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Clinical Observations

"Growing" Cerebellum in an Infant After Shunt Insertion

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ABSTRACT

INTRODUCTION: Supratentorial cortical mantle growth after shunt surgery in infants with posthemorrhagic hydrocephalus is common. However, cerebellar growth and Chiari are rare. **PATIENT DESCRIPTION:** We describe a term newborn with an intraventricular hemorrhage and posthemorrhagic hydrocephalus who underwent endoscopic third ventriculostomy followed by shunt placement at age 4 months. **RESULTS:** After shunt placement, her head circumference growth rate rapidly decreased from the ninety-seventh percentile to the third percentile. Six months after a shunt placement, cerebellar disproportional growth was noticed. Five years after surgery, her cerebellar volume had increased by 300% whereas the cerebral hemispheres volume by 150%, and Chiari 1 appeared. She manifested early hemiparetic cerebral palsy, but, did not develop clinical evidence of increased intracranial pressure or brainstem abnormalities. **CONCLUSION:** This term newborn exhibited apparent cerebellar "growth" and posterior fossa crowding after shunt surgery for posthemorrhagic hydrocephalus. Our patient's findings may have resulted from shunt-related alterations in pressure dynamics, leading to decreased head growth rate with a relatively smaller posterior fossa, in face of a normal brain growth. The timing of intraventricular hemorrhage at term, beyond the vulnerable period of cerebellar development, may have been a contributing factor to the craniocerebellar disproportion and posterior fossa crowding cerebellar development may have been relatively spared and was a contributing factor to the craniocerebellar disproportion and posterior fossa crowding.

Keywords: intraventricular hemorrhage, posthemorrhagic hydrocephalus, shunt, cerebellar growth, Chiari, growing cerebellum

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Introduction

Intraventricular hemorrhage (IVH) in term neonates is rare and occurs in significantly lower rates than in preterm neonates.[1] IVH at term commonly originates from the choroid plexus or the thalamus and less often from the germinal matrix, caudate, cerebral parenchyma, or from ruptured vascular lesions or tumors.[2] Management of posthemorrhagic hydrocephalus is considered similar in the term and preterm infant.[2]

Prior studies reported cortical mantle thickening, coupled with ventricular size reduction after shunt treatment for posthemorrhagic hydrocephalus.[3,4] Persistence of a dilated fourth ventricle after shunt treatment for hydrocephalus has been described too.[5]

We report a case of a term neonate with grade III IVH and posthemorrhagic hydrocephalus who displayed remarkable disproportional cerebellar "growth" and posterior fossa crowding after the shunt insertion.

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Patient Description

This baby girl was born after intrauterine growth retardation at 38.5 weeks of gestation weighing 2020 g. The mother's pregnancy was complicated with late gestational diabetes and systemic hypertension. At 5 days of age, the infant developed fever. A lumbar puncture was bloody, and cultures were negative.

At 11 days of age, an increase in head circumference prompted a cerebral ultrasound which showed grade III IVH, and at 16 days, ventricles were observed to be dilated. A magnetic resonance imaging (MRI) examination at 7 weeks revealed ventricular dilation with aqueductal flow void, an infracerebellar cyst, right parieto-occipital residual IVH, and right-sided colpocephaly (Figure, A).

Clinical and radiological follow-up prompted an endoscopic third ventriculostomy at age 13 weeks, because of exacerbation of hydrocephalus and rapid increase in head circumference. The ventriculostomy ultimately failed, and a ventriculoperitoneal shunt was placed 19 days later. Both surgeries were uneventful.

Six months after surgery, an MRI revealed moderate lateral and third ventricular size reduction; however, the fourth ventricle was significantly smaller, the infracerebellar cyst disappeared, and the cerebellum occupied nearly the entire posterior fossa including a small Chiari (Figure, B). Five years after surgery, MRI revealed slit ventricles with crowding of the posterior fossa and Chiari I (Figure, C).

