



Scorpion Stings in Children at the Midelt Provincial Hospital Center

Soufiane El Moussaoui^{1,2*}, Widad Lahmini^{1,2}, Siham Mellouk¹, Mounir Bourrous¹

¹Emergency Department, Mother – Child hospital, Mohamed VI University Hospital, Marrakesh, Morocco

²Childhood, Health and Development Research Unit, Faculty of Medicine and Pharmacy, Cadi Ayyad University, Marrakech, Morocco.

Abstract

Scorpion envenomation constitutes in Morocco, as in several countries around the world, a major public health problem.

We conducted a retrospective study with descriptive and analytical purposes, focusing on the pediatric population, admitted to the emergency reception department and the pediatric department of the Midelt Provincial Hospital Center. This study interested children aged 0 to 15 years admitted for scorpion stings, with the aim of analyzing the epidemiological, clinical and progressive aspects of scorpion envenomation in children.

During a period of two years (January 2019-December 2020), 121 cases of scorpion stings were recorded, representing a prevalence of 4.78%. All age groups were affected with a predominance of children under 6 years old. The sex ratio (M/F) was 1.42. The majority of cases were of rural origin (59%) and bitten during the hot period (57%) and more precisely during summer nights. The bites mainly affected the distal parts of the upper and lower limbs (90%). The black scorpion was the most incriminated (51%). The treatment time was between 30 minutes and 2 hours in 38.02% of cases and exceeded 4 hours in 33.05% of cases.

On admission, 80% of patients were classified as stage I and 8% as stage III according to the Abroug classification. Pain was reported by 95% of patients. The general symptomatology was dominated by vegetative (29.6%) and digestive (23%) signs. Only one death was declared in a patient classified as stage III upon arrival with multiorgan distress.

None of our patients received anti-scorpion serum. The treatment was mainly symptomatic and palliative depending on the clinical picture presented by the patient.

Overall, scorpion stings remain a summer danger, especially in rural areas of the province of Midelt. They are often benign but the occurrence of complications always remains unpredictable. Hence the need for prevention, education and early and appropriate care, respecting the National Strategy for the Fight against Scorpionic Bites and Envenomation developed by the Ministry of Health in Morocco.

Introduction

Scorpion stings (SS) and envenomation that result from them represent a serious public health problem, particularly in the dry tropical and subtropical areas of North Africa, the Middle East, Central America, and North America. from the south and India [1,2]. In addition to their frequencies, SS have consequences on mortality, morbidity and health expenditure. More than 1.2 million cases of SS and 3250 deaths are recorded each year worldwide [3]. Epidemiological data established by the Antipoison and Pharmacovigilance Center of Morocco (APCM), show that SS are the leader in poisonings noted by the center (50 to 60%) with 62 cases of death on average and a fatality rate general of 0.27% going from 2.37% in 1999 to 0.18% in 2017 with a highly significant difference. Of these deaths, 97% were children under 15 years of age [4,5].

In Morocco, SS constitute one of the concerns of the Ministry of Health and a subject of concern, especially for the child population. Age less than 15 years is

considered a poor prognostic factor and a predictive sign of severity [4].

Indeed, 29,944 cases of SS were collected in 2017, of which children under 15 years old represented 25.29% of the bitten population with a number of deaths of 47 deaths/year, compared to an overall death rate of 55 deaths/year among the entire bitten population, 90% of whom are children under 10 years old [6].

The most fearsome species of scorpion in Morocco is the *Androctonus Mauritanicus*, which belongs to the *Buthidae* family, very widespread in the Atlantic coastal zone, the Souss valley, the Atlas slope and the Saharan regions [7,8].

Aware of the seriousness of SS in Morocco and the importance of rapid and adequate treatment, a national strategy to combat SS was put in place in 1999 then updated in 2013, the main objective of which was to reduce morbidity and mortality caused by this scourge [4,9].

Given the absence of a similar study in the province of Midelt, this work, carried out over a period of two years, had the objective of:

Correspondence

Soufiane EL MOUSSAOUI

Professor, Pediatrics, 1Emergency Department, Mother – Child hospital, Mohamed VI University Hospital, Marrakesh, Morocco

E-mail: soufiane.lueur@gmail.com

- Received Date: 14 May 2024
- Accepted Date: 04 Jun 2024
- Publication Date: 14 Jun 2024

Copyright

© 2024 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International license.

