

# Could Coronavirus Disease 2019 Vaccine Be a New Terminology in Epileptic Seizure Etiology?

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## Abstract

An epileptic seizure is the clinical reflection of abnormal paroxysmal activities of neurons. Its frequency varies according to age. While the incidence of acute symptomatic seizures is 30-39/100 000, it is seen most frequently before the age of 20 and after the age of 60 with the second frequency. Causes such as metabolic disorders, head trauma, and cerebrovascular disease may cause an acute symptomatic seizure. In inactivated coronavirus disease 2019 vaccines, side effects may develop due to inflammation of body cells against given foreign substances. In order to raise awareness, we presented our advanced age case who presented with epileptic seizure after the coronavirus disease 2019 vaccine. A 72-year-old female patient was brought to the emergency room because of convulsions and wheezing after fainting. It was learned that she had urinary incontinence and foaming at the mouth during contraction. She had a history of diabetes and hypertension. She had no previous history of epileptic seizures. It was learned she had a third dose of coronavirus disease 2019 vaccine 3 days ago. There was no feature in her family history. Her vitals, physical, and neurological examinations were normal. Blood tests, cardiac examinations, neuroimaging, and cerebrospinal fluid analysis were normal. Once an epileptic seizure was observed in the follow-up, antiepileptic therapy was started. The patient whose seizure did not recur was discharged.

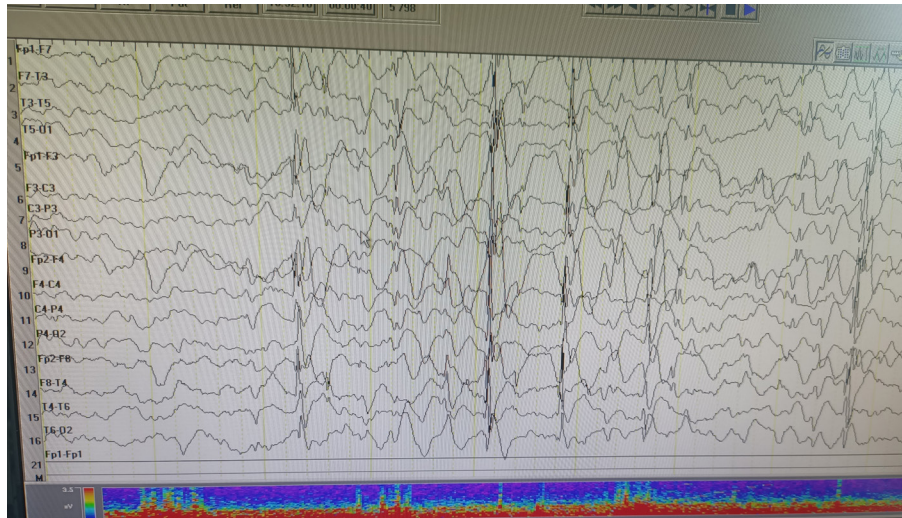
**Keywords:** COVID-19 vaccine, epileptic seizure, side effect

## INTRODUCTION

An epileptic seizure is the clinical reflection of abnormal paroxysmal activities of neuronal groups in the cerebral cortex. Epilepsy, on the other hand, is a multifaceted complex neurological disease that is common and has a paroxysmal course with different symptoms and signs. The frequency and types of seizures vary according to age. While the incidence of acute symptomatic seizures is 30-39/100 000 each year, it is seen most frequently before the age of 20 years and after the age of 60 years. While the cause of the seizure may be epilepsy, many causes other than epilepsy may also trigger the seizure. Causes such as metabolic disorders, intoxication, head trauma, and cerebrovascular disease may cause an acute symptomatic seizure.<sup>1</sup> It is stated as a result of studies and clinical experiences that neurological involvement caused by coronavirus disease 2019 (COVID-19) may be a risk factor for the development of acute symptomatic clinical seizures. It is thought that the virus may cause seizures through direct invasion to the central nervous system or inflammatory mediators secreted from the brain tissue. In inactivated COVID-19 vaccines, side effects may develop due to the inflammation of body cells against the foreign substances given.<sup>2</sup> To be more enlightened in terms of vaccines, it is important that the clinical conditions observed after the administration of vaccination all over the world are reported as possible side effects after all the differential diagnosis tests for other preliminary diagnoses are ruled out. We also considered it worthy to present our elderly case who presented with epileptic seizure after COVID-19 vaccine, thinking that it would be an instructive and enlightening case by raising awareness in this regard.

## CASE PRESENTATION

A 72-year-old female patient was brought to the emergency service due to sudden fainting followed by a seizure and then wheezing. It was learned that she had urinary incontinence and foaming at the mouth during a seizure. She had a history of diabetes and hypertension. It was learned that she had not had such a complaint before. It was also learned that she had the third dose of COVID-19 vaccine (Coronovac, Sinovac) 3 days ago. There was no feature in her family history. She was brought to the emergency service after her consciousness returned to normal. Vital signs checked in the emergency room were as follows: fever: 36, blood glucose: 180 mg/dL, blood pressure: 130/75 mmHg, and pulse: 76 beats/min. Neurological examination and other system examinations were normal. Biochemistry, hemogram, thyroid function tests, troponin, complete urinalysis, and C-reactive protein were found to be normal. Electrocardiogram and echocardiogram performed for cardiac pathology were normal. No significant pathology was detected in the neuroimaging (brain computed tomography, diffusion magnetic resonance imaging (MRI), and contrast-enhanced brain MRI) performed for the etiology of the patient, who was suspected of having epileptic seizures for the first time at an advanced age according to the anamnesis. During the electroencephalography (EEG), the patient had complaints of constant staring, contraction, and unresponsiveness for approximately 1-2 minutes, and during this time, sharp wave discharges with a generalized frequency of 2-3 Hz were detected in the EEG (Figure 1). Levetiracetam intravenous loading (2500 mg) was applied to the patient in the postictal period during the emergency service follow-up.



