Dry Bite by Common krait: A rare phenomenon & its management; rationale use of antivenom

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ABSTRACT
Snake bite is one of the major health concerns in India especially in rural India. One of the dangerously poisonous neurotoxic snakes is Common krait (Bungarus caeruleus), also known as Indian Krait or blue krait. They are nocturnal in nature and contribute to many cases of snake bite envenomation, mainly people sleeping on the floor. Many a times, the victim doesn’t wake up because of the painless venom. They usually wake up with the symptoms of paralysis or may even die in sleep. Very rarely it causes dry bites. Here we report a case of 40-year-old male who presented with a snake bite at 7.00 pm in the evening, when he went to pick the broom. Snake bite or fang marks were present on his forearm, but no signs and symptoms of envenomation were seen. So, we present a
case of “dry bite” which is quite rare in kraits. We kept him under observation for next 72 hours, no deterioration in patient’s health was observed. So, we are hereby elaborating about the case and approach towards a dry snake bite patient & rationale use of antivenom.

Keywords: Bungarus caeruleus; Common krait; Dry bite; Indian Krait; rationale use of antivenom.

1. INTRODUCTION
Snake bite poisoning is usually a life-threatening medical emergency. India is considered to have the highest snakebite related death in the world. Out of 3700 known species of snakes worldwide only 15% are considered dangerous to humans (Gold et al., 2002; Kasturiratne et al., 2008). Out of 5.4 million snakebites worldwide 2.5 million result in envenomation and 125,000 deaths (Menon et al., 2017; Romulus Whitaker et al., 2015). It is estimated that in India alone there are more than 100000 snake bites, leading to 45000 to 50000 deaths per year (Menon et al., 2017; Romulus Whitaker et al., 2015). India is estimated to have the highest snakebite mortality in the world (Kasturiratne et al., 2008; Menon et al., 2017; Munjal and Association of Physicians of India, 2012). In India there are about 236 species of snakes, most of which are nonvenomous; their bites are not dangerous to patients, apart from triggering panic reaction (Munjal and Association of Physicians of India, 2012). Elapidae, Viperidae, Echiscarinatus, and pit viper and hydrophidae (sea snakes) are main poisonous snakes families in India (Munjal and Association of Physicians of India, 2012). Elapidae family includes Common cobra (Naja naja); King cobra and Common krait (Bungarus caeruleus), (Munjal and Association of Physicians of India, 2012).

Most poisonous snake among these is Common Indian Krait, which is about 10 times more poisonous than cobra. It is 1 to 4 feet long, with enlarged hexagonal vertebral scales, uniform white or red belly and narrow white more or less distinct cross bars on the back, which usually absent near the head and neck region (Munjal and Association of Physicians of India, 2012). Snakes have the ability to regulate the venom & its amounts to be injected at the time of bite. That’s why despite the bite by poisonous snake, no systemic sign of envenomation is seen in some patients. This type of snake bite is called as “dry bite” (Kasturiratne et al., 2008; Munjal and Association of Physicians of India, 2012). The fang and tooth marks are present without actual injection of the venom (Kasturiratne et al., 2008).

2. CASE REPORT
A 40-year-old male presented to casualty of AVBRH, Sawangi (M), Wardha at about 10.00 pm, with the history of snake bite over his right forearm while picking up the broom at 7:00 pm. He had caught the snake immediately and the relatives also had a photo of it which revealed the snake as a common krait (fig.1). There were no other complaints reported by patient & his relatives. There was no history of pain, redness, sweating, necrosis, paresthesias, giddiness or syncope, nausea, vomiting, abdominal colic, bleeding from any orifices, eyelid drop, double vision or fatigue, difficulty in swallowing or breathing, swelling around the bite site, slurring of speech, fasciculations, & weakness in any part of body.

There was no history of hypertension, diabetes mellitus, tuberculosis, bronchial asthma, & any cerebrovascular episodes that has caused neurological deficit. On examination – pulse - 80/min regular, normal volume; BP - 120/80 mmHg; No pallor, icterus, cyanosis, clubbing & lymphadenopathy. On local examination – two fang marks were present over his right forearm on ventral site near his ulnar border (fig. 2). There was no sign of inflammation, & paresthesia around the bite mark.

On systemic examination – His cardiovascular system, respiratory system & abdominal system were normal. He was conscious, oriented, having 5/5 power in all group of muscles, no ptosis, & bilateral plantar were flexors. All investigations were unremarkable, as follows. Hemoglobin- 13 gm%; leucocytes- 4500/cmm; platelet- 1.79 L/cmm; peripheral smear- normal; urea- 25 mg/dl; creatinine- 0.92 mg/dl; sodium- 143 mEq/l; potassium- 4.3 mEq/l; SGOT - 27; SGPT- 32; alkaline phosphatase- 195 U/l; total bilirubin- 0.92 mg/dl; Prothrombin time- 13 sec; international normalized ratio-1.2; urine analysis showed no hematuria, myoglobinuria & any other casts or crystals; arterial blood gas studies were within normal range; bleeding time and clotting time were done on admission & discharge, & were within normal limits. Whole blood clotting time was done 6 hourly and was less than 7 minutes. Chest x-ray was also normal (fig. 3).

