Hematotoxicity in Patients with Snake Bite

Afsheen Ishfaq*, Faran Maqbool*, Saima Humayun Toor*, Syed Irfan Ahmed**.
*Department of Medicine District Headquarters Hospital and Rawalpindi Medical College;** Department of Medicine Benazir Bhutto Hospital Rawalpindi and Rawalpindi Medical College

Abstract

Background: To determine the frequency of haemotoxicity in patients with snake bite.

Methods: In this descriptive study patients (n=84) with history of snake bite were included. After detailed history, patients were assessed for spontaneous bleeding along with evaluation of laboratory parameters for hemotoxicity.

Results: Majority (71.4%) were males. Age group maximally affected by snake bite was 21-30 years (38.1%). Hemotoxicity was seen in 69% patients, while neurotoxicity was seen in 3.3%. Deranged PT and APTT were the most frequent abnormality (81%), followed by hematuria (27.6%) and thrombocytopenia (20.7%). Spontaneous bleeding from mucocutaneous sites, hematemesisis and bleeding from venepuncture site were seen in 8.6%, 8.6% and 5.2% of hematotoxic snake bites respectively.

Conclusion: Snakebite is a major public health problem. Hemotoxic snake bites are potentially dangerous, and are the most common type of snake bites in our setup.

Key Words: Snakebite, Haemotoxicity

Introduction

Snake bite is a serious public health problem. It causes significant morbidity and mortality as venomous snakes are native throughout the world. It has been estimated that 5 million snake bite cases occur worldwide every year, causing about 100,000 deaths.1 It is estimated that each year 4 million persons are bitten in Asia alone, half of the bites being venomous. For Africa and Latin America about 1,000 deaths may occur in each area annually.2-4 Pakistan has an estimated 20,000 snakebite deaths each year.5 The incidence of snake bite in developing countries however is underestimated because most victims prefer to go to traditional healers rather than seeking treatment at hospitals.5-8

On an average - cobras and sea snakes result in about 10% mortality ranging from 5-15 hours following bite. Vipers have a more variable mortality rate of 1-15% and generally more delayed (up to 48 hours). While there are many factors influencing the outcome in victims of snake-bite, there is significantly higher mortality among victims who have delayed presentation and develop neurotoxicity.9 Not all bites by poisonous snakes are venomous.10 Most snake bites occur during the monsoon season because of flooding of the habitat of snakes. Incidence also varies with farming activity in relation to rainfall, as it increases the chances of exposure to snake, and to the yearly reproductive cycle of the snake. Epidemics of snake bite have occurred in Pakistan, India and Colombia due to severe flooding.11,12 Male predominance, higher incidence in field areas, involvement of lower extremities are common features in many studies.13-16

Most snake bites occur on the feet and ankles of agricultural workers, snake handlers and hunters. For these people, envenomation is an occupational hazard. Snakes do not generally attack human beings unprovoked. Bites mostly happen when the snake is trodden on in darkness or unintentionally picked up along with foliage. Intentional handling or trying to play with snake also results in bite. At night snake may enter the house in search of prey (mice, lizards etc) and bite the person sleeping on the floor.17 Snake venoms are not single toxins but cocktail of many components: enzymes, non enzymatic compounds, non-toxic proteins, metals, carbohydrates, lipids, free aminoacids, nucleotides and biogenic amines. The venom composition varies from species to species and is the basis of the clinical diversity of ophitoxaemia. Ophitoxaemia leads to increase in the capillary permeability which may cause loss of blood and plasma volume into the extravascular space leading to edema and may be severe enough to compromise circulation. The venom may also have direct neurotoxic action leading to paralysis and respiratory arrest, cardiotoxic effect causing cardiac arrest, myotoxic and nephrotoxic effect.18

Patients and Methods

This descriptive study was conducted at Medical Emergency Departments of Benazir Bhutto Hospital and District Headquarters Hospital. The duration of study was six months i.e. from 02.07.2009 to 01.01.2010. Patients (n=84) with history of snake bite were included in the study. Patients with history of
bleeding diathesis, patients receiving anti coagulants and those with chronic liver disease (history of liver disease for >6 months and evidence of chronic liver disease on abdominal ultrasound) were excluded from the study. Patients were observed by naked eye for spontaneous bleeding from mucocutaneous sites, bleeding from venepuncture sites and hematemesis (vomiting of blood: bright or coffee ground) as evidence of hematotoxicity. Hematotoxicity was measured in form of presence of thrombocytopenia on blood complete picture, hematuria and deranged coagulation profile (PT/APTT). Urine microscopy was done for presence of hematuria. All patients showing signs and symptoms of toxicity were treated with anti snake venom according to standard protocols.

Results

A total of 84 cases of snake bite (14-70 years of age) were enrolled. Majority (71.4%) were male. Mean age of patients was 33.06 years (SD ±14.58). Age group that was maximally affected by snake bite was between 21-30 years (Table 1). Hematotoxicity was seen in 69%, where as neurotoxicity was seen in 3.3% (Table 2 & 3).

Table 1. Haematotoxicity according to gender

<table>
<thead>
<tr>
<th>Gender of patient</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Male</td>
<td>40 (66.7)</td>
</tr>
<tr>
<td>Female</td>
<td>18 (75.0)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>58 (69.0)</td>
</tr>
</tbody>
</table>

Table 2. Comparison of venomous and non venomous snake bites.

