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A Case of Combat-related Scorpion Envenomation in Afghanistan

Nicolas Donat; Yannick Masson*; Thierry Villevieille*; Christophe Pelletier*; Jean-Marie Rousseau*; David Plancade†; Jean-Paul Perez†; Georges Mion‡*

ABSTRACT We report a case of scorpion envenomation occurring during combat in Tagab district, province of Kapisa, Afghanistan. A French soldier was stung by a yellow scorpion (suspected *Androctonus australis*) and sustained systemic envenomation with hemodynamic and neurological manifestations. We discuss the clinical features, prevention, and management of a scorpion sting.

INTRODUCTION

Relatively higher risk areas for scorpion stings include the Middle East and southern Asia, where estimates of annual incidence have ranged from 16 (Oman) to more than 1,000/100,000 habitants.[1] In military settings, the annual incidence among American troops stationed in Saudi Arabia during the operation "Shield of the Desert" was estimated at 2,400 scorpion stings per 100,000 soldiers.[2] Risk is generally considered to be higher in rural environments. Scorpion stings can cause a wide range of symptoms, from severe local reactions to cardiovascular, respiratory, and neurological manifestations.[3] We report on a case of scorpion envenomation occurring during a combat in Tagab district, Afghanistan, where a French soldier was stung by a yellow scorpion with fat tail and sustained systemic envenomation with hemodynamic and neurological manifestations.

CASE REPORT

Securing a medical session in Tagab district, a French Foreign Legion squadron was attacked by insurgency. When trying to collapse a mud wall to facilitate the escape of wounded soldiers, this 34-year-old sergeant was stung by a scorpion. The soldier saw the scorpion, but could not collect it owing to tactical situation and the heavy equipment that he wore (Minimi Para M3 gun/M249 SAW). The arthropod was yellow in color with a thick and large tail which, in combination with the severe envenomation symptoms (described later), suggests a scorpion of the Buthidae family, perhaps *Androctonus australis* (*Buthidae*). The soldier was wearing combat gloves, composed of a thin layer of leather for the palm face and cotton for the back of the hand. The scorpion stung him on the third finger of his left hand through the cotton layer. The patient felt moderate pain, but nevertheless continued with the mission. One hour later (H+1), the area was secured and the patient had his first medical examination by role 1. Intense pain on the stung hand was reported. No cardiovascular, respiratory, or neurological concerns were recorded at that time.

The patient was evacuated to multinational role 3 (Hôpital Militaire de Campagne, KAÏA) by helicopter and admitted on H+2 to the ICU. The patient was confused and complained of intense acute pain from the stung finger to the forearm. His blood pressure was 160/100 mm Hg for a SaO_2 of 100% without oxygen. Fast biology showed no abnormalities (PT 82%, Hb 12.9 gr/dL). On H+4, neurological and cardiovascular complications occurred with hypertension (190/140 mm Hg) and severe agitation (scorpionic envenomation grade 2). Only a local and moderate inflammatory lesion limited to the third left finger was noted. Vascular or necrotizing effects were not apparent. To sedate the patient, a general anesthesia with intubation was administered. A few minutes after induction, more hemodynamic troubles were reported: alternance of tachycardia-hypertension and bradycardia-hypotension that required urapidil 25 mg/h and atropine 1 mg/h, respectively, followed by norepinephrine 0.5 mg/h.

Medical evacuation to role 4 homeland medical facility in Paris was effectuated on H+18. The en-route care showed no particular issue, even for the cardiovascular situation. The patient was sedated (midazolam 20 mg/h and sufentanil 20 mcG/h) and was given minor hemodynamic support (norepinephrine 0.25 mg/h).

On his arrival at role 4, on H+26, vital signs were stable: heart rate 50, blood pressure 124/61, SaO_2 100%, PaO_2/FiO_2 426, lactate 0.8 mmol/L, urinary output 2 mL/kg/h. Examination of the sting wound was normal. Blood samples displayed no inflammatory response, no renal failure, and no cytolysis. Moderate rhabdomyolysis was noted with myoglobine 329 mcG/L, CPK 1,209 UI/L, and TnIc 0.01 mcG/L. Blood gases were normal. Electrocardiography showed sinusal rythm, with normal axe and no abnormalities for conduction or repolarization. Chest radiography showed cardiomegalia (index >0.5), but no edema nor condensation. Transthoracic echocardiogram showed normal left ventricle function, no modification of segmentary kinetics, no valvular disease, and no pulmonary hypertension, but a dilation of the right cavities (RV/LV = 1) was detected.

