OPEN

Transient Reverse Takotsubo Cardiomyopathy Following a Spider Bite in Greece

A Case Report

Lykourgos-Christos Alexakis, MD, MSc, DTM, Sophia Arapi, MD, MSc, Ioannis Stefanou, MD, PhD, Panagiotis Gargalianos, MD, PhD, and Myrto Astriti, MD

Abstract: Black widow spider is endemic in the Mediterranean area and although envenomations are rare, may occasionally lead to death.

We present a case of a 64-year-old female developing a rare variant of takotsubo, stress-induced, cardiomyopathy after a spider bite. This resulted in acute heart failure within 24 hours of the bite. With medical treatment and supportive care, the patient's clinical condition improved.

Reverse takotsubo cardiomyopathy was diagnosed by echocardiography, which was transient. Clinical and echocardiographic findings have been completely resolved on follow-up 46 days later.

Reverse takotsubo cardiomyopathy has not been yet described following a spider bite. Doctors in the emergency department of endemic countries should be familiar with this potential complication.

(*Medicine* 94(5):e457)

Abbreviations: CK-MB = creatine phosphokinase MB isoenzyme, ECG = electrocardiogram, LDH = lactate dehydrogenase, LV = left ventricle.

INTRODUCTION

Black widow spider (latrodectus tredecimguttatus) is endemic in the Mediterranean area and sporadic reports of envenomations appear in literature[1] occasionally leading to death.[2] A 64-year-old female patient with a history of hyperthyroidism on treatment (thiamazole 5 mg once daily, and levothyroxine 62 μg once daily, currently euthyroid with normal thyroid-stimulating hormone, free thyroxine), was referred to our department from a regional hospital following a spider bite, which took place in western Greece (Aetolia-Acarnania region). The bite occurred in the pre-tibial area of the left lower extremity, while cleaning a building in a rural area, early November of 2013. The spider was described as black with red marks, about 2 cm in size and although it was not preserved for identification, the description as well as the clinical signs suggested European black widow spider envenomation.

CLINICAL FINDINGS, DIAGNOSTIC ASSESMENT AND THERAPEUTIC INTERVENTIONS

One and a half hours after the bite, the patient was nauseous, with generalized tremor, sweating, infra orbital edema, diffuse abdominal pain, and severe muscle cramping in the lower extremities. Examination revealed sinus tachycardia (104/min) and slightly increased blood pressure (150/80 mmHg). The abdomen was soft, nontender, without guarding signs. Her laboratory examinations (including abdominal ultrasound) were within normal range apart from a slight neutrophilic leucocytosis (Supplementary Digital Content 1. Table, http://links.lww.com/MD/A191: Evolution of pathological laboratory values during hospitalization). She was put on opioid analgesia (pethidine), wide-spectrum antibiotics, and omeprazol intravenously. Tetanus prophylaxis, corticosteroids (methylprednisolone), and diazepam intravenously were also provided the first day.

The second day she developed acute pulmonary edema with dyspnea, tachypnea, bilateral wheezing, hypertension, tachycardia (120/min). Cardiac enzymes (creatine phosphokinase, CK-MB, Troponin-I) were elevated, whereas the electrocardiogram (ECG) revealed T wave flattening in aVL lead. (Supplementary Digital Content- ECG, http://links.lww.com/MD/A192). High-flow oxygen and furosemide intravenously were administered with immediate improvement. Subsequently, she was put on metoprolol 25 mg twice daily, fondaparinux, lisinopril 2.5 mg once daily, clopidogrel 75 mg, and acetylsalicylic acid 100 mg once daily. An echocardiogram performed on day 3 revealed increased left ventricular end-systolic diameter with end-diastolic diameter preserved within normal limits, moderately impaired left ventricular (LV) systolic function (LV ejection fraction was 36% calculated by Simpson's method), and increased filling pressures. Regional wall motion abnormalities were present, consisting of hypokinesis of the basal and middle segments of the left ventricular walls (more prominent in the anterior wall and interventricular septum), with complete sparing of the apical segments and moderate mitral regurgitation (see videos of transthoracic echocardiograms: Supplemental Digital Content 2, http://links.lww.com/MD/A193: Apical four chamber view hypokinetic basal and middle left ventricular segments, septal and lateral wall, with normal contractility of the apex, Supplemental Digital Content 3, http://links.lww.com/MD/A194:Apical three chamber view hypokinesis of the basal and middle septum and posterior wall with normal contractility of the apex).

Editor: Alessandro Durante.
Received: October 30, 2014; revised: December 17, 2014; accepted: December 19, 2014.
From the 1st Department of Internal Medicine (LCA, IS, PG, MA); and Department of Cardiology (SA), General Hospital of Athens ''G.Gennimatas,'' Athens, Greece.
Correspondence: Lykourgos C. Alexakis, General Hospital of Athens "G.Gennimatas", 154 Mesogeion Avenue, Athens, Attiki, 11527, Greece (e-mail: lchalexakis@gmail.com).
The authors have no funding and conflicts of interest to disclose.

ISSN: 0025-7974
DOI: 10.1097/MD.0000000000000457

FOLLOW-UP AND OUTCOME

By day 6, cardiac troponins and CK-MB were completely normal and the patient had clinically improved. During the course of the illness, low-grade fever, up to 37.6°C, was registered. LV ejection fraction was estimated at 48% on day 8 with persisting hypokinesis only in the basal and medial segments of the septum and anterior wall. She was discharged the next day in good clinical condition on lisinopril 2.5 mg once daily and metoprolol 25 mg twice daily. On follow-up, the abnormal contractility resolved completely, with no residual deficits found in an echocardiogram 46 days after the bite.

