

⇒ Case Report



Quadriplegia as a Rare Complication of Black Widow Spider Envenomation

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Background: *Latrodectus tredecimguttatus*, generally known as black widow spider (BWS), bite can cause a variety of symptoms including muscular spasm, back pain, abdominal pain, severe sweating, and shivering. The bite brings weakness too; however, quadriplegia has not been mentioned in the literature.

Case Presentation: Here, we present a 42-year-old male case with BWS bite who developed muscle weakness and paralysis in the four limbs. The patient needed mechanical ventilation. Nerve conduction velocity reported myopathy in the patient. The patient could eventually walk after 45 days of supportive treatment.

Conclusion: It can be hypothesized that quadriplegia may happen due to the vast acetylcholine depletion.

Keywords: Black widow spider, Envenomation, Quadriplegia

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Background

There are more than 40000 species of spiders worldwide, and black widow spider (BWS) is one of the most poisonous ones with neurotoxic venom which causes several morbidities (1,2). Bites by *Latrodectus tredecimguttatus*, as a known specie of BWS, are reported in the northeast of Iran, where the cities of Mashhad, Neishabour, Sarakhs, and Ghouchan are the main concentration areas of this spider according to the regional data (3). Alpha-latrotoxin is considered the main neurotoxin, which causes an envenomation syndrome named "latrodectism" (4). Pain, agitation, anxiety, tachycardia, diaphoresis, hypertension, muscle cramps, motor unrest, and abdominal pain (may mimic an acute abdomen) are the main clinical manifestations of latrodectism (4,5). Unfortunately, the BWS antivenom is not available in Iran, and supportive care is the only treatment option. In this report, we present a case with quadriplegia after a BWS envenomation, as the first report in the literature.

Case Report

A healthy 42-year-old farmer man, wearing ordinary clothes, was admitted to a regional hospital on the outskirts of Mashhad (Iran) due to a spider envenomation on his left forearm, and after about three hours, he was transferred to the Clinical Toxicology Department of Imam Reza Hospital of Mashhad. He stated that he had felt a significant burning in the bite area and

had thrown away a spider. A very little puncture mark was seen in the bite site without swelling or other skin reactions around. He was awake, agitated, and febrile, complaining generalized muscle cramps. Shivering, considerable sweating, and severe abdominal pain were the other detected signs and symptoms. The vital signs of the patient were BP: 130/60, PR: 90/min, RR: 30/min, and T: 39°C. Guarding was detected in the abdominal examination. Surgery consultation was performed, and an acute surgical abdomen was ruled out. The results of laboratory tests on admission are presented in Table 1.

The patient was intubated and underwent mechanical ventilation due to respiratory failure on day two after admission. Chest X-ray (CXR) was done, and clinical and imaging findings were in accordance with pneumonia. He also suffered from weakness in the upper and lower limbs before intubation, and this weakness progressed to quadriplegia. About 6 days after admission, echocardiography was performed following a positive blood culture, and vegetation was ruled out. About 3 weeks after admission, when the general condition gradually improved, the patient was extubated, and sedative medications were discontinued; the remaining problem was quadriplegia. Given the history of opium consumption and the probability of lead-poisoning quadriplegia, the blood lead level was checked and was found to be 11 mcg/dL which could not explain the quadriplegia. The urine test for arsenic and thallium were negative. Rheumatology consultation was also performed,

Table 1. Laboratory Results on Admission and One Month After Admission

	Item	On Admission	One Month After Admission
Biochemical	Na	148	132
	K	4	4.5
	CPK	991	26
	Mg	-	1.75
	Urea	-	28
	Cr	-	0.8
	Ph	-	2.8
	Aldolase	-	4.58
	Alb	-	2.7
	PH	7.32	-
Gasometry	PCO2	43	-
	HCO3	22	-
	WBC	14,700	9300
CBC diff	Hb (g/dL)	13.6	10.8
	Plt	240,000	356,000

and rheumatology tests were negative. Electromyography and nerve conduction velocity study reported myopathy, as well as severe symmetric peripheral and axonal-type sensorimotor polyneuropathy. Neurology counseling was done, and an initial focal neurologic problem was excluded. Toxic neuromyopathy was raised with recommendations for supportive measures.

Supportive measures, nutrition support, and physiotherapy twice a day were carried out, and the patient's weakness gradually improved, and the patient recovered eventually 45 days after admission. He was able to walk with some help and discharged with recommendations to continue taking physical exercise, physiotherapy, and subsequent follow-ups.

