

CLINICAL VIGNETTE

Systemic Latrodectism: A Venomous Encounter

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Introduction

Black widows, identified by their shiny black coat often marked by a red accent, are among the few spiders whose venom can cause significant whole-body reactions in humans.^{1,2} The medical condition related to a widow spider bite is termed latrodectism. Like most insect bites, widow bites to humans are typically inflicted on the extremities with most bites causing only local irritation and pain. However, up to a third of bites can be severe and manifest as constitutional symptoms.¹ Diagnosis of a spider bite is based on high clinical suspicion and identification of the widow spider if possible. We present the clinical course of a rare case of black widow envenomation with profound systemic symptoms.

Case Report

A 58-year-old-male with no past medical history presented to the emergency department for muscle cramps following a presumed spider bite to his right foot while riding his exercise bike at home. He removed his shoe and saw a live black spider inside. He noticed a small bite mark with surrounding erythema and swelling on his right second toe. About an hour later, while at work, he began having muscle cramps in his legs, lower abdomen, and hands. He also reported shortness of breath, chills, and profuse sweating. The paramedics were called, he was found to have normal vital signs, and he declined transfer to the hospital. His symptoms progressed and about seven hours after initial encounter, were severe enough that he presented to the emergency room for evaluation. He denied fever, nausea, vomiting, dizziness, chest pain, diarrhea, or dysuria, but he had ongoing chills, sweating, muscle cramps, and abdominal contractions.

The patient's social history included regular alcohol use of one half bottle of wine daily with occasional hard alcohol. His last drink was two days prior. The patient also reported a prior 5-pack year smoking history but quit tobacco five years ago. He denied other illicit drug use or high-risk sexual behavior.

On arrival, the patient presented with a temperature of 36.8 °C, blood pressure 144/83, heart rate 114, respiratory rate 28, and oxygen saturation of 100% on room air. Exam showed a well-nourished male appearing acutely ill with rigors, diaphoresis, and tremulousness in upper extremities. Cardiac exam revealed a II/VI systolic murmur. Abdomen was soft and nontender and no neurological deficits were appreciated. There was no obvious bite-type lesion or rash on his foot. Initial laboratory tests

were remarkable for WBC 12.0 10E3/uL with a normal differential, hemoglobin 15.7 10E6/uL with MCV 100.9 fL. Chemistries included creatinine of 1.46 mg/dL and mildly elevated total bilirubin of 1.4mg/dL. Creatinine kinase level was 409 U/L. Lactate and urinalysis were unremarkable. Blood cultures were obtained.

The patient was admitted with positive parameters for the systemic inflammatory response syndrome. There was initial concern for an infectious etiology. However, he exhibited no localizing sources of infection, his leukocytosis quickly normalized, urinalysis showed no signs of infection, and ultimately his blood cultures showed no growth. Given his history of daily alcohol use, there was also concern for alcohol withdrawal. He had no hallucinations, agitation, and only required 3mg of IV lorazepam for symptom control during the hospitalization. Therefore, acute alcohol withdrawal was less likely. While rabies and tetanus can mimic latrodectism, these were unlikely given the patient's lack of exposure.

Given the patient's highly corroborating history, and having ruled out other infectious and metabolic etiologies, he was diagnosed with moderate black widow envenomation and poison control was consulted. The patient was treated with intravenous morphine for pain, lorazepam for muscle spasms, and aggressive fluid resuscitation. He improved with conservative measures, and antivenom administration was not indicated. On hospital day three, he was discharged with oral acetaminophen and cyclobenzaprine. At follow up three weeks later, he reported residual paresthesia in the affected toe, however this totally resolved on subsequent visits.

Discussion

Widow spiders of the genus *Latrodectus* are found in warm climates worldwide. In the United States, the species most implicated in envenomation inhabit Western and Southern states.³ Preferring cool, dark habitats, widows will often reside in garages, woodpiles, and outdoor furniture. When they encounter humans, bites are an act of defense in response to perceived danger. According to the National Poison Data System, approximately 2,600 *Latrodectus* exposures are reported each year, but only 1% of these are deemed life-threatening.⁴

Symptoms of widow bites are caused by the spider's venom which contains a vertebrate-specific alpha-latrotoxin, an excitatory neurotoxin. Alpha-latrotoxin exerts its effect on presynaptic nerve terminals by binding to cell surface receptors, inserting itself into the plasma membrane, then triggering massive exocytosis of neurotransmitters via calcium-dependent and calcium-independent mechanisms.⁵ Neurotransmitters including glutamate, GABA, acetylcholine, norepinephrine, and dopamine are all susceptible to the toxin. The effects of *Latrodectus* toxin on these neurotransmitters are responsible for the clinical response to exposure.

The diagnosis of latrodectism requires a high degree of clinical suspicion. Common symptoms include muscle pain of the extremities, abdomen, and back that often resolve within 24-72 hours with no treatment.^{6,7} Other symptoms include tremor, weakness, paresthesias, headache, nausea, vomiting, and diaphoresis. A thorough history should be obtained regarding other animal exposures, as tetanus and rabies are known to have a similar clinical presentation. Rare complications reported in literature also include cardiomyopathy, priapism, and compartment syndrome.⁸⁻¹⁰ Notably, vital signs are normal in most exposures. Laboratory findings are typically non-specific and not necessary to make a diagnosis. If obtained, laboratory derangements often include hematuria, leukocytosis, elevated serum creatinine kinase, hyperglycemia, or transaminitis.⁷

Treatment of latrodectism is largely supportive. Mild envenomation can be treated with local cleaning with soap and water, oral analgesics, oral muscle relaxants, and antiemetics.⁴ Antibiotics are rarely required and are used only if there are signs of superinfection. With moderate to severe envenomation, parenteral administration of the same medications should be considered. While an antivenom has been developed, it is not widely available and there is limited evidence for its efficacy.¹ When efficacious, antivenom may significantly decrease the duration of symptoms in recipients, but it has also been associated with allergic reactions, serum sickness, and rare fatalities.⁷ Although calcium gluconate was previously considered for severe envenomation, it has been shown to be ineffective for the treatment of muscle pain or spasms. Finally, consultation with a regional poison control center should be routinely pursued.¹¹

Conclusion

Although rare, black widow bites can cause extensive constitutional symptoms that include tachycardia, diaphoresis, and muscle cramps which may mimic systemic infection or alcohol withdrawal. Latrodectism should be considered when there is a compelling clinical picture and if other, more common conditions such as myocardial infarction, acute abdomen, thyroid dysfunction, rheumatologic conditions, heat exhaustion, and cellulitis can be ruled out. Treatment is typically supportive and focused on pain control and other symptom management. While administration of antivenom can be considered in severe cases, evidence of its efficacy is equivocal.

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