Ischemic stroke in a 4 year child resulting from scorpion envenomation: A case report from Nepal.

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Author contribution:

Sunil Bhatta and Pusp Raj Awasthi were both equally involved in the conceptualization, formulation, resources, writing, and editing of the original draft.

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Written and informed consent was obtained from the patient for the publication of the case report, which is available for review by the editor of this journal.

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This is a retrospective case report, and no sampling was used. The ethical approval can be waived.

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Introduction

The scorpion sting is one of the most go to forms of envenomation in countries with tropical climates. There are a variety of scorpions, and some of them have venom that could be detrimental to human beings. Non-fatal symptoms are common, which include pain, burning sensation, and change in color of the skin. Scorpion venom contains neurotoxins, which trigger the body to release endogenous catecholamines and acetylcholine. Systemic envenomation invites autonomic instability with a wide range of manifestations, including cardiovascular (hypertension, tachycardia, arrhythmias, myocarditis, distributive and cardiogenic shock), pulmonary (acute respiratory distress syndrome, pulmonary edema, atelectasis, bronchospasm), acute renal dysfunction, neurological emergencies (seizures, ischemia, hemorrhage, and rarely demyelination), and disseminated intravascular coagulation. A sympathetic storm may or may not follow the initial parasympathetic overdominance phase, which displays emesis, abdominal pain, excessive salivation, bradycardia, and

pupillary constriction. Cerebrovascular injury in systemic envenomations is considered very odd. Globally, it has been documented in only 2% to 5% of cases of scorpionism. [1,2,3,4,5,6,7,8]

We hereby present the case of a 4 year old child with features consistent with autonomic storm following scorpion sting who later developed left sided ischemic stroke. However,he lacked features of defibrination syndrome and myocarditis. Therefore, the most speculated cause of stroke in our patient was presumed to be the autonomic storm and toxin associated vasculitis.

Case history/examination

A 4 year child presented to our emergency department with features of vomiting, abdominal pain, and decreased sensorium following a complaint of pain and noticeable swelling in the right great toe. After a sleep of approximately 10 hours, the child woke up in the morning complaining of severe pain in the right lower extremity. The mother of the child noticed swelling in the right great toe, and one of the family members noticed the scorpion on the floor of the room. They envisioned that the child was stung by the arthropod and rushed to our hospital emergency room.

The child presented to our emergency with features consistent with history. On arrival, the child was febrile, with a temperature of 100.8 degrees Fahrenheit, heart rate of 140/minute and blood pressure of 125/87 mm Hg. Thorough evaluation revealed that the child was drowsy with Glasgow Coma Scale (GCS) of 12 (E3V3M6) and was unable to move right extremity while giving a command and poking with painful stimuli. Deep tendon reflexes and tone were increased in right upper and lower extremities.

Investigations and work-up

Based on the clinical examination, a computerized tomography (CT) scan of the head and two dimensional echocardiography were requested. In addition, a blood sample was withdrawn and sent to the lab for estimation of hemoglobin, platelet count, electrolytes, urea, creatinine, and coagulation profile testing. CT scan showed an infarct in the left middle cerebral artery territory (Figure 1 to Figure 3), and echocardiography showed normal ventricular function. Similarly, all requested lab parameters were in the normal range, including coagulation parameters (prothrombin time, international normalized ratio, activated partial thromboplastin time, and prothrombin time index).

Treatment and outcome

The child was admitted and managed in the high dependency unit with a combination of antihypertensive, antiplatelet, anticoagulant, and antiepileptic medications. Other important aspects focusing on the child's nutrition, physiotherapy, bedside mobilization, and bowel and bladder care were taken care of during the course of treatment. The child gradually improved during the period of treatment and was discharged on day 7 of admission. Physiotherapy and other rehabilitation measures were also addressed during the discharge. The boy made a complete recovery.

