# Case Report

# Specific Antivenom for Bungarus Candidus

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***Background:*** *Bungarus candidus (Malayan krait) snake is a neurotoxin snake. Previous treatment after snakebite was mainly respiratory support until the patient had spontaneous breathing. Recently specific antivenom for the Bungarus candidus snake was produced by the Queen Saovabha Memorial Institute and distributed in June 2004. The present article is the first report on the clinical response to the specific antivenom for Bungarus candidus.*
***Objective:*** *To analyze the signs and symptoms of patients after snakebite and the response of the patients after receiving specific antivenom for Bungarus candidus snake.*
***Study design:*** *Retrospective chart review.*
***Material and Method:*** *Four cases of Bungarus candidus snakebite were identified and divided into two groups. Group 1 (Case 1, 2, and 3) had received specific antivenom for Bungarus candidus while group 2 (case 4) had not. Onset, signs and symptoms after snakebite, antivenom dosage, and response time after receiving antivenom were analyzed.*
***Results:*** *The first three patients received specific antivenom for Bungarus candidus and the fourth patient did not receive any. All four patients developed neurological signs and symptoms from this neurotoxic venom. In case 1, 2, and 4, the first signs and symptoms were dyspnea, difficulty with speech, and opening the eyelids at 50 minutes (30-60 minutes). The onset of other signs and symptoms included respiratory paralysis with intubation 3 hours (2-4 hours), full ptosis 3.66 hours (3-4 hours), mydriasis and fixed pupils 4.33 hours (4-5 hours), no response to stimuli 5.66 hours (4-10 hours), tachycardia 5.5 hours (4-7 hours), and hypertension 14 hours (4-24 hours). The first two patients received specific antivenom for Bungarus candidus after being bitten at 10 and 12 hours, respectively. The first clinical response in case 1, were 12 hours after receiving 16 vials, and in case 2, were 20 hours after receiving 16 vials. These were slight movement of feet phalanxes. At 40 hours after receiving specific antivenom 30 vials in case 1 and 32 vials in case 2, they were able to respond to commands, motor power changed from grade 0 to grade 1 and there was 50% elevated eyebrows. The motor power changed from grade 1 to grade 4 with 100% elevation of eyebrows from full ptosis was 65 hours after receiving specific antivenom 60 vials in case 1 and 70 hours after receiving specific antivenom 87 vials in case 2. The patients had spontaneous opening of eyelids at 90 hours after receiving 80 vials for case 1 and 88 hours after receiving 87 vials for case 2. Case 2 was extubated on day 4 after the snakebite while case 1 was extubated later on day 10 because of superimposing pneumonia.*

*The third case had delayed onset of signs and symptoms of neurotoxicity compared to the other three patients. Dyspnea, difficulty with speech, and opening eyelids occurred at 5 hours after the snakebite. No response to stimuli and respiratory paralysis occurred at 20 hours after the snakebite. His consciousness improved 10 hours after receiving 3 vials of specific antivenom. This was noted by being able to respond to commands and the motor power changed to grade 2 however, full ptosis was still present up to 24 hours. After receiving 23 vials of specific antivenom, he accidentally extubated himself however, he could breathe adequately using a mask with a bag. His motor power changed to grade 4 with 100% elevated eyebrows but full ptosis 34 hours after receiving 38 vials of specific antivenom. He could spontaneously open his eyelids 40 hours after receiving 38 vials specific antivenom. Cases 1, 2, and 3 had persistent mydriasis and fixed pupils until discharge.*

*Case 4 did not receive specific antivenom for Bungarus candidus. He did not respond to stimuli 10 hours after snakebite and he was treated with respirator and symptomatic treatment. On day 2, his blood pressure dropped, he was on dopamine to raise his BP. On day 3, he developed ventricular fibrillation. Defibrillation was administered and ECG returned to normal. He was given further supportive care. On day 7, he was discharged at the request of his relatives without any improvement.*
***Conclusion:*** *The patients who received specific antivenom had more rapid improvement of signs and symptoms comparing to the patient who did not receive the antivenon.*

***Keywords:*** *Bungarus candidus, Neurotoxin, antivenom for Bungarus candidus snake*

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Bungarus candidus (Malayan krait) snake is known as a venomous snake in northeastern Thailand. The venom has neurotoxin. Previously, treatment of Bungarus candidus bite was mainly respiratory support until the patient had spontaneous breathing. Antivenom for Bungarus candidus snake was produced by Queen Saovabha Memorial Institute and distributed in June 2004. It is a monospecific antivenom. The antivenom was first used at Udornthani Hospital in July 2004.

