ORIGINAL ARTICLE

Evaluation of patients with snakebite who presented to the emergency department: 132 cases

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ABSTRACT

BACKGROUND: The present objective was to evaluate clinical stages, complications, treatment modalities, and termination of treatment in patients who presented to the emergency department with snakebite.

METHODS: A total of 132 snakebite cases were retrospectively examined using emergency department records.

RESULTS: The majority of patients, 42.9% (n=57), had grade 0 snakebite. The local complication most frequently observed was pain (42.4%, n=56); the most common systemic complication was prolonged international normalized ratio (INR) level (5.3%, n=7). Local complications were observed in patients at all stages, while systemic complications were observed only in patients at advanced stages. Antivenom was administered in 46.4% (n=61) of patients, 52.2% (n=69) of patients were hospitalized, and 47.7% (n=63) of patients were discharged after 6–12 hours of monitoring. No negative outcome was observed during 6-month or year-long follow-up.

CONCLUSION: Complications should be evaluated based on type of toxin, and appropriate treatment should be initiated efficiently, according to clinical stage. This approach reduces or prevents the development of complications.

Keywords: Complications; snakebite; treatment.

INTRODUCTION

Snakebite is a very serious health risk in tropical regions. It is estimated that Turkey hosts 40 species of snakes, though Viperidae are the most common. Snakebites may present with various clinical manifestations, including mild local symptoms, systemic complications, and death.[1,2] Level of toxicity depends upon several factors, including type and amount of venom injected, location of the bite, and sensitivity of the patient to poison. Graded clinical staging has been developed in order to facilitate treatment and monitorization.[2] Treatment is administered according to clinical stage, preventing or reducing complications. The present aim was to evaluate cases of snakebite in terms of clinical stage, complications, treatment modalities, and clinical termination of treatment in patients who presented to the emergency department.

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MATERIALS AND METHODS

Records of 132 patients who presented with snakebite were retrospectively analyzed. All patients were evaluated in terms of age, gender, site of bite, local and systemic complications, clinical stages (Table 1), treatment, and results.[2] All laboratory findings were collected from the laboratory information system and are shown in Table 2.

All patients were evaluated, and antivenom therapy was administered according to clinical stage. European viper antiserum provided by Turkey's Health Ministry was used (10-mL flacon, administered intramuscularly or intravenously, or 100 mg/mL horse immunoglobulin), in addition to 1 mg/kg steroid, 1 mg/kg pheniramine, and 1 mg/kg ranitidine, initiated for allergenic prophylaxis. Antivenom was administered by intravenous controlled infusion with 100 cc of serum physiologic in 60 min. Data were analyzed using SPSS software (version 21.0; SPSS Inc., Chicago, IL, USA).

Table 1. Clinical grading, antivenom usage, and monitoring steps

Degree of poisoning	Clinical condition	Not used	Monitoring
No poisoning Grade 0	Puncture wounds can be seen, No local or systemic signs	Not used	The patient can be discharged after 8 hours of monitoring.
Mild Poisoning Grade I	Mild tissue swelling, eccihymosis, no systemic symptoms, Normal laboratory findings (normal thrombocytes count) Systolic blood pressure >90 mmHg	Not used	The patient can be discharged after 12 hours of monitoring.
Moderate Poisoning Grade II	Advanced swelling, Pain, eccihymosis, prolonged PTT, Thrombocytes count <80.000/μL, Systolic blood pressure >90 mmHg	Two flacons of antivenom are recommended.	The patient should be monitorized closely during therapy.
Severe Poisoning Grade III	Advenced swelling, pain, necrosis and bullouse lesions can be seen. Prolonged PTT, Thrombocytes count <80.000/μL, Sistolic blood pressure <80 mmHg, Severe systemic symptoms and coagulopathies (bleeding from nose and stomach etc.)	Four flacons of antivenom are recommended.	The patient should be monitored in the intensive care unit.

RESULTS

Thirty-one (23.1%) female and 101 (76.5%) male patients aged between 3 and 84 years were enrolled. The site of 71 (54.2%) bites was an upper extremity, the site of 60 (45.4%) was a lower extremity, the site of 1 was the neck. Clinically graded stages were as follows: 57 (42.9%) cases were grade 0; 38 (28.6%) cases were grade I; 29 (22%) cases were grade II; and 8 (6.5%) cases were grade III.

