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Case Report

Fatal Anaphylaxis to Pork: A Case Report

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ABSTRACT

Food allergy is a common cause of anaphylaxis, which affects up to 10% of young children and 2–3% of adults, and its prevalence appears to be increasing constantly; however the precise incidence of food-induced fatal anaphylaxis among people is unknown. In the case of anaphylactic shock death is likely to occur rapidly and without any warning in seemingly healthy subjects. The lack of reliable laboratory biomarkers and common standard definitions of signs and symptoms makes it difficult for clinicians to diagnose a suspected anaphylactic event. Furthermore at autopsy the findings might hint at the allergic reaction, but classic manifestations may not be appreciated thereby making postmortem diagnosis of anaphylaxis difficult. Here we report one such case of death due to anaphylaxis in a young women with childhood history of allergy to pork.

Keywords: Sudden death, Anaphylaxis, Food allergy, Pork, Serum trytase levels, IgE antibodies, Autopsy

INTRODUCTION

Among all illness-related fatalities, deaths from allergic incidents form a very small subcategory. However death due to anaphylactic shock is likely to occur rapidly and without any warning in seemingly healthy subjects. Anaphylaxis is a severe systemic reaction, which is due to immunoglobulin E (IgE)-mediated release of vasoactive and inflammatory mediators from mast cells and basophils, which occurs after contact with a specific allergen in previously sensitised subjects. It is mainly this mast cell degranulation, which leads to systemic vasodilatation that is associated with a sudden drop in blood pressure and oedema of bronchial mucosa, which results in bronchoconstriction and dyspnea. Cardiovascular and respiratory effects of extreme forms of anaphylaxis cause death with an incidence of ~154 annual fatal episodes per million hospitalised subjects[1]. The actual incidence of anaphylaxis ranges from 10 to 20/100,000 people per year[2]. Fatal food anaphylaxis for a food-allergic person is rarer than accidental death in the general population. Moreover at autopsy the macroscopic findings as well as conventional histopathology are not specific in anaphylactic deaths. Here we report a case of anaphylaxis where a woman died after consuming pork.

CASE DESCRIPTION

The deceased, a 35-year-old married woman who was apparently alright prior to the incidence when she experienced shortness of breath at around 11:00 pm at her residence. Breathlessness progressively aggravated and she was rushed to M.S.Ramaiah Hospital where she was declared brought dead at around 1.40 am. A case of sudden death was registered and the police were intimated. Body was subjected to medicolegal autopsy. As per history from the police inquest and from the family members it was learnt that the deceased had consumed pork for her dinner at about 10:00 pm. Parents also gave childhood history of an episode of allergic reation to pork, which the deceased was unaware of.

AUTOPSY FINDINGS

On external examination, deceased was moderately built

and nourished; post mortem staining was present over back of the body and fixed. Rigor mortis was appreciated all over and there were no external injuries. ECG lead marks were present over chest. On internal examination larynx and trachea showed pink frothy fluid and mucosa was oedematous. Both lungs were oedematous and frothy blood exuded upon sectioning. Heart was intact with patent coronaries. Stomach contained about 200 ml of partially digested meat particles, and mucosa was congested. There was no unusual smell. Other organs were intact and congested.

Organs were subjected for histopathological examination. Blood and viscera were collected and sent for chemical analysis to forensic science laboratory. Histopathology confirmed pulmonary oedema and congestion. Other organs showed congestion and the airways showed oedema. No poison was detected in Chemical examiner's report. Serum concentrations of mast cell tryptase was found to be raised. The test Specific serum IgE antibodies to pork was not performed due to lack of facilities at our centre.

After perusing the history, inquest report, autopsy findings, histopathology and chemical analysis reprts, the cause of death was attributed to anaphylaxis to pork.

