



Epidemiology and outcome of snake bite cases evaluated at a Tertiary Care Hospital in Oman

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KEYWORDS

Snake bite;
Oman;
Anti-snake venom;
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Summary

Objectives: To study the epidemiology of snake bite patients evaluated at the Royal Hospital, Muscat, Sultanate of Oman, and to study their clinical course and outcome.

Methods: A retrospective study of 65 adult patients presenting at Royal Hospital following a snake bite from May 2006 to August 2008.

Results: The main symptoms were local pain at the bite site (26 patients, 40%) and swelling (17 patients, 26%). Only five patients (7.7%) had signs of bleeding. After assessment, only 47 of the 65 patients were admitted. White cell count (WCC) was raised in 15 cases (23%) on presentation to the emergency room. Prothrombin time was prolonged in 34 patients (52%) and APTT was prolonged in 25 patients (38%) on presentation. Thirty-six patients received anti-snake venom (antivenom) at a mean time of 8 h after the bite and 4 h after arrival in the emergency department. Patients with deranged coagulation profile needed a mean of fourteen vials of antivenom for correction of the abnormal coagulation profile. Two patients died: both had delayed presentation to the hospital.

Conclusion: Patients with envenoming following snakebite should receive antivenom as soon as possible: delayed presentation or administration may be very dangerous. The decision to give antivenom should be initiated as soon as possible after patients' arrival at the Emergency Department and the use of the whole blood clotting test (WBCT) may facilitate the early administration of antivenom.

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Introduction

Snake bites cause considerable morbidity and mortality worldwide. The highest burden exists in South Asia, Southeast Asia, and Sub-Saharan Africa. At least 421,000 envenomings and 20,000

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deaths occur each year worldwide due to snake bite [1]. A study done in Saudi Arabia showed that 2.4% of the total admissions to a regional hospital (from May 2002 to May 2005) were due to snake bites [2]. The incidence of snakebite is not known in Oman: there have been no formal studies, snakebite is a non-reportable condition and it is treated in multiple centres. Early medical attention and administration of antivenom, when indicated, are the main outcome determinants [3]. However, in many parts of the world, there are continuing crises in the production, deployment, and accessibility of antivenom [4].

Most Omani snakes are harmless. Of the 9 venomous terrestrial snakes, 9% of envenomations are by the Saw-scaled Viper (*Echis carinatus*). This aggressive snake occurs throughout Oman, especially in rocky areas. About 9% of bites are caused by a related species, Burton's carpet snake (*Echis coloratus*) of hilly regions, or the Horned Viper (*Cerastes gasperetti*) of deserts. All three vipers have broad heads and 2-hinged fangs, and the venom causes impaired clotting. Only in Dhofar are found the non-aggressive Arabian cobra (venom is neurotoxic) and the indolent Puff adder (impaired clotting), but bites have never been reported in this region [5].

Methods

The records of all patients with snake bite evaluated in Royal Hospital from May 2006 to August 2008 were reviewed. Since January 2006 the Royal Hospital became a paperless hospital, all the medical records of patients were computerized including investigations, medications and case notes of patients. The inclusion criteria were age over 13 (considered as an adult patient in Royal Hospital) and confirmed or strongly suspected snake bite. Patients with an uncertain history of snake bite or other animal and insect stings were excluded.

Clinical information (age, gender and co-morbid conditions), snake bite-related information (such as time, place and snake type) and management-related information (such as laboratory tests, treatment given to the patient and the final outcome of the case) were extracted from the patients' records. The treatment sheet was missing in 3 cases.

Results

A total of 85 patients were evaluated at the Royal Hospital from the period of May 2006 to August

Table 1 Patient gender, site of bites and time of bite.

