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Retrospective Evaluation of Snake Bites in Eastern Black Sea Region

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Abstract

Objectives: The aim of this study is to review snake bites, which are rarely encountered and thus regionally neglected in Eastern Black Sea Region but which cause potentially serious clinical pictures, in order to provide a better patient management.

Material and Method: In this study, 27 cases who referred to tertiary emergency service due to snake bite were analysed retrospectively.

Results: Of the 27 cases, 70.4%(n=19) were female and average age was found as 46.77±16.11. Referrals were in the month of July when tea and hazelnut farming was frequently done regionally. However, two patients developed syncope and hypotension after admission. The most common complaints of referral were pain (96.3%,n=26), ecchymosis and swelling (88.9%,n=24) due to bite in the lower extremity dorsum of the foot (96.3%,n=26). While 18.5% were referred to our hospital after they were applied antivenom therapy in another health institution, antivenom therapy was applied to 2 patients(7.4%) due to their clinical picture at admission. 29.6% of the patients who referred to the emergency service were followed and treated by being hospitalized. None of the patients admitted with snake bite died. Elevated INR was the most common serious complication with 11.1%(n=3).

Conclusion: Snake bite is a rare situation in Eastern Black Sea region. In cases in the region which is the natural habitat of Vipera kaznakovi, depending on the feature of the venom, hematotoxic complications can occur, local lesions caused by other Viperia species being at the forefront. Appropriate follow-up and treatment should be based on the existing clinical picture.

Key words: snake bite, eastern black sea region, emergency service visit

Özet

Amaç; Doğu Karadeniz Bölgesinde nadir olarak karşılaşılan ancak potansiyel ciddi klinik tablolara neden olan bu durum karşısında daha iyi bir hasta yönetimi sağlanabilmesi için bölgesel olarak ihmal edilen bu durumun gözden geçirilmesini sağlamaktır.

Gereç ve Yöntem: Bu çalışma üçüncü basamak acil servise yılan ısırması nedeniyle başvuran 27 olgu retrospektif olarak incelendi.

Bulgular: Toplam 27 olgunun %70.4'ü (n=19) kadındı ve yaş ortalaması 46.77±16.11 olarak tespit edildi. Başvuru, bölgesel olarak çay ve fındık tarımının sıklıkla yapıldığı Temmuz ayındaydı. Hastaların hepsinin başvuru esnasında genel durumları iyi ve vital bulguları stabildi. Ancak 2 hastada başvuru sonrasında senkop ve hipotansiyon gelişti. En sık başvuru şikayeti alt ekstermite ayak dorsumundaki ısırık nedeniyle (%96.3, n= 26) ağrı (%96.3, n=26), ekimoz ve şişlik (%88.9, n=24) di. Downey ve arkadaşlarının sistemine göre yılan ısırığın ciddiyeti en sık %51.9 (n=14) ile grade 0 olarak değerlendirildi. Olguların %18.5'i başka bir sağlık kuruluşuna başvuru sonrası antivenom tedavi uygulanarak hastanemize yönlendirilmişken 2 hastaya (%7.4) ise başvuru sırasında mevcut klinik tabloları nedeniyle antivenom tedavi uygulanmış. Acil servise başvuran hastaların %29.6'sı yatırılarak takip ve tedavisi düzenlendi. Yılan ısırığı nedeniyle başvuran hastalarda ölümle sonlanım olmamıştır. INR yüksekliği %11.1 (n=3) ile en sık görülen ciddi komplikasyondu.

Sonuç: Doğu Karadeniz Bölgesin de yılan ısırığı nadir bir durumdur. Vipera kaznakovinin doğal yaşam alanı olan bölgedeki vakalarda venomun özelliğine göre diğer Vipera türlerinin neden olduğu lokal lezyonlar ön planda olmak üzere hemototoksik komplikasyonlara da neden olabilir. Uygun takip ve tedavi mevcut klinik tabloya göre düzenlenmelidir.

Anahtar kelimeler: yılan ısırığı, doğu karadeniz bölgesi, acil servis başvuruları

Introduction

In many regions of the world, particularly in subtropical and tropical countries, poisoning from snake bite is an important public health problem[1]. There are more than 600 species of venomous snakes in the world and most of them belong to Elapidae and Viperidae families[2, 3]. In our country, almost all of the poisoning cases belong to Viperidae family (viper snake) and the sub-types show regional differences. For the Eastern Black Sea region, Vipera kaznakovi (Caucasian viper) has been identified as a dangerous sub-type. Especially the structure of the Eastern Black Sea Region has favourable conditions for the life of this species[4].

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Vipera kaznakovi venom is a cocktail rich in protein and peptide toxins with specificity for a wide variety of tissue receptors. With the entry of venom into the body, the clinical picture changes according to the characteristics of the toxin and the local or systemic response of the person to the toxin[5].

The aim of this study is to review snake bites, which are rarely encountered and thus regionally neglected in Eastern Black Sea Region but which cause potentially serious clinical pictures, in order to provide a better patient management.

