

CHAPTER

31

Management of First Unprovoked Seizure

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Introduction

An estimated 2% to 5% of the population will have at least one nonfebrile seizure during their lifetime (Hauser and Kurland 1975). Patients with seizures or presenting complaints related to seizures represent approximately 1% to 2% of all Emergency Department visits in the United States (Huff et al 2001). A seizure can be the result of an acute central nervous system (CNS) insult or acute systemic disease, in which case it is referred to as a “provoked” (acute symptomatic) seizure or it can result from a past intracranial insult such as stroke, trauma. CNS infections, in which case it is referred to as an “unprovoked” (remote symptomatic) seizures (Commission 1993). This review will confine to first episode of unprovoked seizure.

Incidence

The incidence rate of first unprovoked epileptic seizures has been evaluated as being 45.6 cases per 100,000 inhabitants in the canton of Geneva, Switzerland (Jallon et al 1887) and 61 cases per 100,000 in Rochester, Minnesota (Hauser et al 1993). In a recent study in Iceland the incidence for single unprovoked seizure was 23.5 per 100,000 person-years (20.3-26.7) (Olafsson et al 2005). The specific incidence according to age shows a bimodal distribution, with the highest level in the group aged 0-10 years and in the aged (Hauser et al 1993,

Jallon et al 1997). Population-based studies of the incidence of first unprovoked seizures suggest that there are between 25,000 and 40,000 children per year in the United States who experience a first unprovoked seizure (Hirtz et al 2003).

Olafsson E, Ludvigsson P, Gudmundsson G, Hesdorffere D, Kjartansson O, Hause WA. Incidence of unprovoked seizures and epilepsy in Iceland and assessment of the epilepsy syndrome classification: a prospective study. *Lancet Neurol* 2005; 4: 627-34.

Risk of Recurrence

The estimated risks of a recurrent seizure following a first unprovoked seizure range from a low of 23% (Pearce and Mackintosh 1979) to a high of 71% (Elwes et al 1985). The reasons for this wide variability are mostly methodological. The average recurrence risk across the sixteen studies systematically reviewed was 51%. The risk was 40% and 52% in prospective and retrospective studies that employed first-seizure methods. At or near 2 years following the first seizure, the recurrence risk was 36% and 47% in prospective and retrospective first-seizure studies (Berg and Shinner 1991). The cumulative risk of recurrence increases over time, the majority of the recurrences occur early (within the first 1 to 2 years) (Annegers et al 1986, Hauser et al 1990, Hart et al 1990). In a study with longer follow-up, an average

of > 10 years, of the 407 children, 46% had one or more recurrences during that period of time. Over the extended, 19% of the children enrolled experienced ≥ 4 seizures and only 10% experienced ≥ 10 seizure episodes (Shinnar et al 2000).

Risk Factors for Recurrence

Certain factors may elevate the risk of experiencing a second seizure. The underlying remote symptomatic etiology and abnormal EEG are consistently related to the risk of recurrence. In studies that examined etiology and EEG together, these factors distinguished groups with average recurrence risks as low as 24% and as high as 65%. Partial seizures were associated with an increased recurrence risk, but not consistently (Berg and Shinnar 1991). For children with first unprovoked seizures that are idiopathic/cryptogenic the recurrence risk is generally between 30 and 50% by 2 years (Shinnar et al 1996, Shinnar et al 2000, Campfield et al 1985) and for remote symptomatic seizures, the estimate of recurrence risk is generally above 50% (Shinnar et al 1996, Shinnar et al 2000, Campfield et al 1985, Marinovic and Jovic 1997). Patients with first unprovoked seizure with a normal CT scan and normal EEG are less likely to have a recurrence of seizures (Das et al 2000).

Das CP, Sawhney IMS, Lal V, Prabhakar S. Risk of recurrence of seizures following single unprovoked idiopathic seizure. *Neurology India* 2000; 48: 357-60.

How Much to Investigate?

