

Experiences Of Emergency Physicians On Scorpion Stings

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Abstract

Every year, the United States records about 200 cases of botulism. Those who inject substances such as heroin, use homemade alcohol, and eat improperly prepared canned food are at risk of contracting this extremely rare disease. As seen in this case, those treated with Clostridium Botulinum Toxin are also considered to be in the risk group. However, iatrogenic botulism cases are much rare; and in the literature, case reports of botulism after intragastric Clostridium Botulinum Toxin administration are rare. We aimed to present these cases to draw attention to this rare condition in patients who presented to the emergency department with complaints such as weakness, dyspnea, and diarrhea.

Keywords: Stomach, Botox, Adverse effects, iatrogenic disease

Introduction

Scorpion envenomation is an important public health problem, especially in tropical and subtropical regions, due to the severe clinical symptoms and serious complications, including death¹. Although venomous scorpions show a wide geographical distribution, almost all species harmful to humans belong to the Buthidae family².

In Turkey, scorpion envenomation is particularly common in the southeastern region due to geographical location, climate, and socioeconomic structure. The most prominent scorpion species found in Turkey are *Androctonus crassicauda*, *Leiurus quinquestriatus*, *Mesobuthus eupeus*, and *Mesobuthus gibbosus* species of the Buthidae family³.

In scorpion stings, clinical manifestations are divided into local (pain affecting the involved dermatome, local edema, localized paresthesia, and pruritus) and systemic (tachycardia, tachypnea, respiratory distress, shock, agitation, and altered state of consciousness, etc.). Most victims of stings do not develop envenomation, and systemic symptoms are rare. Localized symptoms occur in 97% of

affected people. Pain is the most common localized reaction. The most feared complications are associated with cardiac involvement. Cardiogenic shock and pulmonary edema are responsible for deaths in the first hours. Children under 5 years of age are the most at risk group³⁻⁵.

Patients are classified into four classes according to the severity of clinical symptoms; Class I is local only, Class II is minor systemic, Class III is major systemic, and Class IV is fatal. The severity of symptoms is influenced by many variables related to the scorpion (type and size of the scorpion, type of toxin), the exposure (number of stings, anatomical location of the sting, amount of venom injected, time until treatment administration) and the patient (age, weight, comorbid diseases, etc.)⁶.

The general approach to bites and stings includes wound care, tetanus prophylaxis, and symptomatic supportive care. In scorpion sting cases, antivenom should be administered in the presence of appropriate systemic and local indications⁷.

In Turkey, especially in Diyarbakır, Şanlıurfa, and Mardin provinces, a horse-derived antivenom is produced using venom and antivenomes obtained from

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Androcutanuscassicauda scorpions, a species that causes life-threatening sting cases. This antivenom also has protection against many scorpion venoms at different rates. Studies conducted in our country have shown that the antivenom produced from *A. crassicauda* yields better results than the best-known antivenoms⁸.

In our country, horse-derived scorpion antivenom is available in several commercial forms with different routes of administration [intravenous (IV), subcutaneous (SC), or intramuscular (IM)]⁹⁻¹⁰. The dose to be used does not depend on the age or body weight of the patient; it is determined by the physician according to the clinical situation and repeated if necessary. Some side effects may occur during antivenom administration. It is recommended to take precautions before and during administration for acute side effects.

Correct and effective intervention in the emergency department for patients exposed to scorpion stings, rapid indication of scorpion antivenom, and management of side effects are life-saving. The aim of this study is to contribute to the literature by investigating the knowledge and skills of emergency physicians about scorpion stings, the problems experienced in the management of these patients, and whether physicians comply with current guidelines in patient management.

Methods

This survey was conducted with physicians working in the emergency department via e-mail. A questionnaire form created by the researchers was used as a data collection tool. In the questionnaire form, in addition to questions about demographic information, a total of 16 questions were asked to measure the participants' experiences about scorpion sting cases and scorpion antivenoms. Ethical approval was obtained from the local ethics committee for the study (KAEK-2016/81).

IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp. Armonk, NY: USA. Released 2012) package program was used for statistical analyses. For descriptive statistics, categorical variables were shown as number of cases and (%). Chi-square and Fisher's exact tests were used to analyze the relationship between categorical variables. $p < 0.05$ was considered statistically significant. Results were given in a 95% confidence interval.