Volume analysis, applying a semiautomatic process, was performed using Brainlab neuronavigation software (Brainlab, Feldkirchen,

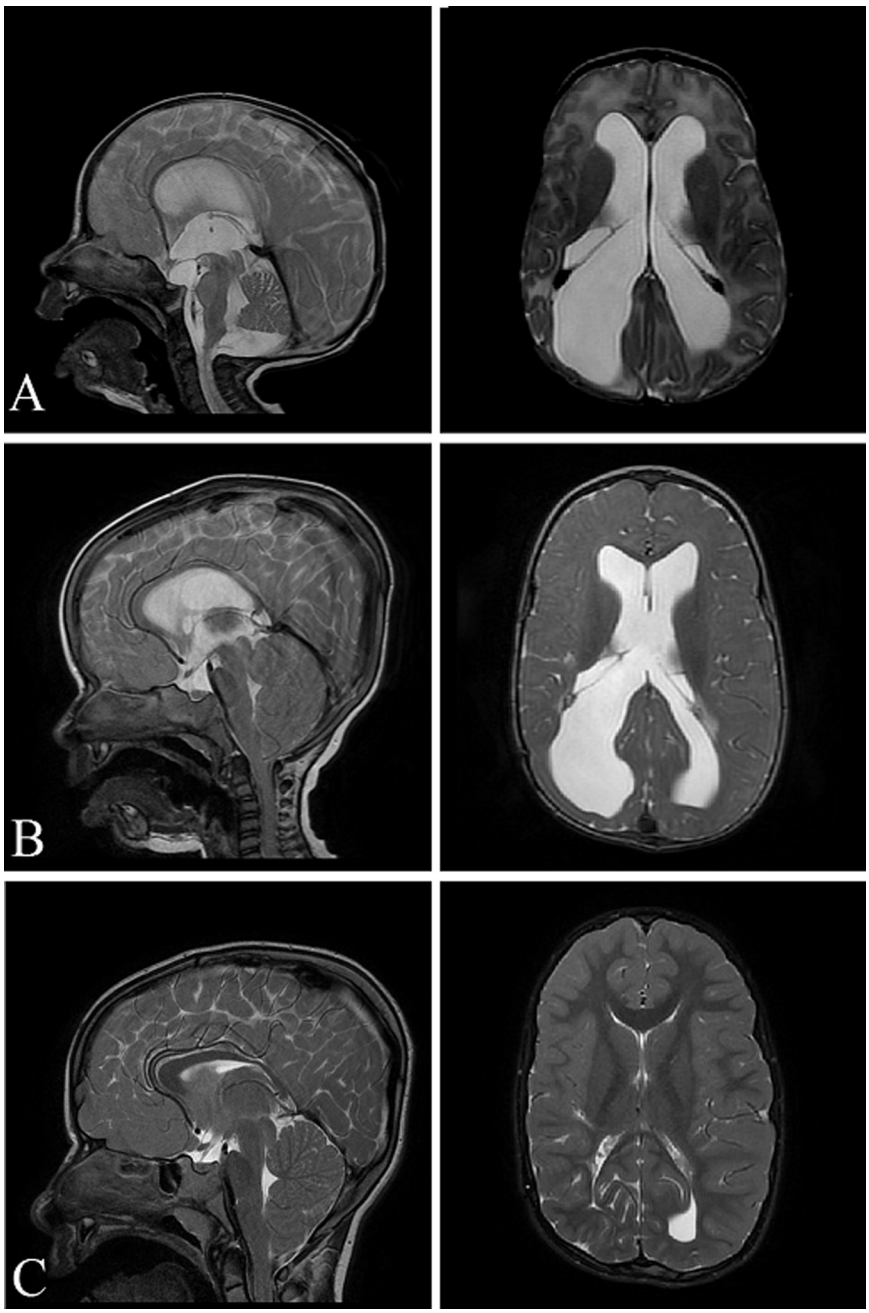

FIGURE.
(A) Magnetic resonance imaging (MRI) at age 7 weeks. (B) MRI at 8 months of age (6 months after placement of a ventriculoperitoneal shunt). The posterior fossa (and foramen magnum) is clearly more crowded compared with (A). (C) MRI at 5.5 years of age. The supratentorial ventricles have collapsed, and there is a crowded posterior fossa with a Chiari.