The diagnosis of a first seizure can be made accurately with the help of strict criteria. The use of these criteria may have contributed to the rather high risk of recurrence in the Dutch study of epilepsy in childhood (Stroink et al 1998). There are evidence-based recommendations for the diagnostic evaluation of children with first unprovoked seizures (Hirtz et al 2000). In the absence of such recommendations in adults, the patient history and physical examination should direct the type and timing of the investigation.

Children

In children the majority of evidence from Class I and Class II studies confirms that an EEG helps in determination of seizure type, epilepsy syndrome, and risk for recurrence and therefore may affect further management decisions. Based on these observations the Quality Standard Subcommittee of the American Academy of Neurology, the Child Neurology Society, and the American Epilepsy Society recommends EEG as part of the neurodiagnostic evaluation of the child with an apparent first unprovoked seizures (Standard). There is insufficient evidence to support a recommendation at the level of standard or guideline for the use of routine neuroimaging. However the Committee suggests that nonurgent imaging studies with MRI should be seriously considered in any child with a significant cognitive or motor impairment of unknown etiology, unexplained abnormalities on neurologic examination, a seizure of partial onset with or without secondary generalization, and EEG that does not represent a benign partial epilepsy of childhood or primary generalized epilepsy, or in children under 1 year of age (Optional) (Hirtz et al 2000).

Adults

The value and role of EEG in new-onset seizures is well established but the value after a single seizure is controversial. In a prospective study of 300 patients by King et al (1998), the sensitivity of EEG for interictal epileptiform discharges (IED) after a first seizure was found to be 43%. The abnormal EEG is a highly significant predictor for seizure recurrence, a risk ratio of 4.5 (Chreiner and Pohlmann-Eden 2003). Although the sensitivity of routine EEG after a single seizure is only about 30%, the positive predictive value is 80%. IEDs help to characterize the seizure type and epilepsy syndrome in 15-30% (Fountain and Feeman 2006). Routine EEG is usually indicated in evaluation of a single seizure when the etiology (Fountain and Feeman 2006).

Brain imaging can identify substrates underlying epilepsy and guide clinicians in the determination of treatment and prognosis. Computed tomography (CT) is not as sensitive or specific as magnetic resonance imaging (MRI) in identifying common epileptogenic abnormalities. In a prospective study of 300 consecutive adults and children presented with first unprovoked seizures, MR imaging showed 38 epileptogenic lesions including 17 tumors (King et al 1998). Of the 406 adult patients with first seizure, CT scanning revealed tumors in 3% (Hopkins et al 1988). Neuroimaging reveals abnormalities in 3 to 38% of patients with a first seizure depending on patients' demographics. A joint consensus statement from the American College of Emergency Physicians, American Academy of Neurology, American Association of Neurological Surgeons, American Society of Neuroradiology suggests emergent neuroimaging when a provider suspects a serious structural lesion (Guideline). Urgent neuroimaging should be considered for patients who have completely recovered from their seizure and for whom no clear-cut cause has been identified to help identify a possible structural cause (Option). The Committee also suggests emergent neuroimaging for patients with partial-onset seizure and for those who are older than 40 years (Option). Seizures and epilepsy in the elderly are commonly caused by a previous stroke or other organic CNS insult and imaging is essential.

Stroink H, Bruwer OF, Arts WF, Geerts AT, Peters AC, van Donselaar CA. The first unprovoked, untreated seizure in childhood: a hospital based study of the accuracy of the diagnosis, rate of recurrence, and long term outcome after recurrence. Dutch study of epilepsy in childhood. *J Neurol Neurosurg Psychiatry* 1998; 64: 595-600.

Hopkins A, Garman A, Clarke C. The first seizure in adult life. Value of clinical features, electroencephalography, and computed tomographic scanning in prediction of seizure recurrence. *Lancet* 1988; 1: 721-6.

Treatment

It is widely agreed that after two or more seizures patients should be given antiepileptic treatment, but there is still controversy about the treatment of patients after a first unprovoked seizure.

The need to balance the cost of AED medication and the potential stigmatizing effect of a diagnosis of epilepsy against the impact of one or more additional seizures must be addressed for each patient individually when making a therapeutic decision.

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