Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Anesthesiology

Delayed Severe Reaction to Scorpion Sting: A Case of a 13 Years Old Child with Pulmonary Edema Treated with Non Invasive Ventilation

El Kihel Hajar[1*], El Jadid Siham[1], Hammouti Amal[1], EL BOUDRARI Mohammed[1]

[1]Intensive Care and Anesthesiology, Provincial Hospital of Zagora, Morocco

DOI: https://doi.org/10.36347/sjmcr.2024.v12i08.004 | **Received:** 24.06.2024 | **Accepted:** 31.07.2024 | **Published:** 02.08.2024

***Corresponding author:** El Kihel Hajar
Intensive Care and Anesthesiology, Provincial Hospital of Zagora, Morocco

Abstract **Case Report**

Scorpion envenomation in children is a dangerous and potentially fatal condition; it should be taken seriously and managed rapidly. We report a case of a 13 years old child who was brought to the provincial hospital of Zagora 26 hours after being stung by a black scorpion, he appeared asymptomatic for nearly a day which delayed the management of his poisoning; he was diagnosed with pulmonary edema and required non invasive ventilation and dobutamine continuous infusion. The child showed rapid improvement and was transferred to the nearest university hospital for further investigations.

Keywords: Scorpion envenomation, child, delayed reaction, non invasive ventilation.

INTRODUCTION

Scorpion envenomation is a major public health issue. According to the Moroccan Center of Poison control and Pharmacovigilance (CAPM), it represents the first cause of poisoning in Morocco with 127,217 stung cases and 231 deaths recorded from 2016 to 2020 [1]. The central regions of Morocco are the most affected by this issue [2] with a mortality risk notably higher among children under the age of 15 years old [3].

Three grades are defined to scorpion poisoning according to the severity of the clinical symptoms: grade I includes patients who are asymptomatic or with only local symptoms, grade II includes patients with systemic manifestations and grade III includes patients with distress or organ failure such as neurological, cardiovascular or respiratory distress [11].

The Zagora oases are known by the presence of five species of scorpions including dangerous species like Hottentotta gentili, Androctonusa moreuxi and Androctonus liouvillei. The most severe cases are mostly described among children and traditional remedies appear to be the most common way used by the locals to treat the scorpion stings [4].

We would like to report a case of a severe and delayed reaction to scorpion poisoning to draw attention to the possibility of mortality among children beyond the recommended phase of surveillance and the dangers of the neglect of such a serious issue.

CASE REPORT

AA, a 13 years old boy with no medical or surgical history suffered from a big black scorpion sting in the foot. The family reported that after being stung at 10 pm, the boy slept normally, woke up and ate normally, played a football game and by the end of the day started to feel a shortness of breath.

At midnight, 26 hours after being stung, the boy was brought to the emergency department of the hospital of Zagora. His Glasgow coma scale was evaluated at 15, he had dyspnea and showed signs of respiratory distress and hypercapnia with a respiratory rate above 25, he was sweating and had substernal and intercostal retractions, his oxygen saturation level was around 80%, his heart rate was 100 bpm and blood pressure was 150/90 mmHg. Chest auscultation revealed bilateral crackling sounds.

He was placed in a sitting position and oxygen was delivered with a high concentration mask. Dobutamine was administered by a continuous infusion pump with a rate of 5µg/Kg/h, 10 mg of Furosemide was initially administered with no noticeable improvement. The EKG showed sinus tachycardia and the chest x-ray showed pulmonary edema.

The boy was admitted at the operating room (the intensive care unit being under construction) and received three sessions of non invasive ventilation with alveolar recruitment using PEEP titration. The sessions lasted for 10, 15 and 35 minutes, he received a total of 30 mg of Furosemide (the only doses available) and urinated 1L. His respiratory rate normalized, the blood pressure dropped at 110/60 mmHg, his signs of respiratory distress and crackles nearly disappeared and his oxygen saturation level was around 98% under 10 L/min.

He was transferred to the Marrakech's Mohammed VI University Hospital by the morning for further investigations and medical care. He was discharged one day after his admission.

