Seizure Presenting to the Emergency Department, Srinagarind Hospital

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The authors would like to evaluate the incidence, clinical manifestation, the appropriateness of treatment, and outcome of seizure at the emergency department (ED). All charts of patients who visited the ED of Srinagarind Hospital from 1 January 2003 to 31 December 2003 were reviewed. The profiles of patients and management at the ED were recorded. There were 33,508 cases who visited the ED with 104 cases (0.31%) presenting with seizure. Four cases (3.9%) were diagnosed as status epilepticus. Generalized tonic-clonic seizure was the most common type. Poor antiepileptic drug (AED) compliance with the low AED level was the main precipitating factor. The normal physical examination and routine laboratory tests were normal in the majority of patients. Phenytoin intravenous loading was the commonest initial treatment even in patients with non-status epilepticus. Fourteen patients (13.5%)were treated with intravenous diazepam even though seizures were discontinued. Sixty patients (57.7%) were discharged after seizure was controlled. The advice in seizure control was recorded in only 11 cases (10.6%). From this review, 12 patients presented at the ED for continuing medication without any seizures. In conclusion, seizure at the ED should be treated more appropriately with both laboratory investigation and drug treatment. Futhermore, patient education should be implemented.

Keywords: *Seizure, Incidence, Emergency department, Treatment, Patient education*

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Seizure can be presented at the Emergency Department (ED) in about 0.7-1.2% of all conditions[1,2]. The incidence rate of epilepsy in developed countries is 24-53 cases per 100,000 person-year[3]. In Thailand, the incidence rate of encephalitis[4], cerebral malaria[5], cysticercosis[6], and head injury[7] are higher than developed countries. The authors believed that the incidence of seizure presenting at the ED should be higher than previously reported. The authors would like to evaluate the incidence, clinical manifestation, the appropriateness of treatment, and outcome of seizure at the ED.

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Material and Method

The authors reviewed all charts of patients who visited the ED of Srinagarind Hospital (Khon Kaen University, Khon Kaen, Thailand) from 1 January 2003 to 31 December 2003. The study protocol was reviewed and accepted by the Ethical Committee of Khon Kaen University.

The authors studied patients who presented with seizure (diagnosed by clinical manifestation of seizure such as tonic-clonic seizure with or without bowel bladder incontinence observed by a witness,

doctor, or nurse, or if the electroencephalogram was compatible with seizure). Eclampsia was excluded. The patient's characteristics, seizure pattern and frequency, underlying diseases, physical examination, laboratory results, antiepileptic level, and treatment were recorded.

Results

There were 33,508 patients who visited the ED of Srinagarind Hospital, a university hospital during the study period, and 104 patients (0.31%) presented with seizure. The mean age was 25 $\pm$ 19 years, range from 1-77 years old. Age distribution is shown in Fig. 1. Male were the majority of patients (73 cases, 70.2%). Forty seven patients (45.2%) presented between 8 am and 4 pm, 38 patients (36.5%) between 4 pm and 12 pm, and 19 patients (18.3%) from midnight to 8 am.

In about one-third of the patients (38.5%), it was their first experience of seizure and 4 patients (3.9%) were diagnosed as status epilepticus. There were 58 patients (55.8%) who had a history of epilepsy and were on antiepileptic drugs (AED). Generalized tonic-clonic (GTC) seizure was the most common type (82 cases, 78.8%) while partial seizure and unclassified seizure were found in 11 patients (10.6%). In the partial seizure group (11 patients, 10.6%); 5 patients had intracranial lesion, 2 had high plasma glucose (695 and 858 mg/dl), and in the others the cause could not be identified. Two patients were with alcohol withdrawal seizure from 16 patients of alcoholic dependence. Half of the patients had idiopathic seizures (Table 1).

The precipitating factor of seizure was found in 38 patients; poor antiepileptic drug compliance (44.7%), sleep deprivation (13.2%), and fever (11.5%) were the first three common factors.

