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Malayan krait (*Bungarus candidus*) envenoming: A case report with literature review

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*We report a case of male patient, aged 52, bitten by Malayan Krait (*Bungarus candidus*) and treated with *B. fasciatus* antivenom. The patient presented at a provincial hospital in a remote district of Chachoengsao province, Thailand, in August 2000. Cases of *B. candidus* bite are considerably rare and there is no antivenom available in the market. A few hours after the bite, he developed full neurotoxin intoxication. He was treated with *B. fasciatus* (Banded krait) antivenom and kept under pressurized respiration. The use of *B. fasciatus* antivenom for *B. candidus* bite victim is consistent with reports on animal experiments in 1999 where *B. fasciatus* antivenom demonstrated comparable neutralizing capacity to both *B. fasciatus* and *B. candidus* venoms. The patient's condition steadily improved after the treatment and achieved full recovery. Since some patients were reported to recover from respiratory failure without antivenom treatment, the merit of *B. fasciatus* antivenom in case of *B. candidus* bite has to be evaluated by a randomized control trial.*

Keywords : Malayan krait, Neurotoxin, Parasympathetic abnormality, *B. fasciatus* antivenom.

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วารสาร จันทรศร, กิตติพงษ์ สุขุม, วิศิษฐ์ สิตปรีชา. การได้รับพิษงูทับสมิงคลา (Malayan Krait): รายงานผู้ป่วย 1 รายและบททวนวรรณกรรมที่เกี่ยวข้อง. จุฬาลงกรณ์เวชสาร 2546 ก.พ; 47(2): 101 - 7

รายงานการรักษาผู้ป่วยชายวัย 52 ปี ที่ถูกงูทับสมิงคลากัด ซึ่งเป็นกรณีที่พบได้ยาก และไม่มีเซรุ่มต้านพิษงูชนิดนี้โดยเฉพาะ ผู้ป่วยมีอาการของการได้รับพิษงูชนิด Neurotoxin หลังจากถูกกัดไม่นาน และได้เข้ารับการรักษานานที่โรงพยาบาลในจังหวัดฉะเชิงเทรา โดยใช้เซรุ่มต้านพิษงูสามเหลี่ยมพร้อมกับการใช้เครื่องช่วยหายใจ หลังจากได้รับการรักษา อาการของผู้ป่วยดีขึ้นตามลำดับจนหายเป็นปกติ ผลการใช้เซรุ่มต้านพิษงูสามเหลี่ยมรักษาผู้ป่วยที่ถูกงูทับสมิงคลากัดครั้งนี้สอดคล้องกับการทดลองในสัตว์เมื่อ ค.ศ. 1999 ที่พบว่าเซรุ่มต้านพิษงูสามเหลี่ยมสามารถต้านพิษงูทับสมิงคลาได้ด้วย อย่างไรก็ตามผู้ป่วยบางรายในอดีตหายจากพิษงูทับสมิงคลาโดยไม่ต้องใช้เซรุ่ม ดังนั้นการใช้เซรุ่มดังกล่าวจึงจำเป็นต้องได้รับการศึกษาเพิ่มเติมจาก Randomized control trial ต่อไป

Snakebites are still common in Thailand and other developing countries. The majority of the cases involved venomous snakes. Chaisin Viravan, *et al.* ⁽¹⁾ reported an analysis of snakes killed and brought to hospitals by the patients. Out of 1631 snakes collected, over 70 % were venomous. Among the neurotoxic venomous snakes, *B. candidus* (Figure1) is a rare specie among the genus *Bungarus*, frequently found in the east and the northeast of Thailand. On the other hand, *B. fasciatus* (Banded krait) is more common throughout the country. The *B. candidus* is usually smaller than the *B. fasciatus* and lives in the forest. The snake is inactive during the day and searches for prey at night. It attacks human only when disturbed. Almost all of the cases involving *B. candidus* bites take place during the night. Cases of *B. candidus* bite are rare; however, its neurotoxic venom can cause severe effects that can be fatal if the patient is not treated properly.