**Material and Method**

Medical records of the four patients bitten by a Bungarus candidus snake were reviewed. The snakes were seen and identified as Bungarus candidus. All patients were admitted to the Department of Medicine, Udornthani Hospital between July and September 2004. The first two cases came within one week of each other, case 1 on July 26, and case 2 on July 27, 2004. The third case came on August 7, 2004. The fourth patient came on September 28, 2004. The authors divided the patients into two groups. Group 1 (case 1, 2 and 3) received specific antivenom for Bungarus candidus snake, Group 2 (case 4) did not receive specific antivenom. Signs and symptoms after the snakebite, onset of signs and symptoms, antivenom dosage, and response time and the pattern of clinical response after receiving antivenom were presented.

***Case 1***

A 42 year old Thai female was bitten by a Malayan krait at the left fifth phalanx while sleeping. She was rushed to the nearest hospital in 30 minutes. She complained of mild difficulty in breathing and raising her eyelids. She was transferred to a general hospital 3 hours after the snakebite. Glasgow coma scale was E4V4M6. Later she developed moderate ptosis and dyspea. She was intubated and transferred to Udornthani Hospital 5 hours after the snakebite. At the emergency room, her vital signs were BP 100/70 mmHg, PR 100/min, RR 20/min, Glasgow coma scale was E1VtM3. Pupils were fixed at 5 mm. Doll's sign was negative. Fang marks were not inflamed. Six hours after the snakebite, the Glasgow coma scale was E1VtM3. The patient lost consciousness, she had no response to stimuli and deep tendon reflexes were absent. Ten hours after the snakebite, the patient received specific antivenom for Bungarus candidus, 4 vials intravenously every 4 hours. Twelve hours after the snakebite and 16 vials of specific antivenom, her phalanxes of lower extremity moved slightly. Forty hours after the snakebite and 36 vials of specific antivenom, she could move her hands and the motor power was grade 1. She responded to command. Her pupils were fixed at 5 mm, and she still had full ptosis however, she could elevate her eyebrows up to 50%. Sixty-five hours after the snakebite and 60 vials of specific antivenom, her motor power improved to grade 4. She had good consciousness. The pupils were still fixed at 5 mm with full ptosis and she could elevate her eyebrows normally. Ninety hours after the snakebite and 80 vials of specific antivenom, she had spontaneous eyelid opening. Pupils were fixed at 5 mm. Specific antivenom was stopped. On day 4, she developed pneumonia. Ceftazidime and amikacin were given. On day 7, sputum culture showed Acinetobactor and Klebseilla, sensitive to both antibiotics. On day 8, she could breathe by T-pieces. On day 10, she was extubated. On day 12, her BP rose to 160/100 mmHg and HR raised to 120/ min. She was given propranolol. Her pupils were fixed and dilated at 5 mm until discharged, 11 days after the snakebite. BP and HR returned to normal on day 17.

***Case 2***

A 64 year old Thai male was bitten by Malayan Krait at the left middle finger while sleeping. One hour after the snakebite, he was admitted to the nearest hospital. Two hours after the snakebite, he had dyspnea. Pupils were dilated to 4 mm and slightly reacted to light. He was intubated and transferred to Udornthani Hospital three hours after the snakebite. At the emergency room, BP was 140/90 mmHg, PR was 100/min, Glasgow coma scale was E3VtM6. Motor power was grade 3. He had moderate ptosis. Pupils were 3 mm and reacted to light. Four hours after the snakebite, BP was 170/100 mmHg, PR was 100/min and RR was16/min. Glasgow coma scale was E1VtM1. Pupils were fixed at 5 mm. He lost consciousness; Doll's eye sign was negative. There was no response to stimuli. Deep tendon reflexes were absent. Fang marks were not inflamed. Twelve hours after the snakebite, the patient started receiving specific antivenom for Bungarus candidus at the dose of 4 vials intravenously every 4 hours. Twenty hours after the snakebite and 16 vials of specific antivenom, his phalanxes of the lower extremity moved slightly. Forty hours after the snakebite and 32 vials of specific antivenom, he could move both his hands. Motor power was grade 1. He responded to verbal command by moving his fingers. Pupils were fixed at 5 mm, there was full ptosis, and 50% elevation of eyebrows. Specific antivenom was then stopped at 70 hours after the snakebite and 87 vials. His motor power improved to grade 4, pupils were fixed at 5mm, eyebrows elevated

