Seizures in the emergency department: clinical and therapeutic characteristics of 122 patients

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Introduction. Epileptic seizures are a common cause of admission in emergency services at hospitals. Performing the correct diagnosis can be difficult, and deciding when and which anti-seizure medication (ASM) to prescribe is critical. Our objective is to detail the characteristics of patients treated in a medium-sized hospital for this reason.

Patients and methods. A retrospective observational study was performed, including all the adult patients treated by the emergency service of the Lucus Augusti University Hospital between January 2022 and January 2023 with a diagnosis of epileptic seizure on discharge. The study recorded their demographic variables, history, whether it was their first seizure, the number of seizures, whether an anti-seizure medication was administered and which one, the diagnosis, the tests performed, and whether the patient was referred to the neurology service.

Results. A total of 122 patients were diagnosed with epileptic seizures in the emergency service. 50.8% of the patients were women. The mean age was 69.8 years. Neurological assessment was requested for 47.6%. 50.8% presented their first seizure. No diagnosis was performed in 46% of the cases, of which only 10 were evaluated by the neurology service. The most common etiology was vascular. An electroencephalogram was performed on 41.8%. Levetiracetam was practically the only drug administered when the neurology department was not consulted.

Conclusions. Early evaluation of patients with their first seizure in the emergency service by a neurological specialist is crucial for the diagnosis of epilepsy. The same anti-seizure medication is almost always prescribed when no cross-consultation takes place.

Key words. Anti-epileptic. Anti-seizure. Emergency service. Epilepsy. Levetiracetam. Seizure.

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Introduction

Epilepsy is a condition that affects around 350.000 individuals in Spain and more than 50 million worldwide [1-3]. According to the World Health Organization, it is estimated that one in ten people will experience an epileptic seizure at some point during their lifetime if they live to the age of 80 [2]. This disease, in addition to having a significant prevalence, carries a significant morbidity, contributing to the deterioration in the quality of life and being the object of social stigma.

Epileptic seizures are the reason for seeking medical attention of approximately 1% of patients seen in emergency medical departments [4,5]. Recent studies have directly linked seizure duration to prognosis, highlighting the importance of an early and effective seizure management [1,3,5,6]. This relationship has been reflected in the new definition of status epilepticus [7] and highlights the crucial need for immediate care in both pre-hospital emergency settings and hospital emergency departments [8].

Patients consulting for a first epileptic seizure require early evaluation, preferably by a neurologist [4,9], to increase the likelihood of reaching a diagnosis of epilepsy in the shortest possible time and, therefore, to adjust the treatment and even improve the prognosis [1,4,10].

Reaching the diagnosis of epileptic seizures in the emergency departments can be complex, even for neurologists, requiring a detailed clinical history and the use of complementary tests such as an electroencephalogram [11]. Recently, perfusion computed tomography is also being used, with special relevance in patients with continuous seizures or status epilepticus [1,4].

The choice of the first anti-seizure medication (ASM) is crucial, since most of them may have undesirable side effects, so it is of vital importance to choose the right drug for each patient [12]. There is no consensus on which ASM is better than the other, so the choice of ASM should be based on the type of seizure or epilepsy and the medical history of the patient, as well as the adverse effect profile of each drug [13].

Our study aims to detail the clinical and evolutionary characteristics of a group of patients with epileptic seizures who were seen in the emergency department of a medium-sized hospital. We evaluated various clinical factors, the performance of complementary tests and referral to on-call neurology, and the choice of the first ASM used. An attempt was also made to determine the percentage of patients who were diagnosed with epilepsy. Finally, we checked whether there were variations in the choice of ASM and the diagnosis of epilepsy depending on whether the neurology service was consulted or not.

Patients and methods

This is a retrospective observational study of all patients over 18 years of age who consulted the emergency department of the Hospital Universitario Lucus Augusti in the period from January 2022 to January 2023, inclusive, with a discharge diagnosis of epileptic seizure according to the definition of these terms published by the International League Against Epilepsy (ILAE) in 2017.

The Hospital Universitario Lucus Augusti reference area is 324,219 inhabitants, with the creation of the on-call neurology ward in 2019. The number of patients seen in the emergency department in the period covered by the study was 81,769.

Demographic variables (sex and age), history of previous epileptic seizures or if it was a first seizure, type of seizure according to the latest ILAE classification (focal, focal with evolution to bilateral tonic-clonic, generalized, of unknown onset) were collected from each case, number of epileptic seizures (divided into a single seizure, two, or more than two), ASM initiated, whether brain computed tomography and electroencephalogram were performed and their results, diagnosis of epilepsy –if it was reached– and finally whether assessment by the on-call neurologist was required by interconsultation.

Patients under 18 years of age, patients with acute symptomatic epileptic seizures due to toxic-metabolic alterations where the main treatment was their correction, and, although the number is included in the study, patients with status epilepticus who required admission to the intensive care unit were excluded from the study of variables.

Data processing and analysis was carried out using the SPSS Statistics® 25.0 statistical package.

