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BRIEF REPORT

Clinical Effects and Antivenom Use for Snake Bite Victims Treated at Three US Hospitals in Afghanistan

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Objective.—Annually, more than 100,000 US and international military and civilian personnel work in Afghanistan within terrain harboring venomous snakes. Current literature insufficiently supports Afghan antivenom treatment and stocking guidelines. We report the clinical course and treatments for snakebite victims presenting to US military hospitals in Afghanistan.

Methods.—All snakebite victims presenting to 3 US military emergency departments between July 2010 and August 2011 in northern and southern Afghanistan were examined via chart review. Case information included patient demographics, snake description, bite details and complications, laboratory results, antivenom use and adverse effects, procedures performed, and hospital course.

Results.—Of 17 cases, median patient age was 20 years (interquartile range [IQR], 12–30), 16 were male, and 82% were Afghans. All bites were to an extremity, and median time to care was 2.8 hours (IQR, 2–5.8). On arrival, 8 had tachycardia and none had hypotension or hypoxia. A viper was implicated in 5 cases. Ten cases received at least 1 dose of polyvalent antivenom, most commonly for coagulopathy, without adverse effects. Six received additional antivenom, 6 had an international normalized ratio (INR) $>$ 10, and none developed delayed coagulopathy. Three received blood transfusions. Hospital stay ranged from 1 to 4 days. None required vasopressors, fasciotomy, or other surgery, and none died. All had resolution of marked coagulopathies and improved swelling and pain on discharge.

Conclusions.—We report the largest series of snake envenomations treated by US physicians in Afghanistan. Antivenom was tolerated well with improvement of coagulopathy and symptoms. All patients survived with minimal advanced interventions other than blood transfusion.

Key words: snake envenomation, snake antivenom, Afghanistan

Introduction

The terrain of Afghanistan is inhabited by several venomous snakes with the potential to produce a variety of toxic effects including neurotoxicity, coagulopathies, and tissue necrosis: these include vipers (such as the saw-scaled viper, *Echis carinatus*) and the Oxus cobra (*Naja oxiana*).[1–3] Although nearby countries such as Pakistan and India are reported by the World Health Organization to possess the largest annual snakebite mortalities in the world with a combined estimated annual snakebite mortality of up to 70,000 deaths per year, little is known about the burden of Afghan snake envenomations.[2–6] In addition to the indigenous population, each year more than 100,000 US and international civilians and military service members presently work in Afghanistan and are at risk for this environmental hazard.

Although snake envenomations occur continually during warm weather in Afghanistan, little information is available about these encounters and their subsequent medical treatment. To date the most comprehensive

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report is a voluntary, cross-sectional survey of 390 US military service members with primary duty assignment to Afghanistan, which was administered after they had departed the country.[6] Although this study revealed 7 self-reported Afghanistan snake encounters and an increased risk of snakebite in Afghanistan compared with Iraq, no questions relating to clinical visits associated with these encounters were asked.[6] Modern US military hospital facilities in Afghanistan frequently possess emergency departments (EDs) with emergency physicians, access to expert toxicology consultation, and available polyvalent snake antivenoms. However, the paucity of published reports of patients treated in these facilities for Afghan snakebites is insufficient to support guidance on hospital antivenom treatment and stocking guidelines. In this investigation we sought to report the clinical effects and treatments recorded for a series of snakebite victims presenting to 3 US military hospital EDs in Afghanistan.

Methods

All available medical records of all snakebite victims treated at 3 US military hospital EDs in Afghanistan between July 2010 and August 2011 were retrospectively reviewed. Site hospitals functioned as high-volume regional referral centers and were located in northwest (Herat Province), northeast (Parwan Province), and southern (Helmand Province) regions of the country and represented the geographic variety of the Afghan terrain. Patients (including international military coalition forces and local Afghan individuals) either primarily presented to or were transferred to their respective EDs for medical care. The diagnosis of snakebite was established by the emergency physician at the receiving facility. All 3 sites had access to expert toxicology consultation either at their respective hospitals or via telephone consultation. Although existing treatment guidelines included specific recommendations regarding symptoms such as progressive local edema or pain, coagulopathy, or marked systemic effects (such as hypotension or anaphylaxis), the decision to give antivenom was at the discretion of the treating ED physician, and antivenom products were not standardized across facilities.

Emergency physicians used a standardized data collection tool to extract available case information including patient demographics; snake species (if known); bite details including anatomic site, time to ED care, and clinical finding at the site noted during hospitalization; laboratory results; details of antivenom use including type, doses given, and noted adverse effects; and notable hospital course details including blood product transfusion, vasopressor use, and surgical procedures performed. Identification of the offending snake was generally by patient report with the assistance of zoological photographs of known Afghanistan snakes. Missing or unavailable data were noted as "unknown," and compiled data were analyzed using descriptive statistics. Institutional review board approval was received for this retrospective analysis of clinical cases.

Results

A total of 17 snakebite cases were available and included for data abstraction. Snakebite victims presented to site EDs between the months of March and August of the study period. Case distribution was 5 (29%) from Herat Province, 4 (24%) from Parwan Province, and 8 (47%) from Helmand Province. Median reported patient age was 20 years (interquartile range [IQR], 12–30 years; range, 7–69 years). Sixteen patients were male (94%), and most (82%) were local Afghans. Two were enlisted American military service members (US Army and US Marine Corps). All bites were to an extremity, including finger or hand (6%), arm (18%), foot or ankle (47%), and leg (29%), and all were reported as legitimate in nature after accidental contact. *Pseudocerastes persicus* and *E carinatus (multisquamatus* or *sochureki)* was implicated in 5 cases, *N oxiana* was identified by the patient in 1 case, and the remaining offending snake identities were uncertain.

Median time from bite to ED care was 2.8 hours (IQR, 2–5.8 hours; range, 30 minutes to 24 hours). On ED arrival 8 patients had tachycardia (heart rate $>$ 100 beats/min), and none had hypotension (systolic blood pressure ranged from 104 to 168 mm Hg) or hypoxia (Spo_2 ranged from 97% to 100%). Reported laboratory values revealed a range of hematologic disturbances (Table). Nine (53%) patients were found to have a leukocytosis (white blood cell count $>$ 10 $\times$ 10^9/L) on arrival. Six patients had an international normalized ratio (INR) $>$ 10, and 10 patients were treated with at least 1 dose of intravenous polyvalent antivenom (Razi Vaccine & Serum Research Institute, Iran; or Favirept, Sanofi Pasteur SA, France), most commonly for a persistent elevated INR. One patient who reported envenomation by *N oxiana* received antivenom for an INR $>$ 10 and painful extremity swelling. Those patients who received an additional administration of antivenom did so an average of 3.5 hours after the first dose (range, 2.5–6 hours). No anaphylaxis, serum sickness, or other adverse effects of antivenom treatment were noted. No patients developed delayed-onset coagulopathy after ED presentation. Three envenomated