Citation: El Moussaoui S, Lahmini W, Mellouk S, Bourrous M. Scorpion Stings in Children at the Midelt Provincial Hospital Center. Prim Healthcare. 2024;1(1):04

- Evaluate the epidemiological, clinical and therapeutic profile of scorpion stings in children.
- Determine the factors having an influence on the clinical course of stung patients, in order to improve care and reduce morbidity and mortality caused by this pathology.
- Situate the extent of this problem at the level of the province of Midelt.

Study materials and methods

Type of study

This is a retrospective analytical study focusing on children admitted for scorpion stings to the emergency room of the Provincial Hospital Center (CHP) of Midelt

Data collection

Data were collected from emergency registers, monthly and annual hospital records and hospitalization records in the pediatric department. The information collected using a pre-established operating sheet concerned: epidemiological data, clinical data, stage of severity, management and evolution. Anonymity and confidentiality were well respected.

Inclusion criteria

The patients included in this study were children aged ≤ 15 years, admitted for SS and treated in the emergency room, in the pediatric department or initially treated and then transferred to the intensive care unit of the Regional hospital of Errachidia, during the period spanning between January 2019 and December 2020.

Statistical analysis

Clinical data were entered into Excel sheets and results were described in raw numbers or average for quantitative variables and as a percentage for qualitative variables; then compared to literature data.

Results

Epidemiological data

One hundred and twenty-one cases of scorpion stings were collected in the emergency room of the provincial hospital center (PHC) of Midelt during the period between January 2019 and December 2020. This corresponds to 40.87 % of cases of SS, all ages combined, admitted to the (PHC) of Midelt during this same period.

A total of 2531 children were admitted to the emergency room during this period, for different reasons, the prevalence of SS was 4.78%.

The age of the patients ranged from 4 months to 15 years with a predominance in the age group of 3 to 6 years. All age groups were affected with an average of 7.18 years.

In this series, we noted a predominance of SS in male children with a percentage of 59%. The sex ratio (M/F) was 1.42.

Of all the cases recorded, the majority of patients were of rural origin (59%).

In our study, most children (51%) were stung by a black scorpion. In 14% of cases, the color of the scorpion was not specified.

The majority of SS (more than 71%) occurred during the hot period extending between June and October. During the summer, 46% of SS were recorded and less than 3% occurred during the winter.

In our study, 61% of cases were bitten during the night, the majority of them (46%) occurred during the first half (between 6 p.m. and 12 a.m.).

In our series, the extremities were the most exposed to SS (90%).

The post injection time (PIT) is defined by the duration between the time of the injection and the time of admission to the emergency room. In our study, the PIT was between 20 minutes and 10 hours, with a predominance of cases arriving with a PIT between 30 min and 2 hours.

Clinical data

The clinical picture resulting from SS, in the patients in our study, is mainly made up of locoregional signs associated or not with general signs.

Pain is the symptom most felt immediately after SS, it is reported in more than 95% of cases; associated in some cases with redness, tingling and sometimes necrosis.

In our series, the most common systemic signs were vegetative signs (fever present in 25.6% of cases) and digestive signs (23% of cases).

In our series, the majority of patients (80%) were admitted in stage I, 12% in stage II and only 8% presented signs of severity in stage III. (Table I).

Therapeutic care

Almost all of the patients in this series did not receive any medical treatment before their admission to the Midelt PHC emergency room.

Some patients (16.52%) attempted traditional procedures (incision, henna, tourniquet, etc.). The treatment implemented

Table I: Distribution of clinical signs

| Clinical signs | | Number of cases | Percentage |
|----------------------|----------------------|-----------------|------------|
| Local signs | Pain | 115 | 95% |
| | Redness | 85 | 70.2% |
| | Tingling | 46 | 38% |
| | Necrosis | 31 | 25.6% |
| Vegetative signs | Fever / Hyperthermia | 31 | 25.6% |
| | Hyper sweating | 5 | 4.1% |
| Digestive signs | Vomiting | 22 | 18.1% |
| | Abdominal tenderness | 6 | 4.9% |
| Cardiovascular signs | Tachycardia | 11 | 9% |
| | HT | 3 | 2.4% |
| Respiratory signs | Polypnea | 7 | 5.7% |
| | Respiratory distress | 4 | 3.3% |
| Neurological signs | Priapism | 3 | 2.4% |
| | Hustle | 5 | 4.1% |

in all patients in our series was only symptomatic. No patient had received antiscorpion serum. Antitetanus serum was administered to 9 patients.

