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ORIGINAL ARTICLE

Epidemiology, Clinical Presentation and Final Outcome of Patients with Scorpion Bite

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ABSTRACT

Most of the scorpion sting cases are acute life-threatening and time-limiting medical emergencies. The present study was undertaken to analyze the varied clinical presentations in patients admitted with a history of scorpion bite, with a special emphasis to find out whether any difference existed in the presentation of paediatric patients in comparison to the adult patients and to understand whether any particular signs and symptoms were associated with increased mortality and morbidity in different age groups. Also, the final outcomes in all the age groups were noted. This study was conducted at a tertiary care hospital (SRN Hospital, Allahabad) from April 2006 to September 2007. In all the age groups, 74 cases presenting with a history of scorpion sting were either observed or admitted to the intensive coronary care unit (ICCU). They were classified into different groups (A-D) depending upon the clinical presentation. GROUP A included patients who presented only with local signs or those who were asymptomatic; GROUP B included patients having signs of acute pulmonary oedema (APO); GROUP C included patients with signs of APO and myocarditis and GROUP D included patients with APO, myocarditis and encephalopathy or encephalopathy alone. The final outcome was tabulated and the results were analyzed to associate the mortality with any particular clinical parameter. The treatment protocol was designed according to the groups divided. The older age group (5-15 years) comprised of the asymptomatic group (Group-A) in which survival was excellent (100%). Group B comprised of the maximum number of patients i.e. 52 (70.27%). In this group, the patients in the age group of 5-15 years were the largest cohort. Survival in this group was quite satisfactory, with a recovery rate of 96.16%. Group C patients had an additional element of myocarditis which affected the younger individuals i.e. age groups less than 5 and 5-15 years comprising of 3 patients each. In this group, mortality was seen in 2 (33.33%) patients. Group D had the worst outcome with 100% mortality rates and affected the extremes in the age groups from very young (less than 5 years) to the elderly (above 15 years) patients. An incidental finding of priapism was noted in 27.02% of the patients. The point to be noted was that it was present in 100% of the cases in the age group of less than 5 years in male children and in 40 % of the cases in the age group of 5-15 years in males. There was no incidence of priapism in males above 15 years.

Key Messages

1. In the present study, most of the patients suffering from the scorpion bite were males and from the rural background.
2. Of the initial signs and symptoms, intense pain and paresthesia were present in 70.27% of the cases; however, breathlessness was the most common (78.37%) initial presentation in the study conducted.
3. The patients were classified into different groups (A-D) depending upon the clinical presentation. GROUP A included patients presenting with only local signs or those who were asymptomatic; GROUP B included patients having signs

- of acute pulmonary oedema (APO); GROUP C included patients with signs of APO and myocarditis and GROUP D included patients with APO, myocarditis and encephalopathy or encephalopathy alone.
- An incidental finding of priapism was noted in 27.02% of the patients. The point to be noted was that it was present in 100% of the cases in the age group of less than 5 years in male children and in 40 % of the cases in the age group of 5-15 years in males. There was no incidence of priapism in males above 15 years.
 - Central nervous system manifestations were infrequently encountered. They were however invariably fatal. Generalized seizures and tonic posturing were seen in 2.70% of the cases.
 - In the pre-prazosin era (1961-1983), 25-30% fatality due to pulmonary oedema was reported in scorpion victims from Western India. Ever since the use of prazosin (1984 onwards) started, the mortality in these victims reduced to less than 1%. In the present study, 90.54% cases recovered fully and mortality was seen in 9.46% of the cases.

Key Words: Scorpion bite, epidemiology, outcome, treatment.

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Introduction

Scorpion sting is an acute life-threatening, time-limiting medical emergency among the rural population in most places in India [1]. Reliable statistics are not readily available for this common rural accident. Case fatality rates of 3-22% were reported among children who were hospitalized for scorpion stings in India [2],[3].

Among the 86 species of scorpions in India, *Mesobuthus tamulus* and *Palamneus swammer-dami* are of medical importance. Cardiovascular effects are particularly prominent following the stings by the Indian red scorpion (*Mesobuthus tamulus*) [4].

The clinical features post scorpion bite, include pain in and around the sting site, florid autonomic signs such as hypertension, tachycardia, hypotension, pulmonary oedema, priapism and infrequently; central nervous manifestations such as encephalopathy, convulsions and coma [5],[6].

The present study was undertaken to analyze the varied clinical presentations in patients who were admitted with a history of scorpion bite, with a special emphasis to find out whether any difference existed in the presentation of paediatric patients in comparison to the adult patients and to understand whether any particular signs and symptoms were associated with increased mortality and morbidity in different age groups. Also, the final outcomes in all the age groups were noted.

Material And Methods

This study was conducted at a tertiary care hospital (SRN Hospital, Allahabad) from April 2006 to September 2007. In all the age groups, 74 cases presenting with a history of scorpion sting were either observed or admitted to the intensive coronary care unit (ICCU). They were classified into different groups (A-D) depending upon the clinical presentation.

