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Review Article

LINES OF MANAGEMENT OF ACUTE SEIZURE

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Abstract:

Introduction: Patients who present with a seizure for the first time are always distressed and worried regardless of being children or adults. Reports estimate that up to ten percent of the general population will suffer from a seizure at least once during their lifetime, with less than 50% of these patients developing other seizures. Therefore, and due to the relatively high prevalence of seizures, thorough assessment and proper evaluation of patients with seizures is considered important. In this article we will be discussing on how to properly assess, evaluate and diagnose a patient who has had at least one seizure.

Aim of work: In this review, we will discuss the most recent evidence regarding the acute management of seizure.

Methodology: We did a systematic search for acute management of seizure using PubMed search engine (<http://www.ncbi.nlm.nih.gov/>) and Google Scholar search engine (<https://scholar.google.com>). We only included full articles.

Conclusions: Seizures are considered to be one of the important causes of presentation to the emergency department, with an overall 10% risk of developing a seizure during lifetime., proper management should be provided to treat the seizure and decrease the distress of the patient. Generally, the risk of recurrence will depend on the type of the seizure, the characteristics of the seizure, the clinical picture, and the age. Unprovoked seizures do not generally require treatment with anti-epileptic drugs, as they will stop after the provoking cause has been addressed. On the other hand, provoked seizures usually require initiation of anti-epileptic drugs.

Key words: acute seizure, first seizure, management, emergency department.

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INTRODUCTION:

Patients who present with a seizure for the first time are always distressed and worried regardless of being children or adults. Reports estimate that up to ten percent of the general population will suffer from a seizure at least once during their lifetime, with less than 50% of these patients developing other seizures. Therefore, and due to the relatively high prevalence of seizures, thorough assessment and proper evaluation of patients with seizures is considered important. In this article we will be discussing on how to properly assess, evaluate and diagnose a patient who has had at least one seizure.

According to the International League against Epilepsy, epilepsy is defined as the occurrence of two or more seizures with a latency period between the two that is longer than twenty-four hours and where there is no clear underlying cause predisposing for these seizures. Following the occurrence of two unprovoked seizures, the risk of recurrence of seizures within the next ten years is usually higher than 60% [1]. This definition was made after carefully studying available evidence and published papers in this field.

The accurate initial assessment is necessary as it assesses the risk of seizures recurrence in patients and aids the planning of management accordingly. This helps as patients who have low probability of having another seizure will not receive unnecessary treatment that could cause them more harms than benefits. In fact, many epilepsy centers currently have a first-seizure section where patients who have had their first seizure in their life will present. These patients will be examined and assessed by highly-experienced neurologists who will plan accurate management plans for them according to their risks.

Apart from calculating the risk of suffering from another seizure, physicians must also consider the risks that will follow the second seizures, if it occurs, and the risks of adverse events following anti-seizures treatment, before making any decision regarding management of the patient.

As we have said, the likelihood of developing another seizure remains to be the most crucial determinant of future management and treatment plans. Therefore, many assessment tools and guidelines have been published to help physicians determine the risk and plan the management accordingly. The American Academy of Neurology has published in 2015 their guidelines in which they discuss the indications for initiation of anti-epileptic treatment, the proper

assessment of first seizures in children, the proper management for children with an unprovoked seizure, the proper assessment of first seizures in adults, and the proper management and treatment for adults with an unprovoked seizure [2,3].

Generally, a seizure can be classified as provoked or unprovoked. As the name implies, a provoked seizure has a clear cause that is responsible for causing the seizure and can be identified in the patient. Causes of a provoked seizure include pharmacological agents, substance abuse, and metabolic abnormalities. Encephalitis can also lead to the development of acute seizures and are sometimes grouped separately in a group called 'acute symptomatic seizures'. The presence of brain trauma and brain injuries can also lead to the development of seizures. On the other hand, in the case of unprovoked seizures, no clear etiology or underlying cause can be detected after full examination and assessment of the patient.