On day 3, sedation was stopped and the patient was weaned off respiratory assistance. Neurological examination was normal

*Intensive care unit, Bégin military hospital, 69 avenue de Paris, 94160 Saint-Mandé (East Paris), France.

†Role 3 medical facilitie, Hôpital Militaire de Campagne, Kaïa, Kabul, Afghanistan.

‡Ecole du Val-de-Grâce, Boulevard de Port-Royal, 75005 Paris, France.

with no residual pain, including the stung finger. Patient was then discharged to a regular medical unit. Further cardiological investigations were required because of a dilation of the right cavities. Transthoracic echocardiogram performed on day 7 showed slight dilation of the right cavities without other abnormalities. Two weeks later, cardiac MRI was normal for the right cavities and left auricle. Despite dilation of the left ventricle (LVTDV 37 mm/m2), with moderate hypertrophia because of physical training, the left ventricle systolic function was normal.

DISCUSSION

Combat casualties are not the only cause of attrition for an army; other sources are disease, nonbattle injury (eg, motor vehicle injury), and the effect of a hostile environment.[4] Scorpion envenomation is an environmental hazard in the Middle or Far East countries such as Afghanistan, with several dangerous scorpion species belonging to the family *Buthidae*. Sting incidence among military personnel in Afghanistan is not clearly known. U.S. soldiers returning from operations in the Middle East self-reported that the incidence of an arthropod encounter (spider or scorpion) was 46.1 per 10,000 person-months and it varied according to season, deployment location conditions, and rank.[5] Recently, there was a case report of a suspected scorpion sting in a military person operating in Iraq.[6]

Scorpion venom is primarily neurotoxic and cardiotoxic. After a sting, the pain is immediate, violent, and sustainable. Other envenomation symptoms (shock, respiratory failure, pulmonary edema, coma) could occur after a couple of hours; the critical life-threatening period ranging from the third to the fifteenth hour. Our report illustrates the fact that there is often a time lapse between the sting and clinical manifestations. Clinical manifestations from scorpion envenomation are well known and depend on the severity of systemic expression.[7] Severe envenomation is apparently rare, perhaps occurring in about 2% of scorpion stings. The left cardiac dysfunction that may result is life threatening. Known mechanisms are toxic myocarditis, adrenergic myocarditis, and even myocardial ischemia. This cardiac dysfunction is probably related to a significant discharge of catecholamines. Scorpion envenomation can thus be similar to an acute myocardial sideration.[8–10] Cardiovascular response to scorpion envenomation occurs in 2 phases. In the first phase, an intense vasoconstriction secondary to the huge release of catecholamines is noted. The second phase consists of structural and morphological variations that alter the functional performance of myocardium. Scorpionic cardiopathy is characterized by a severe, but reversible impairment of ventricular contractility involving the left or both ventricles. The resultant acute cardiac failure and consequent pulmonary edema is responsible for 25% of scorpion envenomation deaths. Risk factors for severe envenomation include host size, with children being more at risk; a sting to the torso, abdomen, head, or neck; delay between sting and seeking of medical care.

Military physicians should be informed about scorpion envenomation and its associated pathology. Immunotherapy using serum therapy is still under development and has not proven its effectiveness. Systematic administration is useless.[11–14] Indeed, it is effective only for early administration (<2–4 hours) and is difficult to initiate during tactical casualty care.[11] Moreover, cost, rarity, and storage requirements for immunotherapy limit its use to role 3 medical facilities.[15] Symptomatic treatment of acute lung edema and cardiogenic shock currently remains the standard care.[16,17] Prevention of a scorpion sting is difficult and is based on wearing long sleeves and pants, checking sleeping bags, and clothes every evening. At nighttime, an ultraviolet light can be used to check for scorpions, as their chitin exoskeleton is fluorescent. Our case report also highlights the fact that gloves worn by French commandos do not prevent scorpion stings. Prevention of scorpion stings can be challenging, not because the interventions themselves are difficult (check boots, clothing, bedding; wear protective equipment like gloves), but rather because personnel often fail to carry out such activities. Further, as our case demonstrates, just wearing generic protective equipment does not provide a guarantee against envenomation, ie, the sting was through a pair of light combat gloves.

CONCLUSION

Afghanistan is an endemic area for yellow and black scorpions (Buthidae, *Androctonus australis*). To our knowledge, this is the first description of combat-related scorpion envenomation. Because systemic manifestations of scorpion poisoning can be life threatening, military practitioners should be advised about this pathology. Once scorpion envenomation is identified, symptomatic treatment should be promptly initiated. Immunotherapy is still under development, but further epidemiologic considerations are required to evaluate the requirement of this therapy at level 3 medical facilities in Afghanistan.

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