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Case Report
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Anaphylaxis Post CoronaVac Vaccine: A Rare but Life-Threatening Adverse Effect

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Abstract

Coronavirus Disease 2019 (COVID-19) has been a global issue till date since its discovery in December 2019. As part of the interventions to end this pandemic, multiple vaccines are formulated and studied worldwide. Vaccine constitutes the most effective measure in public health, preventing the spread of infectious diseases as well as reducing the mortality rate. Similar to any medication, allergic reaction is part of the adverse reactions in vaccine. Anaphylactic reaction is uncommon post vaccination; however, it is potentially life-threatening. We describe a case of anaphylactic shock post CoronaVac vaccination, first ever case reported in Malaysia.

Keywords: COVID-19; Pandemic; Vaccine; Adverse effect; Anaphylaxis

Introduction

Coronavirus Disease 2019 (COVID-19) pandemic has been a global threat to the nation including Malaysia. To date, there are more than 750,000 COVID-19 cases with almost 1% death rate. These numbers are alarming yet still rising daily. Similar to the global situation, the elderly and those with multiple chronic illnesses are more vulnerable to the infection with a higher mortality rate. In Malaysia, highest incidence rate was reported among the age group of 55 to 64 years, with highest mortality rate noted in those with comorbidities such as diabetes, hypertension, end stage renal disease, and heart disease [1].

The management of COVID-19 pneumonia is still a debatable topic. Many proposed medications besides steroids have controversial efficacy reported, with differing opinions among the clinicians. Despite the emergence of many anti-viral and immune-modulating agents as part of the treatment options, the mortality rate of COVID-19 remains high and still rising, with complications and sequelae affecting the quality of life. Hence, vaccine is an essential measure in the prevention of the disease, with the aim of reducing the morbidity and mortality rates. There are many vaccines against COVID-19 available worldwide; many are still under evaluation for their efficacy and safety profiles.

Case Presentation

A 67-year-old man presented with a sudden onset shortness of breath with audible wheeze two hours after he received his first dose of CoronaVac vaccine. He was an active smoker with a possible undiagnosed Chronic Pulmonary Obstructive Disease (COPD), self-medicating with Metered Dose Inhaler (MDI) salbutamol when necessary. He had no known allergy previously.

Initial assessment revealed a man in respiratory distress with respiratory rate of 40 breaths per minute and an oxygenation saturation of 88% under room air. Generalized rhonchi were noted in his respiratory examination. His other systemic examinations were unremarkable, particularly no skin rash to suggest a cutaneous manifestation of allergic reaction. His chest radiograph showed a clear hyperinflated lungs field. His blood investigations revealed a type 2 respiratory failure with respiratory acidosis and eosinophilia with an absolute eosinophil count of 1.0. There was no evidence of infection with a normal white cell count and serum C-reactive protein level.

He was given an intramuscular injection of 0.5 mg adrenaline in view of possible anaphylactic reaction post vaccination, followed by intravenous chlorpheniramine 10 mg and hydrocortisone 200 mg, and MDI salbutamol. Despite the intervention, he was intubated in view of impending respiratory arrest. He required inotropic support after intubation with intravenous infusion of adrenaline. His condition subsequently improved and was able to be extubated two days later. He was issued an allergic card towards CoronaVac and was discharged well after six days of admission with

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outpatient appointments under our Dermatology and Respiratory clinics. Serum tryptase was normal as it was sent more than 24 h later as there was no in-house laboratory reagent.

Discussion

Adverse effects commonly observed post COVID-19 vaccinations are non-specific such as fever, myalgia, arthralgia, and fatigue, as well as allergic reaction. Vaccine-related allergic reactions can develop immediately during the immunization process or after the vaccine has been administered. The risk of an allergic reaction post vaccination is rare and can be as low as one in a million for most vaccines [2,3]. There were reported cases of anaphylaxis event post COVID-19 vaccinations in the United Kingdom and United States, with an estimated risk of one in 200,000 doses [4,5]. Those reported cases had previous history of allergies. CoronaVac vaccination has no documented allergic reaction to date, with most common adverse effects reported as fatigue and headache. In our case, the patient developed severe anaphylactic reaction post CoronaVac vaccination with no history of allergic reaction, which was not reported before.

The pathophysiology of vaccine-induced allergy responses can be explained by different postulated mechanisms leading to mast cell activation and degranulation. One of the mechanisms involves Immunoglobulin E (IgE) and antigen for the activation and degranulation of mast cells, which can be evidenced by the presence of particular IgE and elevated serum tryptase level [6,7]. Another postulated mechanism suggests complement activation as the trigger for mast cell degranulation. Life-threatening allergic reactions can be mediated *via* direct activation of the Mas-Related G Protein-Coupled Receptor-X2 (MRGPRX2), in which the specific IgE may remain undetected and serum tryptase level may be normal [8]. Delayed allergic reaction can occur 48 h to 96 h post vaccination due to overstimulation of T cells and macrophages, resulting in cytokine-mediated inflammation, cell death and tissue damage [9]. Risk factors of allergic reaction include previous anaphylaxis, mastocytosis and other mast cell disorders, and uncontrolled asthma or COPD which could be the aggravating factor in our case.

Allergic reactions to vaccines are rarely attributed by the active vaccine itself. The excipients of the vaccine such as gelatine, thimerosal, represent the major contributors to the development of specific IgE-mediated and immediate reactions associated with vaccines. The inactivated virus strain in the CoronaVac vaccine contains adjuvant components which are sodium-based excipients known to cause allergic reaction [9]. In a nutshell, allergic reactions towards COVID-19 vaccines can occur similarly to all the other vaccines available worldwide. Careful vaccine-safety surveillance over time with proper and adequate monitoring post vaccination is the key to prevent the unwanted adverse effects.

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