

Scorpion Sting in Children in the South-western Region of Saudi Arabia

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Summary

Aderere WI. Scorpion Sting in Children in the South-western Region of Saudi Arabia. *Nigerian Journal of Paediatrics* 1997; 24:45. An analysis of 78 patients admitted with scorpion sting to a tertiary health institution in the south-western region of Saudi Arabia over a period of 12 months has shown a male preponderance. Of the 78 patients, 84.6 percent were admitted during the hottest six months (April to September) of the year. **The lower limbs** were the sites of the sting in 71.8 percent of the cases with either foot being involved in 53.8 percent. Fifty-nine patients, including 47 who were otherwise symptomless, presented with local pain or a sudden cry, which was associated with mild swelling and tenderness at the site of the sting in 37.2 percent. Major symptoms of envenomation in the remaining 31 cases included irritability, restlessness, excessive sweating, vomiting and increased salivation. Systemic signs consisted of tachycardia in 42.3 percent of cases, restlessness and/or irritability in 20.5 percent, priapism in 14.6 percent of 48 males, sweating in 12.8 percent and increased salivation in 3.8 percent. The duration of hospitalization was less than 24 hours in 84.6 percent of the cases. One patient that died, received antivenom very late and developed endorgan failure as well as disseminated intravascular coagulation. Prompt management including the administration of scorpion antivenom may prevent the development of, and in many cases, even reverse the systemic signs of envenomation, which however, remains a potential cause of death.

Introduction

REPORTS on scorpion stings in children in this country are scarce, yet, climatic conditions in some parts of the country are not unlike those in Saudi Arabia where scorpion stings are common.¹⁻³ It was therefore, thought appropriate to report this experience of the management of scorpion sting in patients admitted to a tertiary hospital in Saudi Arabia over a period of 12 months. It is hoped that the information provided will assist physicians in identifying scorpion sting, distinguishing it from other stings/bites and in applying specific and supportive therapy in a timely and rational fashion in order to improve the prognosis of a condition that is potentially fatal.^{1,3,4}

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Patients and Methods

The study was carried out at the Prince Abdullah bin Abdulaziz Hospital, Bisha, which is situated in the south-western region of the Kingdom of Saudi Arabia. The region, like most parts of the Kingdom, has two main seasons, - dry, hot and almost arid weather during the months of April to September and a colder, but still relatively dry period for the rest of the year. Furthermore, the area abounds in hills and rocks with cracks and crevices.

The patients consisted of children admitted with scorpion sting to the Paediatric Unit of the hospital between October 14, 1993 and October 13, 1994, a period of 12 months. The criteria for inclusion in the study included a history of scorpion sting, which history was substantiated by the sighting of the scorpion and in many cases, the killing of same and its later identification by hospital personnel. Excluded were cases with a history of being stung without the stinging object being seen or identified, but which, by the nature of the clinical features and response to therapy and course of the illness, were

probably cases of scorpion sting. Information obtained in respect of each patient who satisfied the diagnostic criteria of scorpion sting, included the age, sex, interval between the sting and presentation at a health institution; others were the clinical features, sites of the sting and the type of scorpion, when identified. Physical examination was general but particular attention was paid to the cardiovascular and nervous systems. Laboratory investigations carried out included complete blood count (CBC), serum electrolytes, urea, creatinine, and in some cases, liver function tests. Also carried out, particularly in the more severe cases, was standard electrocardiography. Depending on the clinical state, initial admission was either to the Intensive Care Unit (ICU) or the general paediatric ward; those who were initially admitted to the ICU were later transferred to the general ward as soon as improvement in the clinical status permitted. Management consisted of intravenous (iv) administration of scorpion antivenom and intramuscular antitetanus toxoid. Other aspects of management were mainly supportive and included the judicious use of iv fluids at the minimal amount necessary, corticosteroid therapy, antihistamines and sedatives.

Results

Seventyeight (48 males and 30 females, a M/F ratio of 1.6:1) cases were admitted during the study period. The ages ranged from nine months to 12 years with a mean of 6.2 years (SD, 3.34 years) and a median of six years. Although the mean of the number of monthly admissions was 6.5, there was a peak of 19 admissions in August followed by 13 each, in May and July (Table I); by contrast, only one case was admitted in the month of December, while there were no admissions in January. Sixtysix (84.6 percent) of the 78 cases were admitted during the hottest six months of April to September. In 30 of 56 instances, the scorpion was described as black in colour (most probably *Androctonus crassicauda species*) and yellow (*Leiurus quinquestriatus species*) in the remaining cases.