DISCUSSION

Immune response is generally a protective process but it may sometimes prove to be injurious to the host itself. The term *aphylaxis* was coined by Charles Richet in 1902 and later changed to *anaphylaxis* due to its nicer quality of speech[3]. In his experiments, Richet injected a dog with sea anemone toxin in an attempt to protect it. Although the dog had previously tolerated the toxin, on re-exposure with the same dose 3 weeks later, it developed fatal anaphylaxis. Thus instead of inducing tolerance (prophylaxis), when lethal responses resulted from previously tolerated doses, he coined the word *ana* (without) *phylaxis* (protection).

Diagnosis of anaphylaxis in cases of sudden death is mainly by excluding other causes, in other words at autopsy anaphylaxis is a diagnosis of exclusion.

Many food and food products are known to trigger anaphylaxis. In Western countries, ingestion of or exposure to peanuts, wheat, nuts, certain types of seafood such as shellfish, milk, and eggs are the most prevalent causes[4,5]. Sesame is common in the Middle East, while rice and chickpeas are frequently encountered as sources of anaphylaxis in Asia[4]. Of the many food allergens reports of allergy to pork are relatively rare; however the events of anaphylaxis to pork are on rise now. Recently the frequency of sensitisation in the skin prick test to pork in the general population was estimated to be 2.0% in a German study population. However in indian population the database for pork allergy is not available. Meanwhile challenge proven allergy to pork ranges from 0.6% to 2.6% in food allergic individuals[6].

Modes of Death in Anaphylaxis

- Cardiac arrest secondary to peripheral vasodilation and myocardial ischaemia.
- Asphyxia and respiratory arrest due to upper airway oedema, lower airway mucus plugging or aspiration of vomit.
- Delayed deaths: coma due to hypoxic encephalopathy, and respiratory failure due to pneumonia.

Investigation into the cause of death, in suspected cases of anaphylaxis, is very difficult if a proper effort is not attempted. During autopsy one should determine whether there is morbid anatomical evidence to support the suspected anaphylaxis and its timing, evidence of other pathological conditions that could account for death or have contributed to death, biochemical evidence of anaphylaxis and serological evidence of the agent responsible for initiating anaphylaxis.

At autopsy, often there is little or nothing specific finding both grossly and at histopathology. There may be laryngeal oedema (or pharyngeal, or other upper airway), which is often difficult to identify after death and an 'empty heart' attributed to reduced venous return from vasodilation and redistribution of intravascular volume from the central to the peripheral compartment[7]. Other signs include eosinophilia in lungs, heart and tissues, and evidence of myocardial hypoperfusion. One should look for contributory myocardial ischaemia, which may be a

consequence of anaphylactic shock, even with normal coronary arteries.

Visual inspection of gastric contents with photographic confirmation can be valuable: post-mortem activity of digestive enzymes can rapidly destroy food materials, so stored samples may be useless unless promptly frozen. Blood and viscera needs to be sent for chemical analysis to rule out any toxicity.

Other samples required are pre-mortem blood specimens if possible. Peripheral cadaveric blood, for mast cell tryptase (MCT) levels, which remains to be useful for up to 3 days after death. However elevated tryptase levels are not confirmatory of anaphylaxis and may be raised for reasons such as major trauma. Though sensitivity and specificity of elevated tryptase levels have not been researched, anaphylaxis cannot be excluded by levels within the reference range. Total tryptase levels typically remain within the reference range in food-induced anaphylaxis. Another investigation to be done is for Specific IgE antibodies to pork meat, which is more specific for diagnosis of anaphylaxis[8].

In the case we examined, we had a history, which was indicating towards possible anaphylaxis.

Anaphylaxis as the cause of death can be inferred only by exclusion of other pathological conditions. During autopsy, we found meat, which was ingested earlier and also this had caused an allergic reaction in childhood. There was the presence of laryngeal and pulmonary odema, which was suggestive of anaphylaxis, which was confirmed histopathologically. There were no other morbid pathological lesions/trauma with other organs being unremarkable. Chemical analysis was negative for any toxic substance. Serum concentrations of mast cell tryptase were found to be raised. Serum IgE antibodies levels to pork meat, a specific test for anaphylaxis could have been done. This was not feasible at our set up as very less centres are available for such tests.

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