The patient was under observation in intensive care unit for 48 hours. The patient was symptomless over the course of time. He was then shifted to the general ward for next 24 hours. We had arranged ASV (anti snake venom), but waiting for symptoms to appear or deterioration of patient’s health. But fortunately, he had developed nothing, so there was no need of ASV for him; & so, he was being discharged following 72 hours of observation. He was requested to sign a consent form, for the sake of publication of his case.

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3. DISCUSSION

Common Indian Krait (Bungarus caeruleus); also known as kala gandait, kala taro, kandar, manyar, chitti, kattuviriyan, vallapamboo is the most dangerous species of venomous snake in the Indian subcontinent, its venom being 10 times more poisonous than cobra venom. It is a nocturnal animal, residing near human households or huts in the wattle & daub & prey on rats, mice, lizards and snakes. Most bites occur during the months of June to December when snake enters in a person’s bed during their hunting activity, to take advantage of the warmth in it (Munjal and Association of Physicians of India, 2012). Most cases of snake bite are reported between 11 pm to 5 am, usually when the person is in sleep and the reflexes are greatly diminished; and the krait with its sharp small fangs injects maximum venom (Munjal and Association of Physicians of India, 2012). The venom stimulates the autonomic nervous system thus within 20 to 30 minutes of the bite, victims experience a transient abdominal colicky pain, bradycardia, sweating,
vomiting, raised blood pressure. Subsequently, within 30 minutes to 18 hours the venom attacks presynaptic acetylcholine receptors resulting in ptosis, pooling of saliva, dysphagia, dyspnoea, inter-nuclear ophthalmoplegia, palatal weakness, weakness of neck muscles, respiratory muscles and lastly the diaphragm. Patient complains of blurred vision, diplopia and lands in respiratory paralysis, coma and anoxic cardiac arrest. Many a times, patients succumb to iatrogenic respiratory infection or adult respiratory distress syndrome. After recovery, few patients experience signs and symptoms of peripheral neuropathy (Kohli et al., 2007; Seneviratne et al., 2002; Munjal and Association of Physicians of India, 2012).

Sir Joseph Fayer (1892) was the first to publish a case report on dry bite (Naik, 2017). “Dry bite” accounts for about 50% of coral snakes & 25% of pit vipers & 80% of the deadliest sea snakes bite (Gold et al., 2002). Dry bite is extremely rare in Common kraits. Some snakes have a very systematic way of injecting venom, so timing of their manifestation can vary a lot and can be unpredictable. A snake may have a “dry bite” for a creature very large for them to eat. Such behaviour is called “venom metering” (Young et al., 2002). The second major assumption that underlies venom metering is the snake’s ability to accurately assess the target. Other mechanics of dry bite are natural or acquired immunity of the victim against the snake venom, absence of venom at the time of strike, diseased venom glands, fangs of the snake getting obstructed due to calcifications impairing the smooth delivery of the venom while striking, mechanical failure resulting in inefficient lunge of the fangs to deliver the venom from the venom sack to the bite site, swift movement of the victim may result in an ineffective bite or early timing of venom injection even before the fangs entered the victim due to misjudgment of the distance by the snake (Klauber and McClung, 1982). Various neurotoxic venom manifests within 6-12 hours of the bite. So, the patient should be kept under observation for this time duration; and patient should be symptomless even after 12-24 hours of bite before labelling it as a case of “dry bite”. We should not miss a case of envenomation by considering dry bite as our 1st diagnosis, as it is the diagnosis of exclusion (Kohli et al., 2007; Seneviratne et al., 2002). Study conducted on “dry bite in venomous snakes” by B Sadananda Naik in Alva’s health centre, Moodabidri, Karnataka, mentioned the incidents, pathophysiology & pathomechanics of dry bite & its medical scenarios (Naik, 2017).