Faced with signs of seriousness (threatening hypertension, state of shock, acute pulmonary edema or disturbances of consciousness), the patients were initially treated: conditioning and symptomatic treatments (Table II), before their transfer to the intensive care unit at the hospital. Regional hospital center of Errachidia.

Table II: Management of serious cases.

| | Supported | Number of patients |
|--------------------|-------------------------|--------------------|
| Put in condition | Lateral safety position | 12 |
| | Oxygen therapy | 34 |
| | Monitoring | 95 |
| | Gastric catheterization | 8 |
| | Urinary catheterization | 8 |
| Treatment received | Atropine | 12 |
| | Antihypertensive | 13 |
| | Anticonvulsant | 5 |
| | Catecholamines | 10 |

Evolution

The evolution was favorable in most cases in our series (76%). Only one death was reported. Less than a quarter of patients (23.1%) presented complications or signs of seriousness. Patients not showing serious signs (class I) were placed under observation in the emergency room until a PIT exceeded 4 hours.

The duration of hospitalization varied between 4 hours and 3 days, 89% stayed less than 48 hours; and 4 patients were discharged against medical advice. Signs of seriousness were noted in 13 cases. The patients concerned were conditioned and received the necessary symptomatic treatments before transferring them to the intensive care unit of regional hospital center of Errachidia.

In our series, only one patient died following SS, resulting in a case fatality rate of 0.82%. It was a 10-year-old boy, of rural origin, whose causal agent was not specified, immediately admitted to class III severity, conditioned then immediately referred to the intensive care unit. and intensive care of the of regional hospital center of Errachidia. The evolution was marked by a rapid worsening of his general condition, then the patient died 6 hours after his hospitalization in the ICU following multi-organ distress.

Discussions

Epidemiology

The annual number of scorpion stings exceeds 1.2 million, leading to more than 3,250 deaths. In Morocco, as in many hot countries, scorpion stings constitute a frequent accident (30,000 cases were recorded during 2009), and a serious and fatal emergency pathology, especially among the child population [10- 12].

In our study, 121 cases of scorpion stings were collected, which represents 4.78% of the reasons for pediatric consultation

in the Midelt provincial hospital emergency room. Comparison between our results and those of the literature is difficult, because the studies are fragmented in time and space. The figures published are only statistics based on hospital consultations. A significant proportion of SS patients do not seek medical attention and often resort to traditional means. Epidemiological assessments in the literature represent only the visible part of the iceberg [13].

All age groups are affected by this condition, with a certain predominance for children under six years old; it is also the age group most affected according to various national and international studies [14-17]. This can be explained by the great activity, the lack of attention and the spirit of adventure and curiosity of children of this age.

The scorpion stings randomly, which means that both sexes are affected in the same way. The difference observed in our series (Sex ratio M/F= 1.42) can be explained by the hyperactivity of the boys (lifting a stone, walking barefoot, etc.).

Like our series and other national series, SS patients mainly come from rural areas [18,19]; view that scorpions are usually found in deserts and arid regions [20, 21]. Several factors can increase the prevalence of SS in rural areas, including: Housing conditions; Unsanitary housing; Existence of dense trees; lack of compliance with safety measures (wearing appropriate shoes and socks), which is common among the infant population [22,23].

On the other hand, rural origin only delays hospital care. This consequently worsens the prognosis, hence the need to develop conditions for transferring patients and ideally, work for the fight and prevention against this condition.

The species of the scorpion is difficult to specify. In our study, the black scorpion was found guilty in more than half of the cases, which is consistent with literature data [24, 25, 26].

This predominance may be related to the presence of *Androctonus Maurétanicus* (AM) on our soils while knowing that not every black scorpion is necessarily an AM [27]. Indeed, several authors have recognized AM as being endemic to Morocco, where it represents by far the main species responsible for serious SS [9,13,28].