The findings of an EEG following the occurrence of a first seizure can show specific patterns that will help classify the seizure and predict the risk of seizures recurrence. However, many patients who had their first seizure show EEG findings that do not fit in any classification even following thorough examination. It is also important to realize that the seizure in patients who present with a 'first' seizure may not in fact be the first, and multiple seizures could have been occurred previously in the patient. In fact, it is relatively common for a patient who presents with a 'first' generalized seizure to have previously had minor seizures like myoclonic jerk, tongue biting, absence seizures, or focal seizures. Therefore, a neurologist must not depend only on the complain of the patient but must also obtain a careful thorough medical history that will help detect any previous attacks or seizures. This is of higher importance when dealing with an adult with a complex partial seizure or a child with an absence seizure.

In cases where the patient is discovered to have had multiple previous seizures, the management and treatment plans will significantly change accordingly. The first step will be to know the onset, course, duration, and frequencies of these previous seizures. Kho et al, conducted a study where they included seventy-two patients who had multiple seizures within one day, but for the first time in their lives. They compared these patients with another group of more than four hundred patients who presented with a single first seizure. The overall seizure recurrence rate in all included patients was 38%, with no significant differences in recurrent rates between the

two groups. These results were also confirmed after authors adjusted for the underlying etiologies of the seizures [4].

As we previously mentioned, the definition of epilepsy states that two or more seizures must occur within a latency period that is longer than twenty-four hours, and without the presence of clear predisposing factor responsible for the seizure.² Therefore, the development of multiple seizures within twenty-four hours does not qualify for a diagnosis of epilepsy, and thus does not indicate anti-epileptic therapy. This is true especially in patients where seizures occur for the first time.

In patients who suffer from at least two seizures within a latency period that is longer than twenty-four hours, and without the presence of clear predisposing factor, the rate of seizures recurrence along with the development of more seizures significantly increases. Hauser et al, conducted a study on 204 patients with unprovoked seizures and found that the recurrence rate following the first seizure was less than 33%. However, the recurrence rate following the second seizure was as high as 76%. They also found that most recurrent seizures occur within less than a year from the preceding seizure. Moreover, they found that following the development of two seizures, the risk of having a third seizure within the next five years was as high as 87% [5].

In this review, we will discuss the most recent evidence regarding the acute management of seizure.

METHODOLOGY:

We did a systematic search for acute management of seizure using PubMed search engine (<http://www.ncbi.nlm.nih.gov/>) and Google Scholar search engine (<https://scholar.google.com>). We only included full articles.

The terms used in the search were: acute seizure, first seizure, management, emergency department.

ANTIEPILEPTIC DRUG PROPHYLAXIS:

When discussing the initiation of anti-epileptic drugs for the prophylaxis of seizures, no current evidence supports this practice except for patients who recently suffered from a head injury and have a high risk of developing a seizure.⁶ In these patients, the guidelines of the American Academy of Neurology supports the use of anti-epileptics for prophylaxis [7]. On the other hand, when dealing with patients with brain neoplasms, cerebral hemangiomas, strokes, or craniotomy, no solid evidence is present to support

the use of anti-epileptic drugs for the prophylaxis of seizures until at least one seizure has already occurred.⁷⁻⁸

ANTIEPILEPTIC DRUG TREATMENT INITIATION:

Following the occurrence of the best seizure, it is important to assess these factors before making the decision of starting anti-epileptics treatment:

Provoked Versus Unprovoked Seizures:

According the official definition of epilepsy, a seizure must be unprovoked to fit the criteria for a diagnosis of epilepsy. This means, no clear underlying cause that predisposed for the seizure should be detected. Provoked seizures have many causes including medications toxicity, substance abuse, and metabolic abnormalities. Most causes of provoked seizures lead to the development of generalized convulsive manifestations. However, sometimes the presence of a hypoglycemic status can lead to the development of focal neurological manifestations. Both alcohol intoxication and alcohol withdrawal can lead to the development of provoked seizures which are usually generalized. These seizures occur due to the lowering of threshold of developing a seizure in patients with alcoholism. Treatment of provoked seizures is mainly dependent on addressing the underlying cause and the use of anti-epileptic drugs is not needed. In fact, anti-epileptic drugs can induce more seizures. Patients must be aware that seizures may reoccur if they are exposed again to the factor that provoked the first seizure.

