

Original article

Secondary bacterial infection among the patients with scorpion sting in Razi hospital, Ahvaz, Iran

Seyed Mohammad Alavi, MD^{1*}, Alireza Azarkish, MD²

¹Jundishapur Infectious and Tropical Diseases Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

²Infectious Disease Wards, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

How to cite this article:

Alavi SM, Azarkish A. Secondary bacterial infection among the patients with scorpion sting in Razi hospital, Ahvaz, Iran. Jundishapur J Microbiol. 2011; 4(1): 37-42.

Received: May 2010

Accepted: September 2010

Abstract

Introduction and objective: Scorpion sting (SS) is a source of considerable morbidity and mortality in many parts of Iran such as Khuzestan a province south west, Iran. Inappropriate use of antibiotics results in microbial resistance as well as economic impact on health sector. The aim of present study was to identify the possible rate of secondary bacterial infection (SBI) among the patients with SS.

Materials and methods: This was a retrospective study in which patient files with the diagnosis of SS were reviewed. The study was undertaken in Razi Hospital, Ahvaz. The hospital files of all patients managed for SS from 2003 to 2008 were reviewed. Diagnostic criteria for SBI were reasonable incubation period, clinical findings (e.g. cellulitis, abscess, and wound discharge) and laboratory clues (e.g. microbiological evidence, leukocytosis more than 10000 and polynucleosis more than 80%). The cases with positive culture results were considered as suspected SBI. Both SBI and suspected SBI considered being candidate for antibiotic therapy.

Results: In the present study, 1381 patients were treated for SS. Out of total 1381 SS cases, 730(52.8%) were treated by antibiotic, whereas only 39 patients (2.8%) were suspected to be SBI .None of these SBI cases confirmed by bacterial culture.

Conclusion: Secondary bacterial infection is a rare complication of SS. This study showed the unnecessary use of antibiotic drugs in the management of SS as a routine approach.

Keywords: Bacterial infection; Scorpion sting; Ahvaz

***Address for correspondence:**

Dr. Seyed Mohammad Alavi, Razi Hospital, Infectious Disease Wards, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran; Tel: +98611 3387724; Mobile: +989161184916; Fax: +98611 3336513; Email: alavi.seyedmohammad@yahoo.com

Jundishapur Journal of Microbiology, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran, Tel: +98611 3330074; Fax: +98611 3332036; URL: <http://jjm.ajums.ac.ir>; E-mail: editorial office: jjm@ajums.ac.ir

JJM. (2011); 4(1): 37-42.

Introduction

Scorpion sting (SS) is a major public health problem in tropical countries and remain a source of considerable morbidity and mortality with an estimated global true incidence of envenomation, millions a year, with some of these cases developing severe sequelae. [1-4]. Scorpion venoms, the most complex of all poisons, are a mixture of different toxins [5,6]. The poison released from poisoned hook on the tail of scorpion has toxicity effect on the most important human body organs such as the nervous system as well as kidney, skin and cardiovascular system depending on the kind of scorpion [7].

There are different kinds of scorpions in Iran, and they can be found all over the country [8,6]. The stings of two species; *Hemiscorpius lepturus* and *Androctonus crasicoda*, can be fatal [9,10]. The following symptoms may be observed in cases of SS: malaise, sweating, heart palpitation, and rise in blood pressure, salivation, nausea, vomiting, diarrhea and shock [6,11].

Bacterial infection as a complication of SS is rare [5,7,9]. Patients with SS may be infected locally (cellulitis) and wound infection is manifested systemically (sepsis and endocarditis) and this has been confirmed by bacterial isolation [5,10,12, 13]. Hengge [14] reported that bacterial skin infection can follow bites or stings as well as mechanical trauma. He believes that the most common bacteria involved in skin infection are staphylococci and streptococci. Whealthy *et al.* [13] reported two cases of aortic bacterial endocarditis after SS.

Infective endocarditis developed in both cases several weeks after they suffered SS [13]. Meyer *et al.* [15] reported *Mycobacterium ulcerans* infection in the site of SS in the skin of 14 patients with SS.

