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Clinical Observations

Prenatal Cerebellar Hemorrhage: Fetal and Postnatal Neuroimaging Findings and Postnatal Outcome

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ABSTRACT

BACKGROUND: Despite significant progress in fetal neuroimaging techniques, only a few well-documented examples of prenatal cerebellar hemorrhages are available in the literature. In the majority of these individuals, the diagnosis of prenatal cerebellar hemorrhages led to termination of pregnancy or death occurred *in utero*; data about postnatal outcome of children with prenatal diagnosis of cerebellar hemorrhages are scant. We describe fetal and postnatal neuroimaging findings and the neurodevelopmental outcome of a child with a large cerebellar hemorrhage that occurred at approximately 27 weeks' gestation. **METHOD:** Data about neurological features and neurodevelopmental outcome were collected from the clinical history and follow-up examination. All pre- and postnatal MRI data were qualitatively evaluated for infra- and supratentorial abnormalities. **RESULTS:** Fetal MRI at 27 weeks' gestation showed a T1-hyperintense and T2-hypointense lesion within the cerebellum suggestive of bilateral cerebellar hemorrhages with extension into the adjacent subarachnoid, subdural, and intraventricular spaces. The prenatal cerebellar hemorrhage was possibly related to maternal sepsis. Postnatal MRI showed encephalomalacic changes involving the vermis and both cerebellar hemispheres. Neurodevelopmental follow-up at 15 months of age was concerning for global developmental delay and significant right esotropia. **CONCLUSION:** This child illustrates (1) the role of prenatal neuroimaging in the diagnosis of fetal cerebellar hemorrhages, (2) the significance of cerebellar involvement for neurodevelopment, and (3) the importance of the collection of postnatal outcome data in children with prenatal diagnosis of cerebellar hemorrhage.

Keywords: cerebellum, hemorrhage, fetal, magnetic resonance imaging, outcome

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Introduction

Significant cerebellar hemorrhage is an important complication of preterm birth.[1] The prevalence of significant cerebellar hemorrhage in preterms differs based on the birth weight between 3% (birth weight <1500 g) and 9% (birth weight <750 g).[2] The overall prevalence may be as high as 20% when including small hemorrhages.[1] Significant

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progress in fetal magnetic resonance imaging (MRI) has increased the frequency of diagnosis of cerebellar hemorrhages prenatally. However, only a few well-documented examples of prenatal cerebellar hemorrhage are available.[3-7] In the majority of these cases, the diagnosis of prenatal cerebellar hemorrhage led to termination of pregnancy from concern of poor postnatal outcome or death occurred *in utero*.[3-7] Little is known regarding the neurodevelopmental outcome of infants with prenatal cerebellar hemorrhage.[8-12]

We describe the fetal and postnatal neuroimaging findings and neurodevelopmental outcome of a child with a severe bilateral cerebellar hemorrhage at 27 weeks' gestation.

Patient Description

A 33-year-old gravida 4 para 2-1-0-3 woman at 27 weeks' gestation was admitted with central line–associated *Enterobacter cloacae* sepsis. Maternal history included hyperemesis requiring parenteral nutrition, secondary acute transaminitis, gestational diabetes, asthma, iron-deficiency anemia, and chronic hypertension (no medication). Fetal ultrasonography on admission showed severe symmetric intrauterine growth restriction and hyperechogenic areas in both cerebellar hemispheres. A fetal MRI showed a T1-hyperintense and T2-hypointense lesion within the cerebellum suggestive of bilateral hemorrhages with extension into the adjacent subarachnoid, subdural, and intraventricular spaces (Fig 1). Moderate ventriculomegaly and supratentorial white matter edema were noted. Maternal evaluation revealed *E. cloacae* bacteremia, negative toxoplasmosis titers, negative cytomegalovirus immunoglobulin M, normal vitamin K level, and the absence of neonatal alloimmune thrombocytopenia. Follow-up ultrasonography at 29 weeks' gestation revealed marked enlargement of the lateral and third ventricles, suggestive of progressive obstructive hydrocephalus that partially resolved on follow-up at 31 weeks' gestation.