Result

Of the 282 physicians who participated in our study, 53.9% (n=152) were female and 46.1% were male. According to the title, 45.7% (n=129) of the participants were emergency medicine physicians and 45.0% (n=127) had 5-9 years of experience in emergency medicine. When the distribution according to geographic regions was analyzed, the highest number of participants was from the Aegean Region with

Table 1: Demographic data of emergency physicians

		N	%
Age	34 and below	165	58,5
	35 to 44	96	34,0
	45 and above	21	7,4
Gender	Female	152	53,9
	Male	130	46,1
Title	General Practitioner	82	29,1
	Emergency Medicine Assistant	71	25,2
	Emergency Medicine Specialist	129	45,7
Working Time in the Emergency Department	Less than 5 years	108	38,3
	5-9 years	127	45,0
	10-14 years	24	8,5
Employed Institution	15-19 years	23	8,2
	State Hospital	108	38,3
Geographic Region	Education Research Hospital	90	31,9
	University Hospital	84	29,8
	Marmara Region	57	20,2
Geographic Region	Aegean	72	25,5
	Mediterranean	15	5,3
	Central Anatolia	26	9,2
	Eastern Anatolia	34	12,1
	Southeastern Anatolia	51	18,1
	Black Sea	27	9,6

25.5% (n=72) and the lowest was from the Mediterranean Region with 5.3% (n=15). The analysis of the demographic data of the participants is given in Table 1.

The proportion of physicians who regularly checked the availability of scorpion antivenom in the emergency department was 31.6% (n=89). Among all title groups, emergency medicine specialists had the highest rate, while emergency medicine assistants had the lowest rate, which was statistically significant ($p=0.01$) (Table 2).

To make antivenom decisions, general practitioners need consultation significantly more than emergency medicine specialists ($p=0.01$).

Our study revealed that only 25.5% (n=72) of emergency physicians practiced pre-antivenom skin testing. No significant difference was found between title groups ($p=0.67$).

For the necessary intervention for complications that may arise during the administration of scorpion antivenom, 73% (n=206) of the participants took the necessary precautions before administration. This rate increases to 80.6% (n=104) in Emergency Medicine specialists, which is statistically significantly higher than the other groups ($p=0.04$). No significant difference was found when analyzed institutionally or regionally.

Administration of antivenom via IV route was significantly more preferred by emergency medicine specialists compared to other groups ($p=0.01$). ($p=0.01$) 31.7% of general practitioners (n=26) administered antivenom as "half to the wound edge/half IM". This rate is also statistically significantly higher in other groups ($p=0.01$).

Tetanus prophylaxis was administered to patients with scorpion stings by 269 (95.4%) of the participating

Table 2: Practice experiences according to title groups

		Titles			P
		General Practitioners n (%)	Emergency Medicine Assistants n (%)	Emergency Medicine Specialists n (%)	
Regular Control of Antivenom	Yes	25 (30,5)	6 (8,5)	58 (45,0)	0,01
	No	57 (69,5)	65 (91,5)	71 (55,0)	
Requesting Consultation for Antivenom Decision	Yes	57 (69,5)*	22 (31,0)	11 (8,5)	0,01
	No	25 (30,5)	49 (69,0)	118 (91,5)*	
Skin Test before Antivenom Administration	Yes	20 (24,4)	16 (22,5)	36 (27,9)	0,67
	No	62 (75,6)	55 (77,5)	93 (72,1)	
Taking Precautions for Complications	Yes	54 (65,9)	48 (67,6)	104 (80,6)*	0,03
	No	28 (34,1)	23 (32,4)	25 (19,4)	
Antivenom Route of Administration	IV	38 (46,3)	34 (47,9)	91 (70,5)*	0,01
	IM	10 (9,3)	7 (9,9)	15 (11,6)	
	SC	8 (9,8)	7 (9,9)	15 (11,6)	
	WE	0 (0)	0 (0)	0(0)	
	HWE/HIM	26 (31,7)*	19 (26,8)	11 (8,5)	
	Other	0(0)	0(0)	0(0)	
Tetanus Prophylaxis	Yes	75 (91,5)	68 (67,7)	126 (97,7)	0,10
	No	7 (8,5)	3 (4,2)	13 (2,3)	
Antibiotic Prophylaxis	Yes	52 (63,4)*	42 (59,2)	52 (40,3)	0,02
	No	30 (36,6)	29 (40,8)	77 (62,2)*	
Service Hospitalization Problem	Yes	42 (51,2)	46 (64,8)	77 (59,7)	0,22
	No	40 (48,8)	25 (35,2)	52 (40,3)	

IV: Intravenously, IM: Intramuscular, SC: Subcutaneous, WE: Woundedge HWE/ HIM: Halfwoundedge / Halfintramuscular *Post Hoc analyses were applied for the groups.

physicians. No significant difference was found between title groups.

To the question “Do you administer antibiotic prophylaxis?” 51.8% (n=146) of all participating physicians answered “yes”. This rate was statistically significantly higher in general practitioners while it was significantly lower in emergency medicine specialists (p=0.02).

The rate of emergency physicians who stated that they experienced problems in the service hospitalizations of patients with an indication for hospitalization due to scorpion sting was 58.5% (n=165). Although this situation did not create a significant difference between title groups, emergency physicians working in university hospitals were statistically significantly the group with the highest number of hospitalization problems (p=0.01).

