

Full Length Research Paper

Management of snake bite in resource-challenged setting: A review of 18 months experience in a Nigerian hospital

Joseph O. Fadare^{1,*} and Afolabi OA²

¹Department of Internal Medicine, Kogi State Specialist Hospital, Lokoja, Nigeria.

²Department of Surgery, Kogi State Specialist Hospital, Lokoja, Nigeria.

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Snake bite is a worldwide environmental and occupational hazard with significant public health importance. The management of snake bites includes the use of specific anti-venom, use of clotting factors and tetanus prophylaxis. In many developing countries however, specific anti-venoms are not widely available and this might affect the outcome of patient management. The main objective of this work is to analyze the clinical presentation, management and outcome of snake bite patients a resource-challenged environment like ours. The study is a cross-sectional retrospective review of medical records of all patients admitted with snake bite to the male and female medical wards of the Specialist Hospital, Lokoja, Nigeria from 1st January, 2009 till the end of June 2010. Information retrieved for the purpose of this study include patients' bio data, affected part of the body, summary of presenting complaints, mode and outcome of management. A sum total of six hundred and sixty-six patients were admitted to the medical wards of the hospital during the period in question out of which fifteen cases (2.25%) of snake bite were recorded. Eleven patients (73.3%) were male and the mean age was 34.3 ± 1.9 years. The most common presenting feature was local swelling (100%), followed by bleeding from the site of envenomation (50%) while four (33%) patients had haematuria. Snake antivenom was administered in eleven patients (91.7%) while five patients had whole blood transfused. No mortality was recorded among the patients admitted with snake bite. The management of snake bite in Nigeria is hampered by unavailability of specific antivenom and other supportive measures like clotting factors and cryoprecipitate. There is a need to make effective and safe antivenoms available and affordable to improve patients' outcome. This work has shown however that it is possible to have good outcomes despite the many challenges encountered by health care personnel.

Key words: Snake bite, management, antivenom, resource-challenged environment.

INTRODUCTION

Snake bite is a worldwide environmental and occupational hazard with significant morbidity and mortality which has been found to occur more among farmers, plantation workers and other people who dwell outdoors especially in rural and poor communities (Alirol et al., 2010; Ahmed et al., 2008; Habib et al., 2008; Pugh and Theakston, 1980). In Nigeria, it commonly affects the

rural population of the savannah region of the country where farming and animal husbandry are the major occupation. The incidence of snake bite worldwide cannot be accurately estimated and the reasons for this include: lack of immediate access to healthcare, influence of traditional beliefs and practices and poverty. In the Nigerian savannah, the incidence of snake bites has been reported to be in the range of 48 to 497 per 100,000 populations per year (Pugh and Theakston, 1980) which indeed can only be an estimate because of the earlier cited reasons. Four main families of snakes (Viperidae,

*Corresponding author. E-mail: jofadare@gmail.com.

Elapidae, Colubridae and Actraspididae) have been identified to be responsible for this problem in Nigeria with three species from the first two families - carpet viper (*Echis ocellatus*), black-necked spitting cobra (*Naja nigricollis*) and puff adder (*Bitis arietans*) being the most common culprits for envenomation in Nigeria (Habib et al., 2001). *E. ocellatus* has been reported to be responsible for the majority of envenomation in the savannah region of Nigeria.

The clinical manifestations of snake bites depend mainly on the specie responsible for envenomation and could affect the central nervous system, kidneys, blood coagulability and the cardiovascular system (Reid and Theakston, 1986). There are also local effects at the site surrounding the point of envenomation. In Nigeria, the main specie responsible for envenomation, *E. ocellatus* has been found to contain a prothrombin activating procoagulant, haemorrhagin which causes bleeding, incoagulable blood, shock and local reactions/ necrosis (Habib et al., 2001). The management of snake bites includes the use of snake anti-venom, use of clotting factors, tetanus prophylaxis and sometimes administration of antibiotics (White, 2005; Tagwireyi et al., 2001). Specific anti-snake venom is usually preferred as it offers better neutralizing properties as compared to non-specific ones. However in many developing countries, use of specific anti-snake venoms is limited because of non-availability, promotion of non-specific anti-venoms and high cost of specific anti-venoms where available (Warrell, 2008; Chippaux and Kambewasso, 2002). This problem of non-availability of specific anti-venom has contributed in no small measure to increasing mortality and morbidity from snake bites in the tropics. In Nigeria, there are three types of anti-snake venom that are sometimes available for purchase: polyvalent non-specific anti-venom produced in India, the Pasteur anti-snake venom and the EchiTab anti-venom which was developed recently specifically for snake bites from the carpet viper, *E. ocellatus* (Habib et al., 2001). From our experience, the most common anti-venom found in the Nigerian market is the polyvalent non-specific type produced in Asia followed by the Pasteur anti-venom. The newly developed EchiTab anti-venom is not yet widely available as it is still undergoing the stringent process of registration (Laing et al., 2003).

