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Case Report

Paediatrics Section

Successful Management of Cardiotoxic Manifestation following Krait Snake Bite in a Child: A Case Report

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ABSTRACT

Krait (*Bungarus*) envenomation is typically associated with neurotoxic symptoms, while isolated cardiotoxicity without neurological or haemotoxic features is exceptionally rare. This report describes the case of a nine-year-old child who presented with cardiorespiratory symptoms following a krait snakebite. Notably, the child exhibited no neurological deficits, coagulopathy, or systemic envenomation markers typically associated with krait bites. The clinical presentation was dominated exclusively by cardiotoxic manifestations, including cardiac rhythm abnormalities and respiratory distress. Timely administration of Anti-Snake Venom (ASV) resulted in the complete resolution of symptoms, underscoring the potential efficacy of ASV even in cases of isolated cardiotoxicity. This case highlights the importance of considering atypical presentations in snakebite cases, particularly in paediatric patients, where initial symptoms may mimic primary cardiac or respiratory conditions. Early recognition and intervention, including appropriate ASV administration, play a crucial role in preventing potential morbidity and mortality. To the best of our knowledge, this represents the first documented paediatric case of isolated cardiotoxicity following krait envenomation that was successfully managed with ASV therapy. This case adds to the growing body of literature emphasising the spectrum of krait envenomation presentations and reinforces the need for maintaining a high index of suspicion for snakebites in endemic areas, even when classical neurotoxic features are absent.

Keywords: Anti-snake venom, Cardiotoxicity, Cardio-respiratory manifestation, Paediatric envenomation

CASE REPORT

A nine-year-old male was brought to the emergency department at 5:00 AM with an alleged history of a snake bite that occurred around 1:00 AM while the child was asleep. According to the parents, the child suddenly woke up crying, and the mother noticed a snake beside the bed, where the child had been sleeping on the ground. The father identified and killed the snake, which was brought to the hospital for identification. Based on its appearance, the snake was identified as a krait (Bungarus caeruleus) [Table/Fig-1]. Following the incident, the child was initially taken to a local hospital, from where he was referred to our centre for further management.

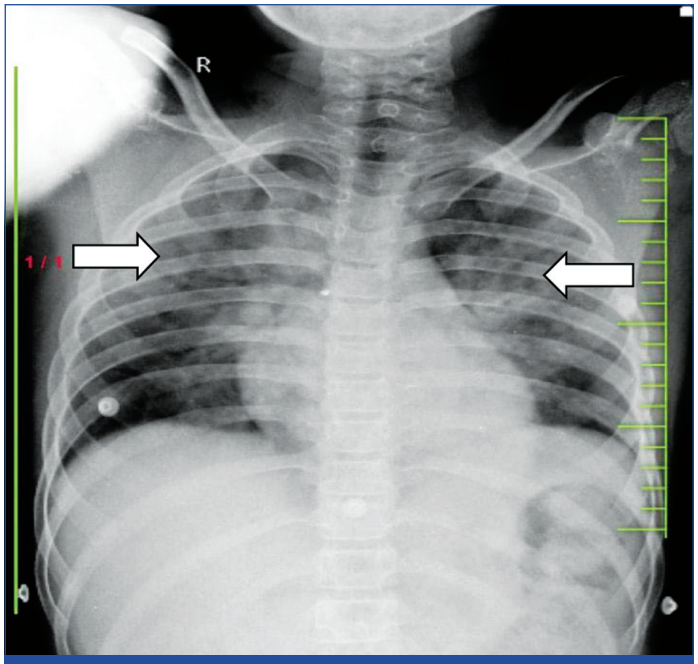
[Table/Fig-1]: Picture depicting the highly venomous type of snake species "Common Krait" which comes under category of "Elapidae."

Upon admission, the child's primary complaints were local pain at the bite site, crying, and fast breathing. On examination, the child was tachycardic with a heart rate of 160 beats per minute, tachypnoeic with a respiratory rate of 34 breaths per minute, and had a blood pressure of 90/50 mmHg. His oxygen saturation was 90% on room air. Inspection of the left foot revealed two fang marks with mild oozing of blood on the fourth toe, though no significant swelling was noted locally. A systemic examination revealed muffled heart sounds and respiratory distress, with bilateral fine crepitations in the infra-axillary areas. Neurological examination was completely normal, with no signs of ptosis, muscle weakness, or altered consciousness.

