Neuroscience, Children's National Medical Center, 111 Michigan Ave NW, Washington, DC 20010. E-mail: wgaillar@cnmc.org).

COMMENT. Imaging is most useful for children with localization-related or remote symptomatic generalized epilepsy. MRI abnormalities are more frequent in infants with seizures than in older children because of presentation of cortical malformations. The authors advise that children younger than 2 years require special MRI sequences because immature myelination may obscure the diagnosis of cortical dysplasia. If the MRI is interpreted as normal and seizures persist, repeat imaging at 6-month intervals is advised, when myelination is more mature and dysplasias can be distinguished. Gadolinium contrast is reserved for suspected tumor, vascular malformation, inflammation, and infectious disorders.

## LONG-TERM OUTCOME OF JUVENILE MYOCLONIC EPILEPSY

All patients developing juvenile myoclonic epilepsy (JME) by 16 years of age in Nova Scotia between 1977 and 1985 were contacted in 2006-2008 to determine long-term seizure and social outcome, in a study at Dalhousie University, Halifax, Canada. Of 24 patients (17 women) with JME, 23 were contacted at a mean age of 36 +/- 4.8 years. Age at first seizure was 10.4 +/- 4.3 years. At 25-year follow-up, 11 (48%) had discontinued AED treatment: 6 were seizure-free (without AEDs) for 5-23 years, 3 had only myoclonic seizures, and 2 had rare seizures. Of those with continued seizures, 8 (36%) had episodes of convulsive status epilepticus, and 3 had intractable epilepsy. Seventy percent enjoyed satisfactory health, work, friendships, and social life, 87% graduated high school, and 69% were employed. Nine were taking antidepressants. Ten women had been pregnant and 4 men were fathers. Eleven pregnancies (80%) were unplanned, and at least 1 unfavorable social outcome was noted in 76%. (Camfield CS, Camfield PR. Juvenile myoclonic epilepsy 25 years after seizure onset: A population-based study. **Neurology** Sept 29, 2009;73:1041-1045). (Response and reprints: Dr Carol S Camfield, IWK Health Centre, PO Box 9700, 5850 University Ave, Halifax, Nova Scotia, Canada B3K 6R8. E-mail: camfield@dal.ca).

COMMENT. One-third patients with JME at 25-year follow-up have seizures well controlled and AED discontinued, in contrast to the generally poor seizure outcome in previous reports. Three-quarters have experienced at least one major unfavorable social event, but 70% report satisfaction with their social life.

# VASCULAR DISORDERS

## CEREBRAL VENOUS SINUS THROMBOSIS CASE SERIES

Presenting features, co-morbid conditions, treatment, and outcome of cerebral venous sinus thrombosis (CVST) in a consecutive series of children are reported from Department of Paediatric Neurology, Bristol Royal Hospital for Children, UK. Twenty-one children (10 male) were diagnosed with CVST (using electronic databases and international codes) and treated in a single pediatric neurology center over a period of 8.25 years. Ages ranged from 1.4 to 16.9 years (median 7.1 years); neonates were not included. Presenting symptoms in

order of prevalence were headache in 15 [71.4%], vomiting (14 [66.6%]), visual disturbance (8 [38.1%]), lethargy/malaise (4 [19.1%]), irritability (3 [14.3%]), limb weakness (2 [9.5%]), unsteady gait (2 [9.5%]), and seizures in 2 [9.5%] patients. Neurological abnormal signs included papilledema in 16 [76.2%], fever (6 [28.6%]), sixth nerve palsy (6 [28,6%]), hemiparesis (5 [23.8%]), decreased level of consciousness (3 [14.3%]), visual field defect (2 [9.5%]), and ataxia in 2 [9.5%]. Patients without papilledema were the youngest, 3.4 years or less. Ear infection (otitis media/mastoiditis) was the most frequent etiological factor, in 13 [61.9%] patients. Other predisposing factors were anemia in 4 and thrombocytosis in 3, nephrotic syndrome in 3, dehydration (3), oral contraceptive (2), group A streptococcal septicemia (2), and pituitary germinoma in 1. Thrombosis was located in superficial sinuses in 21 and deep sinuses in 6. Transverse lateral sinuses were involved in 19 and superior sagittal in 10. CT scans were falsely negative in five of 16 children examined. MRI/MRvenography was diagnostic in all patients. All 21 patients received heparin infusions, and 4 severe cases were treated by local thrombolysis using tissue plasminogen activator, with benefit in 3. All 15 children with infection received antibiotics. Adverse outcome occurred in 45%: 2 died, 8 were treated for chronic intracranial hypertension, 2 had residual hemiparesis, and 1 residual sixth nerve palsy. (Mallick AA, Sharples PM, Calvert SE, et al. Cerebral venous sinus thrmbosis: a case series including thrombolysis. **Arch Dis Child** 2009;94:790-794). (Respond: Dr PE Jardine, Department of Paediatric Neurology, Level 6 UHB Education Centre, Upper Maudlin Street, Bristol BS2 8AE, UK. E-mail: Philip.Jardine@bristol.ac.uk).