DISCUSSION

Our patient developed cardiomyopathy manifested as cardiogenic pulmonary edema. Hypokinesis of the basal and middle segments of the LV wall with apical sparing is characteristic of reverse takotsubo cardiomyopathy (a rare apical sparing variant of takotsubo or stress-induced cardiomyopathy due to catecholamine cardiotoxicity).[3,4] In typical takotsubo apical dyskinesia of the LV is observed. This distinct pattern is inconsistent with abnormalities in any single coronary artery territory and may serve as differentiation from an acute coronary syndrome.[5] Due to lack of any ST segment elevation in our patient's ECGs, lack of chest pain, the history and echocardiographic picture suggesting takotsubo cardiomyopathy, her rapid improvement with supportive care and taking into account the patient preferences, a decision was made not to perform coronary angiography. This is one of the limitations of this case report as underlying coronary artery disease could not be completely excluded.[6]

Black widow spider venom contains alpha-ladrotoxin, a 130-kD protein, which induces exhaustive release of neurotransmitters from vertebrate nerve terminals and endocrine cells including among others neuromuscular junctions and catecholamine-secreting chromaffin cells.[7]

Elevated plasma catecholamine levels play a major role in the mechanism of stress-related myocardial stunning due to sudden emotional stress.[8] Catecholamine release triggered by the direct effect of alpha-ladrotoxin in catecholamine-secreting cells or catecholamines secreted as a result of the emotional and physical stress of the spider bite itself or a combination of both, might have been the mechanism causing the transient cardiomyopathy in our patient.[9]

In the literature, takotsubo cardiomyopathy has been reported after a wasp,[10] a jellyfish sting,[11] as well as following a snake bite.[12] In addition, a few case reports of acute toxic myocarditis caused by black widow spider bites exist,[13,14] and it seems that magnetic resonance imaging may help in its confirmation without the need of a myocardial biopsy.[15] Nevertheless there has been no report so far of a case of reverse takotsubo cardiomyopathy triggered by a spider bite as it is the case in our patient.

CONCLUSION

To our knowledge this is the first report of reverse takotsubo cardiomyopathy following a spider bite. Cardiomyopathy due to spider envenomation is a rare event and although potentially fatal, it can be completely reversible. Doctors in the emergency departments of endemic countries should be familiar with the presenting symptoms, complications, and treatment.

ACKNOWLEDGMENTS

We would like to thank Angeliki Konstantinou, MD, Msc, Dimitrios Sourmpatis, MD, and Aikaterini Papamanoli, MD, for their feedback and advice on the manuscript.

Informed consent was obtained by the patient. No approval from an ethics committee was required since this is a simple case report.

REFERENCES

1. Dzelalija B, Medic A. Latrodectus bites in northern Dalmatia, Croatia: clinical, laboratory, epidemiological, and therapeutical aspects. *Croat Med J.* 2003;44:135–138.
2. Pneumatikos IA, Galiatsou E, Goe D, et al. Acute fatal toxic myocarditis after black widow spider envenomation. *Ann Emerg Med.* 2003;41:158.
3. Patankar GR, Choi JW, Schussler JM. Reverse takotsubo cardiomyopathy: two case reports and review of the literature. *J Med Case Rep.* 2013;7:84.
4. Manzanal A, Ruiz L, Madrazo J, et al. Inverted Takotsubo cardiomyopathy and the fundamental diagnostic role of echocardiography. *Tex Heart Inst J.* 2013;40:56–59.
5. Desmet W, Bennett J, Ferdinande B, et al. The apical nipple sign: a useful tool for discriminating between anterior infarction and transient left ventricular ballooning syndrome. *Eur Heart J Acute Cardiovasc Care.* 2014;3:264–267.
6. Bybee KA, Kara T, Prasad A, et al. Systematic review: transient left ventricular apical ballooning: a syndrome that mimics ST-segment elevation myocardial infarction. *Ann Intern Med.* 2004;141:858–865.
7. Ushkaryov YA, Rohou A, Sugita S. αlpha-Latrotoxin and Its Receptors. *Handb Exp Pharmacol.* 2008;184:171–206.
8. Wittstein IS, Thiemann DR, Lima JA, et al. Neurohumoral features of myocardial stunning due to sudden emotional stress. *N Engl J Med.* 2005;352:539–548.
9. Komamura K, Fukui M, Iwasaku T, et al. Takotsubo cardiomyopathy: Pathophysiology, diagnosis and treatment. *World J Cardiol.* 2014;6:602–609.
10. Jairam A, Kumar RS, Ghosh AK, et al. Delayed Kounis syndrome and acute renal failure after wasp sting. *Int J Cardiol.* 2010;138:e12–e14.
11. Bianchi R, Torella D, Spaccarotella C, et al. Mediterranean jellyfish sting-induced Tako-Tsubo cardiomyopathy. *Eur Heart J.* 2011;32:18.
12. Murase K, Takagi K. Takotsubo cardiomyopathy in a snake bite victim: a case report. *Pan Afr Med J.* 2012;13:51Epub 2012 Nov 15.
13. Kara H, Ak A, Bayir A, et al. Reversible myocarditis after spider bite. *BMJ Case Rep.* 20132013. pii: bcr2013008957.
14. Golcuk Y, Velibey Y, Gonullu H, et al. Acute toxic fulminant myocarditis after a black widow spider envenomation: case report and literature review. *Clin Toxicol (Phila).* 2013;51:191–192.
15. Malajati H1, Bensaad H, Abidi K, et al. The contribution of MRI in the diagnosis of acute myocarditis following a spider bite: a case report. *Diagn Interv Imaging.* 2012;93:887–889.