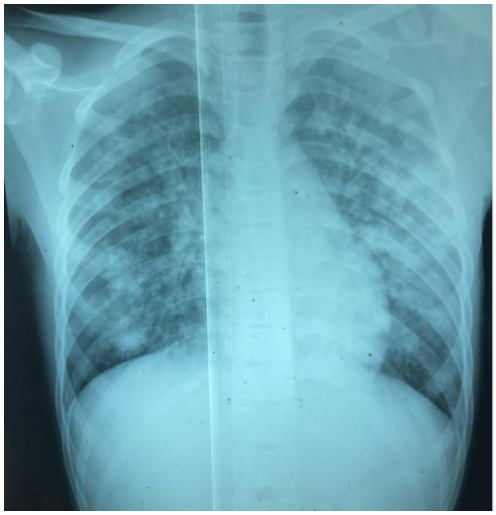

Fig 1: chest X-ray of the child showing pulmonary edema

DISCUSSION

Cardiorespiratory manifestations are the principle leading causes of death after scorpion envenomation with pulmonary edema being the most severe respiratory complication [5].

The scorpion's venom acts mainly on the neuromuscular and cardiovascular systems, it delays the inactivation of the Na^+ channels and blocks the Ca^{2+} activated K^+ channels and diminishes potassium conductance causing the release of cathecholamines into the circulation [6-8].

Although some studies suggest that pulmonary edema is caused by an increased permeability of the pulmonary alveolar capillary membrane [9,10], most authors confirmed its cardiogenic nature with evidence of cardiac dysfunction, myocardial damage and decline in cardiac output [12-14]. This venom induced heart failure may be explained by: an increase in plasma epinephrine and norepinephrine levels [15, 16], a direct effect of the venom on the myocardial cell membranes causing myocarditis [17,18], myocardial ischemia that can be caused by coronary hypoperfusion [19] or vasoconstriction [20].

Diuretics are known for their efficiency in treating salt and water overload and Furosemide is frequently used in the cases of cardiogenic pulmonary edema and congestive heart failure. The small doses used on this patient may have participated in his clinical improvement [32, 33].

The use of non invasive ventilation to treat the pulmonary edema in children with scorpion envenomation has been reported in a study by Dincer Yildizdas *et al.,* to be a rapid effective way with good tolerance and no complications, the children included in this study showed an improvement of oxygenation within 2 hours of treatment [21]. In our case, the patient didn't show any improvement until the non invasive ventilation was started. In spite of the fact that non invasive ventilation is a well established treatment for cardiogenic pulmonary edema that reduces the intubation rate and ICU admission [22, 23], there are no other trials reporting its use in the cases of scorpion envenomation.

The efficiency of serotherapy is an object of debate [24, 25]. Recent published studies targeting endemic species show promising results [26, 27]. In our hospital, serotherapy is not available and we follow the protocol of the Moroccan Center of Poison control and Pharmacovigilance (CAPM). In case of a grade III patient, dobutamine must be initiated which we did with our patient [11]. Dobutamine infusion improves tissue oxygenation and both left and right cardiac function in severe scorpion envenomations [28].

The CAPM recommends a four hours surveillance to grade I patients [11, 29]. In this case, according to the patient and his family, he showed no symptoms during the first 4 hours after being stung and carried on with his activities for more than 24 hours. This shows that a longer period of surveillance may be required for patients appearing to be grade I - it could be extended to 24 hours [30] - and/or an early systematic screening of cardiac dysfunction that may include the measurement of serum cardiac troponin I or interleukin-8 [31].

CONCLUSION

Pulmonary edema is a dangerous complication of scorpion envenomation that should be managed rapidly and the non invasive ventilation may be an efficient and rapid treatment. It is possible that cardiovascular symptoms don't manifest in the first hours after the scorpion sting which imply a higher vigilance among the medical staff and the patient's surrounding. The scorpion sting must not be neglected and we suggest a prolonged surveillance of grade I patients appearing to be asymptomatic.