Local complications were observed at all stages; systemic complications were observed only at advanced stages. The most common local complication was pain (n=56, 42.4%) (Table 3). In laboratory evaluation, routine parameters were analyzed. Serum glucose levels, alanine aminotransferase and aminotransferase activities, and sodium and potassium levels were normal. All echocardiograms showed normal activity. Mean Glasgow Coma Scale scores of patients were 14–15 (Table 4). Prothrombin time (PT) and partial thromboplastin time (PTT) were prolonged, compared to control levels measured 12 hours later.

Increased white blood cell (WBC >10.2x10^3/μL) counts were detected in 44 patients at time of admission, while leukocytosis was detected in 18 patients during control evaluation. However, no significant relationship between WBC counts and clinical stages was determined. Erythrocyte suspension was administered for patients with hemoglobin values below

Table 2. Laboratory findings of patients

Laboratory tests	Mean±SD
White blood cell (x10^3/μL)	11.6±6.2
Hemoglobin (g/dL)	14±1.8
Hematocrit (%)	41.7±4.9
Platelet (x10^3/μL)	239.1±104.3
Glukoz (mg/dl)	137.7±68.7
Blood urea nitrogen (mg/dL)	19.9±9
Crea (mg/dL)	0.7±0.2
Aspartate aminotransferase (U/L)	26.2±9.9
Alanine aminotransferase (U/L)	19.1±8.3
Na (mEq/L)	137.8±3.5
K (mEq/L)	4.1±0.5
Prothrombin time (s)	13.8±2.1
Partial thromboplastin time (s)	23.8±5
International normalized ratio	1.1±0.2

Table 3. Patient grades and local complications

Complication	n	%	Grade
Pain	56	42.4	0–3
Erythema	51	38.6	1–3
Edema	45	34.0	1–3
Necrosis	10	7.5	1–3
Paresthesia	3	2.2	1–2
Cellulitis	3	2.2	1–2

Table 4. Patient grades and systemic complications

Complication	n	%	Grade
PT, PTT and INR abnormalities	7	5.3	3
Anemia	6	4.5	3
Increased BUN and creatinine levels	5	3.7	2
Nausea and vomiting	3	2.2	2
Confusion	2	1.5	3
Compartment syndrome	2	1.5	3
Abnormal vital findings	2	1.5	3
Thrombocytopenia	1	0.7	3
Dispnoea	1	0.7	3
Anaphlaxis due to snake antivenom	1	0.7	3
Periorbital edema	1	0.7	2

PT: Prothrombin time; PTT: Partial thromboplastin time; INR: International normalized ratio; BUN: Blood urea nitrogen.

12.2 g/dL (6.5–7.2–6.6–7.7–7.0–6.8 g/dL) and hematocrit levels below 37.7% (19.2–21.9–19.9–25.1–21.2–21.9%). Patient stages and treatments are described in Table 5.

Sixty-nine (52.2%) patients were hospitalized, 3 of whom had grade III bites and were transferred to the intensive care unit. Sixty-three patients were monitored in the emergency department, where no complications were observed and the bites were considered to be grade 0. These patients were discharged following 6 hours of monitoring. No mortality was observed, and no complications were observed during the 1-year monitoring period.

Table 5. Patient grades and treatment modalities

Treatment	n	%	Grade
Antibiotherapy (1000 mg Amoxicillin + 200 mg clavulanate)	132	100.0	0–3
Tetanus prophylaxis	125	94.74	0–3
Snake antivenom	61	46.42	2–3
Immobilization	35	27.72	2–3
Mannitol	21	16.41	3
Erythrocytes suspension	7	5.30	3
Fasiotomi-debridement-grafting	2	1.51	3

DISCUSSION

Snake venom can cause a variety of clinical conditions, according to the type and amount of toxin, the type of snake, and the susceptibility of the patient. Patients are treated and monitored according to clinical grading.[2] Snake venom has various toxic effects on the region of the bite and on the entire body, including local complications such as pain and swelling at the site, edema, erythema, necrosis, and cellulitis, as well as systemic complications such as fever, nausea and vomiting, compartment syndrome, heart failure, arrhythmias, acute renal failure, shock, coma, or death (Fig. 1a-c).[3,4]

Patients are treated according to recommended protocols. Dry bites without envenomation are scored as grade 0, and bites that lack systemic signs or symptoms are scored as grade I. Antibiotherapy, tetanus vaccine, and symptomatic therapy are administered in these cases.