A descriptive analysis of the variables was performed. Qualitative variables (sex, previous epileptic seizures, type of seizure, number of seizures in the emergency department, ASM used, assessment by neurology, diagnosis of epilepsy) were described as absolute number and distribution in percentages, while the quantitative variable (age) was described as mean and standard deviation.

To compare qualitative variables, the χ^2 test or Fisher's exact test were used, accepting a significance value of 5%.

Results

During the observation period, a total of 122 patients were diagnosed with epileptic seizures at discharge from the emergency department. 50,8% of the patients were women (n = 62), with a mean age of 69.8 years and a standard deviation of 21.33.

Of the total number of cases, 47.6% (n = 58) were referred to the neurology department, which accounted for approximately 5% of the referrals to this department during the same period.

Among the patients, 50.8% (n = 62) presented a first epileptic seizure, these being more frequently evaluated by the neurology department (72.58%; n = 45).

Most of the patients, (67.2%; n = 82), presented a single seizure and the rest of the cases presented two or more seizures, most of the latter subgroup being assessed by the on-call neurologist (69.7%).

Regarding the type of seizures, most of the patients presented focal seizures and seizures of unknown onset –43.4% and 32.8% respectively– while 13.1% presented focal seizures with evolution to bilateral tonic-clonic seizures and only 10.7% presented generalized onset seizures.

The diagnosis of focal seizures was made by the on-call neurologist in almost all of this subgroup of patients (96%). Regarding semiology, 68% of the 53 patients with focal seizures presented with language impairment. All of them were initially triaged in the emergency department as a probable stroke.

As for the specific diagnosis of epilepsy, this was not reached in 46% (n = 56) of the cases, of which 10 had been evaluated by the neurology department. Among the patients diagnosed with epilepsy, the most frequent type was vascular structural epilepsy (64.3%; n = 36), followed by other focal epilepsies (19.6%; n = 11) and to a lesser extent idiopathic generalized epilepsies (16%; n = 9). Of the total, 8.2% (n = 10) were acute symptomatic seizures unrelated to toxic-metabolic disorders. In this last subgroup, a total of four patients had sei-

zures secondary to traumatic brain injury, one was due to posterior reversible encephalopathy syndrome and in the remaining five the cause was meningoencephalitis, one of them inflammatory and the rest infectious. The relationship between the diagnosis of epilepsy and the referral to neurology can be seen in table I.

This diagnosis of epilepsy was made in 79.3% of the patients in the emergency department itself, while the remaining patients received their diagnosis at the neurology outpatient clinic. A total of 32 patients (26%) were followed up in neurology outpatient clinic because of their epilepsy.

In 13.9% of the patients, the seizures recurred during the year and they returned to the emergency department for the same reason during the observational period of the study. Of these 17 patients, only three had been seen by the on-call neurologist at the first visit.

Brain computed tomography was performed in 91.8% of the patients and in 100% of the first seizures. The computed tomography scan was considered 'normal', that is to say, it had no findings that could be the cause of the seizure in 72% of the patients (n = 88) and in 100% of the patients who were not diagnosed with epilepsy. In the case of lesional epilepsy vascular subtype computed tomography allowed the diagnosis in about half of the cases (n = 21.58%). No magnetic resonance imaging was performed urgently.

An electroencephalogram was performed urgently (considered urgent in this case when it was done within 24h of the epileptic seizure) in a total of 41.8% of patients (n = 51). Urgent electroencephalogram allowed the diagnosis of epilepsy in 7 of 9 patients (78%) with a diagnosis of idiopathic generalized epilepsy and in 54.5% of focal epilepsies. Whenever an electroencephalogram was performed, the on-call neurologist was involved.

The most frequently used ASM when treatment was initiated was levetiracetam (56.3%, n = 36), the rest of the drugs were used much less frequently and can be seen in table II. In cases not discussed with a neurologist, levetiracetam was the ASM initiated in 92.5% of the patients in whom treatment was initiated; this same drug was the one chosen by the on-call neurologist in 29.3% of the occasions. The second most frequently used drug by the on-call neurologist was lacosamide (27.6%), used much less frequently by the emergency department without interconsultation (4.7%). Brivaracetam was used when patients presented with a cluster of seizures. Likewise, 83.3% of the times that eslicarbazepine was started, the diagnosis was vascular epilepsy. Valproate was used in only two cases and oxcarbazepine in another two.

Table I. Relationship between epilepsy diagnosis and neurology interconsultation.

	Yes	No
Unknown onset	10	46
Focal	11	0
Vascular	25	11 (performed during outpatient visits)
Idiopathic generalized epilepsy	8	1 (performed during outpatient visits)

No drug was started in 20.5% (n = 25) of the cases, of which only two patients were referred to neurology.

Both the fact of reaching the diagnosis of epilepsy and the type of ASM initiated were significantly related to referral to the neurology department (p < 0.01). Similarly, having two or more seizures and being the first seizure was directly and significantly related to referral to the neurology department. However, in a total of 17 patients with first epileptic seizures, no referral was made.

Patients who were admitted directly to the intensive care unit with status epilepticus, which during this same period was 21 patients, are not the subject of this study due to their peculiar characteristics.