REFERENCES

1. El Oufir, R. (2017). Scorpions stings and envenomations: specific toxicovigilance reports. *Toxicol. Morocco*, *35*, 16.
2. EHMA, A. (2021). Trends in scorpion diversity and richness in Morocco. *Uttar Pradesh Journal Of Zoology*, *42*(12), 1-7.
3. Touloun, O., Boumezzough, A., & Slimani, T. (2012). Scorpion envenomation in the region of Marrakesh Tensift Alhaouz (Morocco): epidemiological characterization and therapeutic approaches. *Serket*, *13*(1/2), 38-50.
4. El Hidan, M. A., Touloun, O., & Boumezzough, A. (2015). An epidemiological study on scorpion envenomation in the Zagora oases (Morocco). *Journal of coastal life medicine*, *3*(9), 704-7.
5. El Hidan, M. A., Touloun, O., & Boumezzough, A. (2015). An epidemiological study on scorpion envenomation in the Zagora oases (Morocco). *Journal of coastal life medicine*, *3*(9), 704-7.
6. Ismail, M. (1995). The scorpion envenoming syndrome. *Toxicon*, *33*(7), 825-858.
7. Moss, J., Colburn, R. W., & Kopin, I. J. (1974). SCORPION TOXIN-INDUCED CATECHOLAMINE RELEASE FROM SYNAPTOSOMES. *Journal of Neurochemistry*, *22*(2), 217-221.
8. Bahloul, M., Chaari, A., Dammak, H., Samet, M., Chtara, K., Chelly, H., ... & Bouaziz, M. (2013). Pulmonary edema following scorpion envenomation: mechanisms, clinical manifestations, diagnosis and treatment. *International journal of cardiology*, *162*(2), 86-91.
9. Amaral, C. F. S., Barbosa, A. J., Leite, V. H. R., Tafuri, W. L., & de Rezende, N. A. (1994). Scorpion sting-induced pulmonary oedema: evidence of increased alveolocapillary membrane permeability. *Toxicon*, *32*(8), 999-1003.
10. Jeddi, H. M. (1981). Respiratory failure among patients after severe scorpion sting. *Critical Care Medicine*, *9*(3), 196.
11. Soulaymani Bencheikh, R. (2017). Piqûres et envenimations scorpioniques: conduite à tenir. Centre antipoison et de pharmacovigilancedu Maroc (CAPM).
12. Abroug, F., Ayari, M., Nouira, S., Gamra, H., Boujdaria, R., Elatrous, S., ... & Bouchoucha, S. (1995). Assessment of left ventricular function in severe scorpion envenomation: combined hemodynamic and echo-Doppler study. *Intensive care medicine*, *21*, 629-635.
13. Hering, S. E., Jurca, M., Vichi, F. L., Azevedo-Marques, M. M., & Cupo, P. (1993). 'Reversible cardiomyopathy'in patients with severe scorpion envenoming by Tityus serrulatus: evolution of enzymatic, electrocardiographic and echocardiographic alterations. *Annals of tropical paediatrics*, *13*(2), 173-182.
14. Kumar, E. B., Soomro, R. S., Al Hamdani, A., & El Shimy, N. (1992). Scorpion venom cardiomyopathy. *American Heart Journal*, *123*(3), 725-729.
15. Gueron, M., & Weizmann, S. (1969). Catecholamine excretion in scorpion sting. *Israel journal of medical sciences*, *5*(4), 855-857.
16. Zeghal, K., Sahnoun, Z., Guinot, M., Richer, C., & Giudicelli, J. F. (2000). Characterization and mechanisms of the cardiovascular and haemodynamic alterations induced by scorpion venom in rats. *Fundamental & clinical pharmacology*, *14*(4), 351-361.
17. Yarom, R., & Braun, K. (1971). Electron microscopic studies of the myocardial changes produced by scorpion venom injections in dogs. *Laboratory Investigation; a Journal of Technical Methods and Pathology*, *24*(1), 21-30.
18. Teixeira Jr, A. L., Fontoura, B. F., Freire-Maia, L., Machado, C. R. S., Camargos, E. R. S., & Teixeira, M. M. (2001). Evidence for a direct action of Tityus serrulatus scorpion venom on the cardiac muscle. *Toxicon*, *39*(5), 703-709.
19. Bahloul, M., Ben Hamida, C., Chtourou, K., Ksibi, H., Dammak, H., Kallel, H., ... & Bouaziz, M. (2004). Evidence of myocardial ischaemia in severe scorpion envenomation: myocardial perfusion scintigraphy study. *Intensive care medicine*, *30*, 461-467.
20. Ismail, M., Osman, O. H., & Petkovic, D. (1976). Electrocardiographic studies with scorpion (Buthus minax, L. Koch) venom. *Toxicon*, *14*(2), 79-83.
21. Yildizdas, D., Yilmaz, H. L., & Erdem, S. (2008). Treatment of cardiogenic pulmonary oedema by helmet-delivered non-invasive pressure support ventilation in children with scorpion sting envenomation. *Annals-Academy of Medicine Singapore*, *37*(3), 230.
22. Gartner, B. A., Fehlmann, C., Suppan, L., Niquille, M., Rutschmann, O. T., & Sarasin, F. (2020). Effect of noninvasive ventilation on intubation risk in prehospital patients with acute cardiogenic pulmonary edema: a retrospective study. *European Journal of Emergency Medicine*, *27*(1), 54-58.
23. Nava, S., Carbone, G., DiBattista, N., Bellone, A., Baiardi, P., Cosentini, R., ... & Groff, P. (2003). Noninvasive ventilation in cardiogenic pulmonary edema: a multicenter randomized trial. *American journal of respiratory and critical care medicine*, *168*(12), 1432-1437.
24. Abroug, F., ElAtrous, S., Nouria, S., Haguiga, H., Touzi, N., & Bouchoucha, S. (1999). Serotherapy in scorpion envenomation: a randomised controlled trial. *The Lancet*, *354*(9182), 906-909.
25. Tarasiuk, A., Khvatskin, S., & Sofer, S. (1998). Effects of antivenom serotherapy on hemodynamic pathophysiology in dogs injected with L. quinquestriatus scorpion venom. *Toxicon*, *36*(7), 963-971.
26. Klotz, S. A., Yates, S., Smith, S. L., Dudley Jr, S., Schmidt, J. O., & Shirazi, F. M. (2023). Antivenom