Antivenom is the main treatment option in cases of venomous snakebite.[5,9] Rate of antivenom therapy ranges from 16–80%.[1,5,6] Antivenom therapy should be administered to

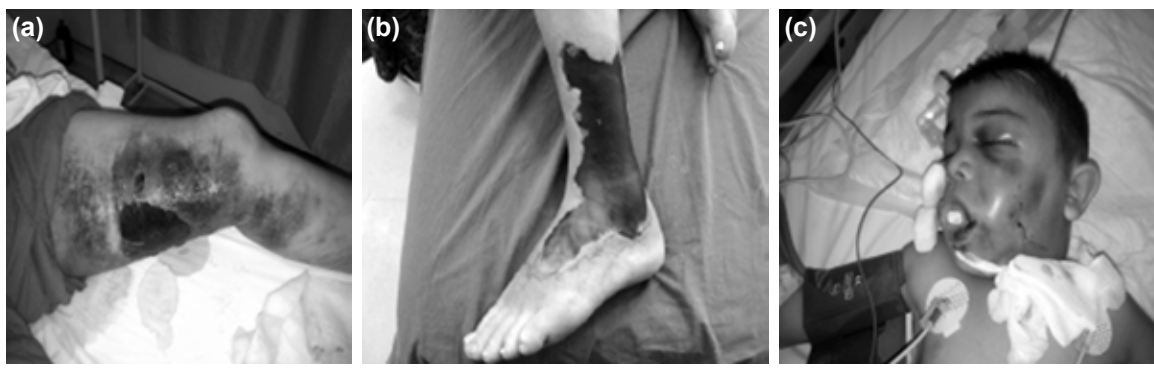

Figure 1. (a)(b)(c)

patients with advancing local or systemic complications. In a study conducted by Karakuş et al., the rate of complication was reported as 2.4%, while rates ranging between 20–75% have been reported elsewhere.[1,5,7–9]

In the present emergency department, antivenom therapy was administered to 61 (46.4%) patients, all of whom had grade II or III bites. Anaphylactic reaction due to antivenom administration was observed in only 2 patients. However, they were discharged following improvement, which may have been the result of administration of steroid and antihistaminic therapy for prophylaxis prior to antivenom administration.

Snake venom includes a variety of toxins and consists of 70% water and 30% protein substances, including leukotrienes, phospholipases, acetylcholinesterase, hyaluronidase, collagenase, antibactericides, neurotoxins, hemotoxins, anticoagulants, cardiotoxins, hemolytic factors, fibrinolytic enzymes, quinine, and histamine.[10,11] Toxins can cause diverse systemic effects, such as leukocytosis, thrombocytopenia, hypofibrinogenemia, bleeding disorders, proteinuria, and azotemia.[4,12,13] However, leukocytosis has been primarily reported as a laboratory finding.[5,14]

The most common venomous snakes in Turkey have neurotoxins and hemotoxins, and belong to the Viperidae family.[4] In the present study, bleeding disorder and anemia were the most common systemic complications. Antivenom and erythrocyte suspension were administered. Daily hemogram, and PT, PTT, and international normalized ratio (INR) monitoring can aid in the prevention of complications.

Patients should be evaluated according to grade of bite and clinically treated. Patients with grade 0 or I bites, with no systemic complications, can be discharged after 12 hours of monitoring.[2,15–17] Symptomatic treatment should be administered. Death can result from insufficient therapy. According to the World Health Organization, about 35000–50000 people die annually from snakebites.[2]

In the present study, 69 (52.2%) patients were hospitalized, and 63 (47.7%) were discharged following improvement after 6–12 hours of monitoring. No deaths or negative outcome were observed during 1-year follow-up, the result of accurate clinical grading, monitoring, and treatment.

Conclusions

Complications resulting from toxins of snake venom should be evaluated, and appropriate treatment should be efficiently administered according to snakebite grade. Patients should be monitored with daily hemogram and bleeding diathesis tests. We believe that this approach may prevent or decrease the number of complications.

Conflict of interest: None declared.