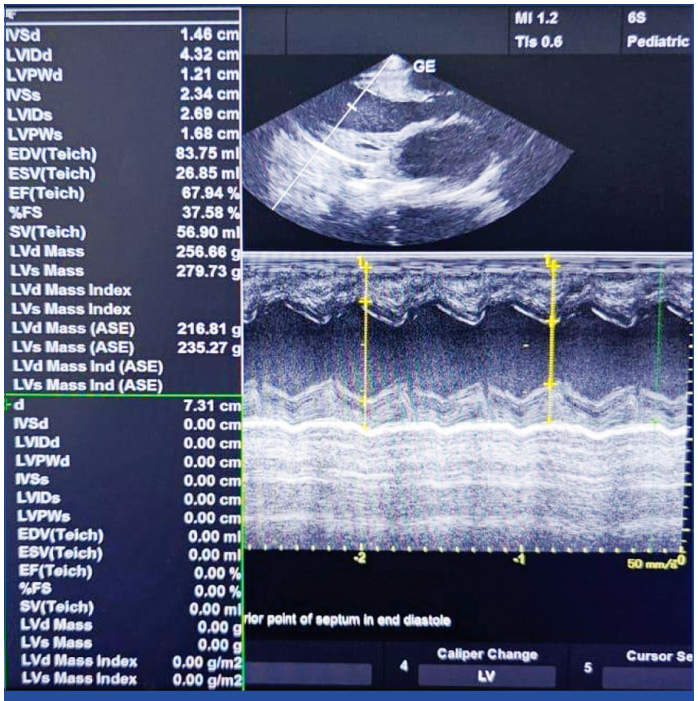
The child was immediately started on oxygen at 6 L/min via bubble Continuous Positive Airway Pressure (CPAP), which improved oxygen saturation to 93%. In light of the tachycardia and hypotension, a continuous infusion of dobutamine was initiated at a rate of 10 mcg/kg/min. Initially, considering the respiratory distress, crepitations, and autonomic dysfunction-like presentation, scorpion sting envenomation was considered. However, the parents were certain about the snake bite history, and the identification of the krait confirmed the diagnosis.

Electrocardiography (ECG) showed no significant changes. Blood investigations revealed a markedly elevated high-sensitivity Troponin I (hsTrop I) level of 3648 ng/L (normal <14 ng/L), indicating significant myocardial injury. CPK-MB was slightly elevated at 37 IU/L (normal 5-25 IU/L). Other laboratory parameters, including complete blood count, renal function tests, and coagulation profile, were within normal limits. A Two-Dimensional (2D) echocardiography revealed a reduced Left Ventricular Ejection Fraction (LVEF) of 35%, with no structural abnormalities. Chest X-ray showed bilateral fluffy infiltrates, consistent with pulmonary congestion [Table/Fig-2,3].

Given the confirmed history of krait bite and the presence of systemic involvement, a decision was made to administer Anti-Snake Venom (ASV). An initial dose of 10 vials of ASV was infused over three hours. Before administration, the child exhibited signs of respiratory distress, including shallow breathing, use of accessory muscles, and decreased oxygen saturation. Following the first dose, there was partial improvement, with a reduction in laboured breathing and improved oxygenation; however, mild tachypnoea and occasional desaturation persisted, necessitating close monitoring and supportive



[Table/Fig-2]: Chest X-ray showed bilateral fluffy infiltrates.



[Table/Fig-3]: A 2D- echocardiography.

care. As the improvement was not complete, a second dose of 10 vials of ASV was administered six hours after the first dose.

After the second dose, the child's respiratory distress resolved completely, and haemodynamic stability was achieved. Dobutamine and oxygen were successfully tapered off over the next six hours. A repeat echocardiography performed before discharge showed an improved ejection fraction of 50%. A repeat hsTrop I before discharge showed significant improvement, reducing to 217.6 ng/L. The child was discharged in stable condition after two days of observation following the final ASV dose, with no neurological deficits or systemic complications noted.

DISCUSSION

India is home to over 60 species of venomous snakes, with the "Big Four" being responsible for the majority of clinically significant envenomations. These include the spectacled cobra (*Naja naja*), common krait (*Bungarus caeruleus*), saw-scaled viper (*Echis carinatus*), and Russell's viper (*Daboia russelii*). Additionally, certain regional species, such as the Central Asian cobra (*Naja oxiana*) in the northwest, the monocellate cobra (*Naja kaouthia*) in the northeast, the greater black krait (*Bungarus niger*) in the far northeast, and the hump-nosed pit viper (*Hypnale hypnale*) along the southwest coast and Western Ghats, also contribute to the burden of snakebite-related morbidity and mortality [1].

Snake venoms are highly complex, with varying compositions depending on the species. Viperid venoms predominantly contain phospholipases A2, metalloproteinases, and serine proteinases, which contribute to local tissue destruction, coagulopathy, and systemic bleeding. In contrast, elapid venoms, including those of cobras and kraits, are rich in three-finger toxins and phospholipases A2, which primarily target the nervous system, leading to neurotoxicity. Other venom components, such as C-type lectin-like proteins, disintegrins, and dendrotoxins, contribute to the diverse systemic effects of snake envenomation [2].

