Alpha Gal Syndrome: A symptomatic presentation in the Emergency Room

Khutaija Noor (itsdrkhan59@gmail.com)
Justin Orren

Case Report

Keywords: galactose-α-1, tick-bite, meat allergy, delayed hypersensitivity reaction, and alpha-gal syndrome

Posted Date: November 21st, 2023

DOI: https://doi.org/10.21203/rs.3.rs-3628265/v1

Abstract

Alpha Gal syndrome or Meat Allergy is a life-threatening delayed condition diagnosed in patients allergic to Galactose-alpha-1,3-galactose after a lone star tick bite. We present a case report of Alpha gal syndrome in a 66-year-old elderly patient in the Emergency Room presenting with symptoms of vomiting, diarrhea, chest pain, difficulty breathing, fever, chills, and hypertension. Early detection is key in this frequently fatal hypersensitivity reaction; this case report emphasizes the diagnostic allergy panel and symptoms after a Lone star tick bite and the need for appropriate education on avoidance of all types of meat and dairy products as they contain galactose-a-1,3- galactose allergen-specific to IgE sensitization.

Method: A case report of a patient with Alpha-gal syndrome.

Introduction

The alpha-Gal syndrome is an IgE-mediated hypersensitivity condition diagnosed in patients allergic to Galactose-alpha-1,3-galactose after a lone star tick bite (*Amblyomma americanum*). Patients are advised to avoid all types of meat and dairy products and mammalian protein-containing drugs. This has also been called the red meat allergy/ tick bite meat allergy. The patient's history typically presents no intolerance to mammalian meat, monoclonal antibodies, prosthetic heart valves, drugs, or vaccines, containing alpha-gal products which are often misdiagnosed as a drug allergic reaction or anaphylactic reaction [1].

The symptoms vary from mild to severe to life-threatening events in individuals, they can present as Hives, itchy rash, nausea or vomiting, heartburn, diarrhea, cough, difficulty breathing, hypotension, oropharyngeal edema, angioedema, dizziness, and abdominal pain. The symptoms can present from 2-6 hours after eating or exposure to allergen alpha-gal. A 66-year-old male patient presented to the Emergency Department following difficulty breathing, fever, chills, hypertension, chest pain, and gastrointestinal symptoms like vomiting, and diarrhea after eating sausage, with a history of hypertension and Alpha Gal syndrome.

Case Presentation

A 66-year-old male presented to the Freeman Health System Emergency Department, with episodes of vomiting, diarrhea, chest pain, difficulty breathing, fever, chills, and hypertension. He reports a medical history of Alpha-Gal syndrome and hypertension. He states that he had eaten at a buffet, he ate sausage with potatoes.

The patient was bitten by the Lone Star tick (*Amblyomma americanum*) 15 months ago and diagnosed with Alpha-Gal syndrome by his primary care physician after obtaining an Alpha-Gal panel indicating allergen-specific to IgE sensitization to galactose-a-1,3- galactose. The patient was referred to an allergist and the patient refused it stating that he had learned about the illness. He has a medical history of

hypertension treated with Amlodipine 5 mg. He also reports a history of pre-diabetes which is monitored and managed by lifestyle changes, and Osteoarthritis treated with bilateral knee replacement surgery.

The Alpha-Gal Panel was conducted in July 2023 at the diagnostic center (Table 1.1). A comprehensive diagnostic panel workup revealed elevated Pork Ig E, Beef IgE, and Galactose alpha. The patient was recommended a diet without mammalian meat, dairy products, mammalian protein-containing drugs, and tick bites, and was prescribed an Epinephrine autoinjector for an anaphylactic reaction.

Table 1.1: Allergies and the Alpha gal panel: Allergies/ adverse reactions were verified. Reported with an allergy to Acetaminophen, Hydrocodone, Penicillin, Propoxyphene, Tramadol and Latex.