On the other hand, most focal seizures with/without the presence of a secondary generalization are found to be unprovoked seizures. Therefore, when a patient presents with a focal seizure, the initial management must be the treatment for unprovoked seizures.

It is clear, therefore, that the management of patients following the first seizure depends mainly of knowing whether the patient with unprovoked seizure will or will not develop another unprovoked seizure and planning further treatment accordingly. However, determining the risk is challenging, and it all depends on probabilities, as we can never know for sure if a patient will or will not have other seizures. For example, when managing a young child with a first unprovoked seizure, normal physical and neurological examination, normal EEG findings, and normal imaging, we can estimate the risk of developing another seizure is relatively low, and thus

no further treatment is usually indicated.

Type of Seizure:

The second element to assess before determining the proper management for a seizure is the type of the seizure. For example, a patient who present with a simple focal seizure with isolated sensory or motor manifestations and without developing altered mental status, will have clinical picture that is milder than a patient who develops a complex focal seizure, or a generalized seizure that is associated with altered mental status. Therefore, each patient must be treated separately based on the type of the seizure and its severity and associated symptoms.

No anti-epileptic medications will be indicated, for example, in a 9-year-old child who presents with a partial motor seizure of the mouth and shows centrottemporal spikes on EEG (the findings associated with benign Rolandic epilepsy). However, if the same patient develops psychological distress or fears psychological distress from possible recurrent attacks, anti-epileptic drugs could be used. On the other hand, if the same seizures with the same EEG findings occur in a 21-year-old patient who is known to have a frontal cortical hemangioma, the risk of developing a second generalized seizure will be significantly high, especially if the patient has already developed cognitive symptoms. Therefore, treatment of this patient is a must to prevent the occurrence of a second generalized seizure. Finally, seizures that occur due to high fever are usually benign and do not require treatment except for treating the fever itself.

Patient Age:

A huge debate is still present on whether management and treatment of an unprovoked seizure be different between children and elderly patients. Generally, the incidence of epilepsy has two peaks, one in children and one in the elderly [9]. It is important to know that in any elderly patient, the seizure must have a cause, even if imaging was nonspecific and did not reveal anything, where it will be called 'seizure of undefined cause' rather than 'idiopathic seizure'. The most common causes of developing a seizure in an elderly patient are strokes.¹⁰ In elderly patients who develop an unprovoked seizure, this seizure is always considered focal.

In a previous study in Wisconsin that included forty-eight patients older than 50 years, investigators found that twelve of these patients developed epilepsy (with recurrent seizures), fourteen of these patients did not develop seizures after their first seizure but showed

abnormal imaging or EEG findings, and the rest did not develop seizures after their first seizure but showed normal imaging or EEG findings [1]. Within the follow-up for a year, 27% of the patients who had a single seizure with normal findings developed another seizure. On the other hand, none of the fourteen patients who developed a single seizure but showed abnormal imaging or EEG findings, developed any other seizures within the follow up year, which is most likely due to the treatment they received. One limitation of this study, which could have led to significant bias, is that five patients were lost before the completion of the first follow-up year, and sixteen patients did not complete the follow-up year because they died [11].

Another important factor to consider when treating an elderly patient with a seizure is the lifestyle and the living situations of this patient. For example, management and treatment plans differ significantly between active patients and long-term care residents.

