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Case Report

Cardiotoxicity and respiratory failure due to Cobra bite

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Abstract: Envenoming by poisonous snakes is an occupational hazard often faced by farmers and farm laborers in tropics. Cobra envenomation is an extremely variable with profound neurological abnormalities (eg, cranial nerve dysfunction, abnormal mental status, muscle weakness, paralysis, Cardiotoxicity and respiratory arrest). Worldwide estimates vary from 1.2 to 5.5 million snakebites, 421,000 to 2.5 million envenomings, and 20,000 to 125,000 deaths. We report case of a 33-year-old male who was bitten by an Indian cobra snake and developed respiratory failure and variable AV block which improved over 17 days. Cardiotoxicity after a snake bite is often acute in onset and relatively rare complication. Physicians should have a low threshold to suspect Cardiotoxicity and aware of systemic toxicity, myocardial dysfunction and arrhythmias.
Keywords: Indian cobra bite, AV block, Ventricular Tachycardia, Ventricular Fibrillation

INTRODUCTION

Out of all the snake species identified till now (about 3000), 300 species are found to be venomous. In India 50 species of snakes are venomous out of a total of 216 known species. The poisonous snakes in India are classified in to *Elapidae* which includes common cobra (*Naja naja*) (Figure 1), king cobra (Figure 2) and common krait (*Bungarus caerulus, Banded krait, Sind krait*), *Echis carinatus* (saw scaled or carpet viper), viperidae (Russell's viper), and pit viper and hydrophiidae (sea snakes) [1].

Fig-1: Indian Cobra

Fig-2: King Cobra

Centre for Global Health Research and Registrar General of India conducted first national survey of death causes (Million Death Study) done in 2001-03 estimates snakebites causing 46,000 deaths per year. However, Central Bureau of Health Intelligence of Government reports only 1,350 deaths for the period from 2004 to 2009 which is grossly underestimated [2]. Global estimates range from 1.2 to 5.5 million snakebites, 421,000 to 2.5 million envenomings, and

20,000 to 125,000 deaths [3,4]. We report a case of cobra bite causing respiratory failure, cranial nerve palsy and variable Atrio-ventricular block.

CASE REPORT

A 33-year-old male patient, auto driver by occupation presented to casualty with history of Cobra snakebite 12 hours ago when he went in to wilderness near the railway station. Patient was taken to local clinic and was later referred here. History of blurring of vision, diplopia, and decreased urine output was revealed. As GCS was 6/15 patient was intubated and kept under ventilator support ACMV (Assist control) mode. On examination pulse was 50 beats/min, and irregularly irregular. Blood pressure was 110/60 mmHg, respiratory rate was 30 breaths/min.

On local examination, 2 fang marks was present over left buttock without local reaction. Investigations on day1 revealed WBC count - 30,700 cells/mm3, Blood urea - 82 mg/dl, Sr. Creatinine - 3.3 mg/dl, platelet count - 60,000 cells/mm3, WBCT> 20 mins .ECG showed 2nd degree AV block, Troponin T was negative, serum electrolytes were abnormal with Potassium of 6 mEq/l, (table 1). The patient was started on IV fluids, ASV, antibiotics, and analgesics. 24 hours later he complained of worsening of diplopia and developed tachypnea, cyanosis, ptosis, muscle weakness and fasciculations. Repeat ECG showed 1st degree AV block (Fig.3).

Patient developed Ventricular tachycardia (Fig.4) which suddenly deteriorated in to Ventricular fibrillation (Fig.5) on 2nd day at 5.00pm. Patient was revived immediately with electrical cardioversion. Patient was started on ionotropes requiring dopamine and nor adrenaline to maintain Blood pressure. Patient's condition improved over a period of 4 days and ionotropic support was discontinued. ECG repeated on 4th - 16th day showed persistent 2nd degree AV block eventhough patient's clinical condition improved. Patient was extubated on day 7.ECG changes are illustrated in Table 1. Patient was discharged on the 20th day with normal ECG findings (Fig. 6). Follow up after 2 weeks showed normal ECG with heart rate of 84 beats/min.

Table 1: Results of clinical investigation on patient

Day	Heart rate per min.	Ecg changes	conclusion
12 hours	48	ST ↑ V1, V2, T inversions V1, V2, V3	1st degree AV block
24 hours	65	ST ↑ V1,V2, ST ↓ & T inversion II, III, aVF, V3-V6	1st degree AV block
2nd day	300	Monomorphic ventricular tachycardia and wave forms	Ventricular tachycardia and ventricular fibrillation
5th day	55	ST ↑ V1, V2, T inversion II, III, aVF, V3-V6	2nd degree AV block type 1, 3:2
10th day	60	ST ↑V2, T inversion V1,V2,V3	2nd degree AV block type 1 4:3
15th day	61	ST ↑V2, T inversion V1,V2,V3	2nd degree AV block type 1 4:3
17th day	68	Normal	Normal

