Spontaneous massive hemothorax following snakebite envenomation: a case report

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Abstract

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Abstract

This unusual case of massive hemothorax developed following snakebite envenomation resulted in massive drop in hemoglobin, from 13.2 to 3.1g/dL, in three-days, and severe respiratory distress that required a number of thoracocentesis. He was stable until day-two of admission, then fully-deteriorated on day-three which reflects the need for close observation.

Introduction

Snakebite is among the deadly disease conditions that is officially recognized by the WHO (June 2017) as a neglected tropical disease [1,2]. Annually, there are approximately 5.4 million snake bites, ensuing in 1.8 to 2.7 million cases of envenomation [2]. It accounts for significant morbidity, disability and mortality worldwide, especially in many tropical and subtropical countries (Sub-Saharan Africa, South and Southeast Asia, and Latin America) [2,3]. Snakebite related estimated deaths have been reported to be between 81,410 and 137,880 and around three times as many amputations and other permanent disabilities each year [2]. In Asia, up to 2 million people are envenomed by snakes each year and in Africa it is estimated from 435,000 to 580,000 cases that require treatment [2].

Depending on the type of snakes and other factors, victims may present with life-threatening pathologies including neurotoxicity, myotoxicity, direct tissue toxicity and hemotoxicity (cardiovascular and hemostatic) [4, 5, 6]. Hemotoxicity is one of the most common clinical signs in victims of snakebite, particularly when viperid snakes are responsible for envenomation [3, 5].

To our knowledge, there are only two published case reports of hemothorax following snakebite envenomation [8, 9]. The aim of this documentation is therefore to report a third case of serious massive hemothorax (hemorrhagic effusion) that required a number of therapeutic thoracocentesis (drainage of blood) which further illustrates the diversity of clinical manifestations of snakebite envenomation.

Case Presentation

Case history and examination

An 18 years old male, previously healthy patient presented to an emergency department of a regional referral hospital in late 2019 with chief complaints of left foot swelling and bleeding following snakebite of one-day duration. Patient was bitten while he was working on his farm field and killed the snake after the event. Patient cut the bite site with a blade and applied a black stone [Fig 1]. He had clinical manifestations such as severe pain, blood-tinged saliva and bloody urine. During admission, on physical examination, patient was acutely sick looking with severe pain and vital signs were as follows: blood pressure: 100/60 mmHg; pulse rate: 90 beats per minute; body temperature: 36.7° C; respiration: 18 breaths per minute, and oxygen saturation: 96%. Besides, patient had blood-stained saliva and pink conjunctiva. There was swollen grade-II pitting edema with tenderness on palpation, and blood oozing from the bite and laceration site of the left foot, 4^{th} toe, after removing the black stone. Patient was admitted as a case of snakebite envenomation (Grade-III) with hematologic toxicity (hematologic lab result showed platelet count: $52,000/\mu$ land hemoglobin:13.2 g/dL during admission).

Differential diagnosis, investigations and treatment

Patient then started a polyvalent snake antivenom (four vials of a snake antivenom as a bolus and then continued with two vials every eight hours), antibiotics (cloxacillin injection and metronidazole), intravenous fluids and tetanus anti-toxin 3000 IU stat intramuscularly. In addition, wound dressing with pressure and catheterization was performed. On the next morning of admission, the patient's condition became stable with normal vital signs. Patient had dry blood between the gums and same finding on the extremity but oozing stopped. Patient still had gross hematuria in urinary bag and continued with the same management. On third day of admission, patient was complaining of epigastric pain. There was no gum bleeding. Patient had slight epigastric tenderness with same finding on the extremity but the urine in bag was clearing of blood. Ranitidine injection was added to the above medication along with anti-acid suspension.

On the fourth day of admission, patient developed fast breathing, shortness of breath, fever, and confusion with passage of scanty urine. Physical examination revealed altered mentation and labored breathing and with the following vital signs: blood pressure: 130/70 mmHg; pulse rate: 120 beats per minute; body

temperature: 38.0°C; respiration: 46 breaths per minute; oxygen saturation: 94% and random blood sugar: 133mg/dL with paper-white conjunctiva. Trachea deviated to the left; there was dullness to percussion with absent air entry on the right chest on auscultation and patient became tachycardic.

In the urinary bag, there was about 60ml of urine which was clear of blood but concentrated. Patient was in critical condition with the impression of pleural effusion and severe anemia to rule out acute kidney injury and sepsis. Chest X-ray [Fig 2] showed homogenous opacification of the right lung and revealed massive pleural effusion with tracheal and mediastinal deviation to the left. Immediate therapeutic thoracocentesis was done which revealed hemorrhagic effusion (hemothorax) and hemoglobin dropped to 3.1g/dL and other lab results were as follows: platelet count: $32,000/\mu$ l and creatinine: 1.5mg/dl. The massive hemothorax required drainage of about 1.5 liters of blood and transfusion of 2 units of whole blood. Patient was put under oxygen, IV fluids and also started on additional antibiotics (intravenous ceftriaxone 1gm twice daily). Five days after admission, patient had similar symptoms/signs and therapeutic thoracocentesis was done with blood transfusions of a total of 10 units of whole blood.