Discussion

Latrodectus genus is a group of hourglass-shaped spiders with different colors of red, yellow, or orange which are found in different parts of the world. *Latrodectus mactans* (native to America's) and *Latrodectus tredecimguttatus* (native to Asia/Europe), generally known as the black widow, are species of *Latrodectus* genus. The *Latrodectus tredecimguttatus* morphological characteristics are illustrated in Figure 1. These spiders tend to live in dark little-used places such as bushy plants and piles of debris; however, they may settle in dark places of a house, such as cabinets, too. Therefore, the risk of BWS bites may be present everywhere (6). In a study by Rafinejad et al in the northeast of Iran, BWS bites were found to be more common in Mashhad than in other cities (3). Afshari et al reported that the majority of spider bites are seen in housekeepers and farmers, and bites are more common in limb extremities and happen more on the left side of the body. They discussed that for farmers, it is probably due to having the farming tools in the right hand and keeping

the cut plants on the left forearms (4).

Generalized muscle pain and spasm, back pain, abdominal pain (that sometimes mimics acute abdomen), severe sweating, and shivering are the expected symptoms of BWS envenomation. Four-limb paralysis seen in our case has not already been reported in the literature (7). The aspiration pneumonia and respiratory failure in the early phase after envenomation, despite patient consciousness (slightly agitated) and without significant metabolic and electrolyte disturbances, can be explained by respiratory muscle weakness in the context of generalized weakness (8).

The suggested differential diagnoses were neurologic lesions (such as Guillain-Barré syndrome), tick bite paralysis, funnel-web spider envenomation, and metal poisoning (lead in particular). All of them were evaluated and ruled out. Symptoms of funnel-web spider envenomation include facial paresthesia, nausea, vomiting, profuse diaphoresis, drooling, and shortness of breath (9), that did not fully match the symptoms of our case. The tick bite paralysis symptoms were also not consistent with our case's. Other differential diagnoses were also excluded during numerous consultations.

Studies showed that the widow spider venom is very strong so that it causes latrodectism syndrome. When the person is bitten by the spider, short-term pain is experienced at the site of the bite. The venom enters the lymphatic system and eventually the bloodstream (6). After around half an hour to two hours, myalgia and muscle cramps start, and then fatigue, weakness, and insomnia appear (10). However, no case of quadriplegia

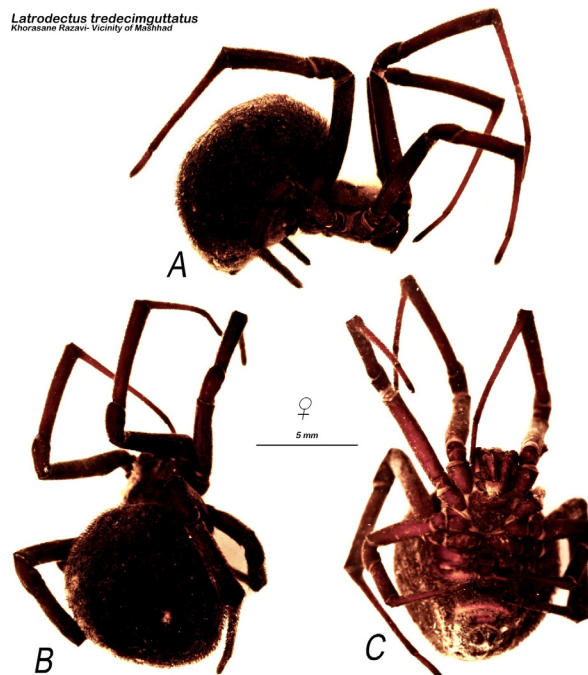


Figure 1. The Morphological Characteristics of *Latrodectus tredecimguttatus*. (A) Lateral view, (B) Dorsal view, (C) Ventral view.

has been mentioned with BWS bite.

It is widely known that the venom contains a variety of necrotizing enzymes and also hemolytic components that can cause micro-vessel hemolysis. Furthermore, it is reported that BWS venom can cause a massive release of acetylcholine at the synaptic junction. This release can cause hypertonia and then hypotonia and muscle weakness (6,11). It can be hypothesized that neurotransmitter depletion may lead to more severe weakness and eventually quadriplegia; however, further studies are required to confirm this hypothesis. In addition, our study was limited as we did not observe the insect, and lumbar puncture was not done to rule other etiologies out, due to the patient's status.

Conclusion

Given that no other cause except the spider bite was found for four-limb paralysis and generalized weakness, this condition was considered a possible rare complication of the BWS bite. This report highlights the need for more extensive studies on this subject.

Authors' Contribution

Study concept and design: BD, and HF; Drafting of the manuscript: AG, and BD; Critical revision of the manuscript for important intellectual content: BD, AG, and HF.

Conflict of Interests

The authors declare that there are no conflicts of interest.

Ethical Approval

Informed Consent was obtained from the patient for publication of the report.

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Informed Consent

Informed consent was signed by the participant.

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