Discussion

As described in previous studies [3,11,14], in our observation of emergency departments patients we have found that epileptic seizures represent a common cause of admission to the emergency departments, occupying second place in terms of neurological emergencies in our center after stroke.

In our study we can observe an apparent lower proportion of epileptic seizures in the emergency departments, which is probably related to the difficulty of diagnosing seizures when they are not tonic-clonic and to the recent creation of the neurology on-call service in our hospital, so that we are not always enquired for assessment, as evidenced by the fact that assessment by the on-call neurologist was only requested in 47.5% of the patients who consulted for seizures. This contrasts with other

Table II. ASM choice and its relationship with neurology interconsultation and seizure number.

	No neurology interconsultation	Neurology interconsultation	Single seizure	Two or more seizures
Levetiracetam	36	17	33	20
Lacosamide	3	16	12	7
Brivaracetam	0	10	0	10
Eslicarbazepine	0	6	5	1
Lamotrigina	0	5	5	0
Other (valproic acid and oxcarbazepine)	1	3	4	0
None	23	2	24	1

studies with similar characteristics to ours, where assessment by the neurology department is more frequent, even reaching practically 100%, in urgent seizures [3,5,15,16]. However, as specified in most seizure management guidelines, when the patient already has a diagnosed epilepsy, the seizure is similar to previous ones and recovery is complete, urgent evaluation by a neurologist is not essential [3].

Most of the patients with a diagnosis of epilepsy were of vascular structural cause, similar to other published studies [4,5], and practically 80% of the patients received the diagnosis in the emergency departments with on-call neurology assistance, allowing better treatment and prognosis, which highlights the importance of specialized evaluation of seizures.

In our series, 100% of the patients who received the diagnosis of epilepsy in the emergency departments maintained this diagnosis upon referral to neurology outpatient clinic, consistent with other epidemiological studies conducted in Spain and Europe.

In our center, the availability of urgent electroencephalogram is currently very limited, being only possible to perform it in the morning and on working days. This often restricts our ability to make the diagnosis of epilepsy as soon as possible and start appropriate and early treatment. Most of the patients who did not receive a diagnosis of epilepsy could be receive a diagnosis later through electroencephalogram in outpatient clinics.

When the neurology department was involved in the initiation of ASM, the choice was more varied, probably because the type of seizure and the patient's characteristics were taken into account. Levetiracetam was initiated in practically all the patients in whom ASM was initiated without calling neurology, perhaps because it is a safe, well-known, well-tolerated drug, with IV availability, and is useful in all types of epilepsy. These results are similar to international studies of seizure treatment in the emergency departments [14,17].

Each time brivaracetam was started it was used for seizure clusters, and the on-call neurologist intervened. This is probably in line with recent studies where the rapid onset of action of brivaracetam for urgent seizures is observed [18].

Finally, it should be noted that it is likely that many focal seizures went unnoticed by healthcare personnel and were therefore not included in this study. It should be emphasized that the fact that the study is retrospective is a limitation that leads to imprecision in data collection and can lead to bias. It would be ideal to carry out other types of studies to verify the results presented here.

Conclusions

Epileptic seizures are a frequent reason for seeking medical attention in hospital emergency departments. Early assessment of seizures by a neurologist directly influences the diagnosis of epilepsy and could be relevant for the choice of the most appropriate drug according to the patient's characteristics. When the neurology department is not consulted, the same drug is almost always used as ASM.

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Crisis en urgencias: una vista a las características clínicas y terapéuticas a través de 122 pacientes

Introducción. Las crisis epilépticas son un motivo frecuente de consulta en los servicios de urgencias hospitalarias. Llegar al diagnóstico correcto puede ser complejo, y es fundamental decidir cuándo y qué medicamento anticrisis (MAC) pautar. Nuestro objetivo es detallar las características de los pacientes que consultaron por este motivo en un hospital mediano.

Pacientes y métodos. Estudio observacional retrospectivo de todos los pacientes mayores de edad que consultaron en el servicio de urgencias del Hospital Universitario Lucus Augusti entre enero de 2022 y enero de 2023 con diagnóstico al alta de crisis epiléptica. Se registraron variables demográficas, los antecedentes, si era una primera crisis, el número de éstas, si se inició un MAC y cuál, el diagnóstico, qué pruebas se realizaron y si se interconsultó con la guardia de neurología.

Resultados. Se diagnosticó a 122 pacientes de crisis epilépticas en urgencias. El 50,8% eran mujeres. La media de edad fue de 69,8 años. Se solicitó valoración por neurología en un 47,6%. El 50,8% presentó una primera crisis. No se llegó al diagnóstico en un 46% de los casos, de los cuales sólo 10 fueron valorados por neurología. La etiología más frecuente fue la vascular. Se realizó un electroencefalograma en un 41,8%. El levetiracetam fue prácticamente el único fármaco utilizado cuando no se consultó con neurología.

Conclusiones. La valoración precoz de los pacientes con una primera crisis en urgencias por un especialista en neurología es determinante para el diagnóstico de epilepsia. Cuando no se interconsulta, casi siempre se pauta el mismo MAC.

Palabras clave. Anticrisis. Antiepiléptico. Crisis. Epilepsia. Levetiracetam. Urgencias.