100%, but still full ptosis. Eighty-eight hours after the snakebite, he had spontaneous eyelids opening. Pupils were fixed at 5 mm. Ninety hours after the snakebite, he was extubated. His BP was high, he then received antihypertensive drugs, propanolol, and sustained release nifedipine. The BP returned to normal three days later. Antibiotic, ceftazidime, was given on the third day after extubation because of fever and leukocytosis. He was discharged on day 6 after extubation. Upon discharge, he still had mydriasis with the pupil size fixed at 5 mm.

***Case 3***

A 19 year old Thai male was bitten by a Malayan krait at the left middle phalanx while asleep. He went to a district hospital. The doctor treated him as an OPD case. Five hours after the snakebite, he went to the same hospital again because he had difficulty in speaking and opening his eyelids. He still maintained good breathing and good consciousness. He was referred to Udornthani Hospital 12 hours after the snakebite. At the emergency room, BP was 120/70 mmHg, pulse rate was 110/minute, and respiratory rate was 24 minute. He was fully conscious, motor power grade 3, pupil 5 mm slightly reactive to light, and he had mild ptosis. There were uninflamed fang marks at the left middle phalanx. Sixteen hours after the snakebite, he had difficulty in breathing thus, was intubated and maintained with a respirator. However, eighteen hours after the snakebite, his consciousness was stuporous. Twenty hours after the snakebite, he went into a coma. He had no response to stimuli, fixed dilated pupil at 5 mm, and full ptosis. Three vials of specific antivenom for Bungarus candidus were given. Thirty hours after the snakebite, his consciousness had improved to response to verbal command, motor power improved to grade 2, pupils were still fixed at 5 mm, full ptosis, 50% elevated eyebrows. Forty-four hours after the snakebite and 23 vials of specific antivenom, he was accidentally extubated, however, his breathing was adequate by mask with a bag. Fifty-four hours after the snakebite and 38 vials of specific antivenom, motor power improved to grade 4, fixed pupil at 5 mm, 100% elevated eyebrows but he still had difficulty in opening his eyelids. Sixty-four hours after the snakebite and 38 vials of specific antivenom, he could fully open his eyelids. Specific antivenom was stopped at 64 hours after the snakebite and 38 vials. Eighty-four hours after the snakebite and 38 vials of specific antivenom, he was discharged with mydriasis and fixed dilated pupils at 5 mm.

***Case 4***

A 54 year old Thai male was bitten by a Bungarus candidus at the phalanx of his left foot in his home during daytime. One hour after the bite, he was rushed to the nearest hospital. He complained of dizziness and vertigo. He also had slight difficulty in breathing. There was no ptosis. After the initial treatment, he was transferred to Udornthani Hospital 4 hours after the snakebite. Upon admission, BP was120/70 mm Hg, PR was 90/min, RR was 26/min. He developed difficulty in breathing and became drowsy. There was generalized muscle weakness and full ptosis. Pupils were fixed at 5 mm. Motor power was grade 3. Fang marks were neither swollen nor inflamed. He was intubated with supported ventilation. Ten hours later, he began to lose his consciousness and had no response to stimuli. Pupils were fixed and dilated to 5 mm. Doll's eye sign was negative Deep tendon reflexes were absent. The patient did not receive specific antivenom Bungarus candidus because it was out of stock. He was intubated and received only supportive treatment and ventilator. One day later, he had fever and received ceftazidime and PGS. On day 2, he was still unconscious. BP dropped to 80/60 mmHg. He received dopamine for maintain BP. On day 3, his BP could be maintained at normal level however, he developed ventricular fibrillation and received defibrillation. ECG returned to normal. Dopamine and adrenaline were given to maintain BP. On day 4-6, the patient remained comatose and maintained with vasopressors. The patient's relatives decided against the medical advice, and took him home.