At 37.4 weeks' gestation, the child's mother was readmitted for worsening preeclampsia. Magnesium was started and labor was induced. Maternal prenatal laboratory values showed positive Group B streptococcus screening and she was treated with penicillin before delivery. The baby was born by vaginal delivery. Apgar scores were 9 and 9 at 1 and 5 minutes. Birth weight was 2530 grams (30th percentile), length

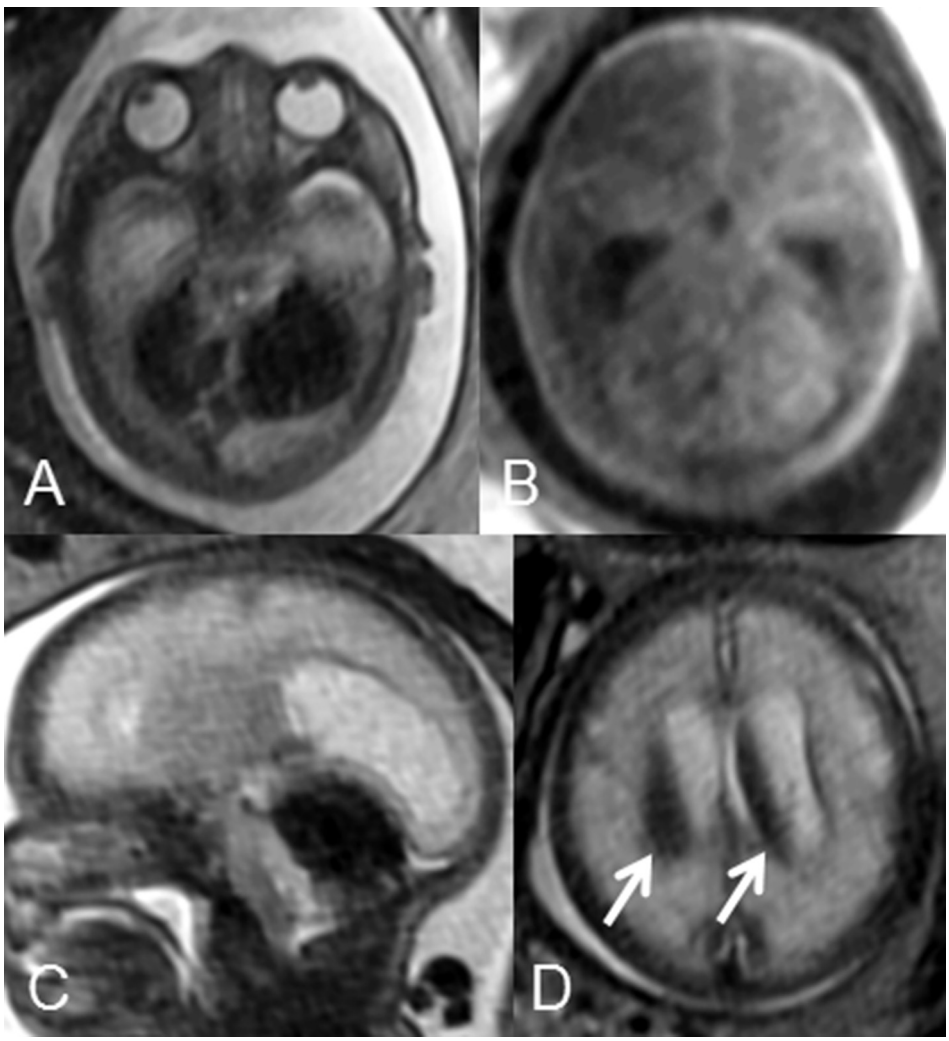

FIGURE 1.
(A) Axial T2-, (B) axial T1-, and (C) sagittal T2-weighted fetal magnetic resonance imaging at 27 weeks' gestation show a large T2-hypointense (A, C) and T1-hyperintense (B) well-marginated lesion located within the entire cerebellum suggestive of a cerebellar hemorrhage. The brainstem appears to be mildly ventrally displaced. (D) Supratentorial axial T2-weighted image reveals a moderate ventriculomegaly with T2-hypointense material within the lateral ventricles (arrows) suggestive of extension of the cerebellar hemorrhage into the ventricular system (shifted to the right because of intrauterine fetal position). In addition, the hemispheric white matter appears T2-hyperintense edematous.