Abnormal neurological examinations were found in 19 patients (18.3%) while abnormal laboratory findings were shown in 13 patients. Complete blood count, blood urea nitrogen, serum sodium, serum calcium, serum magnesium, and plasma glucose were evaluated in at least 60% of the patients (Table 2). There were only 4 identified causes by laboratory chemistry (2 hyperglycemia, 1 hyponatremia, and 1 hypocalcemia). Computed tomography of the brain was done in 17 patients; 9 patients showed abnormalities (52.9%). Antiepileptic drug level was checked in 36 patients (34.6%) and was found to be sub-therapeutic in 15 patients.

The initial treatment at the ED was prescribed in 58 patients (Table 3). Phenytoin intravenous loading was the commonest treatment. Diazepam oral was prescribed in 7 patients. Fourteen patients were treated with intravenous diazepam even though the seizures were discontinued.

Sixty patients (57.7%) were discharged after seizure was controlled. The advice in seizure control was recorded in only 11 patients. From this review, 12 patients presented at the ED for continuing medication without any seizures.

Discussion

Seizure is still an important problem in the ED in several aspects, such as diagnosis, laboratory investigation, and treatment. In the present study, the incidence rate was 0.31%, which was lower than

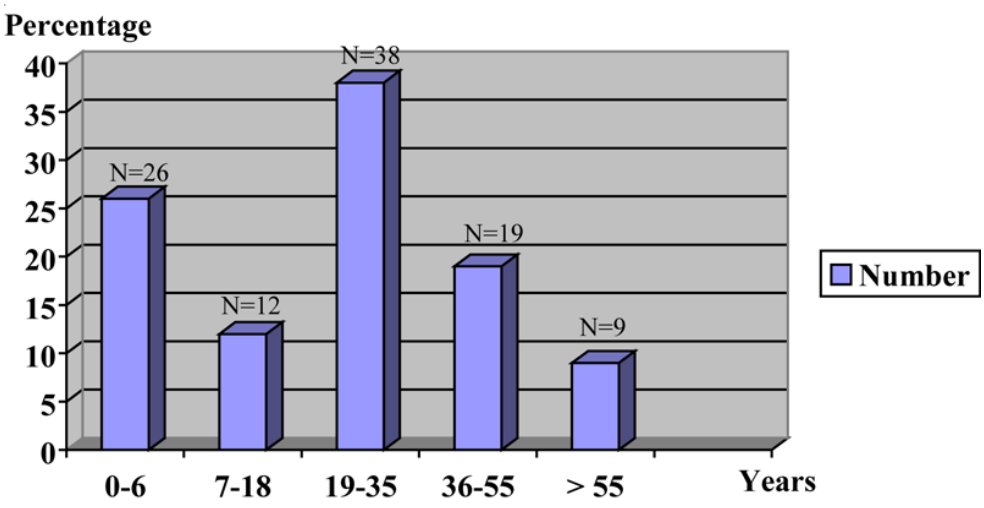

Fig. 1 Age distribution of enrolled 104 cases

Table 1. Etiologies of seizures (N = 104)

Etiologies	N	Percentage
Post cranial surgery	15	14.4
Febrile convulsion	12	11.5
Stroke	5	4.8
Metabolic derangement	4	3.8
Brain tumor	3	2.9
Post encephalitis	2	1.9
Alcohol withdrawal seizure	2	1.9
Head trauma	2	1.9
Neurocysticercosis	2	1.9
Others*	5	4.8
Primary cause**	52	50.0

Note: * are cerebral palsy, hypoxic encephalopathy, encephalitis, arteriovenous malformation, and brain abscess
** cryptogenic and idiopathic