**Results**

Signs and symptoms of both groups after snakebite, with and without receiving specific antivenom and other treatments are shown in Table 1-6.

Case 1, 2, and 3 were bitten during nighttime at their house while sleeping. Malayan kraits are known as nocturnal, most bites occur at night time. Fang marks were seen in all cases. Wound was not swollen or inflamed. Bungarus candidus are snakes whose toxin has no cytotoxicity, which is opposite to Naja naja. Naja naja bitten wound usually has swelling and gangrene. The wound characteristics can be used to differentiate the bite from Bungarus snakes and Naja snakes. Geographic location can also be used to differentiate between Bungarus candidus and fasciatus. Bungarus fasciatus are seen around the river and forest, in middle and southern Thailand, while Bungarus candidus are seen more commonly in northeastern, eastern, and southern Thailand[1].

**Table 1.** Circumstances of snake bite

| | Case 1 | Case 2 | Case 3 | Case 4 |
|---|---|---|---|---|
| 1. Time of snake bite | night | night | night | day |
| 2. Place of snake bite | in house | in house | in house | around house |
| 3. Activity during snake bite | sleeping | sleeping | sleeping | working |
| 4. Bite location of body | upper extremities | upper extremities | upper extremities | lower extremities |
| 5. Wound characteristic | fangs mark not inflamed | fangs mark not inflamed | fangs mark not inflamed | fangs mark not inflamed |
| 6. Patient residency | district | district | district | district |

**Table 2.** Signs and symptoms after snake bite

| Signs and symptoms | Case 1 | Case 2 | Case 3 | Case 4 |
|---|---|---|---|---|
| 1. Respiratory system | | | | |
| 1.1. Chest discomfort | + | + | + | + |
| 1.2. Difficulty of breathing/dyspnea | + | + | + | + |
| 1.3. Respiratory paralysis | + | + | + | + |
| 1.4. Intubation | + | + | + | + |
| 2. Neurological system | | | | |
| 2.1. Difficulty with speech | + | + | + | + |
| 2.2. Motor power grade 0 | + | + | + | + |
| 2.3. No response to stimuli | + | + | + | + |
| 3. Ocular system | | | | |
| 3.1. Difficulty in opening eyelids | + | + | + | + |
| 3.2. Full ptosis | + | + | + | + |
| 3.3. Mydriasis and fixed pupils | + | + | + | + |

**Table 3.** Onset of signs and symptoms after snake bite

| Signs and symptoms | Time | | | |
|---|---|---|---|---|
| | Case 1 | Case 2 | Case 3 | Case 4 |
| Dyspnea | 30 min | 1 hour | 5 hours | 1 hour |
| Difficulty with speech | 30 min | 1 hour | 5 hours | 1 hour |
| Difficulty in opening eyelids and full ptosis | 3 hours | 4 hours | 20 hours | 4 hours |
| Mydriasis and fixed pupils | 5 hours | 4 hours | 12 hours | 4 hours |
| Respiratory paralysis with intubation | 3 hours | 2 hours | 20 hours | 4 hours |
| No response to stimuli | 6 hours | 4 hours | 20 hours | 10 hours |
| Tachycardia | 7 hours | 4 hours | 12 hours | none |
| Hypertension | 24 hours | 4 hours | none | none |

**Table 4.** Treatment

| Treatment | Case 1 | Case 2 | Case 3 | Case 4 |
|---|---|---|---|---|
| 1. Specific antivenom for B. candidus | + | + | + | - |
| 2. Antibiotic drugs | + | + | + | + |
| 3. Antihypertensive drugs | + | + | + | - |
| 4. Tetanus toxoid | + | + | + | + |