for severe scorpion envenomation in arizona. *New England journal of medicine*, *388*(9), 853-854.

27. Darkaoui, B., Hilal, I., Khourcha, S., Lafnoune, A., Chakir, S., Aarab, A., ... & Oukkache, N. (2024). Development and Efficacy of the Antivenom Specific to Severe Envenomations in Morocco and North Africa: Advancements in Scorpion Envenomation Management. *Toxins*, *16*(5), 214.
28. Elatrous, S., Nouira, S., Besbes-Ouanes, L., Boussarsar, M., Boukef, R., Marghli, S., & Abroug, F. (1999). Dobutamine in severe scorpion envenomation: effects on standard hemodynamics, right ventricular performance, and tissue oxygenation. *Chest*, *116*(3), 748-753.
29. Bencheikh, R. S., Khattabi, A., Faraj, Z., & Semlali, I. (2008, April). Conduite à tenir devant une piqûre de scorpion au Maroc. In *Annales francaises d'anesthesie et de reanimation* (Vol. 27, No. 4, pp. 317-322). Elsevier Masson.
30. Hamouda, C., & Salah, N. B. (2010). Envenimations scorpioniques en Tunisie. *Med. emergency*, *5*, 24-32.
31. Meki, A. R. A., Mohamed, Z. M., & El-deen, H. M. M. (2003). Significance of assessment of serum cardiac troponin I and interleukin-8 in scorpion envenomed children. *Toxicon*, *41*(2), 129-137.
32. Morrison, R. T. (1997). Edema and principles of diuretic use. *Medical Clinics of North America*, *81*(3), 689-704.
33. Biddle, T. L., & Paul, N. Y. (1979). Effect of furosemide on hemodynamics and lung water in acute pulmonary edema secondary to myocardial infarction. *The American journal of cardiology*, *43*(1), 86-90.