Journal of Rawalpindi Medical College (JRMC); 2010;14(1):22-25

Snake Bite: Clinical Profile and Evaluation of Effective Anti-Snake Venom Dose

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Abstract

Background: **To determine the optimal dose of antisnake venom required to treat hemotoxic snake bite more effectively.**

Methods: **In this interventional study, out of 52 patients 46 patients with the features of systemic envenomation .i.e. deranged coagulation profile, nephrotoxic or neurotoxic features were assessed clinically and through laboratory tests, while 06 patients had no feature of envenomation. Patients with systemic envenomation were given Antisnake venom.**

Results: **Hemotoxicity was the most common clinical manifestation of snake bite i.e. 39 patients of hemotoxic envenomation, 4 with neurotoxic features while 03 patients had mixed toxicity i.e. hemotoxic, neurotoxic and nephrotoxic. 12 patients responded to single dose of 06 vials (10 ml each vial; total dose of 60 ml), 28 patients required further dose of anti snake venom after initial dose of 6 vials while 06 patients received even higher dose of anti snake venom i.e. 18 vial (180 ml) with blood transfusion. Of these 06 patients, 02 required mechanical ventilation, 02 with nephrotoxicity were referred to dialysis unit, and 02 mortalities were encountered, one with intracranial bleed and other with mixed toxicity and delayed presentation of patient.**

Conclusion: **Most patients with envenomation require higher dose of anti snake venom . An increase in morbidity and mortality is mainly due to delayed presentation after snake bite and under dosage of ASV.**

Key Words: **Snake bite, Snake venom, Hemotoxic, Envenomation.**

Introduction

Snake bite remains a public health problem in many countries even though it is difficult to be precise about the actual number of cases. It is estimated that the true incidence of snake envenomation could exceed 5 million per year, with nearly 50,000 deaths 400,000 develop severe sequelae [1]. The global disparity in the epidemiological data reflects variations in health reporting accuracy as well as the diversity of economic and ecological conditions [2]. Accurate records to determine the exact epidemiology or even mortality in snake bite cases are also generally unavailable [3]. Hospital records fall far short of the actual number owing to dependence on traditional healers and practitioners of witchcraft etc. It has been reported that in most developing countries, upto 80% of individuals bitten by snakes first consult traditional practitioners before visiting a medical centre [4,5].

There are misconceptions concerning the level of snakebite prevalence and mortality in Pakistan, mainly published by international observers. Estimates are given of 20,000 snakebite deaths [6] and yet the Health Department morbidity and mortality figures from Tharparker District (Pop. 0.9 Million), with the most significant snakebite problem, in 2003 were 24.41 and 1.1 respectively, per 100,000 [7].

Approximately 15 percent of the 3000 species of snakes distributed world wide are venomous. Snake envenomation is termed technically as ophitoxemia [8-9].

The main stay of treatment of snake bite is antisnake venom that neutralizes the venom. Type of ASV available in Pakistan is Liquid ASV provided by National Institute of Health Islamabad Pakistan

Much has been written about the initial dose of ASV to be administered, most of which, such as the advice on the ASV product insert is completely misleading or incorrect [10]. When determining dosage levels, particularly the initial dose of ASV, it is important to consider the amount of venom injected by the snake in an average bite. Russell's viper and cobra inject approximately 60mg of venom in the average bite. Each ASV vial neutralizes 6mg of cobra and Russell's viper venom and therefore the initial dose of ASV should be 8-10 vials in all cases with clear evidence of envenoming[11].

The objective of this study was to look into different clinical manifestations of snake bite in population of study area and to assess proper effective dose of antisnake venom in an attempt to establish local protocols.

Patients and Methods

This Hospital based study was carried out in District Headquarters Hospital (DHQ) Rawalpindi from April 2008 to July 2008. A total of 52 patients presenting in emergency department with history of snake bite were studied. .An inclusion criterion for patients in study was; history of snake bite i.e. eye witness account of snake bite, local features i.e. fangs marks, cellulitis, and patients with systemic features such as evidence of hemotoxicity i.e. bleeding tendency, deranged coagulation profile, prothrombin time (PT) more than 30 of normal, activated partial thromboplastin time (APTT) more than 30 of normal or platelets count <100,000 which were performed in hospital laboratory. Other investigations such as serum urea, creatinine, creatine phosphokinase (CPK), lactate dehydrogenase (LDH), were also done in all patients to look for nephrotoxic and myotoxic envenomation. Patients with features of neurotoxic features i.e. new onset of ptosis, dysphagia, nasal regurgitation, respiratory distress requiring mechanical ventilation were admitted in intensive care unit (ICU) where the facility of mechanical ventilation was available. Patients with clear features of systemic envenomation were given Antisnake venom.i.e. Poly valent liquid ASV (10 ml each vial) provided by National Institute of Health Islamabad Pakistan with well maintained cold chain.