Clinical Features

The interval between the sting and presentation at a health institution in 70 cases ranged from less than 30 minutes to 24 hours (mean 2.7 hours, SD

3.9); in 16 cases, the duration was less than 30 minutes, while it was over five hours in five cases. In eight cases, the informants were not certain of the duration.

Table I

Monthly Distribution in 78 Cases of Scorpion Sting

Month	No of Cases	Percent of Total
January	0	0.0
February	1	1.3
March	1	1.3
April	6	7.7
May	13	16.7
June	8	10.2
July	13	16.7
August	19	24.3
September	7	9.0
October	2	2.5
November	7	9.0
December	1	1.3
Total	78	100.0

Table II details the salient clinical features. Local pain at the site of the sting was the commonest symptom in 59 (75.6 percent) cases, followed by sudden crying on being stung and irritability in 19 others who were mainly infants and young children. Fortyseven of 59 cases who presented with pain or sudden crying, were otherwise symptomless. Other symptoms which were relatively uncommon, included excessive sweating (10 cases), restlessness (eight cases), vomiting (seven cases), increased salivation (four cases) and seizures in one child. Twenty nine (37.5 percent) of the 78 cases had no abnormal physical signs other than some redness or/and mild swelling at the involved sites. Other signs elicited included tachycardia in 33 (42.3 percent) cases, general irritability and restlessness which were manifested in 16 (20.5 percent), profuse sweating in ten, priapism in seven of 48 males, drowsiness in seven and increased salivation in three cases.

The mean heart rate in the 78 cases was 105 beats/min (SD 20.97; range 60-170); the rate was over 120 beats/min in 12 and over 160 in two cases, but was less than 70 beats/min in one case. The respiratory rate ranged between 15 and 58 breaths/min (mean 27/min;SD 6.2); it was greater than 40 breaths/min in only one case. The mean temperature was 37.0°C (SD 0.57; range 36-40); it was

greater than 38.5 °C in five cases. The mean systolic blood pressure in 68 cases was 112.6 mm Hg (SD 17.03; range 61-158); it was greater than 120 mm Hg in 21 cases but was less than 80 mm Hg in one case who subsequently died. Similarly, the diastolic pressure (mean, 67.82, SD 13.93, range 30-104) was greater than 90mmHg in four cases while it was less than 40 mm Hg in the only case that later died. There was no difference in the clinical features between those who were stung by yellow as opposed to black scorpions, except that the only child who presented with hypotension and subsequently died, was stung by a yellow scorpion.

Table II

Presenting Clinical Features in 78 Cases of Scorpion Sting

Feature*	No of Cases	Percent of Total
<i>Symptoms</i> ^{@@}		
Local pain	59	75.6
Irritability/sudden cry	19	24.4
Excessive sweating	10	12.8
Restlessness/agitation	8	10.3
Vomiting	7	9.0
Increased salivation	4	5.1
Shivering	3	3.8
Seizures	1	1.3
<i>Signs</i> [@]		
Tachycardia	44	56.4
Local swelling and redness	29	37.2
Irritability & restlessness	16	20.5
Sting marks	10	12.8
Profuse sweating	10	12.8
Priapism*	7*	14.6*
Drowsiness	7	9.0
Increased salivation	3	3.8

+ Other features present in one case each, included irregular breathing, flushed face and conjunctiva, flushed extremity, bradycardia, blurred vision, abdominal rigidity, mild dehydration, arrhythmia.

@ In many of the cases, some of the symptoms complained of, were also seen on physical examination.

* Priapism was present in 7 of 48 males

The lower limbs alone were the sites of the sting in 56 (71.8 percent) cases (Table III) consisting of the feet in 42 cases and the rest of the lower limbs,

in 14 cases. The hands were involved in 18 cases. Other affected sites in one case each, were the left arm and foot, the occipital scalp, the left armpit and pinna, and the lower back.