	No of patients (n = 65)
Sex	
Males	59
Females	6
Site of bite	
Upper limbs	25
Lower limbs	39
Neck	1
Time of day	
Morning	15
Evening	39
Not available	11

2008. Fifteen of them were children and so they were not included in the study. Four patients with scorpion or bee stings were incorrectly labelled as having snake bite. A single patient presented with swelling and he was thought to have snake bite but that case was excluded because of lack of any supportive clinical examination or investigations. Data were therefore available for 65 patients. Eighteen patients were discharged from the Emergency Department after envenoming was excluded and 47 patients were admitted to the medical wards.

Most of the patients were males in the 21–30 year age group. Male-to-female ratio was 9:1. Most of the bites happened in the afternoon or evening and most of the bites were on the lower limbs (see Table 1). Most patients (40 cases) were bitten by snakes in the desert. Snakes were rarely adequately described. The mean time between the bite and arrival to emergency room was 5 h.

Presenting symptoms are shown in Fig. 1. Pain at the bite site was most common. None had symptoms or signs of neurotoxicity. Bleeding occurred in only 7.7% of patients. Swelling of the limb occurred in 26% of the patients. Blistering or skin necrosis

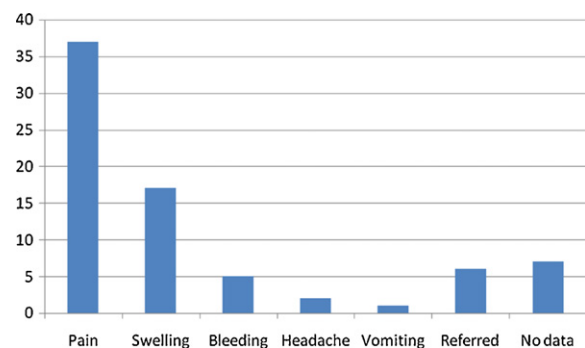


Figure 1 Symptoms of patients who presented with snake bites.

was not seen. Only one patient presented in shock (blood pressure of 80/60 mmHg). He was successfully resuscitated with intravenous fluids.

At presentation, 34 (52%) of the patients had an abnormal coagulation profile. Prothrombin time was more commonly deranged upon presentation than the activated partial thromboplastin time (APTT). Two patients developed delayed deranged coagulation, 6 h after admission to the medical wards. Fifteen patients presented with leucocytosis ($WCC > 11 \times 10^9$). Eight patients had an abnormal creatinine at presentation: only one of them was known to have previous renal impairment creatinine levels recovered to baseline in all eight patients by discharge. CK was not recorded in most of the cases. Only one patient developed severe renal impairment requiring renal replacement therapy due to snake bite envenoming.

36 (55%) patients received anti-snake venom (antivenom) (Saudi Guard polyvalent anti-snake venom). The mean time from arrival at the emergency room to first dose of antivenom was approximately 4 h in these 36 patients, it ranged between 35 min and 895 min; the mean was 233.65 min and standard deviation of 167.8. Nine patients received further antivenom despite the fact that the coagulation profile had normalised. The average number of vials needed to normalise coagulation was 14 vials; the range was from 1 vial to 55 vials, with mean of 13.56 vials and standard deviation of 12.65. However, some patients received as many as 61 vials to normalise their coagulation profile. Thirty-four patients (52%) were pre-medicated with anti-histamines and 29 (45%) received steroids. Thirty-two patients received antibiotics although there was no evidence of necrosis or infection at the site of the bite. Fifty-eight patients were discharged home with no long-term complications. Three patients left against medical advice and a patient absconded from the hospital. Two patients died with intracerebral bleeding and disseminated intravascular coagulopathy respectively. Both patients were presented a few days after the snake bite. They lived in rural areas and they used traditional treatment instead of seeking medical advice. They were unconscious on admission to the hospital. One patient developed acute renal failure because of the snake bite. He was normotensive upon admission with a creatinine of $165 \mu\text{mol/l}$. Following admission, his renal function progressively deteriorated and he was started on haemodialysis when his creatinine exceeded $400 \mu\text{mol/l}$ and he developed oliguria. His renal function improved after haemodialysis and he was discharged home with normal renal function.