Acute Versus Remote Symptomatic Seizures

Physicians must be able to distinguish between acute symptomatic seizures and remote symptomatic seizures. In a previous study, investigators included 148 patients with a single unprovoked remote symptomatic seizure (from a static lesion) and 262 patients with acute symptomatic seizure. The definition of acute symptomatic seizure was made as a seizure that occurred within one week following a stroke, a traumatic brain injury, or an active CNS infection. Authors concluded that patients who suffered from an acute symptomatic seizure had about nine time's higher 30-day mortality rates than patients who suffered from a remote symptomatic seizure. However, when patients were followed for ten years, investigators found that patients who had a remote symptomatic seizure were 80% more likely to develop another unprovoked seizure compared to patients who had an acute symptomatic seizure. Among included patients in this study, the etiologies that predisposed to the development of an acute seizure were traumatic brain injury (in 34.7% of patients), cerebrovascular events (in 34.7% of patients), and neurological infections (in 30.6% of patients), whereas the etiologies that predisposed to the development of a remote seizure were traumatic brain injury (in 25% of patients), cerebrovascular events (in 68.2% of patients), and neurological infections (in 6.8% of patients). In addition, authors noticed that about 31.7% of patients with acute seizures were elderly, whereas up to 48.7% of patients with elderly and have a history of cerebrovascular events. In this study, risk of

developing another seizure following cerebrovascular events was less than 33% if the first seizure was an acute seizure, but as high as 71% if the first seizure was remote seizure. On the other hand, following traumatic brain injuries, the recurrence risk was 13.4% if the first seizure was an acute seizure and 46.6% if the first seizure was a remote seizure. Finally, following neurological infections, the recurrence risk was 16.6% if the first seizure was an acute seizure and 63.5% if the first seizure was a remote seizure. Investigators of this study were able to prove that the type of seizure is an important determinant of the prognosis of the seizure and the risk of recurrence [12].

Based on the findings of this study, acute seizures were not considered epilepsy but rather a provoked seizure. This affected later guidelines of the management of acute seizures [13].

STUDIES OF RISK OF RECURRENCE

As we mentioned earlier, the most important determinant of management and treatment of patients with acute seizures is the risk of developing another seizure. It is not possible to know for 100% whether a patient will develop a seizure or not. Therefore, physicians usually assess the probability of each patient for the development of a subsequent seizure and plan the management accordingly.

Due to the importance of this, many studies have been conducted to come up with the best scores or assessments that will predict the risk of seizures recurrence. Many of these studies are now considered old (before the use of MRI for example), but their findings are still important and used in most recent guidelines of the American Academy of Neurology. Despite being old, and conducted before the emerging of recent imaging techniques, the results of those studies are still valid regarding patients with high risk of seizures recurrence.

Hauser et al, conducted the landmark study where they included 244 patients with different ages and the development of an unprovoked seizure with no prior history of seizures. They followed included patients for thirty-six months and calculated the risk of seizures recurrence within this period [14]. They found the risk of having another seizure after one year of follow up to be 16%, the risk of having another seizure after two years of follow up to be 21%, and the risk of having another seizure after three years of follow up to be 27%. Seizures with EEG showing spike-wave discharges were found to be idiopathic and had a recurrence rate of 50%

following 18 months of follow up. The presence of a positive family history of seizures in a patient with an idiopathic seizure raised the recurrence rate to become 29% after only four months. Authors did not find age, type of seizures, and onset of seizure to significantly affect the recurrence of seizures [14].

CONCLUSIONS:

Seizures are considered to be one of the important causes of presentation to the emergency department, with an overall 10% risk of developing a seizure during lifetime. Seizures generally cause significant distress on the patients, especially in the cases of first seizure. Therefore, proper management should be provided to treat the seizure and decrease the distress of the patient. Following the resuscitation of the patient, the first most important step is to assess the patient for the risk of developing another subsequent seizure. This is done by carefully assessing the patient, obtaining a thorough medical history, and performing a complete physical and neurological examination. Generally, the risk of recurrence will depend on the type of the seizure, the characteristics of the seizure, the clinical picture, and the age. Unprovoked seizures do not generally require treatment with anti-epileptic drugs, as they will stop after the provoking cause has been addressed. On the other hand, provoked seizures usually require initiation of anti-epileptic drugs in patients who have high risk of seizures recurrence. Further studies are still needed to improve the ways in which the risk of recurrence is assessed.

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