The main objective of this work is to analyze the clinical presentation, management and outcome of snake bite patients a resource-challenged environment like ours.

MATERIALS AND METHODS

Setting

This study was carried out at the Kogi State Specialist Hospital, a

tertiary health care facility in Lokoja, North-Central Nigeria. This center is an 80-bed institution with clinical specialists in the area of Internal Medicine, Surgery, Paediatrics, Family Medicine and Gynaecology/Obstetrics that caters for the health care needs of about 3 million people residing in Kogi and other neighboring states of the North-Central region of Nigeria.

Procedure

The study is a cross-sectional retrospective review of medical records (admissions and discharge registers, case notes and death certificates) of all patients admitted to the male and female medical wards of the hospital from January, 2009 till the end of June, 2010. The records of all patients presenting with snake bite were extracted and analyzed. Information retrieved for the purpose of this study include: the age and gender of the patients, month of envenomation, affected part of the body, summary of presenting complaints and mode of management. All the above mentioned variables in addition to the outcome of patient's management were entered and analyzed using Microsoft Excel. The results were expressed as means and frequencies.

RESULTS

A sum total of six hundred and sixty-six patients were admitted to the medical wards of the hospital during the period in question out of which fifteen cases of snake bite were recorded. This represents only 2.25% of the total admission on the medical wards during the study period. However we were able to retrieve the full medical records of only twelve (12) patients for full analysis and review. Majority of the patients (11 to 73.3%) were male while only four (26.7%) were of the female gender. The mean age of the patient was 34.3 years (± 1.9). In all cases, the snake bite affected the lower limbs with the left foot being affected in seven cases and the right in five. Five of the affected patients were bitten during the months of the rainy season (May to October) while the remaining seven patients had their episodes during the months of the dry season (November to April). Majority of the patients (75%) were attacked during the evening or at night. No mortality was recorded among the fifteen patients seen during the study period.

The most common presenting feature was local swelling which was present in all the cases, followed by bleeding from the site of envenomation (50% of cases) while four (33%) patients had haematuria. Other less frequent clinical features include bleeding from the gums, bleeding from venepuncture sites, conjunctival haemorrhage, acute renal failure and sublingual haematoma (Table 1). Ten (83.3%) patients had deranged crude bedside clotting time on presentation.

In managing these patients, administration of anti-snake venom was carried out in eleven patients (91.7%), while five patients had fresh whole blood transfused. Three types of anti-venom were used in the treatment of

Table 1. Presenting features among snake bite patients.

Presenting features	Frequency	Percentage
Local swelling	12	100
Bleeding from bite site	6	50
Haematuria	4	33.3
Acute renal failure	1	8.3
Bleeding from gum	1	8.3
Conjunctival haemorrhage	1	8.3
Sublingual haemorrhage	1	8.3
Bleeding from venepuncture site	1	8.3

these patients: the Institute Pasteur Serum (Ipser) African antivenom (polyvalent equine F(ab')₂ antivenom, *Bitis arietans*, *B. gabonica*, *Echis leucogaster*, *Naja melanoleuca*, *N.haje*, *N.nigricollis*, *Dendroaspis viridis*, *D.jamesoni*, *D.augusticeps*), the MicroPharm "EchiTab G" antivenom (monospecific, *E. ocellatus*, caprylic acid purified whole IgG antivenom and the polyvalent snake antivenom Asia (*Bungarus caeruleus*, *Daboia russelii*, *Echis carinatus*, *Naja naja*). The Pasteur anti-venom was administered in ten patients (83.3%) while only one patient had the EchiTab anti-venom. One patient had 5 vials (50 ml) of the polyvalent non-specific anti-snake venom from India with no effect necessitating a change to the Pasteur type. The average number of vials administered was 2 (Range 1 to 5 vials). Five of the patients had blood transfused with a mean volume of 2.8 pints of blood (Range 1 to 4 pints). Two patients reacted to the anti-venom (one to the non-specific polyvalent and another to the Pasteur anti-venom) necessitating the use of parenteral anti-histamines and hydrocortisone. About half of the patients had antibiotics administered during the period of their hospital stay.