**Table 5.** Neurological signs and symptoms

Case 1

| Glasgow coma scale | | Scale | Day | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Eye open | Spontaneously | 4 | | | | | | O | O | O | O | O | O |
| | To speech | 3 | | | | | | | | | | | |
| | To pain | 2 | | | | | | | | | | | |
| | None | 1 | C | C | C | C | C | | | | | | |
| Motor response | Obey commands | 6 | | | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | Localized pain | 5 | | | | | | A | | | | | |
| | Withdrawn pain | 4 | | | | | | | | | | | |
| | Flexion to pain | 3 | | | | | | | | | | | |
| | Extension to pain | 2 | | | | | | | | | | | |
| | None | 1 | N | N | | | | | | | | | |
| Verbal response | Orientated | 5 | | | | | | | | | | | |
| | Confused | 4 | | | | | | | | | Y | Y | Y |
| | Impropriated | 3 | | | | | | | | | | | |
| | Incomprehensible | 2 | | | | | | | | | | | |
| | None | 1 | T | T | T | T | T | T | T | T | | | |
| Pupil size | Right (+/Reaction) | | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 |
| | Left (-/No reaction) | | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 |

C = Eye closed, O = Open eye, T = Endotracheal tube, Y = Yes, N = No

Case 2

| Glasgow coma scale | | Scale | Day | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 |
| Eye open | Spontaneously | 4 | | | | | O | O |
| | To speech | 3 | | | | O | | |
| | To pain | 2 | | | | | | |
| | None | 1 | C | C | C | | | |
| Motor response | Obey commands | 6 | | | Y | Y | Y | Y |
| | Localize pain | 5 | | Y | | | | |
| | Withdrawn pain | 4 | | | | | | |
| | Flexion to pain | 3 | | | | | | |
| | Extension to pain | 2 | | | | | | |
| | None | 1 | N | | | | | |
| Verbal response | Orientated | 5 | | | | | Y | Y |
| | Confused | 4 | | | | | | |
| | Impropriated | 3 | | | | | | |
| | Incomprehensible | 2 | | | | | | |
| | None | 1 | T | T | T | T | | |
| Pupil size | Right (+/Reaction) | | -5 | -5 | -5 | -5 | -5 | -5 |
| | Left (-/No reaction) | | -5 | -5 | -5 | -5 | -5 | -5 |

C = Eye closed, O = Open eye, T = Endotracheal tube, Y = Yes, N = No

Table 2 shows signs and symptoms of all four patients who developed respiratory failure and neurological system involvement.

Table 3 shows the onset of signs and symptoms after the snakebite. In case1, 2, and 4, dyspnea, difficulty with speaking, and opening eyelids were

**Table 5.** (Continued)

Case 3

| Glasgow coma scale | | Scale | Day | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | | | | 2 | | | | 3 | 4 | 5 |
| | | | 0-12 am | | 13-24 pm | | 0-12 am | | 13-24 pm | | | | |
| Eye open | Spontaneously | 4 | O | | | | | | O | | O | O | O |
| | To speech | 3 | | | O | | | | | | | | |
| | To pain | 2 | | | | | | | | | | | |
| | None | 1 | | | | | N | | | | | | |
| Motor response | Obey commands | 6 | Y | | | | | | Y | | Y | Y | Y |
| | Localize pain | 5 | | | Y | | | | | | | | |
| | Withdrawn pain | 4 | | | | | | | | | | | |
| | Flexion to pain | 3 | | | | | | | | | | | |
| | Extension to pain | 2 | | | | | | | | | | | |
| | None | 1 | | | | | N | | | | | | |
| Verbal response | Orientated | 5 | Y | | | | | | | | Y | Y | Y |
| | Confused | 4 | | | Y | | | | Y | | | | |
| | Impropriated | 3 | | | | | | | | | | | |
| | Incomprehensible | 2 | | | | | | | | | | | |
| | None | 1 | | | | | T | | | | | | |
| Pupil size | Right (+/Reaction) | | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 |
| | Left (-/No reaction) | | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 |

C = Eye closed, O = Open eye, T = Endotracheal tube, Y = Yes, N = No

Case 4

| Glasgow coma scale | | Scale | Day | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Eye open | Spontaneously | 4 | | | | | | | | |
| | To speech | 3 | | | | | | | | |
| | To pain | 2 | | | | | | | | |
| | None | 1 | C | C | C | C | C | C | C | C |
| Motor response | Obey commands | 6 | | | | | | | | |
| | Localize pain | 5 | | | | | | | | |
| | Withdrawn pain | 4 | | | | | | | | |
| | Flexion to pain | 3 | | | | | | | | |
| | Extension to pain | 2 | | | | | | | | |
| | None | 1 | N | N | N | N | N | N | N | N |
| Verbal response | Orientated | 5 | | | | | | | | |
| | Confused | 4 | | | | | | | | |
| | Impropriated | 3 | | | | | | | | |
| | Incomprehensible | 2 | | | | | | | | |
| | None | 1 | T | T | T | T | T | T | T | T |
| Pupil size | Right (+/Reaction) | | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 |
| | Left (-/No reaction) | | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 |