Cellulitis is the most common skin presentation of SS. In the previously reported studies, inflammation and cellulitis induced by SS was culture negative (sterile) [5,7,9].

Antivenom administration is indicated if manifestations of envenomation are evident [5,8]. Although the best results from antivenom are observed within four hours after the sting, antivenom has been noted to be effective in symptomatic patients even when administered more than 48 hours after the sting [8]. Antibiotic administration in SS is only indicated if superimposed bacterial infection is evident [13,16].

Since sign and symptoms of local and systemic manifestation may be attributed to the effect of both toxins and bacteria, the local physicians usually prescribe antibiotics empirically based on clinical presentation for the most of the patients with SS. This may cost too much for the patients, society and may cause bacterial resistance. To our best knowledge there is no study explaining the impact of secondary bacterial infection super imposed on the SS in the region of study. Since SS cases are commonly admitted to Razi hospital and are routinely treated with antibiotic if cellulitis is present. We conducted this study to show the probable importance of infectious complication and the needs for antibiotic administration.

Materials and methods

This retrospective study was undertaken in Razi Hospital, which serves a population estimated to be more than one million people in Ahvaz, from 1 January 2003 to 31 December 2008. The files of 730 cases (of total 1381 SS cases) diagnosed initially as bacterial infected SS by primary physician in the first visit (in the emergency room) and have received antibiotics and 39 patients diagnosed as secondary bacterial

infection when visited by internist or infectious disease specialist (when transferred to infectious disease ward) were reviewed.

To ensure that all relevant data were evaluated, the records of paramedics, health experts (records on identifying the species of scorpion in the scorpion department of hospital), nursing staff and doctors were reviewed. Diagnostic criteria for SBI was reasonable incubation period, clinical findings (e.g. cellulitis, abscess, wound discharge) and laboratory clues (e.g. microbiological evidence, leukocytosis more than 10000 and polynucleosis more than 80%) [17].

Cases with positive culture results were considered documented SBI otherwise were suspected SBI. Both SBI and suspected SBI considered being in need for antibiotic therapy. Diagnosis of sepsis and endocarditis was based on cardiologist and infectious disease specialist impression based on lab (CBC, blood cultures) and echocardiography results and their notes in consulting sheets. SPSS version 17 software was used for data capture and analysis.

Results

In the present study 1381 patients were treated for SS. Microbial examination on blood, wound discharge and other tissue samples were totally negative. Out of 730 cases diagnosed initially SBI, only 39 cases were suspected to be SBI. None of these SBI cases were confirmed by bacterial culture. Data were obtained on 39 suspected SBI patients of which 21(53.8%) were males and 18(46.2%) were females. The age range was between 14 and 90 years with a mean of 34.5 years ($SD \pm 17.5$ years). Twenty six patients (66.6%) were in the urban areas and 13(33.3%) in the rural area. The period of time between sting occurrence and diagnosis of infection

ranged from 1 to 30 days with a mean of 5.6 days ($SD \pm 4.4$ days).

The definite name of scorpion (identified by health experts) was registered in only eight patients among them *H. lepturus* was the commonest with frequency of five patients (62.5%) followed by *A. crasicoda* with 2(25%) and *Mesobuthus eupeus* 1(12.5%). Twenty nine patients (74.3%) sustained cellulitis on the lower limb, six patients (15.5%) on the upper limb, and two patients (5.1%) on the trunk and two patients (5.1%) on the head. More than a bacterial complication was observed in some patients.

Among suspected SBI, cellulitis was the most bacterial complication with the frequency of 92.3%, followed by sepsis, abscess, necrotizing fasciitis and endocarditis (Table 1). The most common systemic sign and symptom was fever (66.6%) and the most common lab data was leukocytosis with 69.3%. Other data about clinical and lab findings are shown in table 2. Further analysis showed that the 8(20.5%) had debridement done, three (7.7%) renal failure and one (2.6%) compartment syndrome.

