



# Scorpion Sting Management at Tertiary and Secondary Care Emergency Departments

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## ABSTRACT

**Objectives:** We sought to review the management of scorpion stings in tertiary and secondary care emergency departments in Oman and determine physician's knowledge of management protocols. **Methods:** We conducted a retrospective study of all scorpion stings cases seen in Sultan Qaboos University Hospital (SQUH) emergency department (ED) from March 2016 to July 2017. Additionally, we conducted a survey of ED physicians regarding their management of scorpion stings in three different EDs including SQUH. **Results:** The total number of scorpion stings seen at SQUH during the study period was 128. Localized pain was seen in 97.7% (n = 125), swelling in 14.8% (n = 19), and local redness in 7.0% (n = 9) of patients. Around 13.0% (n = 17) of patients were found to have systemic symptoms with tachycardia being the most common. Bedside clotting test was done for 11.7% (n = 15) of patients. The most commonly used treatment was local anesthesia (54.7%, n = 70). No patient received scorpion antivenom. In the 89 surveyed physicians the main management method used was analgesia (88.8%, n = 71) followed by local anesthesia (81.1%, n = 65). Most physicians (80.0%, n = 64) believed that local anesthesia was the most effective management. However, 32.5% (n = 26) ordered a whole blood bedside clotting test, 69.2% (n = 18) of which were junior doctors. **Conclusions:** Most scorpion sting cases managed in SQUH had local symptoms. Tachycardia was the most common systemic manifestation. Bedside clotting test was not commonly ordered and mainly requested by junior doctors. Local anesthesia infiltration is the recommended management for scorpion sting. Analgesia was the main management followed by local anesthesia.

The Buthidae scorpion family is the largest and most common venomous species found in the Mediterranean and Arabian Peninsula and includes genera of *Buthacus*, *Leiurus*, *Androctonus*, and *Vachoniolus*.<sup>1,2</sup> The Scorpiones scorpion family is also found in Oman.<sup>3</sup> The annual incidence of scorpion stings globally is estimated to be 1.5 million.<sup>4</sup> In Oman, scorpion stings account for 20% of human exposures due to animal bites and stings.<sup>5</sup> There are also regional variations with only 6% of scorpion stings reported in Muscat.<sup>4</sup> Temperature and humidity are important factors contributing to the summer seasonal variation of scorpion stings.<sup>1,6</sup> Although rarely encountered, systemic complications from scorpion stings have been reported including, but limited to, disseminate intravascular coagulation, anaphylaxis, acute pancreatitis, encephalopathy, acute hepatic injury, pulmonary edema, acute renal

failure, metabolic acidosis, and stroke.<sup>7</sup> A long-lasting demyelinating polyneuropathy following a scorpion sting was reported at Sultan Qaboos University Hospital (SQUH) despite antivenom treatment.<sup>8</sup> A prospective, randomized controlled study conducted in Tunisia including 600 patients with scorpion sting found no significant difference in hospital stay and occurrence of life-threatening complications (shock or pulmonary edema) between steroid and placebo treatment.<sup>9,10</sup> Topical 5% lidocaine was found to be the most significantly effective modality in reducing pain after stings.<sup>11</sup> There was no difference found in complications related to scorpion stings when using prazosin compared to other treatment modalities in a small study done in India.<sup>12</sup> Antivenom use for scorpion stings reported in the literature is variable.

No difference has been found in the outcome or admission rate between patients receiving antivenom four hours post-sting compared for

patients with similar clinical presentations receiving placebo.<sup>10,11</sup> Another study published in 1999 showed no beneficial 'resolution of symptoms' of antivenom administration after four hours compared to supportive treatment.<sup>13</sup> Although antivenom induced anaphylactic shock was reported only in 1.3%, motion sickness was reported in 57% of patients who received antivenom.<sup>9</sup>

## METHODS

Our study included two parts. The first was a retrospective observational study of cases presenting to the emergency department (ED) at SQUH after scorpion stings over a 17-month period from March 2016 to July 2017. Data were collected from an electronic medical record system (Trakcare) for all patients triaged with bites and stings. The study did not include the name of the scorpion family involved. Collected data included demographic data (age, gender, sex, month of sting), clinical characteristics (clinical symptoms, investigation), and management (medication, disposition).

Cases were included if a scorpion sting was confirmed by seeing the scorpion and cases were excluded if no scorpion sting occurred, if the bite or sting was from something other than a scorpion, or if it was an unknown sting.

The second part of our study was a survey conducted to evaluate physicians' knowledge regarding the management of scorpion stings in EDs at two different tertiary hospitals in Muscat (SQUH and Royal Hospital) and a secondary hospital (Armed Forces Hospital).

The primary outcome measured was the management aspects of scorpion stings, and we also investigated the incidence of scorpion stings at SQUH during the study period.