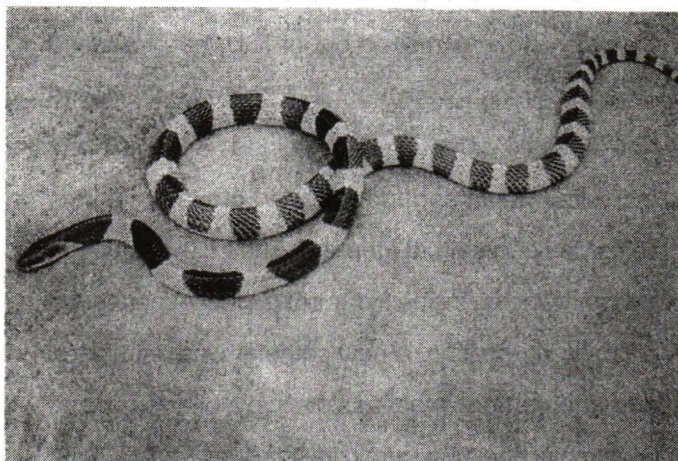


Figure 1. *Bungarus candidus*

There were reports of patients bitten by *B. candidus* in Thailand and Malaysia where most of *B. candidus* are found. D.A. Warrell, *et al.* ⁽²⁾ reported five cases of patients bitten by *B. candidus* in eastern

Thailand and northwest of Malaysia. Among these five cases, two were not envenomed, whereas the other three developed generalized paralysis which progressed into respiratory paralysis; one of which ended fatally. One patient responded to infusion of Haffkine's polyvalent anti-snake serum made from the venoms of *B. caeruleus*, *Naja naja*, *Echis carinatus*, and *Vipera russelli*. Charn Pochanugool, *et al.* ⁽³⁾ reported a case of patient bitten by *B. candidus* who developed respiratory failure. The patient recovered fully with assisted respiration without any use of antivenom. In 1998, there was a case of Malayan krait bite out of 949 cases reported at Chulalongkorn Hospital Memorial. ⁽⁴⁾ Chonwit L, *et al.* ⁽⁵⁾ reported 3 cases of patients bitten by Malayan Krait in the northeast of Thailand. All patients developed ptosis and generalized muscle weakness which later progressed into respiratory paralysis. All patients received assisted ventilation and supportive treatment including administration of neostigmine, Banded krait antivenom and plasmapheresis. Two patients recovered, the other patient had permanent brain damage due to anoxia from 2 episodes of cardiac arrest. Tan N-H, *et al.* ⁽⁶⁾ analyzed biochemical properties of *B. candidus* venom and reported that the major lethal toxin is basic lethal phospholipase A, F6A which accounts for approximately 13 % of the venom protein. Lawan Chanhome, *et al.* ⁽⁷⁾ reported results of animal experimentations suggesting that the commercial antivenom raised to *B. fasciatus* (banded krait) venom neutralized the lethal activity of all Thai *Bungarus* venoms and its neutralizing capacities against *B. fasciatus* (Banded krait) and *B. candidus* (Malayan krait) were almost the same. In August 2000, a 52-year-old patient bitten by *B. candidus* was

admitted to Chachoengsao provincial hospital. He was treated with *B. fasciatus* antivenom and mechanical respirator. He fully recovered in 5 days.

Case report

A 52-year-old Thai male, a native of Chachoengsao, a province in eastern Thailand, was bitten by the *Bungarus candidus* (Malayan krait) on his left hand's middle finger. The snake was killed and taken to the local hospital with him and was initially identified as 0.8 meter genus *Bungarus*. The patient was admitted for observation and about 3 hours later, he developed blurred vision, ptosis, stiffed jaws, chest congestion, and irregular respiration rate with motor power around grade 4. The patient was then intubated and connected to a Bird's respirator before referring to Chachoengsao provincial hospital. He arrived at the hospital about 6-7 hours after being bitten; he was still conscious under the ET tube. The snake was later identified as Malayan krait, *Bungarus candidus*. Initial examination indicated high blood pressure (143/98 mmHg), high pulse at 111 beats/min, bilateral ptosis, pupil at 4 mm on both eyes with good response to light, and motor power at grade 2-3. Fang marks were found on the middle of left hand's middle finger; no bleeding, no swelling, no bleb were found at both marks. Laboratory study results for CBC, UA, BUN, Cr, Electrolyte, and blood sugar were all normal. The patient was then given Tetanus toxoid, Dexamethasone 4 mg intravenous, and penicillin G sodium 2 million unit intravenous every 4 hours. He was later moved to ICU with motor power still at grade 2, and bilateral ptosis.

