

Severe Anaphylaxis Following Physical Exertion in a 12-Year-Old Girl with Recurrent Bronchospasm and Concurrent Rhinovirus/Enterovirus Infection- A Diagnostic Dilemma: A Case Report

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Abstract

A 12-year-old female child with known history of nasal allergy presented to emergency department after experiencing chest pain, difficulty in breathing and recordable blood pressure. Symptoms resolved with intramuscular epinephrine, oxygen support, nebulization with bronchodilator, intravenous corticosteroid and supportive treatment but later on presentation was complicated by recurrent hyperventilation, bronchospasm, chest pain and numbness in hands and feet. She was assessed by a multidisciplinary team and was found to be having rhinovirus/enterovirus infection to be main contributing factor. Anaphylaxis is a life-threatening hypersensitivity reaction that can present with respiratory compromise and cardiovascular collapse. Exercise is a recognized but uncommon trigger. Concurrent respiratory viral infections may further complicate the clinical picture by worsening bronchospasm and creating diagnostic uncertainty during recovery. On follow up visit she was found to be sensitized with house dust mite, a predisposing factor.

Keywords: Anaphylaxis; Adrenaline; Bronchospasm; Atopy; Emergency; Multiple Triggers; Viral Infection

Introduction

This case highlights the complex interaction between exercise-triggered anaphylaxis and concurrent respiratory viral infection. Persistent bronchospasm after stabilization should prompt clinicians to consider alternate or additional diagnoses beyond biphasic anaphylaxis.

Anaphylaxis is an acute, potential life-threatening systemic allergic reaction that may have a wide range of clinical manifestations. Severe anaphylaxis and/or the need for repeated doses of epinephrine to treat anaphylaxis are risk factors for biphasic anaphylaxis [1]. Respiratory manifestations are common in pediatric patients and may be particularly severe in children with pre-existing atopic disease [2].

Exercise-induced anaphylaxis is an uncommon but well-described condition in which physical exertion acts as a trigger for systemic allergic reactions [3]. In some cases, additional cofactors such as infections, medications, or food intake may increase severity [4].

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Rhinovirus infections are the most common illness of childhood, and typically produce mild illnesses in most children [5]. HRV (Human Rhinovirus) infections generally cause relatively mild respiratory illnesses and yet contribute to acute and potentially severe exacerbations in patients with asthma [6].

We report a child with probable exercise-triggered anaphylaxis complicated by persistent bronchospasm associated with concurrent viral respiratory infection which led to diagnostic dilemma.

Case Presentation

A 12-year-old girl with known allergic rhinitis and previous episode of bronchospasm was brought to the emergency department after developing sudden chest tightness and breathing difficulty after roughly 1 hour of exercise.

According to family members, she had been physically active previously and she suddenly complained of chest discomfort followed by fast worsening with chest pain and shortness of breath. There was no known recent food allergen exposure, drug intake, or insect bite history. Mild upper respiratory symptoms as nose block and sneezing has been present for 2 days preceding the admission.

On arrival to the emergency department:

- Oxygen saturation: 89% on room air.
- Respiratory rate: 28 - 30/min.
- Blood pressure: Unrecordable.
- Severe respiratory distress - suprasternal, subcostal retractions with decreased air entry bilateral and wheezing.

She was immediately treated with:

- Intramuscular adrenaline
- Oxygen support
- Intravenous fluid boluses
- Nebulized bronchodilators- salbutamol, ipratropium and budesonide
- Intravenous antihistamines
- Intravenous hydrocortisone
- Intravenous magnesium sulfate.

A second dose of adrenaline was given after 15 minutes as her symptoms were not improving. Her blood pressure improved following resuscitation, and oxygenation gradually stabilized. However, she continued to experience recurrent episodes chest pain, hyperventilation and numbness in hands and feet during hospitalization, 2 such episodes were associated with drop in saturation up to 88 to 90% which improved to 96 to 98% with extra salbutamol nebulization. But in between hyperventilation (Respiratory rate -40/minute), chest pain, numbness and spasm in hands and feet persisted, which were not explainable on routine examination and clinical assessment, so, she was shifted to the intensive care unit for close monitoring and management. Parents later explained that she has very sensitive and introvert behavior, she was tried with sedation and with breathing in bag. She was assessed by cardiologist, child psychologist and neurologist. Later on she developed severe nose block, wet cough and mouth breathing. So, she was assessed by ENT specialist and pulmonologist as well. Chest x-ray, USG chest, in house 2D echo, CT chest and cardiac markers were sent along with other routine investigations. Serum tryptase was not sent as facility was not available, even though tryptase level would have helped in diagnostic confirmation; the child's condition fit clinically into anaphylaxis and was treated on the same line.