Materials and Methods

27 patients who referred to Recep Tayyip Erdoğan University Training and Research Hospital Emergency Clinic due to snake bite between 2010 and 2018 were included in this study. The data were collected retrospectively from the hospital data system.

Findings of poisoning were evaluated in all patients. The severity of the reaction was made according to the classification described by Downey et al.[6]. According to this system, stage 0: no local or systemic findings of poisoning, but <2.5 cm swelling and erythema around the tooth marks; stage 1: no systemic findings of poisoning, but swelling and erythema between 2.5-15 cm; stage 2: mild systemic findings with swelling and erythema between 15-40 cm; stage 3: systemic findings with swelling and erythema over >40 cm; stage 4: serious systemic findings accompanied with coma and shock. Demographic and epidemiological characteristics, clinical symptoms and findings, laboratory results, treatment and results were analysed.

The data were analysed by using SPSS for Windows version 17 (SPSS, Chicago, IL, United States). Descriptive statistics were given as average ± standard deviation for metric discrete variables, while they were given as case and percentage for categorical variables.

Results

Demographic and Epidemiological Features: 40.7% (n=11) of the 27 patients who referred due to snake bite between 2010 and 2018 referred in the month of July. The snakes which caused bite were not brought to hospital. However, the snakes were seen and according to the description made, it was estimated that the snakes were Vipera kaznakovi, also called Caucasian viper, located in the region. 40.7% of the patients referred within the first hour after the incident during tea collection procedure in settlements of the city centre in Rize (Table 1).

Anatomical region of the bites was lower extremity dorsum of the foot with a rate of 96.3% (n=26). According to the system of Downey et al. the most common snake bite severity was evaluated as grade 0 with 51.9% (n=14) (Table 2).

Table 1. Demographic Features (n=27)

Gender	Female	19 (70.4%)
	Male	8 (29.6%)
Age	46.77 ± 16.11 (min: 14, max: 87)	
Occupation	Worker	26 (96.3%)
	Student	1 (3.7%)
Place of residence	Rize, City centre	11 (40.7%)
	Artvin, Hopa	6 (22.2%)
	Rize, Kalkandere	2 (7.4%)
Referral to hospital after the incident	Within the first hour	14 (51.9%)
	(min: 1 hour, max: 168 hours)	

Minimum-Maximum (Mean ±Standard Deviation).

Table 2. Severity of the snake bite according to Downey et al.'s system

Stage 0	14 (51.9%)
Stage 1	8 (29.6%)
Stage 2	5 (18.5%)

Symptoms, Clinical Findings and Laboratory Tests: The patients referred to the emergency service most commonly with the complaint of pain (n= 26, 96.3%). Tables 3 and Table 4 show the patients' clinical symptoms, findings, complications and laboratory findings. 59.3% (n=16) of the follow-ups after referral were made in the emergency service of the health institutions the cases referred to. Follow-up period in the hospital varied between 1 and 11 days and the average time was found as 2.77 ± 2.66. 44.4% (n=12) of the patients were followed for one day, 22.2% (n=6) were followed for two days and 3.7% (n=1) patient was followed for 11 days.

Table 3. Clinical Symptoms and Findings

Local	
Tooth mark	22 (81.5%)
Pain	26 (96.3%)
Ecchymosis	24 (88.9%)
Swelling	24 (88.9%)
Paraesthesia	1 (3.7%)
Regional swelling in lymph nodes	9 (33.3%)
Allergic reaction	1 (3.7%)
Systemic	
Nausea	2 (7.4%)
Vomiting	1 (3.7%)
Hypotension	2 (7.4%)
Syncope	2 (7.4%)

Table 4. Complications and Findings Related to Snake Bite

Complications	n (%)
Wound infection	7 (25.9%)
Thrombophlebitis	1 (3.7%)
Compartment syndrome	1 (3.7%)
Laboratory findings	n (%)
Leucocytosis	20 (74.1%)
Thrombocytopenia	1 (3.7%)
Elevated PT/APTT/INR	3 (11.1%)
Elevated urea	5 (18.5%)
Elevated creatinine	2 (7.4%)
Elevated CPK	14 (51.9%)
Elevated SGOT/SGPT	2 (7.4%)
Elevated LDH	17 (63%)
Haematuria/proteinuria	3 (11.1%)

APTT, Activated partial thromboplastin time; CPK, Creatine phosphokinase; INR, International Normalized Ratio; LDH, Lactate dehydrogenase; SGOT, Serum glutamic-oxaloacetic transaminase; SGPT, Serum glutamic-pyruvic transaminase; PT, Prothrombin time

Treatment and Outcome: After the patients were admitted to the emergency service, they were followed in terms of vitals, local, systemic and delayed findings. The wounded extremity was immobilized and rested. The patients were evaluated in terms of tetanus immunization and tetanus prophylaxis was performed on patients if necessary. Depending on the presence of symptom, analgesic, antiemetic, antiallergic and antibiotherapy were applied by taking fluid electrolyte balance and urine output into consideration. Dialysis was not required in any of the patients who were found to have elevated urea and creatinine. No serious coagulation disorder was found.