Outcome and follow-up

The management strategy continued for one week and eventually, after 12 days of admission, patient became stabilized, breathing comfortably and eating well. On the 12^{th} day of admission, physical examination showed that patient had no signs of respiratory distress and the following vital signs were reported: blood pressure: 110/70 mm Hg; pulse rate: 78 beats per minute; body temperature: 37.0° C; respiration: 16 breaths per minute; and oxygen saturation of 96% [without O_2] with pink conjunctiva. Patient had decreased air entry on the right lower lung field with dullness to percussion. Swelling on the right leg markedly decreased which was localized to the ankle area and non-tender on palpation with dry wound. Patient was observed for the next three days and finally, hemoglobin raised to 7.2g/dL and chest X-ray showed obliteration of the right costophrenic angle with very small effusion. After 15 days of admission, patient get improved and discharged with a ferrous sulphate tablets and follow-up appointment.

Discussion

Attributed to different mechanisms, hemotoxic venoms can have hemostatic effect which is characterized by bleeding from the gums, newly healed wounds, the bite site, the gastro-intestinal and/or genito-urinary tracts and/or hemoptysis, spontaneous bleeding which may result in shock [3], intracranial bleeding [3,7] and peri-nephric hematoma [10]. Hemotoxicity is one of the most common clinical signs in victims of snakebite, particularly when viperid snakes are responsible for envenomation [3,5].

In Eritrea, so far, there are nine identified venomous snakes, four of which are highly dangerous, potentially deadly and commonly available [11]. These species are Naja haje (Egyptian Cobra), Dendroaspis polylepis (black mamba), Echis pyramidum (East African Carpet Viper) and Bitis arietans (Puff adder). The rest five species that are less dangerous and/or not well-studied are: Atractaspis irregularis, Atractaspis microlepidota, Naja pallida, Causus rhombeatus and Dispholidus typus. In the region where our case was bitten, Naja haje, Dendroaspis polylepis, Echis pyramidum and Bitis arietans are already identified as highly dangerous venomous snakes [11].

This case was treated with snake antivenom called Biosnake Antivenom, manufactured by Lexicare Pharma. Biosnake Antivenom is indicated for the following snake species: Naja haje, Naja nigricolis and Cereates cereates. In this case, even though the victim was able to kill the snake but he did not bring it to the health facility and thus, the authors could not identify the type of snake. Identifying snake species has paramount importance in the appropriate management of snakebites and it is also important to further characterize clinical signs and symptoms of every snake species and prepare accordingly. Healthcare professionals and programmers are therefore recommended to work on raising public awareness on the importance of identification of snake species during snake bites. Development of hemothorax following snake bite is not a well-known scenario. To our knowledge, there are only two published case reports of hemothorax associated with envenomation of viperid Echis carinatus [8] and Bothrops asper [9] published in 2012 and 2019. From January 2018 to December 2019, our regional referral hospital had a total of 341 cases of snakebites, of which 235 sought admission and 13 died [13]. Though bleeding or hemorrhage have been encountered in many of the cases, the clinical presentation of the case being reported is distinct. Development of snakebite related massive hemothorax (hemorrhagic effusion) that resulted in massive drop in hemoglobin, from 13.2 to 3.1g/dL, in just three days, with severe respiratory distress indicates the seriousness of the clinical condition and urges the need for strict monitoring of coagulation markers following envenomation.

Though the patient appeared to be stable on the second day of admission, he fully deteriorated on the third day. This reflects the need for close observation of patients, following snake bite, from several hours to few days[4,6] though it depends on the local snake species' venom properties found on a specific geographical location [11]. Use of black stone as a traditional management of snakebite is also a problem that need to be addressed through continuous awareness raising campaigns. Incising the bite site and applying a black stone, with the intention to adsorb the venom, following snakebite has been misconceived as an effective intervention in many of the remote areas. Many victims thus, visit health facilities if their condition gets deteriorated which might be too late for snake antivenoms to be effective to neutralize the circulating venom. Awareness raising activities targeted at the general public are therefore required to sensitize victims to visit health facilities at the earliest (before the venom is attached and fixed to tissues) [7, 12].

In this case report, we had a number of limitations in managing the case such as lack of coagulation studies, and unavailability of blood and blood products (like fresh frozen plasma) and thoracostomy tube. Difficulties in identification of snake species is noted in a number of cases which required blind use of polyvalent snake antivenom which can only cover one to three of the four venomous snakes in our geographic area.

Authors Contribution

YY: Conception, case investigation and management, write-up of the draft manuscript.

MR: Review investigation reports and write-up of the draft manuscript.

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