Discussion

The profile of patients and bites in Oman was similar to many other studies conducted in Asia and Africa [6,7]; most patients were males aged 21–30 years and most events took place in the evening the usual irrigation time in Oman. This also explains why most of the patient could not give a good description of the offending snake.

In the absence of good descriptions and because this was a retrospective study, we were unable to identify the biting species. The main species of venomous snake in the north of Oman are *E. carinatus sochureki* and *E. omanensis*. Both of these are likely to cause shock, incoagulable blood and bleeding.

Despite the absence of definitive identification, there are still some useful lessons to be learnt from this study. Although most of the patients reached the hospital within 2–3 h of the bite, some took much longer, either because they had no means of transport or because they delayed seeking medical help as they lived in rural areas and they did not take the bite seriously. Early presentation to the emergency room is closely linked to increased efficacy of the antivenom and good outcomes [3]. Education of the population about the potential adverse consequences of snakebite and delayed presentation in areas where it is common could be very important.

Thirty-two patients received antibiotics although there was no documentation of local inflammation or signs of infection signs. Some appear to have been started on antibiotics because of leucocytosis, some prophylactically and some because they had some swelling at the bite site. Antibiotics are normally necessary in snakebite if there is necrosis of the wound and there is generally no role for routine antibiotic prophylaxis [8]. Education of medical personnel is necessary to prevent unnecessary prescription of antibiotics.

Over half of the patients were pre-medicated with antihistamine and/or steroids prior to receiving antivenom. Despite this, 2 patients had ‘anaphylactoid’ shock after starting antivenom. They were treated with epinephrine, antihistamine and steroids and both fully recovered. The role of routine prophylaxis is still highly debated and only adrenaline has ever been shown to be of benefit in clinical trials [9].

The average time from presentation to the emergency room to receive first dose of antivenom was approximately 4 h. This delay could be potentially life-threatening. It sometimes occurred because of lack of antivenom at the Emergency Department and sometimes because antivenom was started only after the patient reached to the ward. In addi-

tion, laboratory results of coagulation profile took around 90–120 min to be released. Evidence of a coagulopathy was the major indication for commencing antivenom. This can be achieved by simply using the whole blood clotting test (WBCT), a bedside test which if used in our practice, could shorten the time between arrival at the Emergency Department and starting antivenom to less than 30 min [3].

The average number of vials needed to restore coagulation was 13. Nine out of the 36 patients who received antivenom received further doses of antivenom after restoring coagulation. The aim of these doses was to ensure the persistence of the normal coagulation, although there is no rationale for this with most antivenoms. This practice reflects the differences in the amount and frequency of administration of antivenom recommended by guidelines produced by different countries and organizations [3,10,11] and guidelines for Oman and the middle east would be useful. Appropriate training may also help to improve outcomes as demonstrated in other settings [12].

Only 2 patients died. One of them presented 3 days after the snakebite in a coma. His initial head CT showed evidence of an intracerebral bleed. He was referred for neurosurgical intervention but it was not successful. The other patient had severe coagulopathy and bleeding from the gums that did not respond to antivenom: he died suddenly with a presumed intracerebral bleed. A single patient had acute renal failure that improved dramatically and was discharged with follow up in the nephrology clinic to ensure normal renal function. The overall mortality rate was 3.1%. The finding that eight patients appeared to have mild renal impairment is also interesting as this is not a feature of *Echis* sp. bites and although it may reflect pre-existing renal disease, warrants further study.

Conclusion

This study shows the lack of proper reporting of snake bite cases and the potential for snake bite to be catastrophic if patients do not present rapidly or management is delayed. The management of snakebite could be improved by use of the 20 min WBCT and rapid administration of antivenom in appropriate doses. In general, only moderate amounts of antivenom were needed to restore

coagulation in most patients. The variation in clinical practice reflects lack of definitive guidance and local Omani guidelines incorporating some of these points would help to improve the management of snakebite.

Conflict of interest

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Competing interests: None declared.

Ethical approval: Not required.

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