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TRAUMATIC BRAIN DISORDERS

RISK OF EPILEPSY AFTER TRAUMATIC BRAIN INJURY

The risk of epilepsy after traumatic brain injury was evaluated in a population-based study at Aarhus University Hospital, Denmark. Data from the Danish Civil Registration System identified 1,605,216 births, 1977-2002. During the study period, 78,572 people had at least one traumatic brain injury, and in the same period, 17,470 developed epilepsy, of whom 1017 had a preceding brain injury. Brain injury is classified as "mild" ('concussion,' loss of consciousness <30 min, amnesia <24 hrs, confusion/disorientation, or focal [temporary] neurological deficit); or "severe" (structural brain injury or skull fracture). Relative to no brain injury, the risk of epilepsy was two times higher after mild brain injury, seven times higher after severe brain injury, and two times higher after skull fracture. Risk of epilepsy was highest during the first years after both mild ($p<0.0001$) and severe ($p<0.0001$) brain injury, and the risk remained high for >10 years. Risk of epilepsy after skull fracture did not vary with time since injury ($p=0.16$). All age groups were affected, and risk increased with age for mild ($p<0.0001$) and severe ($p=0.02$) brain injury. Risks were highest in people older than 15 years at time of injury, and in those with long duration of hospital stay for severe brain injury ($p<0.0001$) or skull fracture ($p=0.02$). Duration of hospital stay was not a risk factor following mild brain injury. Risk was slightly higher in females than males. Patients with a family history of epilepsy had a notably higher risk of epilepsy after mild and severe brain injury. (Christensen J, Pedersen MG, Pedersen CB, Sidenius P, Olsen J, Vestergaard M. Long-term risk of epilepsy after traumatic brain injury in children and young adults: a population-based cohort study. **Lancet** 2009 Feb 20 (Epub ahead of print). (Respond: Dr Jacob Christensen, Department of Neurology, Aarhus University Hospital, Norrebrogade 44, DK-8000 Aarhus C, Denmark. E-mail: jacob@farm.au.dk).

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COMMENT. Traumatic brain injury (TBI) is known to carry an increased risk of epilepsy, but factors that modify the incidence of epilepsy are not well defined. In a previous population-based study in Olmsted County, Minnesota, involving 4541 children and adults, the overall standardized incidence ratio for post-traumatic epilepsy was 3.1. For patients who had sustained a mild injury (loss of consciousness or amnesia for <30 min), the incidence ratio was 1.5, with no increase after 5 years; following moderate injury (loss of consciousness 30 min to 24 hrs or skull fracture) it was 2.9; and after severe injury (loss of consciousness or amnesia >24 hrs, subdural hematoma, or brain contusion) the incidence ratio was 17.0 (Annegers JF et al. **N Engl J Med** 1998;338:20-24). Patients in the Minnesota study with an increased incidence of epilepsy after 5 years had a history of severe brain injury and were age 65 yrs or older. In the Danish study, the risk of epilepsy was high for more than 10 years even after mild brain injury (concussion) in younger patients. Family history of epilepsy and mild brain injury independently contributed to the risk of post-traumatic epilepsy in children and young adults.

Prophylactic phenytoin does not reduce the incidence of early or late seizures following brain injury in children (Teasell R et al. **Brain Inj** 2007;21:201-214). Despite disappointing results of trials of prophylactic antiepileptic medication in head injury patients (Temkin NR. **Epilepsia** 2001;42:515-524), the Danish authors suggest their data warrant further study of newer agents in high risk patients. The evidence suggests that prevention of injury offers greater promise of success than prophylactic medication in reducing the prevalence of post-traumatic epilepsy.

RELATION OF AGE AT INSULT TO OUTCOME OF BRAIN INJURY

Cognitive and behavioral outcomes for children who sustain early brain insult (EBI) were evaluated in relation to age at insult in a study at Royal Children's Hospital, Victoria, Australia. Grouped according to age at time of focal brain insult, 36 sustained congenital (first-second trimester) injuries, 33 perinatal (third trimester to 1 month post-natal), 23 were in infancy (2 months to 2 years after birth), 19 preschool (3 to 6 years), 31 mid-childhood (7-9 years), and 19 late childhood (after age 10 years). Children were tested for intelligence, academic ability, executive function, and behavior. Children with EBI were at increased risk for impairment in all domains of cognition and behavior, with mean scores falling 1SD below expectations. Low scores in arithmetic were especially common, occurring in 63% of EBI children. EBI before 2 years resulted in global cognitive deficits, whereas injury sustained after 2 years of age was followed by near normal cognitive development. In contrast, behavior was worse in older children with EBI from 7 to 9 years compared to those sustaining injury from 3 to 6 years. The age at the time of brain insult is important in predicting risk of cognitive and behavioral outcomes in children with EBI, but patterns of vulnerability differ with respect to age at insult. (Anderson V, Spencer-Smith M, Leventer R, et al. Childhood brain insult: can age at insult help us predict outcome? **Brain** Jan 2009;132:45-56). (Respond: Vicki Anderson, Department of Psychology, Royal Children's Hospital, Flemington Road, Parkville, Victoria, 3052, Australia. E-mail: vicki.anderson@rch.org.au).

COMMENT. Children who sustain an early brain insult are at increased risk of developing impairments of cognition and behavior. Injury in the pre- or perinatal period or in