Because of symptom recurrence after initial improvement, biphasic anaphylaxis was initially considered. However, the persistent and recurrent nature of bronchospasm along with other symptoms prompted further investigation.

Respiratory viral panel (PCR Panel) testing returned positive for Rhinovirus/enterovirus infection.

Consolidated table of reports, chronological by collection date/time (abnormal values flagged H/L):

Date/Time	Report	Values
06.04.26 20:13	Chemistry	K 3.3L; ALT 7; Na 141; CRP<0.60
06.04.26 20:13	Creatinine	0.65
06.04.26 19:40	Venous Blood Gas	pH 7.37; pO ₂ 24.0L; pCO ₂ 38.8; Hct 47.6; Na 143.3; K 3.4L; HCO ₃ 21.7; BE -3.3; Lactate 8.3H; iCa 1.172
06.04.26 20:13	CBC	Hgb15.3; Hct43.7; RBC5.36H; MCV81.5; MCH28.5; MCHC35.0; RDW13.6; Plt382; WBC19.08H
06.04.26 20:13	Diff	Neut50.2%; Lymph35.7%; Mono6.4%H; Eos7.2%H; Baso0.5%; ANC9.56H; ALC6.81H; AMC1.23; AEC1.38H; ABC0.10
06.04.26 20:13	Troponin-HS	6.96
06.04.26 23:30	Venous Blood Gas	pH 7.35 pO ₂ 54.6; pCO ₂ 37; Hct 40.9; Na 141; K 3.4; HCO ₃ 20.2; BE -4.7
07.04.26 19:04	Chem	K 3.9; Na 138; Alb 4.51; Ca 2.47; Mg 0.81; Ca (Ionized) 1.22; Cl 111, Troponin (HS) 3.01
08.04.26 06:53	CK (CPK)	45
08.04.26 08:02	Chem	CRP<0.60; Phosphorus 1.43; Mg 0.89; K 4.4
08.04.26 08:57	CT Chest (no contrast)	Mild L main bronchus narrowing; bilateral upper lobe GGO (right>left); no nodule/mass/effusion; suspicious prevascular node (limited evaluation). Imp: bronchiolitis; node f/u advised
08.04.26 17:29	CT Thorax (contrast)	Peribronchial thickening RUL; prior GGO resolved significantly; prevascular node 2 x 1.4 cm; no effusion/pneumothorax. Imp: RUL infiltrate resolution; residual bronchiolitis; node f/u