Table III

Sites affected in 78 Cases of Scorpion Sting

Site	No of Cases	Percent of Total
Lower limbs	56	71.8
Upper limbs	18	23.1
Both upper and lower limbs	1	1.3
Others: occiput; armpit & pinna; lower back	3	3.8
Total	78	100.0

Investigations

The mean haemoglobin (Hb) concentration in 68 cases was 12.69gm/dl (SD1.46; range 7.7-15.8); it was less than 10gm/dl in only five cases. The mean total white blood count (WBC) in 68 cases was 13.37 x 10⁹/l (SD 6.29, range 3.9-32.8); it was <5.0 x 10⁹/l in two cases, and was greater than 15 x 10⁹/l in 18 cases. The platelet counts in 65 cases ranged between 235.0 x 10⁹/l and 749.0 x 10⁹/l (mean 328.0, SD 115.9), but the count was greater than 500.0 x 10⁹/l in nine cases. Similarly, the prothrombin time (PT) and the partial thromboplastin time (PTT) were normal in 29 cases in whom they were determined on presentation. The erythrocyte sedimentation rate (ESR) ranged from seven to 23mm/hr; it was greater than 20 in only one case. Serum electrolytes were generally within normal limits; the mean serum sodium was 139.4 mmol/l (Table IV) and only two patients had hyponatraemia (128 and 129 mmol/l, respectively); similarly, the mean serum potassium was 3.76 mmol/l and only two patients had hypokalaemia (2.8 and 2.9 mmol/l, respectively). The mean blood urea was 4.41 mmol/l; it was abnormally high in five (8.8 percent) of 57 cases. Random blood glucose, calcium, magnesium, and creatinine levels were within normal limits in a vast majority of the subjects; however, in eight (14.0 percent) of 57 and three (7.7 percent) of 39 cases respectively, the blood glucose and calcium levels were slightly higher than normal. In the few cases in whom they were carried out, the initial liver function test values (serum bilirubin and alanine transferase) were within normal limits while in eight (25

percent) of 32 cases, the serum alkaline phosphatase levels were mildly elevated. It is also noteworthy that serum amylase levels were elevated in nine (56.3 percent) of 16 cases. Initial electrocardiographic tracings were normal in 13 (24.1 percent) of 54 cases and abnormal in 41 (75.9 percent) others. In the latter 41 cases, the main abnormality was tachycardia in 38. Others included abnormally tall T waves in five cases, prolonged PR interval in two cases and an RSR' pattern in various leads in four cases.

Table IV

Blood Biochemical Values in Children with Scorpion Sting

	No of Cases	Mean Values (\pm SD)	Range	Local Normal Range
Sodium	49	139.4 (4.2)	128-148	135-148mmol/l
Potassium	49	3.76 (0.46)	2.8-5.0	3.0-5.5mmol/l
Urea	57	4.41 (1.92)	1.6-7.5	2.5-6.3 mmol/l
Magnesium	14	0.96 (0.08)	0.83-1.1	0.74-1.1 mmol/l
Amylase	16	163.4 (103.6)	38-436	25-125 U/l
Alkaline phosphatase	32	538.8 (152.7)	233-857	150-600 U/l
Calcium	39	2.4 (0.21)	1.83-2.84	2.02-2.6 mmol/l
Random blood glucose	57	7.18 (2.99)	4.2-20.0	3.3-8.0 mmol/l
Creatinine	57	56.65 (11.59)	40-90	53-97 mmol/l
Alanine aminotransferase	18	36.5 (4.5)	7-40	0-40 U/l

Management and Outcome

The mainstay of treatment was slow intravenous infusion of scorpion antivenom, usually at a dose of five ampoules (millilitres) dissolved in 50ml of normal saline over a period of 30 minutes and intramuscular antitetanus toxoid which all the cases received irrespective of whether or not signs of envenomation were present. In five cases, additional 1-5ml of the antivenom were administered when response to initial antivenom therapy was adjudged to be unsatisfactory. In four cases, snake antivenom was also administered before the history of scorpion sting was confirmed. Other forms of management were supportive and consisted of the judicious use of sedation with diazepam in two cases who were very restless, intravenous administration of hydrocortisone and promethazine in 15 and two cases respectively, in order to prevent hypersensitivity/anaphylactic reactions to the scorpion

antivenom, cardiac monitoring in those with signs of envenomation, the administration of oral analgesics in eight and local xylocaïne in two cases when pain at the site of the sting was intense, i.v. calcium gluconate in one child who had abdominal rigidity, and anticonvulsant therapy in the only case that had seizures. It is noteworthy however, that in 54 cases, no therapy other than antivenom and antitetanus toxoid was given; specifically, none of the cases with tachycardia and/or hypertension had any specific therapy for the cardiac manifestations.