GROUP A- Local signs/ Asymptomatic

GROUP B- Acute Pulmonary Oedema (APO)

GROUP C- APO+ Myocarditis

GROUP D- APO+ Myocarditis + Encephalopathy OR Encephalopathy alone

All the asymptomatic patients or those complaining of pain and paresthesia at the sting site, with no systemic manifestations, were kept under Group A.

Group B consisted of patients with APO which were identified clinically on the basis of cold and clammy skin, tachycardia with elevated blood pressure, retractions, nasal flaring and grunting, pink frothy sputum, impaired percussion note over lung fields, crepitations and radiological findings; complemented with decreased oxygen saturation.

Group C consisted of patients with APO and Myocarditis. Myocarditis was diagnosed on the basis of clinical features such as tachycardia, arrhythmia, gallop rhythm, systolic murmurs, ECG changes and elevated LDH (lactate dehydrogenase).

Group D consisted of patients with features of APO and Myocarditis as well as encephalopathy, or patients presenting acutely with encephalopathy alone. Patients with persistent irritability or altered sensorium, convulsions and neurological deficit were classified as cases of encephalopathy.

Group A patients were monitored closely for signs of toxicity and were administered analgesics like acetaminophen and ice packs to relieve the signs of inflammation.

All of the symptomatic patients in Group B, C and D received a dose of prazosin (30 microgram per Kg body weight) in the supine position, with monitoring of blood pressure (BP), heart rate (HR), respiration rate (RR) and hydration status. In addition, patients with APO were put on sodium nitroprusside drip and dobutamine along with supportive measures and were ventilated as and when required. These patients were tapered off the sodium nitroprusside drip after they got stabilized haemodynamically and were continued on prazosin. Similarly, dobutamine was tapered and stopped in a phased manner.

Patients of Group D, presenting with additional signs of encephalopathy such as seizures, were managed with anti-

convulsant medication. Also, an unusual association in the paediatric age group was seen in the form of the presence of priapism, which was managed conservatively with ice-packs only.

In the present study, the presence of signs and symptoms in the various age groups were tabulated according to Groups A to D. The final outcome was tabulated and the results were analyzed to associate the mortality with any particular clinical parameter. The differences in presentation and progression towards the final outcome were studied and assessed to compare paediatric patients with adult patients.

Observations

There were 74 patients in the present study, of which 46 (62.16%) were males and 28 (37.83%) were females. The mean time interval between the scorpion sting and the clinical presentation was 8 hours (range 4–16 hours). Of these 74 patients, 70 (94.59%) were from the rural background and 66 (89.18%) patients were admitted during the months from April to August. In the present study, the age groups of 5-15 years and >15 years comprised the largest subgroup, with each having 30 cases (40.54%). The maximum number of males- 20 (43.47%) were seen in the age group of 5-15 years; whereas, the maximum number of females- 16 (57.14%) constituted the age group above 15 years [Table/Fig 1].

(Table/Fig 1) Age and Sex Distribution of all patients with scorpion sting

Age Group	Total	%	Male	% (all cases)	% (all males)	Female	% (all cases)	% (all females)
< 5 yrs	14	18.91	12	16.21	26.08	2	2.70	7.14
5-15 yrs	30	40.54	20	27.02	43.47	10	13.51	35.71
> 15 yrs	30	40.54	14	18.91	30.43	16	21.62	57.14
	74		46	62.16		28		37.83

The clinical manifestations and presentation at the time of admission were tabulated along with the biochemical and radiological profiles of the patients, as given in [Table/Fig 2].

(Table/ Fig 2) Signs and symptoms at admission

Feature	Total (%)
Symptoms	
Extreme anxiety	50 (67.56)
Intense pain at the site of the bite and paresthesia	52 (70.27)
Breathlessness	58 (78.37)
Signs	
Hypotension	13 (17.56)
Pulmonary oedema	58 (78.37)
Hypertension	41 (55.40)
Tachycardia	60 (81.08)
Bradycardia	08 (10.81)
Prisipism	20 (27.02)
Loss of bladder/bowel control	08 (10.81)
Convulsions/ Altered sensorium	02 (2.70)
Laboratory abnormalities	
Elevated L.DH	14 (18.91)
Electrocardiogram	
Sinus tachycardia	60 (81.08)
X-ray chest (PA view)	
Pulmonary oedema	40 (54.05)
Cardiomegaly	

The older age group (5-15 years) comprised of the asymptomatic group (Group-A) in which survival was excellent (100%). Group B comprised of the maximum number of patients-52 (70.27%). In this group, the patients in the age group of 5-15 years were the largest cohort. Survival in this group was quite satisfactory, with a recovery rate of 96.16%. Group C patients had an additional element of myocarditis which affected the younger individuals i.e. age groups less than 5 and 5-15 years, comprising of 3 patients each. Out of these, mortality was seen in 2 (33.33%) patients. Group D had the worst outcome, with 100% mortality rates and affected the extremes in the age groups from very young (less than 5 years) to the elderly (above 15 years) patients [Table/ Fig 3], [Table/ Fig 4].