Patient death due to scorpion sting was experienced by 4.3% (n=12) of the emergency physicians surveyed. The distribution of these cases according to geographical regions was as follows: 41.7% (n=5) in the Southeastern Anatolia Region, 25% (n=3) in the Eastern Anatolia Region, 16.7% (n=2) in the Marmara Region, and 16.7% (n=2) in the Aegean Region.

Discussion

Most cases of scorpion sting have minor local signs and therefore usually require only wound care, analgesics, and tetanus prophylaxis. Patients should be kept under observation for 4 hours. The onset of life-threatening

systemic symptoms is quite rapid, on average 14 minutes. In children, it can be much faster. These patients should be prepared for endotracheal intubation because of the possibility of rapid onset of severe pulmonary edema. In indicated patients, antivenom given within 4 hours of the sting may reduce the duration and severity of clinical symptoms⁷⁻¹¹.

The key to minimizing preventable deaths in sting cases is to ensure timely access to treatment. The availability and accessibility of antivenom should be checked regularly¹². Our study showed that only 31.6% of emergency physicians checked the availability of antivenom in their institutions. Although we could not find a literature study to compare this result, this low rate may be a result of the distribution of duties within the institution or the low frequency of encountering sting cases.

In scorpion antivenoms, although undesirable protein and albumin fractions have been reduced with the new F(ab')₂ products, as with all antivenoms of animal origin, both acute and delayed allergic reactions, including serum sickness, may develop¹³⁻¹⁴.

The spectrum ranges from common side effects such as pain/swelling/redness at the injection site, skin rash, itching, and urticaria to life-threatening side effects such as anaphylactic shock or serum sickness. The onset of serum sickness may occur 6-10 days after administration⁹.

Intubation equipment, epinephrine, and IV fluids should be available before the administration of antivenom as a precaution against anaphylactic shock¹¹.

Intradermal skin testing is recommended before scorpion antivenom. In positive patients, antivenom can be administered after the patient is observed for at least 1 hour after IV antihistamine and adrenaline infusion before antivenom¹⁵.

Our study shows that only 25.5% (n=72) of the participating emergency physicians performed skin testing. Although a negative skin test does not exclude the possibility of complications related to antivenom, the possibility of complications can be reduced with premedication, especially in atopic individuals. The rate of physicians who prepared for possible complications was 73% (n=206) in our study. Emergency medicine specialists were significantly more cautious in this regard. It is noteworthy that emergency physicians showed high sensitivity in taking precautions against the development of complications, but largely ignored the skin test. This result may be due to the desire to administer the antivenom as soon as possible and/or the fact that a negative skin test does not exclude the possibility of complications.

When the literature is reviewed, it is seen that scorpion antivenom is usually administered by IV route^{11,16}. In the package inserts of antivenoms available in our country, it is reported that some commercial forms can be administered by IV, IM, or SC routes. Our study revealed that emergency medicine specialists preferred the IV route at a significantly higher rate than other groups. Another interesting result was that 19.9% (n=56) of the physicians adopted the “half to the wound site/half IM” method of administration, although no supporting recommendation was found in the literature review and package insert information. In general practitioners, this rate was 31.7% (n=26) and significantly higher than the other groups. This method of administration is only recommended when the risk of developing compartment syndrome in the injured extremity during the administration of rabies immunoglobulin is anticipated due to the amount of fluid to be applied around the wound¹⁷. This result showed us that almost one-third of general practitioners were confused in the management of environmental emergencies.

Tetanus prophylaxis is routinely recommended in the management of scorpion stings^{2,10,11}. Our study results showed that almost all physicians followed this recommendation. Prophylactic antibiotic administration is not recommended because the risk of local superinfection is not very high, and wound cleansing and antisepsis are sufficient¹⁸. However, our results show that more than half of the physicians recommend antibiotic prophylaxis for sting patients. This rate is significantly higher especially in general practitioners compared to other physicians.

Our study revealed that scorpion sting patients with an indication for hospitalization had problems in service hospitalization. The rate of physicians who stated that they had problems in this regard was 58.5% (n=165). The

problem of service hospitalization was significantly higher in university hospitals compared to other institutions. In the literature, a similar result was found in snake bites in our country¹⁹. This result suggests that there is a lack of organization in university hospitals in patients who are treated in the emergency department due to environmental emergencies such as bites and stings and who require follow-up.

Conclusions

Our study investigated the knowledge and skills of emergency physicians regarding scorpion stings, whether they comply with current guidelines, and the problems experienced in patient management.

When our results are considered; in-professional training on the management of environmental emergencies should be planned and regulations should be made especially in undergraduate education.

There is a need for more detailed studies to reveal the causes of the problems related to the management of these patients after the emergency department and concrete steps to solve these problems.

Limitations

In our study, we tried to keep the number of questions limited due to concerns about the participation rate; therefore, the subject could only be presented in outline. This prevented us from analyzing the causes of some of the problems and focused only on the existence of the problem.

The number of participants was limited. Therefore, there was not a homogeneous distribution at regional, institutional, and title level.

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