Seventy one of the cases were discharged home with all the features manifested in the acute stage, fully resolved; one child was discharged home partially recovered and one (1.3 percent) died. Of the remaining five cases that were discharged against medical advice, four had fully recovered and were still being kept under observation while the remaining one had not fully recovered, but was reasonably well. The duration of hospitalization was less than one day in 66 (84.6 percent) cases; it was between one and five days in the remaining six cases that were officially discharged, while the only case that died, did so four days after admission. This was an 18-month old boy who was initially taken to a Primary Health Centre (PHC) with a history of having been stung by a large yellow scorpion about one hour previously; he became dyspnoeic and was referred to a local hospital where he was noticed to be irritable and drowsy, with Cheyne-Stokes breathing; he received oxygen and intramuscular promethazine but no scorpion antivenom, before being transferred to Bisha where he was seen about two hours after the sting. On examination, he was irritable, crying excessively, salivating, and had tachycardia (heart rate 170/min) as well as priapism; the temperature was 40 °C and blood pressure 61/30mm Hg. He received an infusion of six millilitres of suitably diluted scorpion antivenom and was admitted to the ICU. After admission, he had frequent apnoeic attacks, was intubated and ventilated while the intravenous fluids were restricted. Within a few hours, he started having the first in a series of cardiac arrests which were initially successfully managed. The following day, he developed disseminated intravascular coagulation and became comatose. On subsequent days, he developed hepatic and renal failure, and despite receiving dopamine infusion, i.v. ceftriaxone, i.v. gentamicin, vitamin K, fresh frozen plasma, fresh blood and other supportive measures, he died four days after admission. In

line with local practice, necropsy was not performed.

Discussion

The fact that most cases of scorpion sting in the present series occurred during the dry, hot months of the year, attests to the fact that these are the climatic conditions under which the scorpion thrives.⁵ Furthermore, these also constitute the season when children play out late at night when these nocturnal animals who live under stones, in stone fences, rock crevices or in short burrows in the ground, emerge to feed. That there was a preponderance of boys over girls in the present series as in others,^{2,6} can be explained by the fact that boys are more adventurous and are more likely to insert their hands in holes and under stones where these creatures hide, as occurred in some of the cases in this series. Furthermore, local culture discourages females of all ages from wandering, whereas the movements of the males are relatively unrestricted.

Features of serious envenomation, many of which were manifested in the present series include myalgia, generalized weakness, muscle spasm, epigastric pain, excessive salivation and rhinorrhoea, excitement, rapid breathing, vomiting, sweating, coma, convulsions, pulmonary oedema⁷ and respiratory failure⁸ which is often fatal.⁹ These features are ascribed to what has been described as "autonomic storm."⁵ The cardiovascular manifestations of scorpion sting, some of which like tachycardia and hypertension, were manifested in the present and previous series,^{2,4,6} are believed to be due to the effects of catecholamines. Other cardiovascular manifestations which have been described but only a few of which were seen in the present series, include arrhythmias, electrocardiographic (ECG) and enzymatic evidence of myocardial damage, cardiogenic shock and heart failure.⁷ Among the ECG changes described are sinus tachycardia, ventricular ectopic beats, widening of QRS complex, AV block, idiopathic rhythm, atrial fibrillation and arrhythmias.

Although the PT and PTT as well as platelet levels were normal in the present series, coagulation abnormalities as end-stage phenomena and as part of DIC may occur, as indeed occurred in the child that died in the present series and as previously reported by Rashid and Hossain.³ Furthermore, a case of intracranial haemorrhage and reti-

nal haemorrhage has also been reported in a 3-year old child in whom PT and thrombin times were normal, but who had a low level of fibrinogen and a PTT that was twice the normal values.¹⁰ It has been reported that evidence of pancreatitis is common with the sting of the South American *Tityus*, and although no overt cases of pancreatitis was diagnosed in the present series, a substantial number of the cases had increased serum amylase.

Despite the controversy surrounding the effectiveness or otherwise, of scorpion antivenom,¹¹ it is our belief that the low mortality recorded in the present series was due not only to the mildness of the disease in most cases, but also to the prompt intravenous administration of the antivenom in a majority of the cases. In this connection, it is noteworthy that the administration of adequate doses of scorpion antivenom was delayed in some of those who presented with severe symptoms and the only fatality; by the time they received the antivenom, they had already developed features of envenomation. Although it is likely that the antivenom has its greatest beneficial effect when given before symptoms of envenomation become manifest, previous workers⁸ have described the quick reversal of symptoms of envenomation following the administration of intravenous antivenom as was also the case in the present series; in their series like in ours, no side effects were encountered.