Although present all year round, scorpion stings are more frequent in our series during the summer season: 71% of cases are recorded between June and October. Our data agrees with that of the literature: Due to the fact that they are photophobic and known to be nocturnal, scorpions mainly intervene at the end of the day and during the first half of the night and remain hidden all day.

All parts of the body can be the site of puncture, but the distal parts, particularly the hands and feet are the most affected. This is explained by the fact that these are the most exposed parts, without protection, particularly in children, and which are the site of significant motor activity.

The PIT is significantly linked to the "Geographic origin" factor. It is proven as a prognostic element; thus, the more treatment is delayed, the more the patient's condition is threatened with worsening. In our study, it was between 20 minutes and 10 hours, with an average of 4 hours. In 38% of cases, the PIT was between 30 minutes and 2 hours.

Clinical data

Scorpion stings are a serious accident in children. The consequences of SS are very disparate. The clinical translation varies from one subject to another depending on the age, terrain and type of scorpion in question. The interaction of all these factors gives rise to clinical polymorphism and a great variability of symptoms, which can range from a simple local reaction to serious cardiac, respiratory or neurological manifestations [29-31].

Pain is the main symptom. The most common digestive signs are abdominal pain and vomiting.

Neurovegetative signs include profuse sweating, hypersialorrhea, hypersecretion, miosis and priapism in boys, which are all signs of stimulation of the parasympathetic system. Mydriasis and urinary retention are signs of stimulation of the sympathetic system.

Cardiovascular damage remains the main cause of mortality in scorpion envenomation.

Respiratory signs [32-34] consist of polypnea, bronchial congestion or even acute respiratory failure (ARI) which makes the initial picture serious.

scorpion envenomation indicates serious envenomation and corresponds to stage III of the severity scale [35].

Therapeutic support

There is no consensus on the treatment of scorpion sting envenomation. Currently, therapeutic conduct has two components: symptomatic treatment aimed at correcting the disorders caused by the action of the venom on the body and specific treatment (antiscorpion serum) aimed at neutralizing the venom.

In Morocco, close observation of this type of patient is recommended during a four-hour PIT in an emergency department so as not to overcrowd the intensive care units. As long as there is a way to identify patients with a high potential for worsening, the most reasonable thing is to reserve hospitalization for them. During this four-hour observation period, the healthcare professional must reassure and inform the patient and those around them about preventive means, the difference between sting and envenomation and the uselessness of certain practices and therapies (tourniquet, incision, scarification, application of traditional products.)

Clinical evolution

Despite the severity of the clinical picture, the outcome is often favorable with improvement in general condition and regression of systemic signs. In our series, 92% of patients developed favorably, either after observation in the emergency room until a 4-hour PIT, or after hospitalization.

In accordance with the literature, the time required for the appearance of symptoms of envenomation is less than 4 hours, which explains the national strategy developed by the APCM.

Before hospitalization, once the 24-hour mark has been exceeded, the vital prognosis is no longer at stake and recovery is obtained without after-effects [18,36,37].

Predictive signs of severity are the signs which appear in a patient classified as stage I or II, and which should warn of an

imminent progression towards class III.

We can distinguish several seriousness factors linked to the species, the victim, or the environment.

In total, from the analysis of our study, the prognostic factors retained were:

- Post-puncture time of more than 2 hours.
- Cardiovascular complications.
- Signs of neurological distress.
- Class III.

In Morocco, overall mortality from scorpion envenomation was 2.9‰ in 1998.

This is a significant mortality in comparison with international data: 1.26‰ in Tunisia, 2.8‰ in Mexico and 2.6‰ in Brazil. Bias being the reporting problem [38].

On a national scale, Marrakech region was the region of the kingdom where the incidence and case fatality rate were the highest, with successively more than 1‰ and more than 0.5% [38].

In our series, only one case of death was recorded. That's a case fatality rate of 0.82%. This low rate is probably linked to the less venomous type of scorpion.

Prevention remains the essential weapon in the fight against scorpionism, the national strategy for combating SS integrates the participation of different sectors, other than health (local authorities, public works, agriculture, education, etc.).

This strategy is based on the IEC (Information/Education/Communication) program, and includes two components: Education and public awareness.

Conclusion

Scorpion stings in children constitute a frequent reason for consultation and hospitalization at the Midelt provincial hospital center, especially during the summer period.