<table>
<thead>
<tr>
<th></th>
<th>Venous snakebites 100% (84 patients)</th>
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<tbody>
<tr>
<td></td>
<td>Venous</td>
</tr>
<tr>
<td>Hemotoxic</td>
<td>71.4% (n=60)</td>
</tr>
<tr>
<td>Neurototoxic</td>
<td>96.7% (n=58)</td>
</tr>
</tbody>
</table>

Deranged PT and APTT were the most frequent abnormality, each seen in 47 patients (81%) with hematotoxicity, followed by hematuria (27.6%, n=16) and thrombocytopenia (n=12, 20.7%). Mean PT was 30.83 ±15.89 sec and mean APTT was 50.88 sec (SD ±20.24). Spontaneous bleeding from mucocutaneous sites was seen in 8.6% (Table 3). Ptosis was seen in neurotoxic snake bites. All 84 cases were hospitalized. Patients who did not show signs and symptoms of toxicity were discharged after 24 hours of hospitalization, whereas ASV was administered to all cases of venomous snake bite according to the hospital protocol.

Table 3: Snakebite induced toxicity-Clinico-haematological profile

<table>
<thead>
<tr>
<th>Variable</th>
<th>No (%)</th>
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<tbody>
<tr>
<td><strong>Haematotoxicity (n=58)</strong></td>
<td></td>
</tr>
<tr>
<td>Deranged PT/APTT</td>
<td>47 (81)</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>12 (20.7)</td>
</tr>
<tr>
<td>Haematuria</td>
<td>16(27.6)</td>
</tr>
<tr>
<td>Spontaneous bleeding from mucocutaneous sites</td>
<td>5(8.6)</td>
</tr>
<tr>
<td>Haematemesis</td>
<td>5 (8.6)</td>
</tr>
<tr>
<td>Bleeding from venepuncture site</td>
<td>3 (5.2)</td>
</tr>
<tr>
<td><strong>Neurotoxicity (n=2)</strong></td>
<td></td>
</tr>
<tr>
<td>Ptosis</td>
<td>2 (100%)</td>
</tr>
<tr>
<td>Ophalmoplegia</td>
<td>2 (100%)</td>
</tr>
<tr>
<td>Respiratory muscle weakness</td>
<td>2 (100%)</td>
</tr>
</tbody>
</table>

Discussion

Snake bite is a global problem, especially of rural communities living in the tropics, where basic health facilities are poor and as a result deaths are common. The true burden of snake bite is not known due to under and misreporting. South Asia is the world’s most heavily affected region, due to its high population density, widespread agricultural activities, venomous snake species and lack of functional snake bite control programs.

Snake venom, the most complex of all poisons, is a mixture of enzymatic and non-enzymatic compounds as well as other non-toxic proteins, carbohydrates and metals. The variation of venom composition from species to species explains the clinical diversity of ophitoxaemia. Venomous snake bites can present with local or systemic features of envenoming - haematotoxities, neurological symptoms, myotoxicities, organ failure and some nonspecific features. In some cases victims present with complication of treatment by traditional healers or self induced inappropriate application of tourniquet.

Studies show that young age group is a more vulnerable section of the population for snake bite. Gender distribution is almost uniform in literature with males being affected twice or thrice as commonly as females. As males are more commonly involved in outdoor activities, this might explain why they fall prey to snakes more frequently.

There may be predominance of a type of toxicity seen in a population in certain geographical area of the world. This can be attributed to the species of snakes found in that particular area. In a descriptive case series in Amritsar (India), Singh et al. reported that all
of the envenomations were neurotoxic. Sheikh et al. found primarily hemotoxic manifestations of snakebite in majority. Hematotoxicity was seen in a large number (69%) of patients in our study, making it a predominant manifestation. Not all snake bites result in systemic envenomation. In our study a total of 71.4% of snake bite victims showed signs and symptoms of toxicity, of which 96.7% of venoms bites were hemotoxic bites and only two cases of neurotoxic bites (ptosis, ophthalmoplegia, respiratory muscle weakness) were seen. Rest of snake bites were unable to produce any toxic manifestations in victims i.e. they were dry bites. This observation is consistent with the studies done earlier in both of these hospitals.

Venoms such as Russell’s viper venom contain enzymes that have a procoagulant effect in vitro; while in vivo there is an anticoagulant effect. This is because these enzymes activate different steps of the clotting cascade. A purified enzyme can influence several coagulation factors simultaneously. Most of this is immediately broken down by the body’s own fibrinolytic system. Eventually the levels of clotting factors become so depleted that the blood will not clot. This is called consumption coagulopathy. Sufficient quantities of neutralizing antivenom should be administered before making attempts to correct a coagulopathy.

In an Iranian study hematuria was seen in 68% of victims where as in our study, the frequency was 27.6% in those showing hematotoxic manifestations. It can be ascribed to an increased number of rhabdomyolysis, myoglobinuria and hemoglobinuria, in Iranian study. These parameters can lead to increased risk of renal damage which in turn leads to hematuria. Thrombocytopenia and platelet dysfunction is commonly seen in snake bites. It can be due to different proteins which can destroy and also can protein functional platelets impairment.

**Conclusion**

In our set up hemotoxic snake bites and are potentially dangerous and are most common type of bite

**References**