We used standard statistical tests to analyze the comparative demographics of the groups for gender and age. Means and medians were calculated for continuous variables. Data were analyzed using Microsoft Excel™ (2010).

## RESULTS

The total number of scorpion stings seen at SQUH ED between March 2016 and July 2017 was 128. Table 1 represents the demographic characteristics

**Table 1:** Demographic characteristics of patients stung by scorpions.

Epidemiological characteristics	n	Percentage
<b>Age</b>		
Adult patient	108	84.4
Pediatric patient	20	15.6
<b>Sex</b>		
Male	96	75.0
Female	32	25.0

of the patients. Most incidences of stings occurred during the summer from May to July (59.4%, n = 76) with the peak occurring in June. Over half of the patients (55.5%, n = 71) stayed in the ED for less than two hours, 39.1% (n = 50) stayed two to four hours, and only 5.5% (n = 7) stayed more than four hours.

Table 2 represents the clinical features of patients with scorpion stings. The majority of patients (97.7%, n = 125) had localized pain, swelling was seen in 14.8% (n = 19) of patients, and localized redness in 7.0% (n = 9) of patients. Seventeen patients had systemic symptoms, with tachycardia being the most common in 15 (11.7%) patients, followed by hypertension in four (3.1%) patients. Vomiting and chest pain were seen in one patient each.

Table 3 shows the investigations done. Whole blood bedside clotting test was done in 15 (11.7%) patients followed by a coagulation test in seven (5.5%) patients. An electrocardiogram was done only for four patients. Most patients (54.7%, n = 70) received local anesthesia, and the remaining (43.0%, n = 55) patients received tetanus toxoid [Figure 1].

**Table 2:** Clinical features of patients with scorpion stings.

Clinical features	n	Percentage
<b>Local signs</b>		
Pain	125	97.7
Swelling	19	14.8
Redness	9	7.0
<b>Systematic symptoms</b>		
Tachycardia	15	11.7
Vomiting	1	0.8
Chest pain	1	0.8
Hypertension	4	3.1

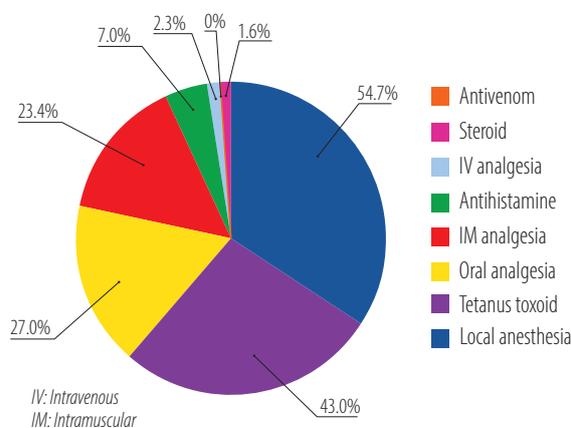
**Table 3:** Lab investigations in patients with scorpion stings, n (%).

Laboratory test	Done	Not done
Full blood count	5 (3.9)	123 (96.1)
Coagulation	7 (5.5)	121 (94.5)
Urea and electrolyte	4 (3.1)	124 (96.9)
Liver function test	2 (1.6)	126 (98.4)
Bedside clotting test	15 (11.7)	113 (88.3)

Stung patients received oral analgesia (27.0%, n = 35) followed by intramuscular analgesia (23.4%, n = 30); only 2.3% (n = 3) received intravenous analgesia. No patients received scorpion antivenom. Patients were discharged on non-steroidal anti-inflammatory drugs (42.2%, n = 54) and paracetamol with or without codeine (20.3%, n = 26) [Table 4].

The survey was collected from 89 physicians working in the ED; nine were excluded as they never managed a scorpion sting. Most respondents were junior doctors working (60.0%, n = 48) and managed both adult and pediatric cases (46.3%, n = 37).

Most physicians (98.8%, n = 79) treated patients with local symptoms (local pain and swelling). Only 13.8% (n = 11) treated patients with systemic symptoms. Analgesia were the main management prescribed (88.9%); 33.8% (n = 27) used intravenous analgesia, 21.3% (n = 17) used intramuscular analgesia, and 33.8% (n = 27) used oral analgesia. The other common modality of treatment was local anesthesia (81.3%, n = 65). Other less frequently

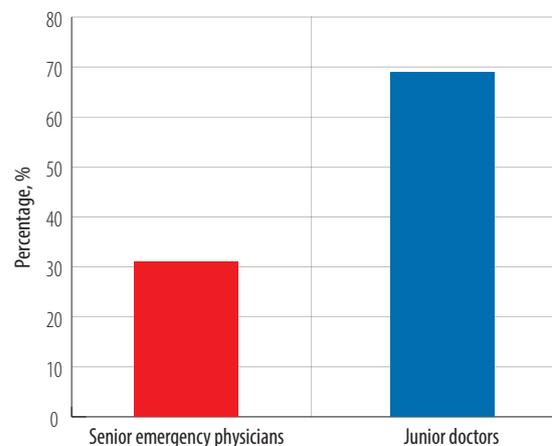
**Figure 1:** Treatment given to patients in the emergency department for the treatment of scorpion stings.**Table 4:** Discharged medication given to patients of scorpion stings.

