Familial Arachnoid Cysts in Association With Autosomal Dominant Polycystic Kidney Disease

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ABSTRACT. Autosomal dominant polycystic kidney disease (ADPKD) is a systemic disorder well-known for its association with intracranial aneurysms. Recently, intracranial arachnoid cysts have also been reported to be associated with ADPKD. We describe a father and daughter who each has a posterior fossa arachnoid cyst and asymptomatic ADPKD. To our knowledge, this is the first report of familial occurrence of arachnoid cysts in association with ADPKD. *Pediatrics* 2002;110(1). URL: http://www.pediatrics.org/cgi/content/full/110/1/e13; *autosomal dominant polycystic kidney disease, familial arachnoid cyst, hypotonia.*

ABBREVIATIONS. ADPKD, autosomal dominant polycystic kidney disease; MRI, magnetic resonance imaging.

Autosomal dominant polycystic kidney disease (ADPKD) is a common disorder, occurring in approximately 1 in every 400 to 1000 live births.[1,2] This disease has been associated with cysts in other organs, including the liver, pancreas, lungs, spleen, ovaries, testes, thyroid, uterus, and bladder, as well as colonic diverticuli and valvular heart disease.[2,3] In addition, the association of ADPKD and intracranial aneurysm is quite well-known.[4] Recently, intracranial arachnoid cysts have also been reported to be associated with ADPKD[5,6]; however, familial occurrence of arachnoid cysts in patients with ADPKD has not been reported previously. We describe here a child and her father who each presented in infancy with hypotonia and developmental delay and were found to have an arachnoid cyst of posterior fossa and asymptomatic ADPKD.

CASE REPORT

An 11-month-old girl was referred to Başkent University Hospital for neurologic evaluation because of marked hypotonia and developmental delay. Her development was globally delayed. She had social smile at 4 months and gained head control at 5 months. She was able to reach and transfer the objects at 7 and 8 months, respectively. She just started to sit with support but had no babbling yet.

Prenatal and perinatal history was unremarkable. Postnatal medical history was significant for congenital dislocation of left hip, diagnosed at 3 months old, and gastroesophageal reflux. On the family history, paternal great-grandfather and grandfather had died because of renal failure, and a diagnosis of ADPKD had been made for the grandfather. Her 33-year-old father had a history of hypotonia, developmental delay, and seizures since early infancy, and he was unable to finish primary school because of mild mental retardation. He was diagnosed as having asymptomatic ADPKD by abdominal ultrasonography and computerized tomography 3 years ago.

General physical examination of our patient was unremarkable, and there were no dysmorphic or abnormal cutaneous findings. On neurologic examination, the patient had significant axial hypotonia along with increased deep tendon reflexes and bilateral ankle clonus. No lateralizing signs were present. With the presumed diagnosis of central hypotonia and developmental delay, a battery of biochemical tests, urinalysis, thyroid function tests, TORCH screen, serum and urine amino acid analysis, and serum lactate concentrations were obtained, and all produced negative results. Cytogenetic analysis revealed a 46 XX karyotype. Magnetic resonance imaging (MRI) of the brain, however, demonstrated a posterior fossa arachnoid cyst of 3.2 × 4.8 centimeters in size (Fig 1A and B). With the known family history of ADPKD, an abdominal ultrasonography was obtained for possible association and showed renal cortical cysts leading to the diagnosis of asymptomatic ADPKD in this child. Because the father had a similar neurologic history, his medical records and an MRI of his brain were also reviewed, and he was found to have an arachnoid cyst in a similar location (Fig 2A and B). To exclude a possible association of a Marfan-like syndrome, neurofibromatosis, or tuberous sclerosis, the father was reexamined, and he was not found to exhibit any stigmata of these conditions.

The daughter had undergone a cystoperitoneal shunt placement, but the shunt was removed 3 months later because of disconnection and infection. She has remained hypotonic afterward and on follow-up at the age of 24 months, she was just starting to sit independently and babble. She has also experienced 2 partial seizures associated with fever and was started on antiepileptic therapy because of the presence of right frontal sharp waves on an electroencephalogram.

DISCUSSION

Arachnoid cysts are extraparenchymal accumulations of cerebrospinal fluid covered by a thin membrane that is continuous with the normal arachnoid. Although their precise causative mechanisms are unknown, they are considered to be developmental anomalies of the arachnoid. Arachnoid cysts have previously been associated with some inheritable connective tissue disorders, such as Marfan's syndrome and neurofibromatosis type 1.[7,8] In recent years, presence of arachnoid cysts in patients with ADPKD have also been reported.[5,6] ADPKD is a systemic disorder well-known for its association with extrarenal manifestations, including cerebral aneurysms. At least 2 different genes, located on chromosomes 4 and 16, have been linked to ADPKD.[9–11] It has been proposed that the primary defect in ADPKD is in abnormal cellular differentiation and maturation that could promote cyst formation in several possible mechanisms.[12,13]

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Received for publication Nov 19, 2001; accepted Apr 1, 2002.
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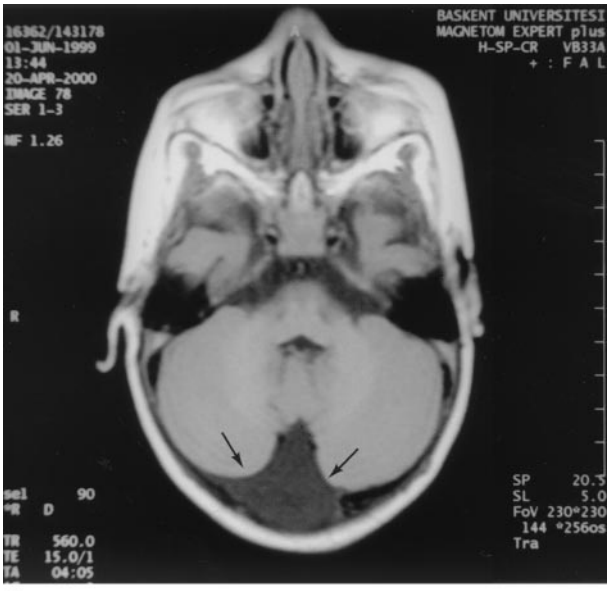