Initial dose of 06 vials was given in 500ml of normal saline over 2 hrs. After 6 hrs of ASV infusion, patients were reassessed clinically and through laboratory tests. In case of no improvement the same dose of ASV was repeated.

The patients bleeding profusely were transfused with blood, platelets, or fresh frozen plasma accordingly in addition to ASV. Patients with evidence of nephrotoxicity i.e. markedly raised urea and creatinine, myotoxicity markedly raised LDH, and CPK (rhabdomyolysis) were referred to dialysis units.

Results

Out of 52 patients 28 (53.8%) presented within 24 hrs, 16.30% presented within 48 hrs while 08 (1.5%) patients presented after 48 hrs of snake bite(fig 1). Most, 42 (80%) patients were male while 10 (20%) were female. Forty six (88%) patients had the features of systemic envenomation while 6(12%) had no features. The most common clinical manifestation of snake bite found was hemotoxicity (84.7%), followed by neurotoxicity (4 patients; 8.7%) , while 3 patients (6.5%) revealed mixed toxicity , i.e., hematotoxicity, neurotoxicity and nephrotoxicity(fig 2) . Twelve (26%) patients responded to single dose of 06 vials (60ml), 28 (60.8%) patients required further dose of ASV after initial 6 vials i.e. (120ml).

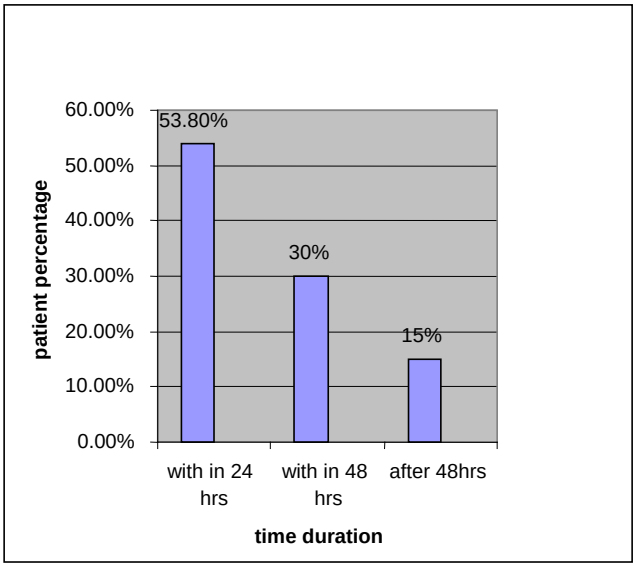

Fig1 : Duration of presentation after snake bite

Six (13%) patients received higher dose of ASV 180ml with blood and blood products(Fig 3)

