

# PEDIATRIC NEUROLOGY BRIEFS

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J. GORDON MILLICHAP, M.D., F.R.C.P., EDITOR

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### VASCULAR DISORDERS

#### OUTCOME AND MORTALITY OF STROKE

Death certificate data for ischemic and hemorrhagic stroke (subarachnoid hemorrhage [SAH] and intracerebral hemorrhage [ICH]) in children under 20 years of age in the United States were analyzed for a 20 year period at the University of California, San Francisco. Whites accounted for 81% of the stroke mortalities, and sexes were equally distributed. There were 4881 deaths from stroke, with an average of 244 per year. Average annual mortality rates were 0.09 per 100,000 person-years for ischemic stroke, 0.14 for ICH, and 0.11 for SAH. Infants under 1 year old had the highest mortality rates of any age group: 0.57 for ischemic stroke, 0.60 for SAH, and 1.04 for ICH. Infants accounted for only 5% of the children, but one third of stroke deaths occurred in infants (35% of ischemic, 30% of SAH, and 39% of ICH stroke deaths). Between the years 1979 through 1998, childhood mortality from stroke declined by 58%, from 0.55 to 0.23/100,000 person-years, with reductions in all major subtypes. Ischemic stroke decreased by 19%; SAH by 79%; and ICH by 54%. Risk factors for mortality included the following: black ethnicity (relative risks for ischemic, SAH, and ICH stroke were 1.74, 1.76, and 2.06, respectively ( $p < 0.0001$  for all types); and male sex (relative risks for SAH and ICH were 1.30 and 1.21, respectively ( $p < 0.0001$ ) but not for ischemic stroke (relative risk 1.02 ( $p = 0.76$ )). Compared to adults, death rates for hemorrhagic stroke (ICH and SAH) have declined more among children, whereas death rates for ischemic stroke had dropped twice as much for adults (45%) as for children (19%). (Fullerton HJ, Chetkovich DM, Wu YW, Smith WS, Johnston SC. Deaths from stroke in US children, 1979 to 1998. *Neurology* July (1 of 2) 2002;59:34-39). (Reprints: Dr Heather J Fullerton, University of California, San Francisco, Department of Neurology, Box 0114, San Francisco, CA 94143).

COMMENT. Mortality from stroke in US children has declined by more than 50% over the last 20 years. Infants are particularly susceptible, accounting for one third of stroke deaths in children, black children are at greater risk of death from stroke than white children, and males have a higher mortality rate than females.

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**Outcome in young adults with ischemic stroke** was studied in 287 consecutive patients (15 to 45 years) followed for 3 years by clinical examinations or telephone interviews at the University of Lille, Roger Salengro Hospital, France. (Leys D, Bandu L, Henon H et al. Neurology July (1 of 2) 2002;59:26-33). The annual mortality rate was 4.5% in the first year and 1.6% in the second and third year follow-up. The annual stroke recurrence rates were 1.4% and 1.0% in the first year and subsequent years, respectively. Epileptic seizures occurred in 6.6% of patients.

In an editorial, Kittner SJ (Stroke in the young, Coming of age. Neurology July (1 of 2) 2002;59:6-7) emphasizes the social toll of ischemic stroke described in the above studies of ischemic stroke in young adults: high incidence of divorce and job loss. He discusses the role of homocystinuria and B vitamin deficiency in the cause of vascular disease and stroke, and a genetic contribution to stroke risk, particularly in early-onset cases.

Report of the NIND&S Workshop on perinatal and childhood stroke was published as a special article by Lynch JK et al. Pediatrics Jan 2002;109:109-123. See Ped Neur Briefs March 2002;16:21-22.

### **MINOR HEAD INJURY AS CAUSE OF STROKE**

Stroke and acute hemiparesis developing within 15 minutes to 72 hours (mean 16.3 hours) after minor head injury is reported in 8 children, 2-7 years of age (mean 6.2 yrs), at Johann Wolfgang Goethe University, Frankfurt, Germany. CT or MRI showed cerebral infarctions affecting branches of the middle cerebral (3), anterior cerebral (1), posterior cerebral (1), and basilar (3) arteries, and involving the basal ganglia, internal capsule, and brain stem. Prothrombotic risk factors (increase in lipoprotein and factor V Leiden mutation) were present in 2 children. Outcome at a mean of 3.9 year follow-up, classified by the Glasgow scale, was a moderate disability in 4, severe disability (2), non-disabling sequelae (1), and total recovery (1). Minor head injury may explain some cases of so called "idiopathic" strokes. (Kieslich M, Fiedler A, Heller C, Kreuz W, Jacobi G. Minor head injury as cause and co-factor in the aetiology of stroke in childhood: a report of eight cases. J Neurol Neurosurg Psychiatry July 2002;73:13-16). (Respond: Dr Matthias Kieslich, Department of Paediatrics, Paediatric Neurology, Johann Wolfgang Goethe University, Theodor-Stern-Kai 7, 60590 Frankfurt/Main, Germany).

**COMMENT.** Stretching and shearing forces imposed by minor head injuries can lead to a traumatic endothelial intimal lesion of small intraparenchymal end arteries. This is followed by fibrin accumulation, leukocyte reaction and formation of a white thrombus that occludes the arterial lumen after a latency period. The minor trauma may be the only cause of stroke or a co-factor in etiology in cases having a prothrombotic or other known risk factor. A recent media publicized and alleged case of a child developing a cerebral hemorrhage or stroke following a ride on a roller coaster may represent an under-recognized example of minor head injury as a precursor of stroke in young children. Risk factors for hemorrhagic stroke in children include vascular malformation, malignancy, trauma, and coagulation disorders.