Table 2. Laboratory investigation

Laboratory test	N 104	%	Result		Cause of seizure, N (%)
			Normal, N (%)	Abnormal, N (%)	
CBC	70	67.3	35 (50)	35 (50)	0
BUN	84	80.8	84 (100)	0	0
Blood chemistry					
Glucose	70	67.3	68 (97.1)	2 (2.9)	2 (2.9)
Sodium	77	74.0	56 (72.7)	21 (27.3)	1 (1.4)
Calcium	73	70.2	60 (82.2)	13 (17.8)	1 (1.6)
Magnesium	64	61.5	41 (64.1)	23 (35.9)	0
CT of the brain	17	16.4	8 (47.1)	9 (52.9)	9 (52.9)
AED level*	36	34.6	9 (37.5)	15 (62.5)	15 (41.7)

Note: CBC; complete blood count, BUN; blood urea nitrogen, CT; computed tomography, AED; antiepileptic drug, * missing data = 12 cases (33.3%)

Table 3. Initial treatment at the Emergency Department

Drugs	N = 58	Percentage
Phenytoin iv. loading	18	17.3
Diazepam iv. or im.	14	13.5
Phenytoin oral loading	10	9.6
Diazepam oral	7	6.7
Diazepam rectal suppository	3	2.9
Phenobarbital iv. loading	3	2.9
Phenobarbital oral loading	3	2.9

Note: iv; intravenous, im; intramuscular

Table 4. Compare clinical manifestation with Kramholz's report

Clinical variables	Kramholz A, 1989 Number (Percentage)	Present report, 2006 Number (Percentage)
Duration of studied (months)	6	12
Number of hospital beds	525	850
Number of patients at ED	29,131	33,503
Number of seizure patients	200 (0.7)	104 (0.31)
M:F	75:25	70:30
First onset of seizure	69 (34.5)	40 (38.5)
Febrile convulsion, N	30 (15)	12 (11.5)
History of epilepsy, N	92 (46)	58 (55.8)
Status epilepticus, N	14 (7)	4 (3.8)
Alcoholic dependence, N	60 (30)	16 (15.4)
Alcohol withdrawal seizure, N	13 (22)	2 (12.5)
Hematology study, N	114 (57.0)	70 (67.3)
Cause of seizure, N	no data available	0
Chemistry studies, N	125 (62.5)	70 (67.3)
Cause of seizure, N	no data available	4 (5.7)
CT brain, N	2 (1)	17 (16.3)
Abnormal CT brain, N	0	9 (52.9)
AED level, N	69 (75)	36 (34.6)
Subtherapeutic level of AED, N	36 (52.2)	15 (41.7)
Missing data of AED level, N	14 (20.2)	12 (33.3)
Admitted, N	63 (31.5)	44 (42.3)
Advice of treatment, N	not done	11(10.6)

Note: ED; Emergency Department, M; male, F; female, N; number of patient, ( ); %, AED; antiepileptic drug

previous reports (0.7-1.2%). It may be explained because the authors worked in a university hospital, not a neurological hospital.

Even though there was a higher incidence of cerebral parasitic diseases or encephalitis in Thailand, the incidence rate and laboratory findings of seizure were not different when compared with Kramholz's report in 1989[1] (Table 4). Many laboratory investigations such as complete blood count, plasma glucose, and blood chemistry did done in most cases but the results did not defined the cause of seizure[8,9]. The authors' suggestion is to do blood chemistry test only in cases of suspected metabolic seizures such as focal hyperglycemic seizure, renal failure, drugs associated with electrolyte disturbance, etc.

GTC was the most common type of seizure presented at the ED. Partial seizure had a lower incidence but it suggested intracranial lesion. Again the authors' suggestion is to do a computed tomography of the brain in patients with partial seizure. To the authors' knowledge, plasma glucose must always be tested in focal seizure especially in the northeastern part of Thailand[10].