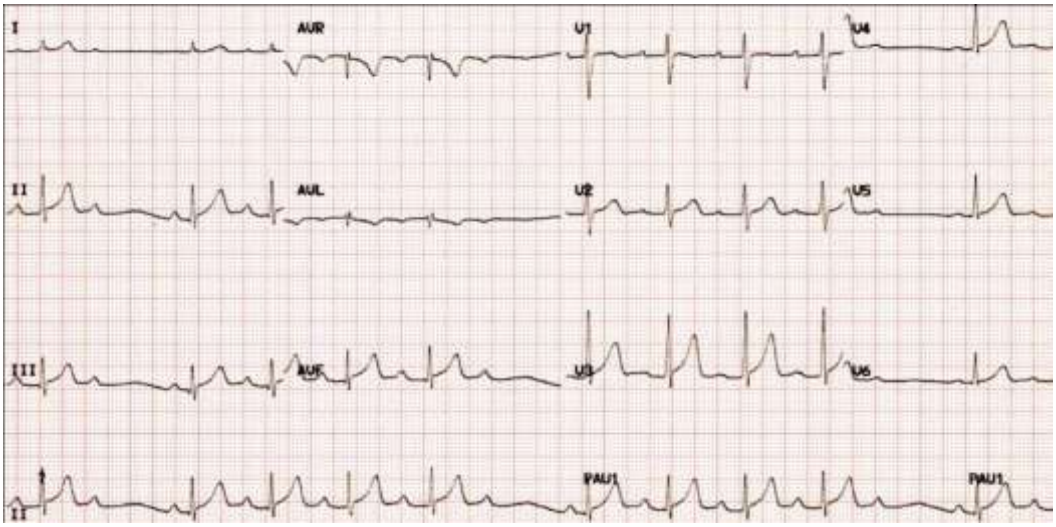

Fig-3: AV block in Electro Cardiogram

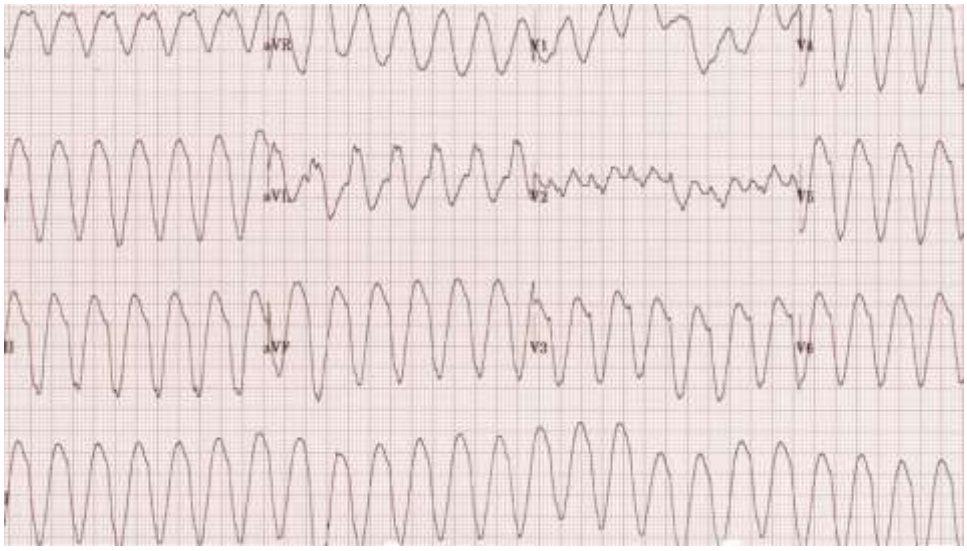

Fig-4: Ventricular Tachycardia

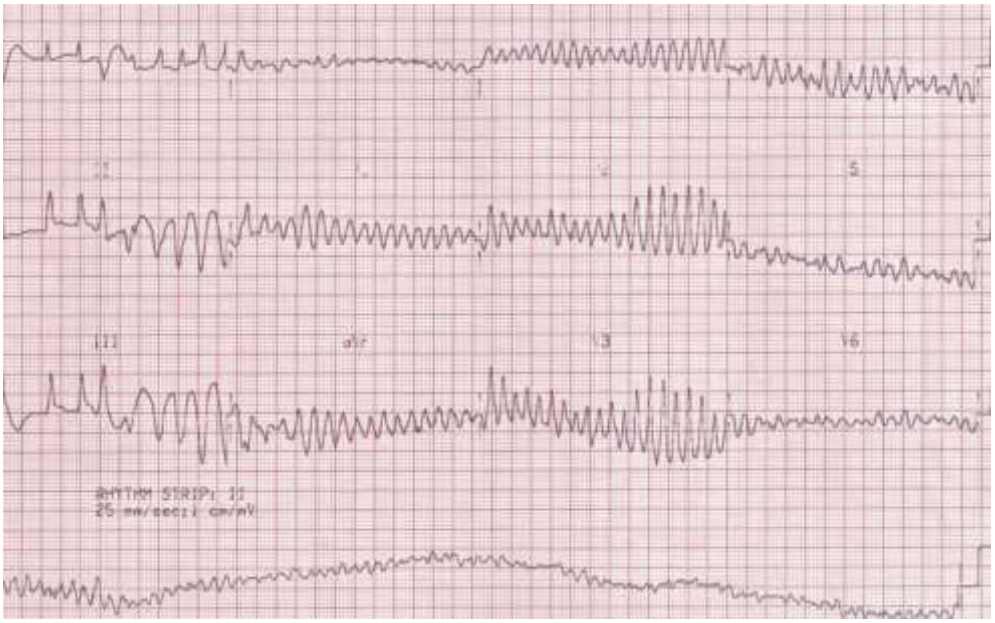

Fig-5: Ventricular Fibrillation

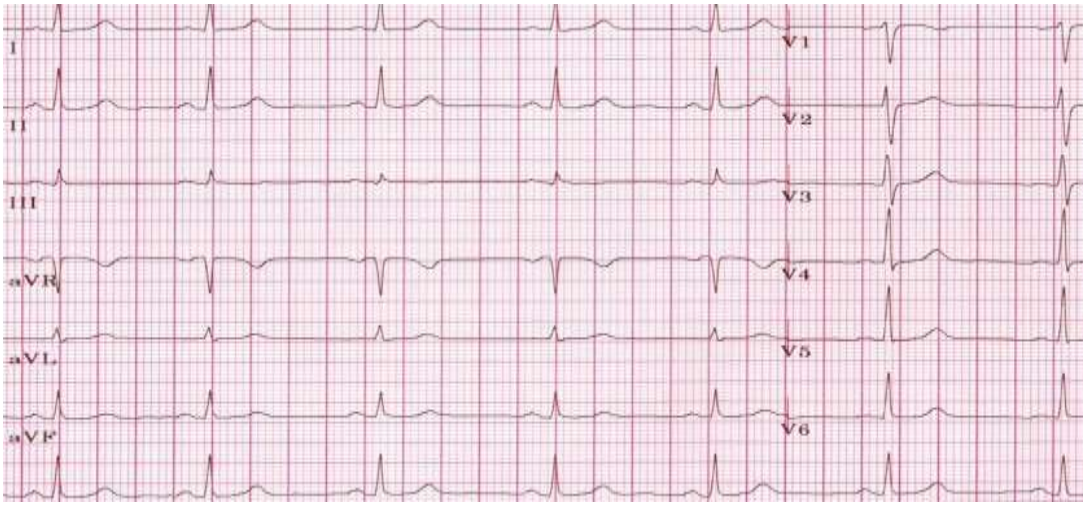

Fig- 6: ECG on Day 17

DISCUSSION

According to some studies > 2,000,000 snake bites occur in India, and >50000 deaths which are grossly underestimated[12]. Cobra venom is rapidly absorbed due to its small molecular size and absorption is increased by exertion (running, fear, palpitations). Cobra venom contains the following toxins-

1) Neurotoxins acting on postsynaptic area causing neuromuscular blockade by competitive binding to nicotinic ach. receptors. One group found to have 4 disulfide bridges and 60-62 amino acids. Other group found to have 5 disulfide bridges and 71-74 amino acids.

2) Cardiotoxins cause cell depolarization which is irreversible resulting in hypotension, dysrhythmia, and even death.

3) Complement activators through the alternate pathway (C3-C9).4) Enzymatic toxins- hyaluronidase, phospholipase A_2, and *L* -amino acid oxidase etc. [5-[7]

ECG abnormalities and cardiotoxicity has been found following envenomation by Indian cobra (Naja Naja), Vipers, Echis ocellatus and Atractaspis engaddensis etc. Various mechanisms suggested are cardiotoxins [8], myotoxins [9], vasospasm in coronaries [10], dyselectrolytemia[11] hypotension and autonomic disturbances. Venom of Indian cobra is rich in alpha-bungarotoxin and cobratoxin which act postsynaptically.

Polyvalent anti-snake venom is available in India which acts against venom of cobra, viper, Russell's viper and krait. 100 ml (10 vials) ASV should be added to 200 ml of 0.9% normal saline and administered over 30-50 min. Reaction to ASV can develop in 10 minutes to 3 hours and systemic anaphylaxis should be treated with adrenaline.

CONCLUSION

Snake bite is a common clinical condition encountered by physician in rural areas and an important cause of mortality in many parts of the world. A high index of suspicion for Cardiotoxicity and risk of arrhythmias is required following snake bite. This complication can occur both acutely as well as in later stages. Very few case reports are presented regarding cobra toxin affecting conductive system of heart and arrhythmogenic potential.

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