As in previous reports,^{2,5} most cases in the present series were benign, in that apart from the history of a sting, the fright, pain, mild local swelling and mild to moderate tachycardia, the victims were otherwise, asymptomatic and had no abnormal signs. This shows that although alarming, scorpion sting in most instances is not life threatening. It is not known for certain, the factors that determine the exhibition of systemic signs of envenomation, but the amount of venom injected relative to the weight of the victim, may be important.⁵ It is also likely that early administration of scorpion antivenom may prevent the full expression of the features of envenomation in some cases. If there are no signs of envenomation within a few hours of the sting, the chances of serious effects are remote. Furthermore, if the patients present early and receive appropriate treatment, the duration of symptoms and signs would usually be short. In the present series, most of the cases were discharged within 24 hours including most of those with systemic effects in whom the features of envenomation

subsided completely before discharge. Although there have been reports of symptoms of envenomation lasting as long as 24 hours,¹² as also occurred in a few of our cases, the average is about four hours. Despite this apparent good prognosis however, deaths still occur. The mortality in our series was 1.3 percent, a rate that was lower than the 4-50 percent reported by others,^{3 4 13} but higher than the zero fatality reported by Izuora, Syed and Al Hindi.² The usual cause of death in cases of scorpion sting is either cardiac or respiratory failure. Antecedent and associated events heralding the end include, as occurred in the only child who died in the present series, end-organ failure,⁴ myocardial damage with pulmonary oedema,⁴ hyperpyrexia and disseminated intravascular coagulation.³

The combination of features of scorpion envenomation is so characteristic that a fairly confident diagnosis of such a sting can be made in most instances even when the identity of the stinging object is unknown. Thus, a history of a sting resulting in severe local pain with minimal swelling at the site, and systemic signs such as increased salivation, anxiety, increased sweating, abdominal rigidity, tachycardia and in the male, priapism, would strongly suggest a scorpion sting. However, difficulties may arise when all the features are not present. For instance, some of the features of scorpion sting can be caused by the venom of other creatures such as a bee which causes local pain and hypotension and in acute anaphylaxis, may cause sweating and tachycardia in addition to glottic oedema or bronchospasm.⁹ Similarly, a spider bite may result in abdominal rigidity, severe local pain, excessive salivation and vomiting,⁹ while a snake bite would cause local pain and swelling in addition to systemic haemorrhage.¹⁴ However, at least in the males, the venom from these insects and reptile do not cause priapism and neither do they individually cause the same constellation of features as scorpion sting, while the local swelling that accompanies snake bite is usually very severe unlike the mild swelling of scorpion sting. Furthermore, the circumstances of such bites/stings would help in the identification of the offending creature.

The management of scorpion sting includes the intravenous administration of scorpion antivenom and tetanus prophylaxis. The use of the antivenom is controversial; the controversy centres on whether

or not, it is necessary to use the antivenom in those without systemic signs of envenomation. It is our opinion that provided adequate precautions are taken, it is probably wise to administer early, the antivenom in all cases. The fact that the manifestation of signs of envenomation may be delayed in some cases, further supports the argument for early administration of the antivenom in all cases. A recommended initial dose of antivenom is five ampoules (millilitres), irrespective of the age of the victim, diluted in 50ml of normal saline, to be given as an intravenous infusion over a period of 30 minutes, after a test dose. Some workers in anticipation of reactions in form of allergy or anaphylaxis, give adrenaline or hydrocortisone or both, routinely before the antivenom is administered, while others would add an antihistamine and use all the three drugs at the same time. However, there are others⁹ who recommend the use of these drugs which must be readily available, only if untoward reactions occur. Other aspects of management are mainly supportive and symptomatic and include cardiac monitoring, local or systemic analgesics for those with severe local pain, antihypertensives for hypertension, anticonvulsants for seizures, and a judicious use of sedatives such as diazepam for excessive restlessness and agitation. The use of intravenous fluids is controversial. Ordinarily, there is no indication for intravenous fluid therapy, but if it must be used, it should be given judiciously and in most cases, not exceeding two thirds of maintenance rate in order to prevent pulmonary oedema. Some workers⁵ have also advocated the use of i.v calcium gluconate to relieve muscle spasm, as was used in one of our cases with abdominal rigidity. The question of where to treat is also controversial; if possible, all cases should be admitted for initial observation, and if after about 12 hours, there are no signs of envenomation, such patients could be sent home; otherwise, if the signs develop or the child is admitted with established signs, he should be treated until all such signs resolve.

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