REFERENCES

1. Karakus A, Zeren C, Celik MM, Arica S, Ozden R, Duru M, et al. A 5-year retrospective evaluation of snakebite cases in Hatay, Turkey. Toxicol Ind Health 2015;31:188–92. Crossref
2. Kara ME, Ay MO, Seğmen S, Avcı A, İçme F, Gökel Y. Management of Snake Bites. Archives Medical Review Journal 2014;23:272–92.
3. Karakus A, Ozkan M, Karcioglu M, Ozden R, Ustun I, Caliskan K, et al. Diabetic foot due to anaphylactic shock: a case report. Arch Trauma Res 2014;3:17610. Crossref
4. Sönmez BM, Yılmaz F, Yılmaz MS, Kavalcı C, Gökhan Ş, Akbulut AS, et al. Clinical Aspects and Emergent Management of Snake Bites Presented to Emergency Department. J Clin Anal Med 2015;6:558–61. Crossref
5. Bulut M, Eren Ş, Özdemir F, Köksal O, DurmuŞ O, Esen M, et al. Snakebite cases admitted to Uludağ University Faculty of Medicine Emergency Department and current management of snake bite. Akademik Acil Tıp Dergisi 2009;8:31–4.
6. Moreno E, Queiroz-Andrade M, Lira-da-Silva RM, Tavares-Neto J. Clinical and epidemiological characteristics of snakebites in Rio Branco, Acre. [Article in Portuguese] Rev Soc Bras Med Trop 2005;38:15–21.
7. Açikalin A, Gökel Y, Kuvandik G, Duru M, Köseoğlu Z, Satar S. The efficacy of low-dose antivenom therapy on morbidity and mortality in snakebite cases. Am J Emerg Med 2008;26:402–7. Crossref
8. Jenkins JL, Break GR. Manual of emergency medicine. Philadelphia, PA: Lippincott Williams & Wilkins; 2000.
9. Satar S, Karcıoglu O, Sebe A. An usual localization of snakebite antivenin Treated without: a case report. The Mount Sinai Journal of Medicine 2005;72:116–9.
10. Koh DC, Armugam A, Jeyaseelan K. Snake venom components and their applications in biomedicine. Cell Mol Life Sci 2006;63:3030–41. Crossref
11. Ouyang C, Teng CM, Huang TF. Characterization of snake venom components acting on blood coagulation and platelet function. Toxicon 1992;30:945–66. Crossref
12. Gökel Y, Başlamışlı F, Koçak R. Çukurova yöresinde yılan ısırmaları. Çukurova Üniversitesi Tıp Fakültesi Dergisi 1997;22:184–8.
13. Gundappa RK, Sud K, Kohli HS, Jha V, Gupta KL, Joshi K, et al. Snakebite induced acute interstitial nephritis: report of a rare entity. Ren Fail 2002;24:369–72. Crossref
14. Santoro ML, Sano-Martins IS, Fan HW, Cardoso JL, Theakston RD, Warrell DA. Haematological evaluation of patients bitten by the jararaca, Bothrops jararaca, in Brazil. Toxicon 2008;51:1440–8. Crossref
15. Johnston MA, Tullett WM. Adder (Vipera berus) bites: a case report and review of the management for emergency medical personnel. Arch Emerg Med 1993;10:375–9. Crossref
16. Chang KP, Lai CS, Lin SD. Management of poisonous snake bites in southern Taiwan. Kaohsiung J Med Sci 2007;23:511–8. Crossref
17. Köse R. The management of snake envenomation: evaluation of twenty-one snake bite cases. [Article in Turkish] Ulus Travma Acil Cerrahi Derg 2007;13:307–12.

ORİJİNAL ÇALIŞMA - *ÖZET*

Acil servise başvuran yılan ısırması olgularının değerlendirilmesi: 132 olgu

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AMAÇ: Bu çalışmada, yılan ısırması nedeni ile acil servise getirilen hastaların klinik evreleri, gelişen komplikasyonlar, yapılan tedaviler ve sonuçları değerlendirildi.

GEREÇ VE YÖNTEM: Bu amaçla acil servise yılan ısırması nedeni ile getirilen 132 olgu hastane kayıtlarından geriye dönük olarak incelendi.

BULGULAR: Hastaların %42.9'u (n=57) Evre 0 düzeyindeydi. En sık görülen lokal komplikasyon ağrı (n=56; %42.4) iken sistemik komplikasyon International Normalized Ratio (INR) değerinde uzama %5.3 (n=7) idi. Lokal komplikasyonlar her evrede görülebilirken sistemik komplikasyonlar ileri evrelerde görüldü. Yılan antivenomu %46.4 (n=61) hastaya uygulandı. Altmış dokuz hasta (%52.2) hastaneye yatırılırken, 63 hasta (%47.7) acil servisteki 6–12 saatlik gözlem sonrası şifa ile taburcu edildi. Ölüm olgusu görülmedi. Olgulardan altı aylık ve bir yıllık sürede olumsuz geri bildirim alınmadı.

TARTIŞMA: Yılan ısırması olgularında yılan zehirinde bulunan toksinlere göre oluşabilecek komplikasyonlar değerlendirilmeli ve uygun tedavi evrelere göre zamanında başlanmalıdır. Bu yaklaşım komplikasyonların gelişimini engeller veya azaltır.

Anahtar sözcükler: Komplikasyon; tedavi; yılan ısırması.

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