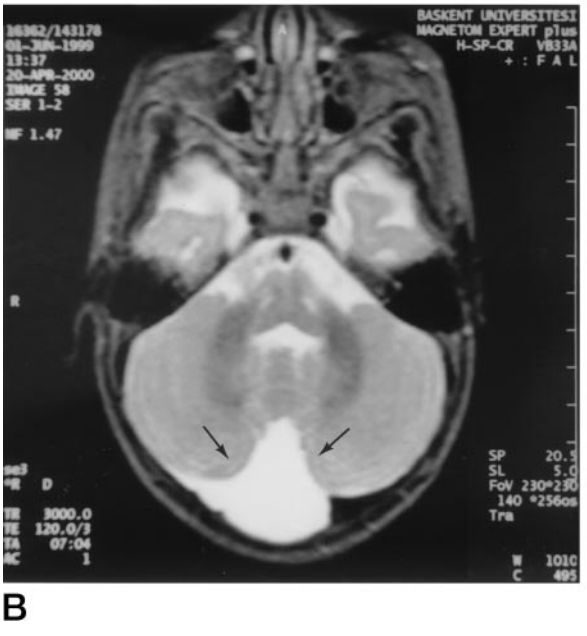
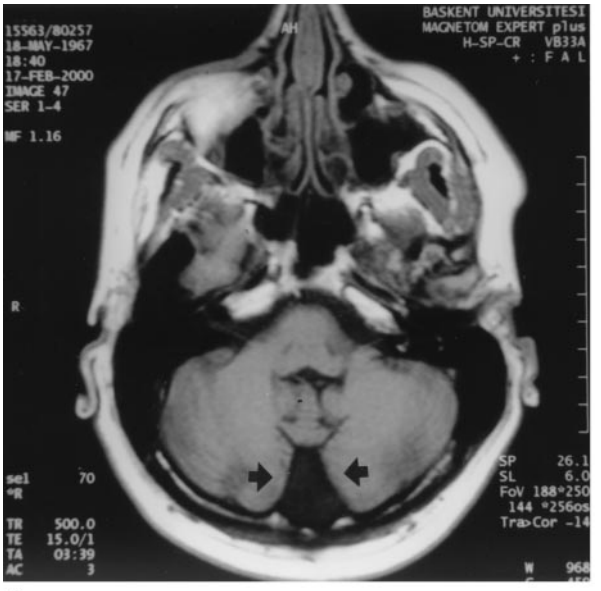


Fig 1. Eleven-month-old girl's cranial MRI: Transverse T1-weighted (A) and T2-weighted (B) images demonstrate a midline-right parasagittal 3.2 × 4.8 cm-arachnoid cyst with minimal mass effect, which is hypointense on T1 and hyperintense on T2-weighted images (arrows).



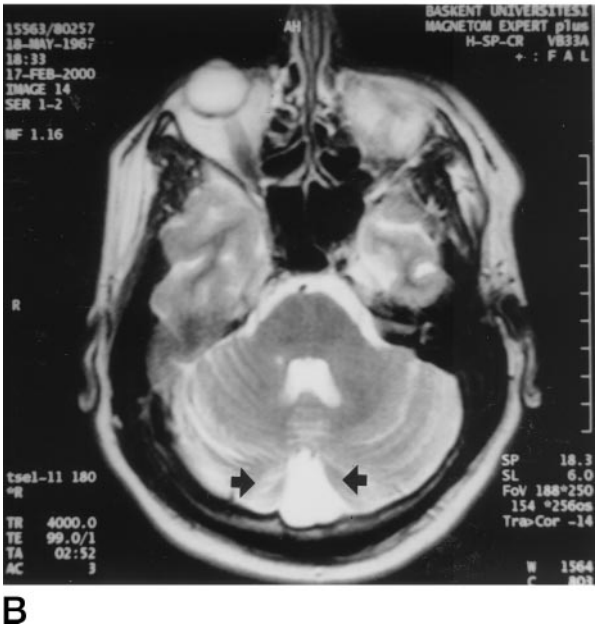


Fig 2. Thirty-three-year-old father's brain MRI: T1-weighted (A) and T2-weighted (B) images show a 2.2 × 3.0-cm posterior fossa arachnoid cyst, which is hypointense on T1-weighted and hyperintense on T2-weighted images (arrows).

In a relatively large-scale study, intracranial arachnoid cysts were detected in 8% of patients with ADPKD; however, in that study, no statements could be made regarding the possibility of familial clustering of arachnoid cysts in these patients.[6] To the best of our knowledge, this is the first report about the familial occurrence of arachnoid cysts in patients with ADPKD. The other interesting features in our cases are the presence of mental retardation and seizures, which were not previously reported in association with ADPKD. These may suggest the presence of a more diffuse dysplastic process involving cerebral cortex in addition to the arachnoid cysts in ADPKD.

CONCLUSION

This is the first report of familial occurrence of posterior fossa arachnoid cysts in association with ADPKD. Additional delineation of the pathogenetic mechanisms involved awaits detailed family studies.

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Pediatrics 2002;110;e13
DOI: 10.1542/peds.110.1.e13

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