilizing and 3 progressed.

When fetal ventriculomegaly is diagnosed, pregnant women should be offered karyotyping as well as serologic studies for cytomegalovirus and toxoplasmosis. Many centers complement ultrasonographic findings with magnetic resonance imaging (MRI) of the fetal brain because it provides additional information about fetal brain anatomy. Levine et al. [11] reported 25 cases of ventriculomegaly diagnosed ultrasonographically, followed by an MRI evaluation of the fetal brain. They found that MRI changed the diagnosis in 10 cases (40%), identifying 7 cases of agenesis of the corpus callosum and 1 case each of cerebellar hypoplasia, partial agenesis of the cavum septum pellucidum, and total absence of corpus callosum. Some experts contend, however, that dedicated transvaginal neurosonography done by experienced sonographers should minimize the need for MRI. Magnetic resonance imaging was not routinely performed in the present study. In the future, MRI may help in predicting which cases that are likely to normalize and which are not.

A careful review of the literature reveals only 2 reports on the natural history in utero of ventriculomegaly. In the retrospective review by Hudgins et al. [8] of the outcome of 47 fetuses, 20 had multiple anomalies, 19 were electively aborted, and none survived; of 5 cases of late diagnosis with multiple anomalies, none of these survived; and of the other 22 fetuses, 19 had stable and 2 had progressive ventriculomegaly. In 1 case, ventriculomegaly resolved in utero. Nineteen of these fetuses survived, 13 were born with normal intelligence and 6 with moderately to severely delayed development. However, associated anomalies were detected by ultrasonography in 74% of the fetuses. Ventriculomegaly was isolated and progressive in 2 fetuses that were delivered at term and the newborns underwent a subsequent shunting procedure. Both are neurologically normal.

Mahony et al. [9] prospectively studied 20 fetuses with mild dilation of the lateral ventricles but no other detectable central nervous system abnormalities. A 15- to 31-month postnatal follow-up showed a normal outcome in 8 cases (40%), an uncertain prognosis in 4 cases (20%), and death in 8 cases (40%). Serial antenatal sonograms were obtained in 17 cases. Among the 8 cases with a normal outcome, 7 demonstrated no additional sonographic abnormalities and 6 showed resolution of the ventricular dilation antenatally. Conversely, all 12 fetuses with demise or an uncertain prognosis demonstrated additional sonographic abnormalities, and 6 showed stable or progressive ventricular dilation on follow-up sonograms.

The present study is the largest number of fetuses with isolated ventriculomegaly that attempted to evaluate serial ultrasonographic examinations. Its findings may be helpful when counseling patients about the in utero course of isolated ventriculomegaly. However, the most important outcome is how the children do postnatally with respect to associated findings and developmental delays. In the present series, 26 cases (41%) appeared to have normalized in utero. This small number does not allow to generalize about outcome. Therefore, it is not known whether mild
ventriculomegaly that resolves in utero may be a marker for postnatal problems. Further studies, including postnatal follow-up, are needed.

Acknowledgment

This study was presented at the 50th Annual Meeting of the American Institute of Ultrasound in Medicine, June 20–22, 2005, Orlando, Florida.

References