COMMENT. Cerebral venous sinus thrombosis (CVST) is rare in children and occurs more frequently in neonates. In one recent study of 70 patients, ages ranging from 6 days to 12 years, 25 (35%) were neonates. (Wasay M et al. **J Child Neurol** 2008;23(1):26-31) Seizures were the most frequent presenting feature, occurring in 59%. This finding contrasts with the present series that excludes neonates and in which seizures occurred in only 9.5%. Seizures were reported in 58% of 160 consecutive children (newborn to 18 years of age) with CVST enrolled in a Canadian Registry in six years from 1992-1998. Occurrence of seizures was followed by a poor outcome. (deVeber G et al. **N Engl J Med** 2001;345(24):1777-8). A report of four neonates with CVST and seizures who developed infantile spasms with hypsarrhythmia at 7-11 months of age demonstrates the poor long-term outcome of neonatal CVST that presents with seizures. (Soman TB et al. **J Child Neurol** 2006;21(2):126-131).

Diagnosis of CVST is frequently overlooked because presenting symptoms are varied and nonspecific. Headache is the most frequent presenting symptom in older children and adults, affecting 95% of patients with isolated lateral sinus involvement. (Damak M et al. **Stroke** 2009;40(2):476-481). Presence of comorbid factors, especially ear infection, should alert the probability of CVST in a child presenting with headache, vomiting and papilledema. Imaging with CT is unreliable, with a high incidence of false negatives, and MRI/MRV is recommended but sometimes difficult to interpret due to anatomical variation. The right transverse sinus is commonly dominant, and the left transverse sinus may be narrowed and atretic. (Renowden S. **Eur Radiol** 2004;14:215-226; Connor SE, Jarosz JM. **Clin Radiol** 2002;57(6):449-461).

**Dramatic increase in venous thromboembolism (VTE)** is reported in Children's Hospitals in the United States from 2001 to 2007 (Raffini L et al. **Pediatrics** Oct 2009;124:1001-1008). The increase was observed at all ages, including neonates. Of 15,000

cases, 1206 involved the intracranial venous sinuses. Pediatric malignancy was the most common comorbid condition associated with recurrent VTE.

# HEADACHE DISORDERS

## DIETARY TREATMENT FOR MIGRAINE UNDER SIX YEARS

Clinical factors and response to treatment were compared in children < 6 years and older children treated for migraine by nonpharmacologic measures in a pediatric headache clinic at Schneider Children's Medical Center, Petah Tiqwa, Israel. Treatment involved only good sleep hygiene, additive-free diet, and limited sun exposure. Foods eliminated included smoked lunch-meats, smoked cheese, yellow cheese (high tyramine), chocolate, pizza, and foods containing monosodium glutamate. Of 92 children identified retrospectively in records, 50 boys and 42 girls met study criteria. Ages ranged fromn 3.8 to 17.2 years (mean 9.4 +/- 3.9 years). Thirty-two (15 boys and 17 girls) were aged 6 years or younger at onset of follow-up, and 60 were older. The younger group had a significantly lower frequency of migraine attacks with aura (13 vs 23 patients, P=0.02) and a lower number of migraine attacks per month (6.8 vs 14.08, P= 0.008); disease duration before start of treatment was also shorter (11.34 vs 24.62 months, P= 0.0057). Response to treatment was graded 1 (none), 2 (partial-50% decrease), and 3 (complete- 75% decrease in attacks). Mean ages of patients with grade 1, 2, and 3 responses were 10.588, 9.11, and 8.11 years, respectively (P=0.02). The younger group of patients had a significantly higher percentage with grade 2 or 3 responses as opposed to grade 1 response (73.3% vs 27.7%, P<0.0075). Also, percentages of patients with grade 3 compared to those with grade 1 responses were significantly different in the 2 groups (81.2% vs 38.3%, P<0.001), and on comparison of results for each of the 3 grades (P=0.0003). Nonpharmacological therapy for migraine may be effective in younger children because of shorter disease duration and fewer attacks than in older children. (Eidlitz-Markus T, Haimi-Cohen Y, Steier D, Zeharia A. Effectiveness of nonpharmacologic treatment for migraine in young children. **Headache** Oct 2009;xx:xx). (Respond: Dr T Eidlitz-Markus, Ambulatory Day Care Center, Schneider Children's Medical Center of Israel, Petah Tiqwa 49202, Israel).

COMMENT. The nonpharmacological, "conservative" therapy as described above is predominantly dietary, eliminating additives and foods commonly recognized as migraine triggers, especially cheese and chocolate (Egger J et al. **Lancet** 1983;2:865-869; Egger J et al. **J Pediatr** 1989;114:51-58; Millichap JG, Yee MM. **Pediatr Neurol** 2003;28:9-15). Elimination diets, such as the Feingold additive-free diet, advocated in the treatment of the hyperactive child, was found in controlled studies to be mildly effective only in some small groups of younger children. The diet was ineffective in older children (NIH Consensus Panel 1982). Elimination and oligoallergenic diets continue to be used in some European and Australian centers for the treatment of childhood neurobehavioral disorders. Interest in dietary therapy for childhood hyperactivity has waned in the United States, and few neurologists use elimination diets for migraine in practice.

Age seems to be a factor in the effectiveness of dietary therapy for migraine. According to the above, children under 6 years are expected to derive most benefit. However, before eliminating certain foods, specific headache triggers should first be identified by