The initial management at the ED was mostly inappropriate. Intravenous loading of phenytoin should be used in patients with status epilepticus[11]. In addition, convulsive seizures which are short-lived do not require emergency drug treatment. Emergency antiepileptic drug therapy is needed in convulsive attacks if the convulsions persist for more than 10 min or is longer than customary for the individual patient[12]. However, 18 patients (17.3%) were treated with phenytoin intravenous loading. The other treatments such as oral or intravenous diazepam, oral loading phenytoin, or intravenous- oral loading phenobarbital were not necessary in patients whose seizure had already completely stopped.

There were 58 patients, with a previous history of epilepsy. The subtherapeutic level of AED was found in 50% of the patients (Table 4). Poor drug compliance was the main precipitating factor (44.7%). The presented data showed that only 10.6% of the seizure patients received doctors' advice but this may be underestimated because some physicians did not record it on the chart. Twelve patients visited the ED for continuing antiepileptic drug. This may reflect how

much the patients understand their disease. The authors can prevent the poor drug compliance by giving more information to the patients about how to treat and control their seizures. In conclusion, seizures at the ED should be treated more appropriately both laboratory investigation and drug treatment. Furthermore, patient education should be implemented.

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การศึกษาผู้ป่วยที่มาพบแพทย์ด้วยอาการชักที่แผนกอุบัติเหตุและฉุกเฉิน โรงพยาบาลศรีนครินทร์

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คณะผู้วิจัยได้ศึกษาถึงอุบัติการณ์ อาการทางคลินิก ความเหมาะสมในการรักษาและผลการรักษาผู้ป่วยที่มาพบแพทย์ด้วยอาการชักที่แผนกอุบัติเหตุและฉุกเฉินโรงพยาบาลศรีนครินทร์ ตั้งแต่วันที่ 1 มกราคม พ.ศ. 2546 ถึงวันที่ 31 ธันวาคม พ.ศ. 2546 พบผู้ป่วยที่มีอาการชักจำนวน 104 ราย จากผู้ป่วยทั้งปีจำนวน 33,508 ราย (ร้อยละ 0.31) มีผู้ป่วยที่ได้รับการวินิจฉัยว่าเป็นภาวะชักต่อเนื่องจำนวน 4 ราย (ร้อยละ 3.9) อาการชักทั้งตัวเป็นอาการที่พบได้บ่อยที่สุด การขาดยากันชักและระดับยากันชักที่ต่ำกว่าระดับที่เหมาะสมเป็นปัจจัยที่เป็นเหตุหลัก ผู้ป่วยส่วนใหญ่มีผลการตรวจร่างกายและตรวจทางห้องปฏิบัติการเบื้องต้นอยู่ในเกณฑ์ปกติ ด้านการรักษามีการใช้ยาฟีไนโตอินทางหลอดเลือดดำเป็นการรักษาเบื้องต้นที่บ่อยที่สุดทั้งที่ผู้ป่วยไม่ได้รับการวินิจฉัยว่าเป็นภาวะชักต่อเนื่อง นอกจากนี้ยังมีผู้ป่วยจำนวน 14 รายที่ได้รับยาไดอะซีแพมชนิดฉีดทางหลอดเลือดดำทั้งที่ผู้ป่วยไม่มีอาการชักแล้ว ผู้ป่วยจำนวน 60 ราย (ร้อยละ 57.7) ถูกจำหน่ายจากโรงพยาบาลภายหลังจากสามารถควบคุมอาการชักได้ แพทย์ให้คำแนะนำผู้ป่วยเพียง 11 รายและพบว่ามีผู้ป่วยจำนวน 12 รายที่มารับยาที่แผนกอุบัติเหตุและฉุกเฉินทั้งที่ไม่มีอาการชัก โดยสรุปการดูแลรักษาผู้ป่วยที่มีอาการชักที่แผนกอุบัติเหตุและฉุกเฉินยังต้องการการดูแลที่เหมาะสมมากยิ่งขึ้นทั้งด้านการใช้ยา และการตรวจทางห้องปฏิบัติการ รวมถึงการให้คำแนะนำแก่ผู้ป่วย