**Figure 1.** Generalized sharp wave discharges with a frequency of 2-3 Hz.

A lumbar puncture was performed for the etiology of advanced age epileptic seizure in the patient who was observed to have definite epileptic seizures in the emergency room. The analysis of the cerebrospinal fluid was found to be normal. The patient, who was followed up in the intensive care unit, was started on three times 500 mg maintenance levetiracetam treatment. The epileptic seizure did not recur throughout the patient's clinical follow-up. The results of the control EEG were detected to be normal. Neurological examination was normal. The patient, who did not have seizures again in the follow-up, was decided to be followed up and discharged with antiepileptic treatment.

## DISCUSSION

The year 2020 was a year in which many negative effects of the COVID-19 pandemic emerged, and the problems caused by the COVID-19 infection still continue. The COVID-19 epidemic, which started in China in December 2019, is still the most important agenda item in the world. Vaccine applications are always the most promising development in dealing with infectious diseases and global epidemics. Considering the world history, the fights against many epidemics have been successful thanks to effective vaccination programs. In the report published by the US Centers for Disease Control and Protection, the number of child deaths prevented by the measles vaccine alone was 20 million between the years 2000 and 2015. World Health Organization data also emphasize that nearly 3 million deaths are prevented every year.<sup>3</sup> It is the CoronaVac COVID-19 vaccine, which was first applied in our country. In the CoronaVac (inactivated severe acute respiratory syndrome-coronavirus 2) vaccine, which is prepared according to the inactivated virus vaccine technique, it is aimed to create immunity by injecting the virus, which has lost its ability to reproduce and to infect as a result of chemical inactivation, into the body. Phase-3 clinical studies were initiated in our country in September 2020. As a result of subsequent studies, it was determined that antibody response developed within 4 weeks after 3 doses of vaccine.<sup>4</sup> The most frequently reported side effects after the administration of Coronovac vaccine up to now are redness, swelling, and numbness in the vaccinated area, fever, chills, headache, myalgia, vomiting, nausea, and weakness.<sup>5</sup> The largest study on the side effects of COVID-19 vaccines to date was conducted in Israel and was published in August 2021. In this study, it

was revealed that there was no statistical difference between the rate of epileptic seizures seen after the disease in patients having COVID-19 infection and the rate of epileptic seizures seen after the COVID-19 vaccination.<sup>6</sup> In the literature, a case report in which post-vaccine epileptic seizure was reported as an adverse effect was made from India.<sup>7</sup> In this case report, a 68-year-old patient who had a focal epileptic seizure 3 days after vaccination was described, and he had a history of first epileptic seizure in advanced age, similar to our case. However, no pathological finding was detected in the EEG performed in the case reported from India. Unlike this case reported in our case, there is a significant pathological EEG finding. Following and evaluating the development of undesirable effects after vaccination is important both in terms of providing early diagnosis and treatment and improving the quality of vaccination services, thus improving the public's trust in vaccination.<sup>8</sup> In clinical practice, we encounter some pictures that can be evaluated in terms of post-vaccine side effects in line with the findings obtained after the anamnesis and examination on a case basis. After all the necessary examinations are done, it is important to report the clinical pictures that are thought to be a vaccine side effect among the preliminary diagnoses, in terms of creating healthy data about vaccines. After conducting our investigations for all prediagnoses in our case, we thought that it would be instructive to present our case since it could be a condition that could be considered in terms of vaccine side effects, which remains one of our preliminary diagnoses.

Epileptic seizures are common in older people. The definition of elderly patient is defined as those aged over 60 or 65 years. In a study including primary health care services, the prevalence of epilepsy in elderly people was found to be 11.8 per 100 and annual incidence was found to be 117 per 100 000. Among neurological diseases, epileptic seizures take third place after cerebrovascular diseases and dementia in old age. Cerebrovascular diseases are the most common cause of epileptic seizures in old age.<sup>9</sup> In developing countries, the most common cause of seizures is central nervous system infections. Other conditions that should be investigated in patients having epileptic seizures in advanced age are arterial hypertension, metabolic disorders, cardiac arrhythmias, intoxication, and head trauma.<sup>10,11</sup> Since our patient had an epileptic seizure for the first time, tests for all differential diagnoses

were performed and no significant pathology was found. As a result of the evaluations made by reviewing the anamnesis, clinical findings, and laboratory tests related to our case, it was among our preliminary diagnoses that there might be a side effect of the vaccine presenting with epileptic seizure. Of course, for the conditions reported on a case basis to be accepted as a vaccine side effect, a decision should be made after a lot of research, analysis, and comparison of the data obtained. For this reason, it is important to make and collect healthy notifications effectively.

The development of a vaccine is very important in the fight against a global epidemic. Notifications made in a healthy process for all clinical conditions that occur during the new vaccine applications to be evaluated as possible vaccine side effects will provide a better understanding of scientific information about vaccines. Based on this purpose, we found it worth presenting our case that we encountered in our clinical practice.

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**Declaration of Interests:** During this study, the research any drug that has a direct link to the subject company that provides medical instruments, equipment and materials and/or from a manufacturing firm or any commercial firm, In the evaluation process, the decision to be made about the study any material and/or morale that may adversely affect support has not been received.

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