Discharge medication	n (%)
Non-steroidal anti-inflammatory drugs	54 (42.2)
Paracetamol +/- codeine	26 (20.3)
Antihistamine	7 (5.1)
H2 blockers	2 (1.6)
Steroid	1 (0.8)
Antibiotics	1 (0.8)

used modalities of treatment were tetanus toxoid (32.5%, n = 26) and antihistamines (30.0%, n = 24). Only 3.8% (n = 3) used steroids, and 15.0% (n = 12) used antivenom.

When asked the question, "What is the most effective management of scorpion stings?" most physicians (80.0%, n = 64) chose local anesthesia while only 11.3% (n = 9) chose intravenous analgesia. Antivenom was thought to be the most effective management in 8.8% (n = 7) of physicians.

Twenty percent (n = 16) of physicians had never used local anesthesia for the management of scorpion stings. Of these, 81.3% (n = 13) reasoned their choice for not using it as "due to pain control by IV analgesia." The rest thought their patients had tolerable pain. Around 32.5% (n = 26) of physicians ordered whole blood bedside clotting test; 69.2% (n = 18) were junior doctors, and only 30.8% (n = 8) were senior emergency physicians [Figure 2]. The most common reason given for ordering by 84.6% (n = 22) of physicians was due to fear that scorpion stings cause coagulopathy.

**Figure 2:** Correlates the use of whole blood bedside clotting test with the level of treating providers.

## DISCUSSION

Our study found that over half (54.7%) of patients stung by scorpions received local anesthesia in the ED, 27.3% received tetanus toxoid, and only 2.3% received intravenous analgesia. A regional randomized controlled study found that topical lidocaine was an effective and safe treatment for scorpion stings associated with pain in patients with no systemic signs and symptoms of envenomation.<sup>11</sup> In the same study, some of the providers thought that oral and intravenous analgesia were better treatments than local anesthesia for pain management. The use of steroids in severe scorpion-envenomed patients was not found to improve their outcome.<sup>14</sup> In our study, steroid was used only in 3.8% of patients.

Children represented around 15.6% of patients with scorpion stings in our study, but none of them developed serious envenomation or needed antivenom; although children are usually at greater risk of developing severe scorpion envenomation requiring administration of antivenom.<sup>15,16</sup> Most patients in our study had local symptoms; the most common systematic manifestation was tachycardia. Scorpion venom is known to cause stimulation of neurotransmitters and catecholamines, which explain the tachycardia.<sup>17</sup> All our patients who undergone blood investigation had normal results including coagulation profile.

The release of cytokines and inflammatory mediators induced by the venom have been implicated in hepatic and hematologic derangements, as well as direct action of scorpion venom on liver endothelial and blood cells.<sup>18,19</sup> Whole blood bedside clotting test was done in 11.7% of patients and all had normal results. Certain species of scorpions can cause derangement in the bedside clotting test, such as the Venezuelan *Tityus discrepans* scorpion venom, which contains an anticoagulant component<sup>20</sup> and is different from species available in Oman. A retrospective study of 290 patients in Iran reported that hemoglobinuria, coagulopathy, transfusion, and kidney problems were more commonly seen in patients admitted more than 24 hours after the sting.<sup>21</sup> All our patients presented within a few hours. This study included only hospitals in Muscat governorate and might not necessarily represent other governorates in term of systemic toxicity and utilization of antivenom.

This study had several significant limitations. First, as for any retrospective study, there were

missing information in some cases. Second, there was no patient follow-up, and some may have developed more symptoms after being discharged from our hospital and were seen in different hospitals. However, this is unlikely as they were given discharge instructions to come back if they developed any alarming signs, but none had a repeat visit. Our survey had the potential for recall bias, as some of the doctors may not have remembered their management of scorpion stings.

## CONCLUSION

Most scorpion sting cases managed in our hospital had local symptoms. Tachycardia was the most common systemic manifestation seen. Local anesthesia infiltration is the recommended management for scorpion sting. Bedside clotting test was not commonly ordered and mainly requested by junior doctors. Analgesia was the main management followed by local anesthesia infiltration. Scorpion antivenom is rarely used.

### Disclosure

The authors declared no conflicts of interest. No funding was received for this study.

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