On the following day, the patient's condition showed slight improvement; he had low-grade fever

and was able to move his fingers and legs slightly. The patient continued to receive respiratory support and was given steroid and antibiotic. Treatment with *B. fasciatus* antivenom was initiated at 1 vial intravenous every 4 hours. Chest x-ray was carried out and was found normal. Improvement was observed a few hours after the treatment of the *B. fasciatus* antivenom; the patient began to move eye brows, lifting both legs vertically, folding fingers, motor power improved to grade 3-4, but blood pressure and pulses remained high. Assisted respiration and tidal volume remained normal. Treatment with the *B. fasciatus* antivenom was doubled to 2 vials intravenous every 4 hours 24 hours later for another 48 hours.

After 4 days in the hospital, antivenom treatment was completed. The patient showed satisfactory improvement; all vital signs were stable except blood pressure and pulse still slightly higher than normal, motor power improved to grade 4-5. A day later, he was moved out of ICU, no ptosis, and limbs movements were normal. ET tube was removed while Foley's catheter was retained. Application of antibiotic was changed from IV to oral at 1 tablet 4 times/day and steroid stopped. The Foley's catheter was removed on the next day but patient experienced difficulty in urination. A new catheter was re-inserted and the patient was assisted by clamping and unclamping the tube to train the bladder. The catheter was retained for another 4 days after which normal urination was observed. Constipation was also observed throughout this period. The patient fully recovered and was discharged on the following day; after spending 11 days in hospital.

Discussion

Treatments for patients bitten by the *B. candidus* varies and the results are ranged from full recovery to fatality. A review of nine cases of Malayan krait snakebite is summarized in table 1. In all cases, the bite sites did not swell and the patients never lost consciousness, except in one case the patient suffered decreased consciousness, and another with cardiac arrest. Common neurotoxin intoxication such as ptosis, paralysis of jaw, respiratory paralysis, tetraparesis were observed in all cases. Parasympathetic abnormalities were also observed. Almost every patient developed mydriasis, hypertension and tachycardia. Constipation and difficulties in micturition were observed in few cases.

There is no commercially available antivenom against *B. candidus* toxin. The use of *B. fasciatus* antivenom for *B. candidus* bite victims were reported and appeared ineffective in some cases.^(2,5) However, animal experiments by Lawan Chanhom, *et al.*⁽⁷⁾ indicated that the antivenom raised to *B. fasciatus* venom effectively neutralized the lethal activity of all Thai *Bungarus* venoms tested in *in vitro* neutralization experiment. The neutralizing capacity to *B. fasciatus* and *B. candidus* venoms were almost the same.

Many cases of Malayan krait envenoming were treated with anticholinesterase drugs such as neostigmine and edrophonium chloride. One case responded positively to anticholinesterase drugs.⁽²⁾ Anticholinesterase drugs do not improve paralytic effect of the venom and parasympathetic abnormalities still persist for a long time in many cases. The cause of parasympathetic abnormalities is still unclear.

Assisted respiration applied in all cases appeared successful. However, prolonged assisted

respiration can pose high risk of mechanical failure and could result in fatality. More than half of 46 cases of fatal snakebites in Thailand, surveyed from 15 provincial hospitals by Sornchai Looareesuwan, *et al.*,⁽⁸⁾ were resulted from respiratory failure that followed neurotoxin intoxication.

In this case report, *B. fasciatus* antivenom was used for *B. candidus* bite by continuously administered intravenously at 1 vial every 4 hours, and later increased to 2 vial every 4 hours for the entire duration of 3 days. The patient's clinical presentation improved after the antivenom was introduced and the recovery was impressive. The improvement could coincide with the respirator application. Full recovery was achieved in 5 days. It is not clear whether higher dosage would improve the recovery rate. Higher dosage of *B. fasciatus* antivenom and adjuvant treatment such as anticholinesterase need further studies and clinical tests in *B. candidus* bite victims. Additional research should be directed toward developing common antivenom for all neurotoxin envenoming. This will simplify the use of antivenom which can be made available in hospitals throughout the country and eliminate the need for identification of snake which could lead to inappropriate treatment if the snakes are not correctly identified. Since there were some successful cases reported based on assisted respiration alone, the value of *B. fasciatus* antivenom in the treatment of *B. candidus* bite victims needs to be substantiated by a controlled clinical trial.