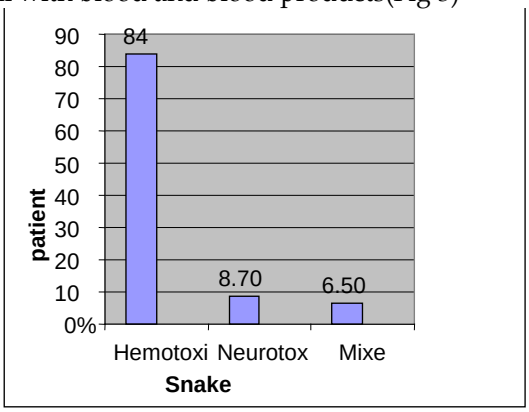

Fig2: Nature of Snake Envenomation

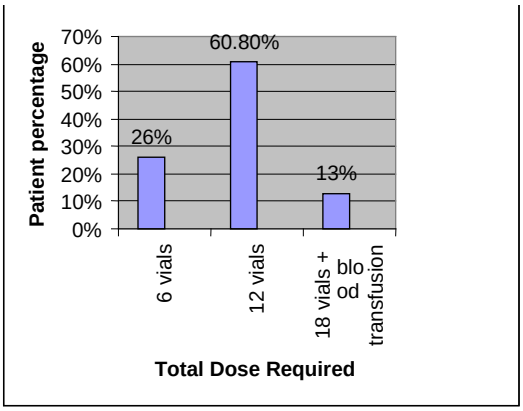

Fig 3: Dose Response Relationship

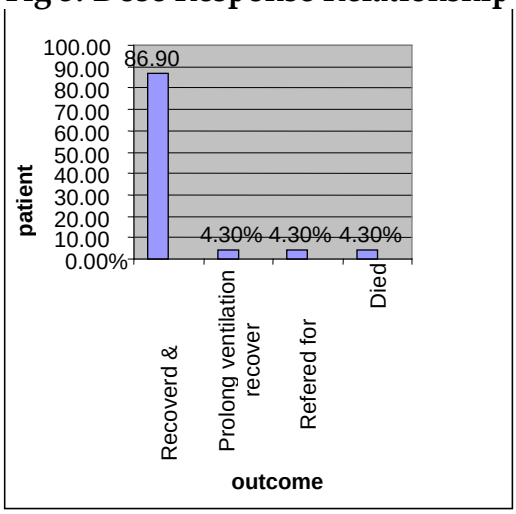

Fig 4: Outcome of patients

Out of total 46 envenomed patients 40 (86.9%) recovered. 02(4.3%) patients required prolonged mechanical ventilation and Intensive care but recovered. 02 (4.3%) patients with nephrotoxicity were referred to dialysis unit after giving initial dose of ASV(fig4).Two (4.3%) mortalities were encountered one (2.17%) with intracranial bleed and other (2.17%) with mixed toxicity and delayed presentation of patient.

Discussion

This study shows a predilection of male victims of snake bite. The age and sex incidence of snake bite victims throws light on the vulnerable section of the population. While snake bite is observed in all age groups, the large majority (90%) are in males aged 11-50 years. The predominance of male victims suggests a special risk of outdoor activity [12].

In our study 8 (15%) patients presented even after 48 hrs of snake bite and those with features of systemic envenomation were having more complex clinical picture. The delay is due to people using folk and indigenous remedies before reaching the hospital especially in rural areas.

There is no consensus as to the outer limit of time of administration of antivenom. Best effects are observed within four hours of bite [13]. It is effective in symptomatic patients even when administered up to 48 hours after bite. Reports suggest that antivenom is efficacious even 6-7 days after the bite [14].

Six patients in study had clear history of snake bite but were asymptomatic and had no sign of ophitoxemia, so ASV was not given to them.

The most obvious explanation for a confirmed snake-bite but no clinical manifestations are bite by a non-poisonous species. However, it is well documented that a large number of poisonous species also often do not cause symptoms. In a study of 432 snake-bites in North India, Banerjee noted that 80% of victims showed no evidence of envenomation[15]. Most common manifestation found in study population was coagulopathy beside the local manifestations which were in almost all patients. The most common and earliest symptom following snake bite (poisonous or non poisonous) is fright[16], particularly of rapid and unpleasant death [17] .Owing to fright, a victim attempts 'flight' which unfortunately results in enhanced systemic absorption of venom.

These emotional manifestations develop extremely rapidly (almost instantaneous) and may produce psychological shock and even death. Fear may cause also transient pallor, sweating and vomiting. Local pain with radiation and tenderness and the development of a small reddish wheal are the first to occur. This is followed by edema [13] swelling and appearance of bullae - all of which can progress quite rapidly and extensively even involving the trunk [18]. Tingling and numbness over the tongue mouth and scalp and paraesthesias around the wound occur mostly in viper bites [17]. Local bleeding including petechial and/or purpuric rash is also seen most commonly with this family.

Hematological changes are some of the commonest features of snake bite poisoning. Bleeding may occur from multiple sites including gums [19], GIT (haematemesis and melaena), urinary tract, injection sites and even as multiple petechiae and purpurae. Subarachnoid haemorrhages were documented in 5 of 200 cases in Saini's series of patients in Jammu region [20]. In addition cerebral haemorrhage and extradural haematoma have also been reported [21,22] .

The use of whole blood in dealing with viper

bites is common in Pakistan. Some doctors express a view that after 24 hours, ASV had no role and blood products should be used instead. However, the primary means of restoring clotting factors to normal levels is by the use of ASV. Persisting bleeding should prompt the administration of additional antivenom [24, 25]. Once the venom has been adequately neutralized with anti venom the liver will begin to restore factors to normal levels. Blood or blood products are only required in exceptional circumstances such as severe bleeding and should not in any eventuality be given until coagulation has been restored [23].

The ASV used in our study was the liquid Antisnake venom produced by National Institute of Health Islamabad, Pakistan and in case of no improvement and profuse bleeding its dose was repeated.

In conclusion, snake-bite is a common life-threatening emergency in the study area. Occupational risk and an increased seasonal incidence of snake-bite was observed.Knowledge of the varied clinical manifestations of snake-bite is important for effective management, ready availability and appropriate use of antisnake venom, close monitoring of patients, institution of ventilatory support and early referral to specialized units when required, helps in reducing the mortality.

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