08.04.26 17:29	CT Sinus (no contrast)/Respiratory PCR	Mucosal thickening R middle/inferior turbinates and bilateral maxillary sinus bases; R OMU obscured; frontal/ethmoid/sphenoid normal; olfactory fossa 5.5mm R/6.5mm L. Imp: mucosal sinus disease; R OMU obscuration; Rhinovirus/Enterovirus detected
09.04.26 08:02	Creatinine; blood sugar	0.58 mg/dl;112 mg/dl
09.04.26 08:02	CBC	Hgb15.6; Hct45.0; RBC5.53H; MCV81.4; MCH28.2; MCHC34.7; RDW14.3H; Plt359; WBC13.69H
09.04.26 08:02	Differential count	Neut83.7%H; Lymph11.5%L; Mono4.7%; Eos0.00%L; Baso0.1%; ANC11.45H; ALC1.58; AMC0.65; AEC0.00L; ABC0.01L
15.04.26 11:52 Follow up	Vitamin D	12L
15.04.26 11:52	IgE	156.0
15.04.26 12:12	CBC	Hgb15.1; Hct44.2; RBC5.36H; MCV82.5; MCH28.2; MCHC34.2; RDW14.0; Plt398; WBC14.41H
15.04.26 12:12	Diff	Neut48.4%; Lymph42.0%; Mono6.9%H; Eos2.4%; Baso0.3%; ANC6.97; ALC6.05H; AMC1.00; AEC0.35; ABC0.04
15.04.26	Food Allergy Panel (33 items) Specific IgE Ku/L	All negative (0.35) — egg, milk, casein, wheat/gluten, rice, soy, sesame, nuts, seeds, fruits, veg, fish/shellfish, meat, chicken, CCD
15.04.26	Inhalation Allergy Panel	<i>D. pteronyssinus</i> 32.38 POS; <i>D. farinae</i> 42.88 POS; grass/tree/weed/pollen mixes, animal danders, molds, cockroach, feathers, CCD — all negative (0.35)
(K: Potassium mmol/L; Na: Sodium mmol/L; ALT: Alanine Amino Transferase U/L; CRP: C-Reactive Protein mg/L; ANC: Absolute Neutrophil Count; ALC: Absolute Lymphocyte Count; AMC: Absolute Monocyte Count; AEC: Absolute Eosinophil Count in 10 ³ /microL; Alb: Albumin; Ca: Calcium; Mg: Magnesium; Cl: Chloride; GGO: Ground Glass Opacity; OMU: Ostiomeatal Complex; Hgb: Hemoglobin g/dL; Hct: Hematocrit %; RBC: Red Blood Cells 10 ⁶ /microL; MCV: Mean Corpuscular Volume fL; MCH: Mean Corpuscular Hemoglobin pg; MCHC: Mean Corpuscular Hemoglobin Concentration g/dL; RDW: Red Cell Distribution Width %; Plt: Platelet 10 ³ /microL; WBC: White Blood Cells 10 ³ /microL)		

Table

Chest x-ray, CT chest (Non-contrast and contrast), CT PNS:

The recurrent bronchospasm along with other symptoms were contributed to be multifactorial initially including differential diagnosis of panic attack, hypocalcemic tetany. She was given intravenous methylprednisolone during ICU stay after the viral pathology was confirmed as she was having recurrent bronchospasm episodes.

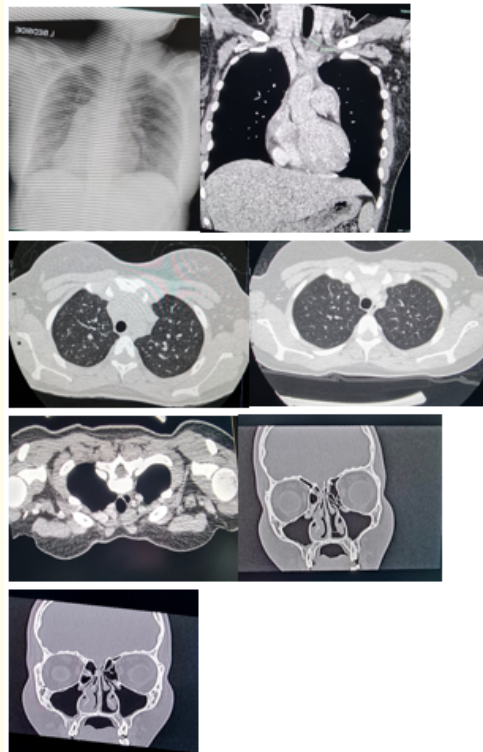


Figure 1

She showed steady improvement over the next few days and was discharged from ward with outpatient follow-up advice and to carry Epi-Pen. On follow up visit she was found to be sensitized to house dust and was advised immunotherapy.

Discussion

This case was challenging because the initial diagnosis appeared straightforward—severe anaphylaxis with respiratory cardiovascular compromise. Children more often present with respiratory symptoms, whereas adults more frequently experience cardiovascular compromise [7].

The unrecordable blood pressure and severe bronchospasm required rapid intervention, and timely administration of adrenaline likely prevented further deterioration.

The clinical course became more complicated when bronchospasm repeatedly recurred along with hyperventilation, numbness and chest pain after apparent stabilization. Biphasic anaphylaxis reaction was an important consideration, especially given the severity and persistence of the events. In routine Among ED patients with allergic reactions or anaphylaxis, clinically important biphasic reactions and fatalities are rare [8].

