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CASE REPORT

Diagnostic Challenges and Management Strategies for Superior Sagittal Sinus Thrombosis Induced by Snake Bite Envenomation: A Case Report from Somalia

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Introduction: Snakebite is a serious and potentially fatal public health concern, especially in tropical and subtropical regions, leading to severe complications. The World Health Organization (WHO) identified snakebite as a Neglected Tropical Disease (NTD) in 2017 and launched a global campaign in 2019 with the goal of halving the number of snakebite-related deaths and disability cases by half by the year 2030.

Case Presentation: A 26-year-old farmer male presented with a snake bite and soon developed neurological complications, including diplopia, seizures, and altered mental status with Glasgow coma scale(GCS) of 11 out of 15. Investigations revealed coagulation abnormalities and magnetic resonance venography showed acute thrombosis of the superior sagittal sinus. The patient was diagnosed with superior sagittal sinus thrombosis. He was admitted to the intensive care unit and treated with anticoagulants to manage the thrombus, prevent further clot formation, and administer seizure medications to control any potential seizures associated with the condition. Moreover, we closely monitored the patient's condition to ensure effective treatment and to address any complications that may arise. Throughout the next three days, the patient's health gradually improved due to supportive care. He was extubated and transferred to the general ward. He was discharged after 10 days, having made a full recovery.

Conclusion: This case report from Somalia emphasizes the importance of recognizing and managing superior sagittal sinus thrombosis as a rare but life threatening consequence of snake bite envenomation, particularly in resource-limited settings where access to advanced diagnostic and treatment modalities may be limited. If a patient experiences headache, impaired vision or seizures, after a snake bite, it is important to be highly suspicious of cerebral vascular complications including venous sinus thrombosis. Moreover, we recommend that a national study be conducted to identify the prevalent snake species in the region and to determine their specific habitats.

Keywords: superior sagittal sinus thrombosis, snake bite, magnetic resonance venography

Introduction

Snakebite is a major public health concern and life-threatening condition, affecting an estimated 5.4 million people, leading in 81,000–138,000 mortalities and 400,000 persistent disabilities (blindness, amputation, and posttraumatic stress disorder) across tropical and subtropical regions globally.[1–3] WHO recognized snakebite as a NTD in 2017 and in 2019 initiated a global campaign with the aim of diminishing up to half of the incidence of snakebite-related fatalities and disability cases by the year 2030.[3] Among the 3700 species of snakes, 15% of them are estimated to be venomous.[4] Snake bites from venomous species can result in a range of symptoms, from localized pain, swelling, nausea, dizziness,

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and breathing difficulties, if left untreated, can potentially lead to severe complications such as hemorrhagic blisters, cellulitis, necrotizing fasciitis, hemolysis, disseminated intravascular coagulation (DIC), bleeding disorders, kidney toxicity, coagulation issues, neurological problems, and even acute myocardial infarction, which can become life-threatening.[5,6] Snakebites are experienced worldwide, but data regarding snakebites and their treatment in Somalia are limited. Sinus thrombosis (ST) is a rare and life-threatening illness characterized by nonspecific clinical presentations such as nausea, headaches, unconsciousness, and generalized tonic-clonic seizures.[6] In this instance, a 26-year old man farmer experienced superior sagittal thrombosis (SST) two days after being bitten by a snake.