Table 1: Bacterial complication of scorpion sting among patients admitted in Razi hospital

Complication		No=39	%
Local	Cellulitis	36	92.3
	Abscess	5	12.8
	Necrotizing fasciitis	5	12.8
	Compartment syndrome	1	2.6
Systemic	Sepsis	10	25.6
	Infective endocarditis	2	5.1

Discussion

In this study, although we had no documented case of SBI, but only 2.8% of SS cases had enough strong clinical and laboratory clues to be suspected as SBI.

Rarity of documented bacterial infection in this study is in agreement with prior studies [8,9,12].

Table 2: Clinical and lab findings in suspected case of secondary bacterial infection among patients with scorpion sting

Variables		No=39	%
Clinical	Fever	26	66.6
	Tachycardia	10	25.6
	Rigor	4	10.3
Laboratory	Leukocytosis	31	79.5
	Polynucleosis	27	69.2
	Positive CRP	13	33.3
	ESR>20	10	25.6

ESR: Erythrocyte sedimentation rate, CRP: C-reactive protein

Radmanesh [9] in his work showed that all cases of cellulitis in SS were due to cytotoxic effect of scorpion poison and no bacterium was isolated of skin lesions. In other studies the inflammation and cellulitis in SS cases is reported to be sterile and chemical [5,7]. Hengge [14] and Meyer *et al.* [15] reported secondary bacterial infection in skin lesion of their patients with SS. The reason for this difference is not clear but we suppose that some factors such as the kind of scorpion, climate status, and primary health care service presented to SS case and the extension of the skin lesion may influence the bacterial complication of the SS in various studied regions.

Indeed in contrast to other animal injuries bacterial infection is not a usual and serious complication [5,10]. This difference is due to the fact that oral microbial flora of animal bites are the main source of infection where as stinger of the scorpion is not attributed to a known microbial flora [5,7,9]. The source of infection in SS is attributed to patient's skin flora or nosocomialy transmitted infections [8,9]. The present study showed that subjects with suspected SBI had a mean age of 34.5 years

(SD±17.5). These findings are quite different from those in other studies that more animal or insect bite infections occur in children [5,10,16].

The difference in age distribution in this study could be explained by the fact that in the region of study, children with bite infection frequently admitted to another hospital named Abuzar. The gender equality in this study is not comparable to the findings of other studies, where animal bite infections were more common in males [10]. The difference in gender distribution in this study with other studies could be explained by the fact that in our study majority of patients are in city and occupation does not have any effect on them, whereas in other studies farming is the main occupation in the rural areas and this tends to attract more males as farmers.

The present study, showed that about 75% infection occurred on the lower limb. These results are comparable with findings of other studies, where 64% of SS were on the lower limbs and the victims were usually stung on their bare feet [5,7,10]. This finding brings a question in our mind whether frequency of infection in lower limb is due to frequency of SS or due to exposure of the lower limbs to microbial pathogens.

In this study we observed two cases of infective endocarditis suspected to be due to bacterial complication of SS. This finding is consistent with Whealhy *et al.* [13] who reported two cases of bacterial endocarditis even several weeks after SS. In the present study, the most important evidences of bacterial infection were as follow: polynucleosis, fever and purulent discharge. This finding explains that although cellulitis after SS is usually sterile, but in those patients with the evidence of infection such as fever, leukocytosis, polynucleosis, purulent wound discharge and cardiac

murmur, possibility of bacterial complications should be considered.

Although confirmed bacterial infection in this study was not documented, but there were enough strong clues of bacterial infection in the minority of patients to initiate antibiotic therapy. This study also showed that very low proportion of SS cases needed antibiotics. Out of 730 patients initially received antibiotic (by local physicians) only 5.3% (39/730) were considered to be in need of antibiotics by infectious disease specialist due to evidence of infection. Indeed about 95% of those received antibiotic didn't need antibiotic therapy. In general, antibiotics are usually unnecessary as bacterial infection is uncommon unless secondary to necrosis or iatrogenic [5,10,12,13].