Discussion

On an annual basis, in excess of a million reports of scorpion stings are made across the globe, with a 20 per 100,000 population figure for prevalence. While roughly 5% of reported cases are severe, only about 0.3% of severe cases result in mortality. [1]

The Asian forest scorpion(*Heterometrus* species) is the most common scorpion found in Nepal, is responsible for non-fatal envenomations, and usually leads to local skin manifestations. The eastern Indian scorpion, or *Hottentotta tamulus* , is a species of scorpion belonging to the Buthidae family is also found in the tropics of Nepal. It is nocturnal and is reported to be deadly.[8]

Patients presenting with scorpion envenomation have been split into three grades: Patients in grade (I) merely have local pain; those in grade (II) have systemic symptoms; and those in grade (III) have significant neurological impairment (coma and/or convulsions) or cardiorespiratory symptoms, primarily cardiogenic shock and pulmonary edema. [1,2,3]

Depending on the species of arachnid and the toxin's plasma levels, the clinical symptoms can vary considerably. The release of endothelin, neuropeptide Y, and nitric oxide is prompted by the toxin. It triggers the complement and coagulation systems, which leads to an upward spiral of neurological harm (seizures, cerebral edema), inflammation, and microthrombosis. [1,4,5,6]

Because venom is hydrophilic, it has low blood-brain barrier permeation. In young kids, the central nervous system may be heavily involved in the envenomation process since the blood-brain barrier remains fragile. The central nervous system outcomes (grade III) resulting from scorpion stings can vary widely and manifest as diminished consciousness, convulsions, subarachnoid hemorrhage, intracerebral hemorrhage, and ischemic infarcts. [3,6]

Neurological complications from scorpion stings are well reported in South America, Venezuela, India, and Turkey. Eight percent of patients in a case series drawn from southern India had neurological involvement; of these, four percent had hemorrhagic stroke and four percent had ischemic stroke. [2,5]

Cerebral infarcts typically appear more than 48 to 72 hours after the initial scorpion envenomation. [2,3] Contrary to this, our patient exhibited signs and symptoms of cerebral ischemia in less than 24 hours, which made this case more atypical for reporting.

Scorpion stings are a problem in emerging economies, where medical costs are always a concern. The cornerstone of treatment in these areas is typically prazosin and supportive care. [1]

Antivenin is theoretically the specific management. Purified anti-venom F(ab)2 is currently in widespread usage. Venom is released into the circulation during the initial cholinergic phase. Antivenom works best during this time and can neutralize free venom in about 5 hours. This stops the ensuing sympathetic storm. However, due to unavailability of antivenin in Nepal, we managed the cause with combination of prazosin, anticoagulants, and antiplatelet agents.[1,3]

The main takeaway from this case report is that, despite being extremely common, scorpion stings can seldom surface as an ischemic stroke. Various explanations were put forth to delineate the pathophysiology behind the occurrence of cerebral infarction in scorpion envenomation. They can be summarized as briefly due sympathetic storm, myocarditis (left ventricular systolic dysfunction due to myocarditis, causing stagnation of blood and subsequent thromboembolism), venom vasculitis, and defibrination syndrome. [6,7]

Conclusion

In tropical and subtropical climates, scorpion envenomation is typical. Serious systemic effects and end organ damage might result from a severe scorpion sting envenomation. The central nervous system (CNS) can be compromised infrequently, but in a variety of complex ways, as a result of the toxin's various neurotoxic effects. Furthermore, medical professionals working in environments where scorpion stings are commonly reported should be aware of the wide range of clinical toxidrome associated with envenomation. [1,2,3,4,5,6,7,8]

