

Post-Vaccination Encephalomyelitis Following Meningococcal Polysaccharide Vaccine (Mencevax ACWY): A Case Report

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Introduction: Post-vaccination encephalomyelitis is an inflammatory disorder of the central nervous system. It is triggered by certain vaccines. The diagnosis of post-vaccination encephalomyelitis depends on the close temporal relationship between vaccination and clinical presentation.

Case Presentation: We describe a 30-year-old man with post-vaccination encephalomyelitis following Mencevax ACWY meningococcal polysaccharide vaccine. Encephalomyelitis is a very rare side effect of this vaccine.

Conclusions: Post-vaccination encephalomyelitis is a very rare side effect of Mencevax ACWY.

Keywords: Encephalomyelitis; Central Nervous System; Vaccination; Post Vaccinal Encephalitis

1. Introduction

Post-vaccination encephalomyelitis is an inflammatory disorder of the central nervous system (1). Traditionally, post-infection encephalomyelitis is regarded as a pediatric disease, but it is not uncommon in the adult population (2). The diagnosis of post-vaccination encephalomyelitis depends on the close temporal relationship between vaccination and clinical presentation (1).

Meningococcal disease describes infections begotten by *Neisseria meningitidis*. The disease spreads as result of close or direct contact with someone infected. Initially, the infected individual exhibits flu-like symptoms, but the disease rapidly exacerbates with such symptoms as high fever, fatigue, headache, and neck stiffness. The infection spreads through the blood and can affect the meninges, resulting in meningitis. In order to prevent meningococcal disease and meningitis, one should receive a meningitis vaccine consisting of either a meningococcal polysaccharide vaccine or meningococcal conjugated vaccine. Although the vaccine itself does not cause meningococcal infection, it can cause some adverse side effects, which may become severe (3). We herein present a case of post-vaccination encephalomyelitis due to Mencevax ACWY meningococcal polysaccharide vaccine.

2. Case Presentation

A 30-year-old man received Mencevax ACWY meningococcal polysaccharide vaccine on 29 April, 2014, for the first time before traveling to Mecca. Thirteen days later, he was admitted to the emergency department with the

chief complaint of headache and vomiting and received dexamethasone (intramuscular) and normal saline. He was discharged after having experienced a relief of his headache. Twelve hours later, however, he developed headache, vomiting, and fever. He referred to Hazrat Rasul Hospital (in the west of Tehran). On admission, he was alert with a blood pressure of 120/80 mm Hg, heart rate of 100 beats/min, respiratory rate of 20 breaths/min, and oral temperature of 39°C. A fundoscopic examination showed no evidence of papilledema, disc atrophy, neuritis, or hemorrhages. The cranial nerves and the muscle strength of all the limbs were normal. Deep tendon reflexes were normally evoked without pathological reflexes. There was no cerebellar or sensory ataxia. The counts of blood cells, hepatic and renal functions, electrolytes, and blood glucose were all normal. The analysis of the cerebrospinal fluid (CSF) revealed pleocytosis, white blood cell (WBC) = 300 mm³, lymphocyte = 70%, polymorphonuclear neutrophil (PMN) = 30%, protein = 117 g/dL, and glucose = 41 g/dL. The initial computed tomography (CT) scan of the head was normal. A presumptive diagnosis of infectious meningitis was made, and empirical treatment with ceftriaxone and vancomycin was initiated. Despite 48 hours of antibiotic therapy, the patient's mental status declined. He was transferred to Mehr Hospital (in the center of Tehran). On admission, he was unconscious and his body temperature was 38°C. Neurological examination did not show focal neurological dysfunction, and stiff neck, Kernig's sign, and Brudzinski's sign were negative. Ceftriaxone and vancomycin were continued.

An emergency magnetic resonance imaging (MRI) of the brain showed unremarkable findings. The lumbar puncture was repeated, and the CSF displayed pleocytosis (WBC = 1260 mm³, lymphocyte = 98%, and PMN = 2%). Additionally, the patient had red blood cell of 300 mm³, protein of 130 mg/dl, and glucose of 63 mg/dl (blood glucose = 91 g/d), and the smear and the culture were negative. Further tests on the CSF included polymerase chain reaction for herpes simplex (HSV-1 and HSV-2), *Cytomegalovirus*, Epstein-Barr virus, varicella-zoster virus, *Mycobacterium tuberculosis*, and cryptococcal antigen as well as flow cytometry for lymphoma: all the tests were negative. The HIV antibody test (ELISA) was also negative. Other laboratory examinations, including electrolytes and renal and liver functions, were all within the normal range. Electroencephalography demonstrated generalized slowing. After infectious etiologies were ruled out and given the lack of clinical response, all the antibiotics were discontinued on day 14 of admission. Neurological and rheumatological consultation was performed. After the exclusion of infectious and non-infectious etiologies and considering the patient's recent exposure to Mencevax, the diagnosis of post-vaccination encephalomyelitis was suggested. It is deserving of note that the myelin basic protein test to confirm the diagnosis is not available in Iran. High-dose methylprednisolone (1 g/d for 5 d) was initiated, which conferred gradual improvement in the patient's consciousness, fever, and headache. Treatment was followed by oral prednisolone (50 mg/d), which was gradually tapered. During the following 2 months, he was asymptomatic.

