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Case Report: Management of Pit Viper Envenoming without Antivenom: A Case Series

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Abstract. Pit viper envenoming is common in the hilly and the Himalayan regions of Nepal. Antivenom present in Nepal is unlikely to neutralize the venom of these pit vipers, although it has been used often by the healthcare providers in the clinical practice. Here, we report 15 cases of snakebite with a deranged coagulation profile. All patients recovered from envenoming on conservative management and without the administration of antivenom.

INTRODUCTION

Snakebite, with an estimated 20,000 snakebites annually, is a major public health issue in Nepal.[1] Pit viper envenoming is common in the hilly and the Himalayan region and produces cytotoxic and hemotoxic effects.[2] The only specific antidote of snakebite envenoming is antivenom. The polyvalent antivenom produced against "big four" in India is imported to Nepal and contains no naturalizing antibodies against pit viper venom.[3] However, in clinical practice, it is observed that the antivenom is administered to treat pit viper envenoming by healthcare providers. We report 15 cases of pit viper envenoming managed conservatively without administrating antivenom.

CASE REPORT

In 2019, 15 snakebite patients were seen in the emergency room of Bayalpata Hospital. They presented with swelling, pain, blisters, tingling, and burning sensation of the bitten limb and dizziness (Table 1). The swelling was localized to the bite area in 10 patients, whereas it extended all over the bitten limb in five patients. The fang marks of snakebite were present in all the patients. The patients were hemodynamically stable and had no spontaneous bleeding or neurotoxic manifestation. Laboratory investigation suggested coagulopathy in all the patients. The 20-minute whole blood clotting test (20WBCT) was positive in addition to deranged prothrombin time and international normalized ratio (PT/INR) in all the patients. Renal function tests were normal. Patients were observed closely and managed conservatively. Conservative management included monitoring of vital signs, urine output, laboratory parameters, clinical status, limb immobilization, bed rest, analgesics, and local wound care. Intramuscular injections were avoided. Tetanus toxoid was administered after the normalization of INR values. None of the patients were given antivenom or blood transfusion. The hospital stay was 3–8 days. All the patients recovered from coagulopathy.

DISCUSSION

Antivenom is the specific antidote for snakebite envenoming. Although monovalent antivenom is the definite antidote that can neutralize the specific snake venoms, it is not available in Nepal. Nepal imports antivenom produced in India against snakes of Indian origin and contains neutralizing antibodies for the venom of common krait (*Bungarus caeruleus*), common cobra (*Naja naja*), Russell's viper (*Daboia russelii*), and saw-scaled viper (*Echis carinatus*). Krait and cobra cause neurotoxic envenomation and are the major envenoming species in Terai. Envenoming due to Russell's viper is scarce, and saw-scaled vipers are not reported from Nepal.[2,4]

Green pit vipers and mountain pit vipers are widely distributed and frequently encountered venomous snake species in the hills and mountains of Nepal.[2] Most of the snakebites that had been presented to our hospital emergency belonged to those species of snakes. No antivenom is available to treat pit viper envenoming. There is no evidence that the polyvalent snake antivenoms imported from India neutralized venoms of other species of snakes of Nepal.[2,5]

Most of our patients presented with local symptoms and coagulopathy. The common tests to measure coagulopathy due to hemotoxic snake envenoming are 20WBCT and PT/INR.[6,7] All our patients had incoagulable blood on 20WBCT, and the PT/INR level was deranged to the undetectable level in eight patients. The patients were kept in observation with regular monitoring until the coagulation profile normalized, and the patients improved clinically. None of the patients received antivenom or blood products. All the patients recovered with no complications, although the hospital stay was longer (average 5 days) for patients with an undetectable INR value at admission.

The positive 20WBCT and undetectable range of PT/INR can be worrisome for the healthcare personnel in the rural settings where the health workers are the mid-level healthcare providers and have to work on their own without any guidance and supervision, and they may feel impelled to use the antivenom that is available even in unrelated species such as pit vipers. This practice of using antivenom has become the part of normal practice in many of the healthcare settings in Nepal, with little reference to whether available antivenom is beneficial. Even the WHO has not tackled this issue sufficiently in its guideline on snakebite envenoming in the Southeast Asia region. The inappropriate use of antivenom exposes patients to a large amount of equine protein that may possibly cause anaphylactic reactions and death.[6,8] In a recent study by Sharma et al.,[9] of 155 patients, 13 (8.4%) patients developed anaphylaxis attributed to snake antivenom administration that caused fatality in eight patients (5.61%). Moreover, it is scarce and costly.[8,9]

Pit viper envenoming may cause painful local swelling to more serious features including venom-induced coagulopathy

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TABLE 1
Clinical features of snakebite patients presenting to the emergency room