Children are the main victims and the occurrence of envenomation in children constitutes a risk factor, so any delay in adequate medical care can have serious consequences on the clinical course of envenomed children.

In our study, the evolution was favorable in the majority of cases and the fatality rate was low (0.82%). Generally, it is detected that the mortality of envenomed animals is an exponential function of the time elapsed between the time of the bite and the time of first aid.

Better knowledge of the signs of seriousness and education of the population would make it possible to improve the prognosis. It is proven that the future of patients envenomed by scorpion is directly linked to the precocity, quality and continuity of care.

In light of these data, it is necessary for the Ministry of Health and local authorities to consider this condition as a program disease, with the aim of improving the formidable prognosis of this endemic, especially at the level regions that suffer the most.

Statement of Ethics

This study has the authorizations of Maternal and Child Hospital numbered with a Ref. (SAA N°252/2020).

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

- Besbes L, Nouira S, Abroug F. Severe scorpion envenomation. In Mion GR, Goyffon M. Grave envenomations. Harnette. 2000: 139-48
- Goyffon M, Vachon M, Broglion N. Epidemiological and clinical characteristics of the scorpion envenomation in Tunisia. *Toxicon* . 1982;20:337-344.
- Chippaux JP, Goyffon M. Epidemiology of scorpionism : a global appraisal *Acta Tropica* 2008; 107:71–79
- Anti-Poison and Pharmacovigilance Center of Morocco Official publication of the CAPM. No. 33 - 2nd quarter 2017. Google Scholar
- Soulaymani-Bencheikh R, Soulaymani A, Semlali I, et al. Scorpion poisonous stings in the population of Khouribga (Morocco). *Bull Soc Pathol Exot.* 2005;98(1):36-40..
- El Oufir R, Rhalem N, Hmimou R, Semlali I, Benlarabi S, Soulaymani Bencheikh R. Scorpionic Stings and Envenomations in Morocco 1999-2017. *CAPM: Toxicology Morocco.* 2017;33(2).
- Vachon M. Study on scorpions. Institute pastor of Algeria. Edit Algiers: 1952;1:487.
- El Oufir R, Semlali I, Idrissi M, et al Scorpion sting : a public health problem in el kelaa des sraghna (Morocco) *J Venom . Anim. Toxin sincl Trop Dis* 2008, 14 (2): 258-273.
- Soulaymani BR CAPM. Annual report 2009
- Soulaymani-Bencheikh R, Idrissi M, Tamim O, et al. Scorpion stings in one province of Morocco: Epidemiological, clinical, and prognosis aspects. *J Venom Anim Toxins Incl Trop Dis.* 2007;3(2):71-462.
- Charrab N, Semlali I, Soulaymani A, Mokhtari A, El Oufir R, Soulaymani Bencheikh R. The epidemiological characteristics of scorpionism in the province of Beni Mellal (2002-2004). *Rev Biol Biotechnol.* 2007;6:36-39.
- Suhendan A, Ozcan O, Bora I. Epidemiological and clinical characteristics of scorpionism in children in Sanliurfa , Turkey . *Toxicon* 2007; 49:875-880
- Goyfon M, El Ayeb M. Epidemiology of scorpionism *Bull Soc Toxicolo Clin Infotox:* 2002;15:2-6.
- Lharmis M Scorpion sting in children: study at the Hassan II hospital in Agadir. Thesis of Medicine, Faculty of Medicine and Pharmacy, Marrakech (2009), No. 39.
- Johnson DG. Ensinnck JW. Stimulation of glucagon secretion by scorpion toxin in the perfused rat pancreas . *Diabetes* 1976; 25:645-9
- Bouaziz M, Bahloul M, Kallel H, et al. Epidemiological , clinical characteristics and outcome of severe scorpion envenomation in South Tunisia : multivariate analysis of 951 cases. *Toxicon.* 2008;52(8):918-926
- Nazih G. Scorpion sting in children experience of the ibn khatib hospital in Fez. Thesis Doctorate Medicine, Rabat; 2003, no. 190.