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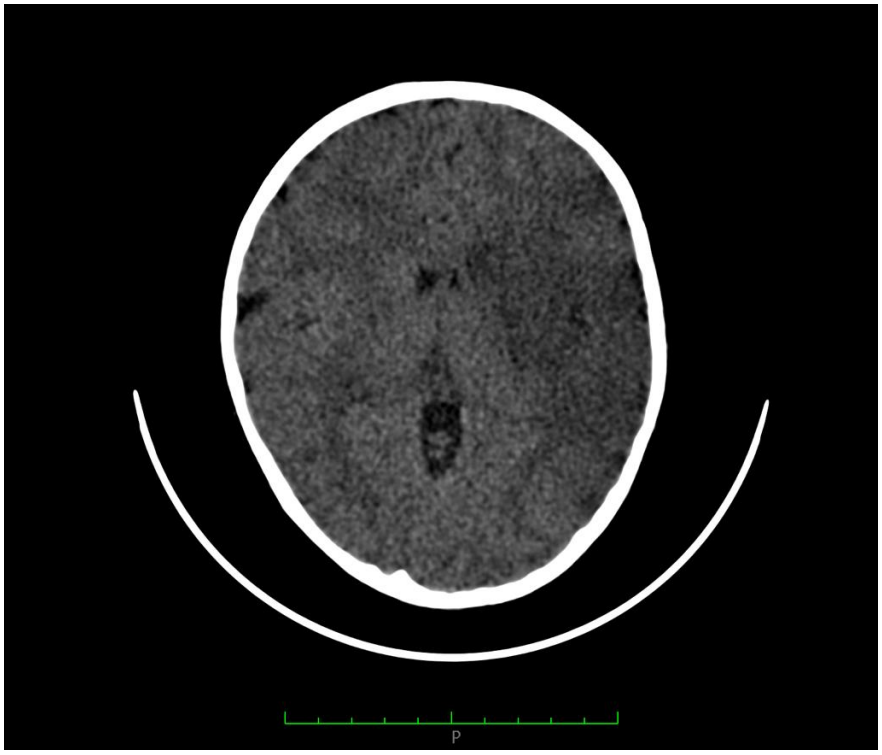

Figure 1: CT axial section showing hypodensitiy in left frontoparietal region with loss of garywhite differentiation suggestive of ischemic infarction.

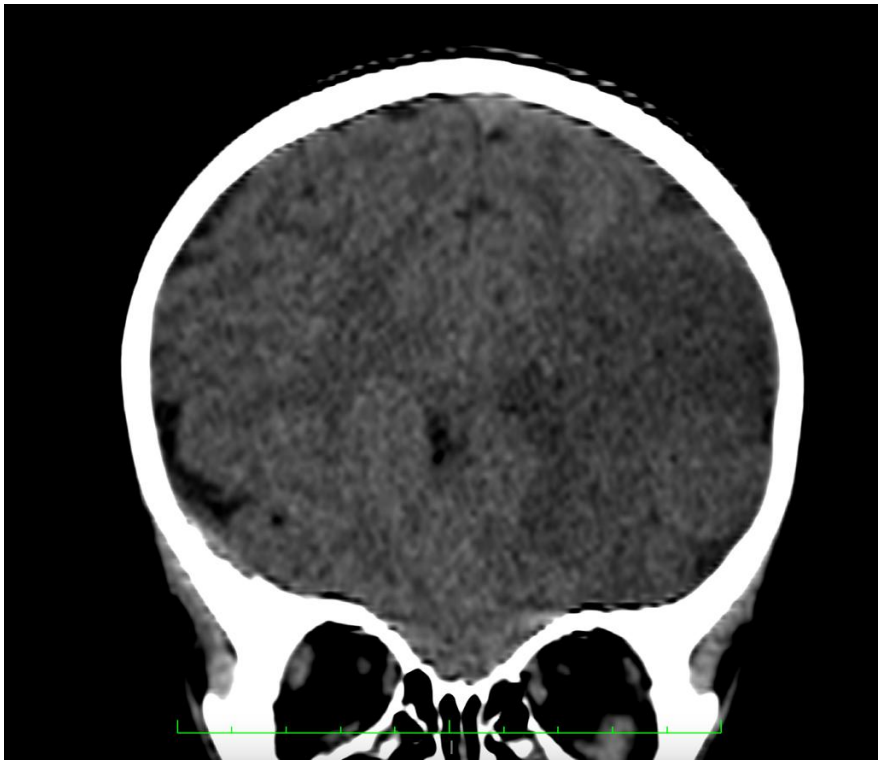

Figure 2: CT coronal section showing ischemic infarction in left frontoparietal region.

Figure 3: CT axial section showing hypodensity in the left fronto-parieto-temporal region with loss of graywhite differentiation suggestive of ischemic infarction.