One more study conducted in Brazil on dry bite concluded that 10 out of 33 cases of lancer head viper and 3 out of 7 cases of rattle snake bites had no laboratory or clinical evidence of local or systemic envenomation. They also mentioned several possible mechanisms as mentioned above for dry bite. Thus, antivenom administration can be postponed or not indicated in such cases, if no deterioration occurred (Silveira and Nishioka, 1995). Dry bite is now an important clinical entity in the grading of severity of envenomation by poisonous snakes (Ahmed et al., 2012; Naik, 2017; World Health Organization and Regional Office for South-East Asia, 2016). So, anti-snake venom should not be given empirically, as risk of anaphylaxis will weigh its benefits (Alves De Rezende et al., 1998; Naik, 2017; World Health Organization and Regional Office for South-East Asia, 2016). Indications for anti-snake venom (ASV) according to WHO are when the victim develops one or more clinical or laboratory signs of systemic or local envenomation. (A) Hematological features include - hemostatic abnormalities such as spontaneous systemic bleeding, coagulopathy (deranged 20WBCT or prothrombin time (PT)) or thrombocytopenia. (B) Neurotoxic signs include - ptosis, external ophthalmoplegia or paralysis. (C) Cardiovascular abnormalities include - hypotension, shock, cardiac arrhythmias. (D) Urological abnormalities include - acute kidney injury, oliguria or anuria, increased blood urea & creatinine, hemoglobinuria, myoglobinuria, brown urine and any other evidence of intravascular hemolysis or rhabdomyolysis (muscular pain, hyperkalemia). (E) Local signs of envenomation include - local swelling involving more than half of the bitten limb within 48 hours in the absence of the tourniquet, swelling involving the toes and fingers, rapid extension of the swelling beyond wrists or ankle within few hours of the bite of the hand or feet, cross one joint proximal to bitten site & enlarged tender lymph nodes draining the bitten limb (Alirol et al., 2010; World Health Organization and Regional Office for South-East Asia, 2016).

Indications of ASV according to Indian guidelines are the same i.e. cellulitis and local swelling with or without bite marks; features of external or internal hemorrhage; presence of any neurological signs, hypotension or shock requiring inotropic support; coagulopathy and acute kidney injury (Alirol et al., 2010; Daswani et al., 2017; World Health Organization and Regional Office for South-East Asia, 2016) (table 1 & 2).

<table>
<thead>
<tr>
<th>Table 1 Protocol of ASV use</th>
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<tbody>
<tr>
<td><strong>Conventional protocol of ASV use: (Daswani et al., 2017)</strong></td>
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<tr>
<td><strong>Neurotoxic snakes</strong></td>
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<tr>
<td><strong>Vasculotoxic snake bites</strong></td>
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<tr>
<td><strong>Modified protocol of ASV use: (Daswani et al., 2017)</strong></td>
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<tr>
<td><strong>Conventional Protocol</strong></td>
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<td><strong>Modified Protocol</strong></td>
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</tbody>
</table>
Neurotoxic snakes  
5 vials of ASV f/b 5 vials after 2 hours. If symptoms not improving or progressing, & patients showing no response to neostigmine or requiring ventilator support then 10 vials stat f/b 10 vials after 2 hours.

Vasculotoxic snake bites  
a. 5 vials of ASV f/b 2 vials every 6 hourly till the coagulation profile normalises or signs and symptoms regress.  
b. In cases of frank bleeding 10 vials of ASV f/b 5 vials at 2 hourly if bleeding continues.  
c. If frank bleeding occurred after the first dose then repeat dose with 5 vials 6 hourly

Severe cellulitis  
5 vials of ASV f/b 2 vials every 6 hourly (only if cellulitis spreading)

<table>
<thead>
<tr>
<th>Snake</th>
<th>Manifestation</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>Krait</td>
<td>Neuroparalysis, abdominal pain</td>
<td>ASV, ventilator, atropine with neostigmine</td>
</tr>
<tr>
<td>Cobra</td>
<td>Neuroparalysis</td>
<td>ASV, atropine with neostigmine, ventilator</td>
</tr>
<tr>
<td>Russell’s viper</td>
<td>Bleed, DIC, shock, renal failure</td>
<td>ASV, dialysis, blood transfusion</td>
</tr>
<tr>
<td>Saw scaled viper</td>
<td>Bleeding</td>
<td>ASV, blood transfusion</td>
</tr>
</tbody>
</table>

**Table 2** Summary of snake bite & its management (Munjal and Association of Physicians of India, 2012)

4. CONCLUSION
Snakebite related morbidity & mortality is highest in India in all over the world. The most poisonous snake being Common Indian Krait and most of Krait bite cases are not reported or noticed as patient dies in sleep without any pain. Dry bite, which is an important clinical entity in the grading of severity of envenomation by poisonous snakes, has unusual occurrence in Krait. We should not consider dry bite as 1st diagnosis, & should not miss a case of envenomation, as many times symptoms appear in next 6-12 hours of bite. Administration of ASV should be avoided empirically in each and every patient; especially in asymptomatic cases of snake bite. ASV should not be used as a precautionary step, as risk of anaphylaxis will weigh its benefits. Rationale use of ASV decreases its side effects or complications. The education on dry bite & rationale use of ASV will help in terminating the practice of unwanted use of ASV and will decrease its cost, side effects or complications.

**Informed Consent**
Potential participant were enrolled the study after signing the informed consent.

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**Conflicts of Interest:** The authors declare no conflict of interest.

**REFERENCE**