Case Report

A 26-year-old male farmer with no prior medical history presented to the emergency department (ED) of our tertiary care hospital, reporting a snake bite on his right foot two days-prior while walking on a street near his house in a rural grassland area in the evening. He was unable to specify the snake species but reported severe pain and a wound in his right leg soon after the bite. His initial treatment involved cleaning the wound with tap water and taking two doses of Diclofenac (75 mg each) for pain at a local health unit. On the second day, the wound developed into a localized defect or excavation in the skin and underlying soft tissue of the right leg's foot. He was advised to avoid movement while being transported to a tertiary care hospital in Mogadishu, Somalia. At the end of day two, upon arrival at our ED, he had altered mental status (AMS) and more than three episodes of generalized tonic-clonic seizures. The patient's family reported that he had been experiencing diplopia before he developed seizures and AMS. During the initial examination, the patient's vital signs were mostly normal, but his oxygen saturation was 89% on room air, and he had a Glasgow Coma Scale score of 11 out of 15. The examination of the right foot revealed superficial puncture wounds, along with swelling and a localized defect or excavation in the skin and underlying soft tissue. Examination of the right leg revealed superficial puncture wounds. Neurological examination revealed the patient was lethargic and disoriented. Cardiac, lungs, and abdomen examination were unremarkable. In the ED, the patient was immediately stabilized, and supportive care was initiated. This included supplemental oxygen, intravenous fluids, injection of ceftriaxone 2g, prophylaxis against tetanus, and close monitoring of his vital signs and neurological status. Moreover, he received 10-mL polyvalent anti-snake venom. The laboratory tests revealed a hemoglobin of 11.9 g/dL and a hematocrit of 36%. The white blood cell count was 15.2*1000/mm^3 with neutrophil predominant (11*1000/mm^3), and the platelet count was 480. The erythrocyte sedimentation rate was 30 mm per hour. Liver enzymes were slightly elevated, with alanine aminotransferase (ALT) at 65 U/L and aspartate aminotransferase (AST) at 63 U/L. The creatinine kinase (CK) level was 159 U/L (normal range: 24–195 U/L). Prothrombin time (PT) measured 29 seconds (control: 13 seconds), and partial thromboplastin time (PTT) was 43 seconds (control: 29 seconds). Serum electrolytes, urea, creatinine, lactic dehydrogenase, arterial blood gasses, and fasting plasma glucose levels were within normal limits. Since the patient's condition deteriorated, we administered diazepam 10 mg intravenously, phenytoin 1000 mg as a loading dose, and 30 g of mannitol over 20 minutes (repeated every 6 hours). Additionally, the patient was intubated. The primary objectives were to stabilize the patient's condition, achieve seizure control, and lower the elevated intracranial pressure. The initial computed tomography (CT) scan of the head revealed no signs of acute intracranial abnormalities. Since the patient's condition deteriorated, magnetic resonance venography (MRV) was performed and revealed loss of normal blood flow in the entire superior sagittal sinus in keeping acute thrombosis (Figure 1). Additionally, urgent carotid Doppler ultrasound, chest X-ray, electrocardiogram, and echocardiogram were conducted, all of which returned normal results. The patient was admitted to the intensive care unit (ICU) for close monitoring and was treated for superior sagittal sinus thrombosis (Figure 2). Enoxaparin, which is low-molecular-weight heparin (LMWH) therapy, was started at a dose of 1 mg/kg, administered subcutaneously every 12 hours, to encourage thrombus resolution and prevent additional complications. In the course of the three days, the patient's mental status gradually improved with supportive care and anticoagulation treatment. He was treated with equine polyvalent antisnake venom (ASV) at a total dose of 30 vials. The initial dose of 10 vials was administered as an infusion over 1 hour, followed by the second and third doses of 10 vials each, given after 1 hour due to a lack of improvement during the first hour. After six hours of initial treatment, the liver function test (ALS and AST), PT, and PTT levels returned to the normal range. He was successfully extubated and subsequently transferred to the inpatient ward for continued management and rehabilitation. The patient made a good recovery and was subsequently discharged home 10-days post admission. Upon discharge, the patient was prescribed

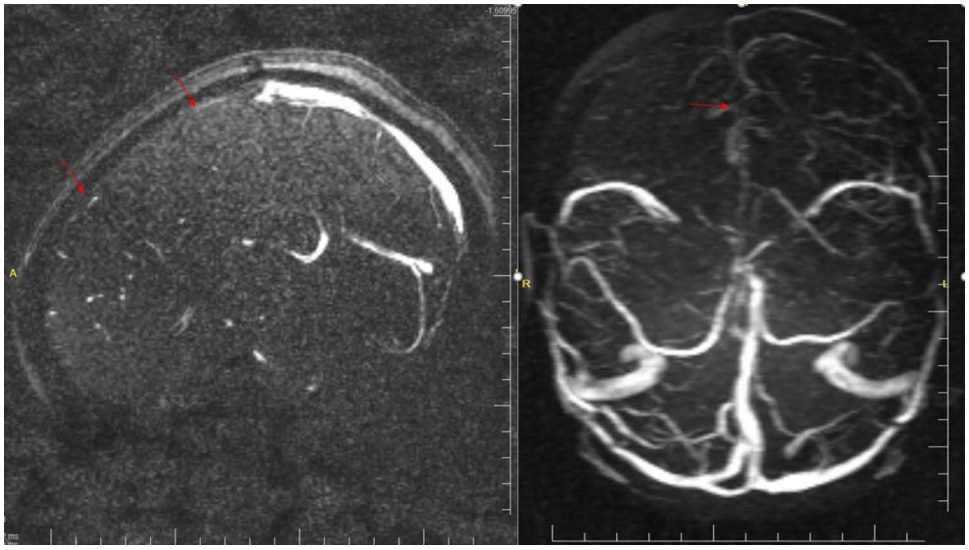

Figure 1 MRV brain shows loss of normal blood flow in the entire superior sagittal sinus in keeping acute thrombosis at the area of the red arrows.

