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Research Article

DIPHTHERIA, PERTUSSIS AND TETANUS VACCINE (DPT) INDUCED SEIZURES: A SUSPECTED CASE IN A PEDIATRIC PATIENT

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ABSTRACT

A 4 months old male patient was admitted in the hospital with the chief complaint of 2 episodes of generalised tonic clonic seizures, raised body temperature and altered sensorium after the first dose of DPT vaccine under routine immunisation schedule. DPT vaccine induced seizures diagnosis was made and treated. Pertussis component of the DPT vaccine is mainly responsible for neurologic reactions and the relationship between DPT vaccine and seizures was shown as a probable ADR. The patient was improved on 2nd day with the treatment and finally recovered and discharged on 4th day. Patient was followed up after a period of 3months and found to have no neurological defects.

INTRODUCTION

Immunisation is an important part of child care practice. It is one of the most beneficial and cost effective measure of the prevention of diseases.[1] Although vaccines are proven to be extremely safe, there is a potential risk of an adverse reaction, as with any other drug or medication.[2] Any untoward medical occurrence which follows immunization and which does not necessarily have a causal relationship with the use of the vaccine is clubbed under AEFI (Adverse Event Following Immunisation). The adverse event may be any unfavourable or unintended sign, an abnormal laboratory finding, a symptom or a disease. This risk of AEFI with vaccination is always weighed against the risk of not immunizing a child. It is only when the benefit outweighs the risk, that a vaccine is considered safe. However, even at a relatively low rate, because of the high absolute number of beneficiaries, there is risk of a few serious adverse events in the vaccinated children.[3] The pathophysiology of severe reactions to Diphtheria Pertussis Tetanus (DPT) vaccine is not well understood. Active pertussis toxin in DPT vaccine has been proposed to cause severe reactions.[4] Here we report a case of DPT induced seizure in a child which might be due to pertussis fraction.

Objective

To report the case of a patient with a suspected Diphtheria, pertussis and tetanus vaccine (DPT) induced seizures.

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METHODS

The data of this case report were obtained by reviewing medical files, imaging records of the diagnostic methods to which the patient was submitted.

Case report

A 4 months old male patient was admitted in the hospital with the chief complaint of 2 episodes of generalised tonic clonic seizures, raised body temperature and altered sensorium after the first dose of DPT vaccine under routine immunisation schedule. On examination pulse rate and respiratory rate were normal. Pupil was constricted and reacted poorly to light. Patient had post ictal drowsiness. There was no history of head injury, trauma or previous history of seizures. Developmental mile stones were appropriate for age.

Investigations revealed haemoglobin - 8.6g/dl (11.5-16.5g/dl), RBC – 3.61 million cells/cumm (3.5-6.5 cells/cumm), WBC – 6300 cells/cumm (5000-10000), platelets – 1.16 lakhs/cumm (1.5-4.0 lakhs/cumm), Sr. Sodium – 133mmol/l (135-155mmol/l), Sr. Potassium – 3.8mmol/l (3.5-4.5mmol/l), Sr. Chlorides – 98mmol/l (98-110mmol/l) and all the other liver function tests (LFT) such as total bilirubin, direct bilirubin, SGOT, SGPT, ALP were in the normal range along with the renal function tests (Sr. Creatinine and Urea). DPT vaccine induced seizures diagnosis was made and treated. Sodium valproate was administered intravenously and Inj Meropenem, Inj Amikacin, Syp Paracetamol was given so as to decrease the symptoms. The patient was improved on 2nd day with the above treatment and finally recovered and discharged on 4th

day. Patient was followed up after a period of 3months and found to have no neurological defects.

ADR analysis

After collecting past and present medication history from the patient ADR analysis was done by using Naranjo's scale [5], WHO-UMC ADR assessing scale and Karch & Lasagna scale, results were shown in table 1. We have also addressed the severity, predictability & preventability as a part of management through Modified Hartwig and Siegel scale [6], Shumock and Thornton [7] preventability scale, results were shown in table 2.

Table 1 Causality of assessment of suspected drug

Suspected drug	Suspected ADR	Naranjo's Scale	WHO-UMC	Karch & Lasagna scale
DPT vaccine	Seizures	Probable ADR (6)	Probable ADR	Probable ADR

Table 2 Severity, Predictability and Preventability of suspected ADR

Suspected drug	Suspected ADR	Severity	Predictability	Preventability
DPT vaccine	Seizures	Severe level 4 (b)	Predictable ADR (type A)	Not preventable ADR

DISCUSSION

Immunization is a proven tool for controlling and even eradicating disease. A successful immunization program is of particular relevance to India, as the country contributes to one fifth of global under five mortality with a significant number of deaths attributable to vaccine preventable diseases. There is no doubt that substantial progress has been achieved in India with wider use of vaccines, resulting in prevention of several diseases. Successful immunization strategy for the country goes beyond vaccine coverage in that self-reliance in vaccine production, creating epidemiological database for infectious diseases and developing surveillance system are also integral parts of the system.

An adverse event following immunization (AEFI) or vaccine associated adverse event (VAE) is defined as an untoward (temporally associated) event following immunization that might or might not be caused by the vaccine or the immunization process. These events may be recognized during clinical trials or during post marketing surveillance. Most parenteral vaccines induce some degree of local reactions including pain, erythema and induration. Fever is the most common systemic reactions.[8]

Mild adverse events following DTwP when administered for both primary and booster doses in infants and children consist of local reactions (50%) and systemic reactions such as fever >38 °C and irritability (40–75%), drowsiness (33–62%), loss of appetite (20–35%), and vomiting (6–13%). Mild adverse events are similar but less frequent following administration of vaccines containing acellular pertussis antigens compared to vaccines containing whole-cell pertussis antigens. More severe adverse events are rare and may consist of temperature in excess of 40.5 °C (0.3% of vaccine recipients), febrile seizures (8 per 100000 doses) or hypotonic– hyporesponsive episodes (0–291 per 100000 doses).[9]

It is important to note that the benefits of protection afforded by a vaccine always far exceed the small risk of a serious and life threatening reactions. A few cases of DPT induced serious neurologic adverse effects were reported from India.[10,11] Pertussis component of the DPT vaccine is mainly responsible for neurologic reactions. It causes neurologic damage by affecting cellular signalling, catecholaminergic and GABAergic systems and defect in blood brain barrier due to endotoxin mediated endothelial damage. Whole cell pertussis vaccine induces the IL-1β production in the hippocampus and hypothalamus of vaccinated animals. This leads to decrease in the release of inhibitory neurotransmitters GABA and adenosine in the hippocampus and induce convulsive activity. Acellular type did not induce the IL-1β production.[12] Whole cell pertussis vaccines contain 3000 different proteins, whereas acellular pertussis vaccine (DTaP) contains 2-5 proteins.[13] This may be the reason for less chances of seizures, encephalopathy and hypotensive episodes with DTaP as compared to whole cell vaccine.[14]

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Conflict of interest

The authors have no conflict of interest.

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