However, positive testing for Rhinovirus/enterovirus infection provided an explanation for the prolonged and recurrent respiratory symptoms.

Exercise may have acted as the primary trigger for anaphylaxis or as a cofactor that lowered the threshold for a severe reaction. Underlying allergy must also be a co-factor [9].

This case highlights how multiple overlapping mechanisms may coexist in pediatric emergencies:

- Exercise- triggered anaphylaxis
- Underlying atopy
- Viral- induced airway hyper-reactivity.

Recognizing these overlapping contributors can help guide treatment decisions and monitoring duration.

Anaphylaxis diagnosis chart can be used to diagnose the suspected anaphylaxis (JACI) [10]:

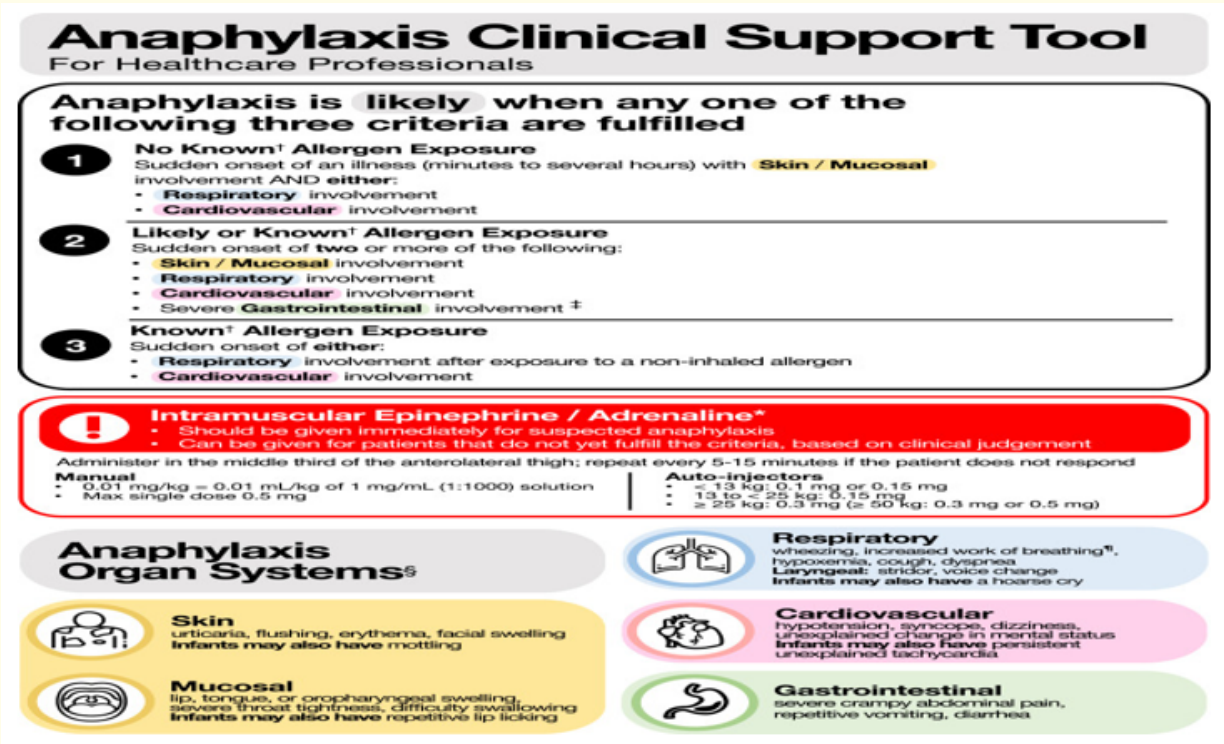


Figure 2

Conclusion

Children presenting with exercise-associated anaphylaxis and persistent bronchospasm may have more than one contributing factor:

When respiratory symptoms continue despite appropriate treatment of anaphylaxis, clinicians should consider concurrent respiratory infections, especially in children with underlying atopy.

Conflict of Interest

There is no conflict of interest.

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