Allergy	Type	Severity	Reaction	Status	Date
Acetaminophen (from Lorcet 10/650)	Allergy	Mild	Rash	Verified	October, 2023
Hydrocodone (from Lorcet 10/650)	Allergy	Mild	Rash	Verified	October, 2023
Penicillin	Allergy	Mild	Rash	Verified	October, 2023
Propoxyphene (from Darvocet-N)	Allergy	Mild	Rash	Verified	October, 2023
Tramadol (from Ultram)	Allergy	Mild	Rash	Verified	October, 2023
Alpha Gal	Allergy			Verified	October, 2023
Latex	Allergy		Rash, Itching	Verified	October, 2023

Table 1.2: Diagnostic panel for Ig E response to Alpha gal syndrome.

Test	Result	Flag Range	Reference Unit
Pork (F26) IgE	0.25	H	<0.10 KU/L
Beef (F27) IgE	0.20	H	<0.10 KU/L
Lamb (F86) IgE	<0.10	N	<0.10 KU/L
Galactose Alpha 1,3 Galactose IgE	0.32	H	<0.10 KU/L

Clinical Significance Alpha-Gal Panel -

This in vitro allergen-specific IgE panel is used to quantitatively measure an individual's IgE response to alpha-gal, an allergen component, and 3 types of meat (beef, pork, and lamb) that commonly trigger

alpha-gal-associated meat allergy (Table 1.2). This IgE panel may be used in conjunction with other clinical information to aid in the diagnosis of alpha-gal syndrome, a severe allergic reaction to mammalian meat induced by past bites from the Lone Star tick.

Most cases of alpha-gal syndrome occur in the southeastern United States because of the heavy presence of Lone Star ticks. Other types of ticks have also been associated with alpha-gal syndrome in Europe, Australia, Asia, and the northern and western United States. The alpha-gal (i.e., galactose-alpha-1,3-galactose) IgE test helps evaluate the etiology of meat allergies in patients with delayed onset of symptoms (3 to 6 hours after eating meat). IgE antibodies to alpha-gal are the likely mediator of anaphylactic reactions in individuals who develop hypersensitivities to beef, pork, and/or lamb as adults [2].

The presenting symptoms started after eating sausage at the buffet 6 days ago for which the patient vomited chewed food, had one episode of heavy diarrhea, and his lips turned purple which resolved. The patient was advised to administer epinephrine when he is experiencing a swollen throat, urticaria, and difficulty breathing. The presenting symptoms at the emergency department with persistent chest pain which was constant, described as pressure in nature, and a rating it 6/10 on the pain scale. Difficulty in breathing is alleviated with movements, present at rest and relieved when lying on the chest, and worsening frontal headache on a scale of 9/10, pressured in nature, he took Advil to ease his pain. The patient states no history of smoking, alcohol use, or other illicit drug use. The patient's allergies were reviewed and listed below.

On a physical exam, the patient is oriented to time, place, and person. Appears to be well developed/ nourished well hydrated with normal pharynx, has normal breath sounds, regular rate and rhythm, normal heart sounds, pulse equal bilaterally. His abdomen is soft, and non-tender with normal bowel sounds. The patient has a normal mood, no edema of the lower extremities, and warm and dry skin. The patient was hemodynamically stable with 97 % oxygen saturation at admission and 100% oxygen saturation at discharge with blood pressures ranging from 160/87 to 117/76 and heart rates ranging from 70s to 90s. During his visit to the ER, he was not presenting with emergent medical or surgical conditions.

Due to his history of Alpha-Gal syndrome the medications used to treat his symptoms had to be carefully considered so that they would not include any possible mammal proteins. The options for medication were discussed with the pharmacist and as per their recommendations the patient was given diphenhydramine and metoclopramide intravenously, and intravenous normal saline administration. The intravenous version of metoclopramide did not contain any mammalian proteins, but the oral version did contain these proteins, as noted by the pharmacist.

The following is the list of lab values obtained in the Emergency Department and overall revealed no significant abnormalities. Lab testing at the ER visit showed elevated creatinine kinase, and normal lab values of WBC, RBC, Platelets, Electrolytes, cardiac Enzyme, Renal workup, and Blood Glucose (Table 2). A chest x-ray revealed no acute cardiopulmonary pathology, and ECG demonstrated a normal sinus rhythm with a normal rate, normal intervals, and no ST segment or T wave changes.