DISCUSSION

It was interesting to note the relatively small number of patients with snake bite in our study despite the fact that the study site is located in the savannah region of North-Central Nigeria. Habib et al. have earlier reported the fact that less than 10% of snake bite victims present at any health care facility and many of them actually patronize traditional health practitioners. Another factor is the fact that the study site is actually located in the transitional section tropical between the tropical and savannah regions of Nigeria hence the incidence of snake bite may not be as high as those from the northern parts of the savannah. The preponderance of male patients among our series can only be explained by the professional responsibilities of men in a predominant agrarian

community and this result is in keeping with that from similar studies from other regions (Chippaux and Kambewasso, 2002; Sharma et al., 2005). The mean age recorded in this study, (34.3 ± 1.9 years) also supports the notion that snake bite is more common among the young and active members of the population. Having a patient aged 74 years among our cases should also not be surprising as elderly people still work on the farms in these communities. The finding that only the lower limbs were affected and most bites occur at night might be due to the fact that the reptiles were disturbed or stepped upon because of poor lighting of the environment and the fact that most people go about barefooted or with minimally protective footwear. In contrast, the involvement of the upper limbs has been reported in studies in Zimbabwe and occupational factors may play a role here (Muguti et al., 1994).

Regarding the clinical features, local swelling and features of coagulopathy were the most commonly recorded among the patients. Clinically, the coagulopathy disorder was diagnosed using the crude bedside whole blood clotting time (WBCT20) which has been found to strongly suggest carpet viper envenomation in the Nigerian savannah (Meyer et al., 1997). In the WBCT20 test, several millilitres of blood collected from the patient are left to stand for 20 min in a clean, dry test tube. The tube is then tilted at intervals to see if the blood has coagulated.

Identification of the snake responsible for the bite/envenomation in most cases will clarify whether the snake is poisonous or not and this will determine the next line of action. Though the snake was killed in some of the cases reviewed during this study, none was brought to the hospital for identification of specie mainly because the patients were not aware of the need to do this. Due to resource challenges, the use of other coagulation tests like PT/PTTK and fibrinogen were not carried out in these patients either for the diagnosis of coagulopathy or for the monitoring of the recovery process.

In managing our patients, the Institute Pasteur Serum

(Ipser) African antivenom was the most commonly administered with the primary outcome of resolution of coagulopathy achieved. Only one patient had anaphylaxis reaction during its administration and the reaction was managed with parenteral anti-histamines and corticosteroids. This observation is strongly in support of findings from a previous study which concludes that there are no benefits using routine premedication (steroids or anti-histamines) before administration of anti-venom (Yong Soh and Rutherford, 2006). Only one patient had the EchiTAB anti-venom administered and the relatives had to travel about 350 kilometers to purchase it. This fact underlines the problem of availability of potent antivenom in Nigeria. It would be difficult to determine the comparative efficacy of the Institute Pasteur Serum (Ipser) antivenom and the EchiTAB antivenom among our patients because of the small number but a comparative study carried out previously in northern Nigeria had shown that both are equally effective with the EchiTAB antivenom needing a smaller dose than Ipser antivenom to achieve the same outcome ((Meyer et al., 1997). The imported non-specific anti-venom from Asia was only administered in one patient who after 50 ml (5 vials) without any clinical improvement had to be converted to the Institute Pasteur Serum (Ipser) African antivenom with which a significant clinical improvement and good outcome achieved. The problem of production of antivenom for snake bites in developing sub-Saharan African countries has been receiving some positive attention in the recent years. In addition to laboratories traditionally producing antivenoms for Africa, such as EgyVac (Egypt), Sanofi-Pasteur (France) and South African Vaccine Producers (South Africa), some other manufacturers, such as MicroPharm Ltd. (UK), Instituto Bioclon (Mexico), and Instituto Clodomiro Picado (Costa Rica), have produced antivenoms against relevant African snake venoms.(Ramos-Cerrillo et al., 2008; Segura et al., 2010).

In one patient out of our cohort with haemorrhage from puncture sites and mucosal surfaces who was unable to get any anti-venom, the bleeding episodes was managed with multiple transfusions of fresh whole blood. Blood transfusion during the management of snake bite serves two purposes: first it provides some clotting factors that can help in correcting some of the haemorrhagic tendencies and also it corrects the anaemia due to continuing blood loss in these patients. Transfusion of clotting factors (fresh frozen plasma or cryoprecipitate) was not possible in any of these patients because of non-availability of the infrastructure to preserve these biological in our setting. However, the managing team insisted on transfusion of fresh whole blood in all cases so that the required factors are still useful for the patient.

No mortality was recorded among patients with snake bite treated in our health care facility during the study duration. Data from Kaltungo, a town in the Nigerian savannah where snake bite is very common revealed a mortality rate of 1.4% among snake bite patients during the year 2007 (Habib et al., 2008). This relatively low rate of mortality among hospitalized patients shows a high level of competence among the medical personnel in these healthcare facilities despite all the material and logistics inadequacies.

Conclusion

Snake bite continues to be a major cause of morbidity and mortality worldwide and Nigeria is no exception. Its management in Nigeria is hampered by unavailability of specific antivenom and other supportive measures like clotting factors and cryoprecipitate. There is a need to make effective and safe antivenoms available and affordable to improve patients' outcome.

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