SN	Age (years)	Gender	Envenoming snakes*	Clinical presentation	20WBCT	PT/INR	Renal function test (ref: urea: 15–45 mg/dL, creatinine: 0.4–1.4 mg/dL)	Hospital stay (days)	Recovery status
1	41	Female	Green pit viper	Swelling and pain on the right ring finger	Positive	35.6/2.7	Urea: 40, creatinine: 1.2	4	Recovered
2	11	Female	Green pit viper	Pain, swelling of the whole right leg, and blister formation on the right ankle	Positive	50/3.8	Urea: 30, creatinine: 0.9	7	Recovered
3	68	Female	Mountain pit viper	Pain and swelling over the whole right leg	Positive	38/2.9	Urea: 42, creatinine: 1.3	5	Recovered
4	24	Female	Mountain pit viper	Pain and swelling over the left ring finger, and burning and tingling sensation of the whole bitten limb	Positive	190.5/16.7	Urea: 22, creatinine: 1.2	4	Recovered
5	18	Male	Green pit viper	Dizziness and minimal swelling over the bitten area (left thumb)	Positive	160/12	Urea: 31.3, creatinine: 1.3	6	Recovered
6	27	Male	Green pit viper	Pain and swelling over the whole right leg	Positive	53/4	Urea: 26.1, creatinine: 1.2	4	Recovered
7	68	Female	Green pit viper	Pain and swelling over the whole right leg	Positive	38/2.9	Urea: 44.1, creatinine: 1.2	5	Recovered
8	52	Male	Green pit viper	Pain and swelling over right ankle, use of tourniquet just below the knee, and swelling present below the tourniquet site	Positive	Undetectable	Urea: 29.1, creatinine: 0.7	3	Recovered
9	23	Male	Green pit viper	Swelling over the right ankle region, and tingling and burning sensation over the bitten area	Positive	Undetectable	Urea: 23, creatinine: 0.6	3	Recovered
10	35	Female	Green pit viper	Snakebite on the right ring finger and minimal swelling over the bitten finger	Positive	Undetectable	Urea: 24.8, creatinine: 0.7	3	Recovered
11	77	Female	Green pit viper	Pain and swelling on the right ankle joint	Positive	Undetectable	Urea: 44, creatinine: 1.3	8	Recovered
12	15	Female	Green pit viper	Pain and swelling on the whole right leg	Positive	Undetectable	Urea: 18.5, creatinine: 0.5	7	Recovered
13	18	Female	Green pit viper	Pain and swelling on the right ankle joint	Positive	Undetectable	Urea: 22.2, creatinine: 0.8	4	Recovered
14	27	Female	Green pit viper	Snakebite on the left ring finger, pain and burning sensation over the whole bitten limb, and minimal swelling over the bitten area	Positive	Undetectable	Urea: 42, creatinine: 1.0	5	Recovered
15	33	Female	Mountain pit viper	Pain and burning sensation over the bitten left foot and minimal swelling over the bitten area	Positive	Undetectable	Urea: 32, creatinine: 1.1	6	Recovered

20WBCT = 20-minute whole blood clotting test; PT/INR = prothrombin time and international normalized ratio. Undetectable PT/INR value was labeled to the extremely high value of PT/INR not detected by the hospital laboratory PT/INR machine.

* The dead envenoming snake brought by the patient (or their visitors) was identified by the medical personnel who had been trained to look after the snakebite cases in the hospital. "Venomous Snakes of Nepal: A photographic guide" was used as a reference to review the identified snake.[2] If there was any confusion about identifying the snake, then the image of the snake was taken and sent to the national expert on snakebite via social networking groups such as "WhatsApp."

and spontaneous bleeding as recorded recently from eastern Nepal (R. Ruiz de Castañeda et al., unpublished observations). However, polyvalent antivenom (imported to Nepal from India) is not indicated in pit viper envenoming and should be managed conservatively in the hospital.

Coagulopathy is a common manifestation of pit viper envenoming in Nepal and can be managed conservatively without the administration of antivenom currently available in Nepal. The inappropriate use of antivenom wastes the scarce antivenom and has financial implications and also exposes patients to the adverse effect of antivenom, including fatal reactions.

Although all our patients were successfully treated with conservative management without complications, we may not have seen the full spectrum of pit viper envenoming in patients presenting to our hospital. Thus, although we did not identify a clear need for specific antivenom for pit viper envenoming, it would not be prudent to conclude from this sample of patients that there is no need for specific antivenom.

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REFERENCES

1. Sharma SK, Bovier P, Jha N, Alirol E, Loutan L, Chappuis F, 2013. Effectiveness of rapid transport of victims and community health education on snake bite fatalities in rural Nepal. *Am J Trop Med Hyg 89:* 145–150.
2. Sharma SK, Pandey DP, Shah KB, Tillack F, Chappuis F, Thapa CL, Alirol E, Kuch U, 2013. *Venomous Snakes of Nepal*. Dharan, Nepal: B.P. Koirala Institute of Health Sciences, 1–76.
3. Shrestha BR, Pandey DP, Acharya KP, Thapa-Magar C, Mohamed F, Isbister GK, 2017. Effective, polyvalent, affordable antivenom needed to treat snakebite in Nepal. *Bull World Health Organ 95:* 718–719.
4. Bartaula B, Shah B, Bhurtel N, Sharma SK, 2018. Acute kidney injury due to Russell's viper envenomation: first documented case in Nepal. *J Adv Intern Med 7:* 45–46.
5. Pandey DP, Ghimire A, Shrestha BR, 2019. Retrospective documentation of a confirmed white-lipped green pit viper (*Trimeresurus albolabris* Gray, 1842) bite in the South-central hills of Nepal. *Wilderness Environ Med 30:* 79–85.
6. Maduwage K, Isbister GK, 2014. Current treatment for venom-induced consumption coagulopathy resulting from snakebite. *PLoS Negl Trop Dis 8:* e3220.
7. Pongpit J, Limpawittayakul P, Juntiang J, Akkawat B, Rojnuckarin P, 2012. The role of prothrombin time (PT) in evaluating green pit viper (*Cryptelytrops* sp) bitten patients. *Trans R Soc Trop Med Hyg 106:* 415–418.
8. Isbister GK, Duffull SB, Brown SGA, 2009. Failure of antivenom to improve recovery in Australian snakebite coagulopathy. *QJM 102:* 563–568.
9. Sharma SK et al., 2019. Acute severe anaphylaxis in Nepali patients with neurotoxic snakebite envenoming treated with the VINS polyvalent antivenom. *J Trop Med 2019:* 2689171.