- El Gouzzaz , Khaoula . Scorpion stings in the province of El kelaa of Seraghna clinical and evolutionary aspects. Thesis Medicine Rabat 2009.
- B. El Hafny, N. Ghalim , “Clinical evolution and circulating levels of venom in scorpion envenomations in Morocco. Venoms and Toxins Unit, Research Department, Pasteur Institute of Morocco, Casablanca , Morocco .
- Abouihia B. Scorpion envenomation in the province of Tiznit. Retrospective study March-September 1997. Méd. Thesis, Casablanca, 1998, No. 4
- H.Azza. Epidemiology and prognostic factors of scorpion envenomations . Doctoral medicine thesis, Marrakech 2015. No. 148.
- Bosnak M, Ece A, Yolbas I, Bosnak V, Kaplan M, Gurkan F. Scorpion sting envenomation in children in southeast Turkey . *Wilderness Environ Med.* 2009; 20(2):118–24.
- Hosseinasab A, Alidoosti K, Torabinejad M. Epidemiologic characteristic and predisposing factors of scorpion sting in the south of Kerman province. *J Med Council IR Iran.* 2009; 27(3):295–301
- Tamim K. Scorpionism , Epidemiology and Risk Factors in Morocco: case of the province of Khouribga National Doctoral Thesis 2010, Ibn Tofail University – Kenitra.
- Hmimou R, Soulaymani A, Mokhtari A, et al. Risk factors caused by scorpion stings and envenomations in the province of kelaa des sraghna (Morocco). *J Venom Anim Toxinsincl Trop Dis* 2008, 14(4) : 628-640.
- Touloun O, Boumezzough A, Slimani T. Scorpion envenomation in the region of Marrakesh Tensift Alhaouz (Morocco): Epidemiological characterization and therapeutic approaches. *Serket.* 2012;13(1/2):38-50.
- El Khayari B., Scorpion stings and envenomations at the ElKela des Sraghna provincial hospital Méd Thesis Casablanca 2005; No. 395.
- Goyffon M. Scorpionism *Revue Française des Laboratoires*, April 2002, No. 342
- De Rezende NA, Dias MB, Campolina D, Chavez- Olortegui C, Diniz, CR, Amaral CF. Efficacy of antivenomtherapy for neutralizing circulating venom antigens in patients stung by *Tityusserrulatus* scorpions. *The American Journal of Tropical Medicine and Hygiene.*1995;52(3):277-280
- Ouanes – Basbes I, Elatrous S, Nouira S, et al. Direct vs mediated effects of scorpion venom : an experimental study of the effects of second challenge with scorpion venom . *Intensive Care Medicine* 2005; 31:441-46.
- Chippaux JP. Emerging options for the management of scorpion stings . *Drug design, development and therapy.* 2012;6:165-73.
- Zili N, Lukasczewicz AC, Naija W, Mebazaa A. Cardiogenic shock pathophysiology: recent aspects *Update Conferences* 2004, 391-398.
- Isbister GK, Bawaskar HS. Scorpio envenomation . *New England Journal of Medicine.* 2014;371(5):457-463.
- Yildizdas D, Yilmaz HL, Erdem S. Treatment of cardiogenic pulmonary oedema by helmet-delivered non-invasive pressure support ventilation in children with scorpion sting envenomation. *Annals-Academy of Medicine Singapore.* 2008;37(3):230.
- Derkaoui A, Elbouazzaoui A, Ifraji Z, Achour S, Labib S. “ Ischemic stroke : a rare complication of scorpion envenomation ”. *La Presse Médicale.* 1983;40(1):106–108.
- Rachid MA, Khattabi A, Amine M, Younous S, Khachcha M, Maaroufi A. Prognostic factors for death by scorpion envenomation in the region of Marrakech, Morocco. *Annals of Analytical Toxicology.* 2013;25(4):169-174.
- Abourazzak S, Achour S, El Arqam L, et al. Epidemiological and clinical characteristics of scorpion stings in children in Fez, Morocco. *Journal Of Venomous Animals and Toxins including Tropical Diseases.* 2009;15(2):255-267.
- Tamim OK, Soulaymani-Bencheikh R, Soulaymani A, Tayebi M, Zemrour F, Mokhtari A, Semlali I, El Oufir G. Epidemiological profile of scorpion stings and envenomations in Morocco: Analysis of the monthly survey (2001 to 2003). In: *Health, Education and Environment.* 2006:128-141.