Figure 2 Orally intubated patient and under assisted ventilation.

tablet rivaroxaban (initially 15 mg twice daily for 3 weeks, then 20 mg once daily) and levetiracetam (500 mg twice daily) to continue treatment of the superior sagittal sinus thrombosis and prevent the recurrence of seizures.

Discussion

Snake venom contains a variety of toxins that can cause wide range of symptoms, from localized pain, swelling, and gangrene to severe and systemic complications such as compartment syndrome, necrosis, rhabdomyolysis, neurotoxic, cute kidney injury, respiratory distress, coagulation disorders, and cardiac complications.[5,6] To our knowledge, there are no comprehensive studies on snake bites in Somalia, with only one case report available detailing a 5-year-old boy who was bitten by a snake and presented with severe infection, necrosis, and gangrene in his right hand.[7]

The mechanism behind snake bite-induced venous sinus thrombosis involves direct injury to the endothelium, hypercoagulability, or stasis, which can be explained by Virchow's triad.[8,9] Cerebral venous sinus thrombosis (CVST) can involve multiple venous sinuses, with the transverse sinuses and superior sagittal sinuses being the most frequently affected, and can present with a range of manifestations, including headache, seizures, visual abnormalities, focal neurological deficits, and others.[10] Cerebral infarction following snakebite is an uncommon occurrence, with only a small number of cases reported globally. In a prospective study of three hundred nine participants with snakebite, researchers identified cerebrovascular complications in 8 patients (2.6%), including 7 cases of hemorrhagic stroke and 1 case of ischemic stroke.[11] Another study conducted in Sri Lanka, researchers examined 500 victims of snake bites and revealed that 9 (1.8%) patients of the study population had CT scan evidence of ischemic strokes.[12]

In the current instance, the patient developed convulsion and altered mental status two days after the snake bite, without exhibiting hypotension. The diagnosis of superior sagittal sinus thrombosis (SSST) was confirmed based on the patient's clinical manifestations and corresponding radiographic findings. Similarly, Yousaf M. and colleagues described a case involving a 25-year-old male who experienced convulsion and headaches after a Viper snake bite. Magnetic resonance venogram (MRV) results indicated transverse sinus thrombosis and sigmoid sinus stenosis, and the patient received treatment with antivenom, rivaroxaban, levetiracetam, and supportive or palliative care.[13]

Eighty percent of the cases had predisposing risk factors, including cancer, inflammatory illnesses, head injuries, dehydration, and prothrombotic disorders.[8,9] Our patient was relatively young and after deep investigation demonstrated no premorbid illness and underlying risk factors associated with SST. Also, there was no history of any drug abuse. Echocardiography and echocardiography were negative for cardiogenic emboli. The infarct in our patient is most probably due to toxic vasculitis caused by injury to the endothelium by snake venom toxin as our patient had neither hypotension nor premorbid illness and underlying risk factors associated with SST.

Inconclusion, superior sagittal sinus thrombosis which subtype of CSVT is a rare form of stroke that often affects younger age-groups. Given the above case report, Snake envenomation can lead to SSST. Clinicians should maintain a high index of suspicion and promptly evaluate patients presented with headache, seizures, focal deficits, or altered mental status following a snake bite. Diagnosis primarily relies on CT/MRI venography, with cerebral angiography used if other imaging methods are inconclusive. Anticoagulation with low-molecular-weight heparin (LMWH) is the standard treatment, while endovascular thrombolysis remains a subject of controversy.

Data Sharing Statement

We confirm that we have complete access to all data in this study and accept full responsibility for its integrity. Data for this study are available upon reasonable request from the corresponding author.

Ethics Approval

In accordance with the regulations of the review board at Mogadishu Somali Turkish Training and Research Hospital, institutional review board approval is not necessary for case reports.

Consent for Publication

Written informed consent was obtained from the patient to publish the case details and any associated images.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, design, or in all these areas; took part in drafting, revising, or critically reviewing the case report; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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