3. Discussion

Acute disseminated encephalomyelitis (ADEM) is an inflammatory demyelinating disease of the central nervous system (4) and encompasses post-infectious and post-vaccination encephalomyelitis (1). The incidence rate of ADEM is 0.8 in 100000 people, and post-vaccination ADEM accounts for < 5% of all the ADEM cases (4). It has been associated with several vaccines such as rabies, diphtheria, tetanus, pertussis, influenza, small pox, measles-mumps-rubella, Japanese encephalitis, polio, and hepatitis B vaccines. The clinical presentation of ADEM comprises fever, altered consciousness, and multifocal neurological deficits, which typically appear within 1 day to 3 weeks after immunization. The CSF examination usually reveals lymphocytic pleocytosis, raised protein levels, and myelin basic protein. The CT and MRI of the brain in ADEM can be normal, but they often show multifocal or extensive white matter or deep gray matter lesions (thalamus and basal ganglia) within 5 to 14 days of the symptom onset (5).

Meningococcal vaccine is used to help prevent meningitis. Mencevax ACWY meningococcal polysaccharide vaccine can be used in adults and children over 2 years of age, but it confers protection only against meningitis

caused by the four *Neisseria meningitidis* serogroups of A, C, W-135, and Y. This vaccine is recommended for individuals in close contact with those infected by A, C, W-135, and Y serogroups of meningococcal disease. In addition, individuals travelling to countries where the disease is endemic or highly epidemic are advised to receive the vaccine. Moreover, individuals with inherited defects of properdin or complement or functional or anatomical asplenia are at increased risk of meningococcal infection.

The side effects of Mencevax ACWY meningococcal polysaccharide vaccine include tenderness, pain or discomfort, redness, itching around the injection site, headache, dizziness, weakness or fatigue, serious allergic reactions, and fever (> 38°C) and/or chills. Neurological reactions (reactions involving the nervous system) are rare but can be serious (6). In our patient, given the likelihood of neurological reactions to Mencevax, the plausible time relationship between the clinical event and the vaccine administration, and the absence of other possible etiologies, the diagnosis of post-vaccination ADEM was very likely. The main therapeutic options for ADEM are high-dose corticosteroids, plasma exchange, and intravenous immunoglobulin (1). In our patient, high-dose steroid therapy had a good outcome insofar as the treatment was successful without any complications.

We herein presented a possible case of post-vaccination encephalitis due to Mencevax ACWY meningococcal polysaccharide vaccine. This case report highlights the possibility of adverse neurological events following immunization with this vaccine. We would, therefore, recommend that ADEM be considered in the differential diagnosis of a patient with altered consciousness and fever after recent vaccination.

Authors' Contributions

Masoud Mardani diagnosed and treated the patient, designed the study, edited the manuscript, prepared the manuscript, and conducted the literature search. Shabnam Tehrani prepared the manuscript and conducted the literature search. Marjan Hemmatian collected the data and prepared the manuscript.

References

1. Bennetto L, Scolding N. Inflammatory/post-infectious encephalomyelitis. *J Neurol Neurosurg Psychiatry*. 2004;75 Suppl 1:i22-8.
2. Chen WL, Liao MF, Chiang HL, Lin SK. A possible case of acute disseminated encephalomyelitis after Japanese encephalitis. *Acta Neurol Taiwan*. 2013;22(4):169-73.
3. MDhealth.. *Meningitis vaccine side effects*. 2014. Available from: <http://www.md-health.com>.
4. Machicado JD, Bhagya-Rao B, Davogusto G, McKelvy BJ. Acute disseminated encephalomyelitis following seasonal influenza vaccination in an elderly patient. *Clin Vaccine Immunol*. 2013;20(9):1485-6.
5. Aria M, Takagi D, Nagao R. Acute disseminated encephalomyelitis following influenza vaccination report of a case with callosal disconnection syndrome. *Rinshoshinkeigaku*. 2014;54(2):135-9.
6. Rixensart B. *Glaxosmith kline group of companies. Mencevax ACWY product information*. 2014. Available from: <http://www.gsk.com.au/products-vaccine-detail>.