Conclusion

We report a full recovery of the *B. candidus* bite victim with *B. fasciatus* antivenom treatment plus a carefully controlled respiratory support. Although the

Table 1. Malayan krait snake bite summary.

Patient	13 , male (6)	44 ,female (6)	39 ,male (6)	47 ,male (3)	41 ,male (8)	12 ,female (8)	35 ,male (8)	12 ,male (9)	52 ,male *
Bite location	Thigh	Big toe	Ankle	Right thumb	Rt middle finger	Rt thumb	Lt hand	Rt elbow	Lt mid finger
Time	3a.m.	3a.m.	3.30a.m.	Daytime	Night	night	Daytime	8p.m.	midnight
Place	House	Rice mill	Farm	Institute	House	house	Frog farm	house	house
Clinical Presentation									
Loose conscious	No	No	No	No	No	cardiac arrest twice	Yes	No	No
Swelling at the bite site	No	No	No	No	No	no data	Pain	No	No
Piosis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ophthalmoplegia	Yes	Yes	Yes	Yes	no data	no data	no data	no data	Yes
Paralysis of jaw,tongue	Yes	Yes	Yes	Yes	Yes	no data	no data	no data	Yes
Respiratory paralysis	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Tetraparesis	Yes	Yes	No	Yes	Yes	Yes	Yes	flaccid paralysis	Yes
Muscle tenderness	No	No	Yes	Yes	no data	no data	no data	No	No
DTR	no data	no data	no data	no data	Grade I	no data	absent	absent	Grade I
Parasympathetic abnormalities									
Mydriasis	Yes	no data	no data	no data	Yes	Yes NRTL	Yes fix	Yes	Yes
Tachycardia	120/min	Yes	90/min	No	110/min	102/min	98/min	> 120/min	111/min
Hypertension	140/70	No	130/70	No	170/110	144/96	150/100	150/100	140/90
Constipation	no data	no data	no data	no data	no data	no data	Yes	no data	Yes
Difficulty in micturition	no data	no data	no data	no data	no data	no data	Yes	Yes	Yes
PMN leucocytosis	Yes	Yes	Yes	No	No	No	no data	no data	No
Application of respirator	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Time after bite until intubation	4 hr	4 hr	N/A	8.5 hr	20 hr	no data	no data	40 min	3 Hrs
Total length of intubation	49 hr	13 hr	N/A	88 hr	72 hr	2 month	27 days	58 days	96 hrs
Antivenom									
Type of antivenom	B-fasciatus	None	Haffkine	None	B-fasciatus	None	B-fasciatus	None	B-fasciatus
Dosage of antivenom	Total 150 ml	None	100 ml	N/A	10 mg q 30 min*3	N/A	10cc q 1 hr*6	N/A	2 vial q 4 hrs
Response to antivenom	None	None	Positive	N/A	Negative	N/A	Negative	N/A	Positive
Medical treatment									
anticholinesterase		N/A	N/A	Edrophonium chloride	Neostigmine 50 microg. /kg/day*2	Neostigmine+plasma pheresis	Neostigmine	Neostigmine	N/A
Response	Positive	N/A	N/A	Negative	Negative	Negative	Negative	Negative	N/A
Time after bite until extubation	53 hr	17 hr	N/A	96 hr	4 days	2 month	27 days	58 days	99 Hrs
End result	Improve	Dead	Full recovery	Full recovery	Improve	Permanent brain damage	Full recovery	Improve	Full recovery

* = this case report,() = No.of reference.

results appeared to be consistent with animal experiments where the antivenom raised to *B. fasciatus* venom effectively neutralized the lethal activity of Thai *Bungarus* venoms, further clinical tests are required to confirm its effectiveness on victims of *B. candidus* bite. Until such clinical tests are reported, proper treatment of the patients with timely use of mechanical respirator in addition to application of available antivenom remain critical for full and timely recovery.

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