Conclusion

This finding highlight over unnecessary use of antibiotic drugs in the management of SS. Inappropriate use of antibiotics results in microbial resistance as well as economic impact on health sector. There were no more published studies about bacterial infections after SS to be compared with this study, so we think this study from this point of view.

Study limitations

As this was a retrospective study, some of the information required was incomplete. Sample size of 39 patients was small to calculate the appropriate rates or compare the variables. Future prospective study in larger scale is recommended. Case definition of infection was dependent on clinical and non specific laboratory finding. Better result should be found by culture confirmation.

Acknowledgements

This article was extracted from general physician dissertation approved by the

research, ethics committee of the medical college of Ahvaz Jundishapur University of Medical Sciences (No: 88159). We thank research deputy of medical college for approving and staff of the infectious and tropical disease research center for technical and financial support. We also thank Eng. Albaji and Sharifi for kindly cooperation to access the epidemiologic sheets of SS in Ahvaz Health Centre.

References

- 1) World Health Organization. Rabies and envenoming: a neglected public health issue: report of a Consultative Meeting, WHO, Geneva, 10 January 2007.
- 2) Russell FE. Toxic effects of terrestrial animal venoms and poisons. In: Klaassen CD (ed), *Casarett & Doull's toxicology: the basic science of poisons*. New York, McGraw-Hill. 2001: 945.
- 3) Possani L. Strucure of scorpion toxicon. In: Tu A (ed). *Hand book of natural toxins, insect poisons, allergens and other invertebrate venoms*. New York. McGraw-Hill. 1970; 513-50
- 4) Isbister GK, Gray MR. Australian scorpion stings: a prospective study of definite stings. *Toxicon*. 2003; 41: 877-83.
- 5) Goldstein EJC. Bites. In: Mandel CI, Bonnet JE, Dolin R, (eds). *Principle and practice of infectious disease*.7th ed. New York. Churchill Livingstone. 2010; 3911-17.
- 6) Pipelzadeh MH, Jalali A, Taraz M, Pourabas R, Zaremirakabadi A. An epidemiological and clinical study on scorpionism by the Iranian scorpion *Hemiscorpius lepturus*. *Toxicon*. 2007; 50(7): 984-92.
- 7) Radmanesh M. Scorpion stings survey in Khuzestan: *Hemiscorpius lepturus* sting. *Daru Darman*. 1997; 10: 32-41.
- 8) Radmanesh M. Scorpion stings differentiation and management. *Daru Darman*. 1990; 7: 26-30.
- 9) Radmanesh M. Cutaneous manifestations of *Hemiscorpius lepturus* sting a clinical study. *Int J Dermatol*. 1998; 37: 500-7.

- 10) Alavi SM, Alavi L. Epidemiology of animal bites and stings in Khuzestan, Iran, 1997-2006. *J Infect Public Health.* 2008; 1(1): 51-5.
- 11) Delavar Shahabzadeh A, Amirkhani N, Dinparast S, Bigdeli A, Akbari M. Epidemiological and clinical survey of scorpionism in Khuzestan province, Iran. *Toxicon.* 2009; 53(4): 454-9.
- 12) Trisolini R, Paioli D, Patelli M, Cancelieri A, Squintaani L. Scorpion sting induced infection. *Acta Cytol.* 2008; 52(2): 263-4.
- 13) Wheathy GH, Wait MA, Jessen ME. Infective endocarditis associated with a scorpion sting. *Ann Thorac Surg.* 2005; 80(4): 1489-90.
- 14) Hengge UR. Arthropod bite reactions and pyoderma. *Hautarzt.* 2008; 59(8): 633-41.
- 15) Meyers WM, Shellly WM, Connor DH, Meyers EK. Human *Mycobacterium ulcerans* infections developing at sites of trauma to skin. *Am J Trop Med Hyg.* 1974; 23(5): 919-23.
- 16) Pasternack MS, Swartz MW. Cellulitis, necrotizing fasciitis and subcutaneous tissue infection. In: Mandel GL, Bennet JE, Dolin R, (eds), *Principle and practice of infectious disease.* 7th ed, New York, Churchill Livingstone. 2010; 1289-313.