Although snakebite-related cardiotoxicity is rarely reported, there have been documented cases of sudden cardiorespiratory arrest attributable to cardiovascular toxicity following envenomation. However, isolated cardiotoxic manifestations, especially in the absence of neurotoxic, haematotoxic, or systemic symptoms, are exceptionally rare, particularly in paediatric populations. Here, we report a unique case of paediatric envenomation by a common krait, presenting exclusively with cardiorespiratory compromise and complete resolution following the administration of ASV [3].

Diagnosing snakebite envenomation in paediatric patients can be challenging, especially when the offending snake is not identified at the time of the bite. In such cases, a syndromic approach is often employed, where the clinical presentation and laboratory findings are used to infer the likely species responsible [4]. However, in this case, the absence of classic neurotoxic or haemotoxic features, combined with the isolated cardiotoxicity, made syndromic diagnosis particularly difficult. The diagnosis was, therefore, heavily reliant on the clinical history, which identified a krait bite.

Snakebite-induced cardiotoxicity is infrequently reported; however, recent literature has documented cases of sudden cardiorespiratory arrest attributable to cardiovascular toxicity following envenomation. Notably, isolated cardiotoxic manifestations, especially in the absence of neurotoxic, haematotoxic, or systemic symptoms, are exceptionally rare, particularly in paediatric populations. For instance, a case involving a 12-year-old boy bitten by an Indian common krait (*Bungarus caeruleus*) presented with severe neurotoxic symptoms and fulminant myocarditis, leading to cardiogenic shock and requiring intensive interventions [5]. Similarly, an 11-year-old girl exhibited autonomic dysfunction without a clear history of snakebite, underscoring the variability in clinical presentations [6].

In another instance, a 33-year-old male developed respiratory failure and variable atrioventricular block following a cobra bite, highlighting the potential for cardiac complications post-envenomation [7]. However, reports of isolated cardiotoxicity without accompanying neurotoxic or systemic manifestations remain exceedingly rare. Here, we present a unique case of paediatric envenomation by a common krait, characterised exclusively by cardiorespiratory compromise, with complete resolution following the administration of ASV.

The child's clinical course, characterised by new-onset acute heart failure with cardiogenic shock, muffled heart sounds, tachycardia, and elevated biomarkers of myocardial necrosis, strongly suggested myocardial involvement secondary to envenomation. Importantly, other common causes of acute heart failure, such as myocarditis, were ruled out given the hyperacute onset, absence of fever, and lack of any infectious prodrome. The rapid and complete resolution of symptoms following ASV administration further supported the diagnosis of venom-induced myocardial injury.

Currently, there are no established guidelines for the management of cardiac manifestations following snakebite, and the role of

immunomodulators or adjunctive therapies remains unclear. In this case, timely administration of ASV alone was sufficient to achieve full clinical recovery, underscoring the critical role of early venom neutralisation.

This case is also notable for the complete absence of Central Nervous System (CNS) involvement, which is typically considered a hallmark of krait envenomation. This atypical presentation highlights the diagnostic challenges posed by isolated cardiotoxicity in snakebite cases and underscores the need for a high index of suspicion and careful consideration of snakebite envenomation in paediatric patients presenting with unexplained cardiopulmonary compromise, particularly in endemic regions.

While cardiac complications following snakebite have been documented in the literature, they are typically seen in conjunction with other systemic manifestations, such as neurotoxicity, coagulopathy, or renal involvement. Nayak KC et al., reported cardiac abnormalities in 30% of patients with snakebite, including disturbances in heart rate (47%), rhythm abnormalities (6.7%), and both hypertension and hypotension (6.7%). Electrocardiographic changes included sinus tachycardia, sinus bradycardia, arrhythmias, tall T-waves, non-specific ST-T changes, and atrioventricular blocks. However, only one patient in their cohort had evidence of pulmonary congestion, and the vast majority of cases involved viper envenomation (93%) [8].

To the best of our knowledge, this is the first reported paediatric case of snakebite presenting with isolated cardiotoxicity, without any neurological, haematological, or other systemic involvement. This case not only expands the spectrum of recognised clinical presentations of krait envenomation but also emphasises the importance of early ASV therapy, even in cases with atypical manifestations.

CONCLUSION(S)

This case highlights a unique and unprecedented presentation of common krait envenomation in a paediatric patient, characterised by isolated cardiotoxicity without any accompanying neurological, haematological, or systemic manifestations. This case also emphasises the need to consider snakebite envenomation in the differential diagnosis of unexplained acute cardiovascular collapse in children, particularly in endemic regions. Further research is warranted to better understand the cardiotoxic potential of krait venom and to establish evidence-based management protocols for snakebite-induced myocardial injury.

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