18.5% of the cases had been referred to out hospital after having been given antivenom therapy in another health institution. Two patients (7.4%) received antivenom therapy at admission due to their existing clinical picture. 29.6% of the patients who referred to the emergency service were followed and treated by being hospitalized. None of the patients admitted with snake bite died.

Discussion

Snake bite is included in the "Neglected Tropical Diseases" which require intervention by the World Health Organization[7]. This situation is not only limited to tropical regions; it is also valid in the Eastern Black Sea Region of our country. When the literature was reviewed, no case series related to snake bites of the region were found.

Geographical structure of Eastern Black Sea Region and the growing areas of main sources of livelihood such as tea and hazelnut create a natural habitat for Vipera kaznakovi. Although snake bites are not very common especially regionally, lack of adequate protective measures in July, which is the period with the highest temperature in tea or hazelnut collection periods, increased exposure. We think that this situation can be evaluated as a professional exposure for the region. In a study Al et al. evaluated snake bites in adults in Southeast Anatolia Region in 2010, snake bites were found to be a professional risk in middle aged individuals[8]. This result is similar to our results.

It was found that 70.4% of the exposed individuals were female. This is due to the fact that female workforce is at the forefront in the agricultural areas which are the main source of income regionally. In studies conducted worldwide, victims were found to be generally adult males[9]. We think that this situation results from the regional differences within the country as well as difference between countries. Although snake bites are seen in all age groups, it was found that average age was 46.77 ± 16.11 (min: 14, max: 87) with a wide range. It is noteworthy that the wide age range in this study is due to the differences between the communities in which other studies are conducted.

Snake venom is a cocktail rich in protein and peptide toxins that are specific for a wide variety of tissue receptors that can cause local and systemic findings[10, 11]. This feature varies according to the type of snake and thus causes the emergence of different clinical pictures. As in other Viperid species, Vipera kaznakovi, which lives in the Eastern Black Sea Region, often causes local reactions such as pain, bruising and swelling and tissue necrosis, coagulopathy, haemorrhage, Rhabdomyolysis and/or acute kidney damage[20]. In the present study, it was found that the patients referred to emergency service within the first hour most frequently with the complaints of pain as a result of bite in lower extremity foot dorsum with a rate of 96.3%. In parallel with the literature[12, 13], in the present series, it was found that all patients were conscious upon admission, while 7.4% of the patients were found to have a tension artery lower than 90/60 mmHg and their vitals were not stable. This is seen as the effect of a protein suppressing the myocardial functions in the venom of some Viperia species[14]. In addition, as an indicator of consumption coagulopathy caused by venom, it was found that INR, PT, APTT values were high in 3 patients and thrombocytopenia was found to develop in one patient. According to the system of Downey et al.[6], the severity of snake bites was evaluated most frequently as grade 0 with a rate of 51.9%. The results found showed similarity with other case series of Viperia species snake bites in terms of both local effects and systemic findings. Although the risk of an individual's being bitten by a snake is low, death rate is high. Traditional treatments such as sucking and cutting are used especially in snake bites in rural areas and most of the time,

these cases die before they reach the hospital. In the present series, 96.3% of the cases occurred during tea collecting in the rural area. However, only 40.7% referred to emergency service from their settlement within the first hour and they received tourniquet, which is a traditional method. Following their admission to the emergency service, the patients were followed in terms of vitals, local, systemic and delayed findings and the affected extremity was immobilized, tetanus prophylaxis was performed to patients who needed tetanus prophylaxis and depending on the presence of symptoms and paying attention to fluid electrolyte balance and urinary output, fluid, analgesic, antiemetic, antiallergic and antibiotherapy were applied. 25.9% of the patients received antivenom therapy in parallel with the literature due to their existing clinical state[15,16]. Antivenom therapy is thought to be unnecessary for all snake bites, and it was applied only on cases when necessary in the present study[17]. Depending on the snake bite, it can cause myonecrosis compartment syndrome which occurs under the influence of venom. Although this is not an actual compartment syndrome, in cases with typical findings, it is necessary to measure the pressure between compartments and to request surgical consultation in case of increase[18, 19]. In this series, compartment syndrome developed only in one case and fasciotomy was applied.

Various complications resulting from systemic involvement and delayed treatment or incorrect applications can cause death[20]. However, none of the patients followed and treated in this series (n= 27) died and all of them were discharged in healthy conditions.

As a conclusion, snake bite can be defined as a rare and neglected situation for Eastern Black Sea region. For this reason, our study was conducted with limited number of cases. In cases in Vipera kaznakovi's natural habitat, systemic complications such as hemototoxic and cytotoxic complications can occur, local lesions caused by other Viperia species being at the forefront. Appropriate follow-up and treatment should be arranged according to the existing clinical picture. We think that this approach can prevent or decrease complications.

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