Table 2: Laboratory analysis for the following lab test:

Lab	Values
WBC	5.0
RBC	5.25
Hgb	16.0
Hct	47.7
MCV	90.9
MCH	30.5
MCHC	33.5
RDW	12.9
Platelet count	301
MPV	9.3
Neutrophils	38.0
Lymphocyte	48.3
Monocyte	9.9
Eosinophil	2.8
Basophil	0.8
Absolute Neutrophils	1.9
Absolute Lymphocytes	2.4
Absolute Monocytes	0.5
Absolute Eosinophils	0.1
Absolute Basophils	0.0
Sodium	139
Potassium	4.3
Chloride	104
Carbon Dioxide	24
Plasma Anion Gap	11
Blood Urea Nitrogen	12
Creatinine	1.0

GFR Calculation	79
BUN/Creatinine ratio	12
Glucose	106
Calculated Osmolality	278
Plasma Calcium	9.7
Creatinine Kinase	605 (H)
CK-MB (CK-2)	1.86
Troponin I	<0.012 (L)

(Table 2: Medical abbreviation: WBC -White blood cell, RBC -Red blood cell, Hgb -Hemoglobin, Hct -Hematocrit, MCV -Mean corpuscular volume, MCH -Mean corpuscular hemoglobin, MCHC -Mean Corpuscular Hemoglobin Concentration, RDW -Red cell distribution width, MPV -Mean platelet volume, GFR- Glomerular Filtration rate, CK-MB -Creatine kinase-myocardial band)

Discussion

Over the past few decades, there has been an increase in the incidence of Alpha-gal syndrome. In this case report, we discuss the primary measures to be taken before administering medication to a patient with Alpha gal syndrome, as many cases do not present with classic symptoms.

Our patient's path was similar because of his diagnosis, and various medication allergy reactions were verified in the emergency department before administering medication. Avoiding foods, medications, and other products with alpha-gal antigens might be difficult due to the absence of labeling mammalian-derived sources, as the patient ate sausage as the food was not labeled. The patients are advised to be cautious in the diet they consume.

We advised our patients to avoid red meat, dairy products, and alcohol. We wanted to minimize the danger of severe allergic responses. The patient is recommended to follow up with his allergist. In treating patients with Alpha gal syndrome, a close relationship is vital between the treating physician and pharmacist.

In the past few decades, the previous study demonstrated an increasing incidence [3], measures can be taken to avoid tick bites such as wearing long sleeves, long pants, high socks, and tick repellent.

Conclusions

Alpha-gal syndrome is a delayed hypersensitivity reaction and can present with varying symptoms such as urticaria, gastrointestinal symptoms, angioedema, anaphylaxis reaction, and drug-induced

hypersensitivity. The patient was presented with a tick bite on history taking, and allergy to all types of red meat, dairy products, and alcohol that induce variable hypersensitive reactions.

This case report aims to educate health workers to remember that multiple medications are mammalian protein-containing drugs that need to be avoided in these patients. It is essential to confirm with pharmacists that medications that plan to be given either in the acute setting, such as the Emergency Department or in an outpatient setting, are approved to be mammalian protein-free medications to prevent any allergic reactions. The patient was treated for presenting symptoms in the Emergency department.

Consent:

Written informed consent was obtained from the patient to publish this case report.

Declarations

Competing interests: The authors declare no competing interests

References

1. Alpha-gal syndrome—Food or drug allergy: A case report, Marina Božan, Vesna Vukičević Lazarević, Ivan Marković, Jadranka Morović-Vergles, Joško Mitrović, https://doi.org/10.1002/ccr3.7830
2. https://testdirectory.questdiagnostics.com/test/test-detail/10555/alpha-gal-panel?q=10555&cc=MASTER
3. Thompson JM, Carpenter A, Kersh GJ, Wachs T, Commins SP, Salzer JS. Geographic Distribution of Suspected Alpha-gal Syndrome Cases — United States, January 2017–December 2022. MMWR Morb Mortal Wkly Rep 2023; 72:815–820. DOI: http://dx.doi.org/10.15585/mmwr.mm7230a2