(Table/ Fig 3) Subdivision of all patient according to the clinical presentation

Groups	Age group (in Yrs)				
	<5	5-15	>15	Total	%
GROUP A	0	2	12	14	18.91
GROUP B	6	21	17	44	59.45
GROUP C	7	7	0	14	18.91
GROUP D	1	0	1	02	2.70
Total	14	30	30	74	

(Table/ Fig 4) Survival and mortality according to the age groups

Groups	Outcome			
	Improved		Deaths	
	Total	%	Total	%
GROUP A	14	100	00	0
GROUP B	42	95.45	02	4.54
GROUP C	11	78.57	03	21.42
GROUP D	00	0	02	100
Total	67	90.54	07	9.45

Discussion

Scorpion stings increase dramatically in summer months and are lowest in winter. In our study also, the maximum number of scorpion stings were reported in the months from April to August. Scorpions commonly inhabit the crevices of dwellings, underground burrows, the areas under logs or debris, paddy husk, sugarcane fields and coconut and banana plantations. In our study, the finding that out of 74 patients admitted in the ICCU, 70 (94.59%) were from the rural background, correlates well with the natural habitat of the scorpion [7]. Also, most of the patients were male i.e. 46 (62.16%) who venture out more in fields in the rural setting [Table/ Fig 1].

Of the initial signs and symptoms, intense pain and paresthesia were present in 70.27% of cases; however, breathlessness was the most common (78.37%) initial presentation in the study conducted. Serotonin found in scorpion venom is thought to contribute to the pain associated with scorpion sting [8].

Scorpion venoms are species-specific complex mixtures of short neurotoxic proteins (31-64 amino acid sequences) [9]. The venom contains numerous free amino acids, appreciable quantities of serotonin, hyaluronidase and various enzymes that act on trypsinogen. Voltage dependant ion channels are altered by the venom. The toxin acts by opening sodium channels at presynaptic nerve terminals and by inhibiting calcium dependant potassium channels. An autonomic storm is thus initiated [4]. The unopposed effects of the alpha-receptor stimulation are thought to result in autonomic disturbances, and this has been the rationale for treatment with the alpha-blocker prazosin [10], as also instituted in

the present study. Tachycardia, hypertension, myocardial dysfunction, pulmonary oedema and shock are important manifestations of the 'autonomic storm' found in patients stung by a scorpion [7]. These very signs and symptoms were also recorded in our study where tachycardia was seen in the maximum number of patients i.e. 60 (81.08%); followed by pulmonary oedema in 52 (70.27%) patients. Hypotension was seen in 13 (17.56%) patients who presented later than the average reporting time of 8 hours in the present study; which points towards the fact that in the early hyperdynamic phase, the blood pressure is elevated and LV contraction is enhanced. This is followed by a hypokinetic phase in which hypotension and impaired LV function occurs [Table/Fig 2] [11],[12],[13],[14].

All of the cases with myocarditis had APO and many had S3 gallop and apical murmur of mitral regurgitation, similar to the tachyarrhythmia myocarditis in 3-75% of the cases and apical murmur in 43.9% of the cases in other studies [15],[16],[17]. The myocarditis was corroborated with an increased level of lactate dehydrogenases (LDH).

An incidental finding of priapism was noted in 27.02% of the patients. The point to be noted was that, it was present in 100% of the cases in the age group of less than 5 years in male children and in 40 % of the cases in the age group of 5-15 year old males. There was no incidence of priapism in males above 15 years. This phenomenon is due to the parasympathetic over stimulation in children, as they are more likely to develop a more rapid progression and increased severity of symptoms because of their lower body weight. These findings need to be corroborated in further studies, as to the best of our knowledge this has not been addressed in the literature so far.

Central nervous system manifestations are infrequently encountered. They are however, invariably fatal. Generalized seizures and tonic posturing was seen in

2.70% of cases in comparison to 2-13% from India, Israel and South Africa [18].

In the pre-prazosin era (1961-1983), 25-30% fatality due to pulmonary oedema was reported in scorpion victims from Western India. Ever since prazosin started being used (1984 onwards), the mortality in these victims reduced to less than 1% [7]. In the present study, 90.54% cases recovered fully and mortality was seen in 9.46% cases. Of these, 100% mortality was seen in Group D patients having CNS involvement. The next most affected group was Group C, having evidence of the involvement of the myocardium where mortality was in the range of 35.71%.

Prazosin is now clinically accepted for scorpion sting cases. There must be no delay in administration of prazosin. The importance of treating pulmonary oedema effectively with sodium nitroprusside or nitroglycerin infusate and dobutamine support cannot be over emphasized as this is a major cause of subsequent mortality [18].

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