C = Eye closed, O = Open eye, T = Endotracheal tube, Y = Yes, N = No

**Table 6.** Antivenom dosage and response time with signs and symptoms after received antivenom

Case 1

| Signs and symptoms | Time | | Dosage | |
|---|---|---|---|---|
| | Response time since the first dose of antivenom | Duration of each stage | Accumulated dose of antivenom | Dosage of each stage |
| 1. First dose of antivenom after the snake bite | 10 hours | - | 5 vials | - |
| 2. Slight movement of feet, phalanxes | 12 hours | 12 hours | 16 vials | 11 vials |
| 3. Motor power grade 1 | 40 hours | 28 hours | 36 vials | 20 vials |
| 4. Response to command | 40 hours | 28 hours | 36 vials | 20 vials |
| 5. 50% elevated eyebrows | 40 hours | 28 hours | 36 vials | 20 vials |
| 6. Motor power grade 4 | 65 hours | 25 hours | 60 vials | 24 vials |
| 7. 100% elevated eyebrows | 65 hours | 25 hours | 60 vials | 24 vials |
| 8. Spontaneous opening eyelid | 90 hours | 25 hours | 80 vials | 20 vials |

Case 2

| Signs and symptoms | Time | | Dosage | |
|---|---|---|---|---|
| | Response time since the first dose of antivenom | Duration of each stage | Accumulated dose of antivenom | Dosage of each stage |
| 1. First dose of antivenom after snake bite | 10 hours | - | 5 vials | - |
| 2. Slight movement of feet, phalanxes | 12 hours | 12 hours | 16 vials | 11 vials |
| 3. Motor power grade 1 | 40 hours | 28 hours | 36 vials | 20 vials |
| 4. Response to command | 40 hours | 28 hours | 36 vials | 20 vials |
| 5. 50% elevated eyebrows | 40 hours | 28 hours | 36 vials | 20 vials |
| 6. Motor power grade 4 | 65 hours | 25 hours | 60 vials | 24 vials |
| 7. 100% elevated eyebrows | 65 hours | 25 hours | 60 vials | 24 vials |
| 8. Spontaneous opening eyelid | 90 hours | 25 hours | 80 vials | 20 vials |

Case 3

| Signs and symptoms | Time | | Dosage | |
|---|---|---|---|---|
| | Response time since the first dose of antivenom | Duration of each stage | Accumulated dose of antivenom | Dosage of each stage |
| 1. First dose of antivenom after the snake bite | 10 hours | - | 5 vials | - |
| 2. Slight movement of feet, phalanxes | 12 hours | 12 hours | 16 vials | 11 vials |
| 3. Motor power grade 1 | 40 hours | 28 hours | 36 vials | 20 vials |
| 4. Response to command | 40 hours | 28 hours | 36 vials | 20 vials |
| 5. 50% elevated eyebrows | 40 hours | 28 hours | 36 vials | 20 vials |
| 6. Motor power grade 4 | 65 hours | 25 hours | 60 vials | 24 vials |
| 7. 100% elevated eyebrows | 65 hours | 25 hours | 60 vials | 24 vials |
| 8. Spontaneous opening eyelid | 90 hours | 25 hours | 80 vials | 20 vials |

among the earliest symptoms that occurred with the onset of 50 minutes. Respiratory paralysis was the second symptom with the onset of 3 hours. Full ptosis, mydriasis with fixed dilated pupils followed with the onset of 4 hours. No response to stimuli occurred later at 6 hours. Autonomic dysfunction such as tachycardia and hypertension were seen in two cases at 13 hours and 18 hours, respectively. However, case 3 signs and symptoms were delayed compared to case 1, 2, and 4.

Only case 1, 2, and 3 received specific antivenom for Bungarus candidus. Antibiotics and tetanus toxoid were given in all cases. Antihypertensive drugs were given in case 1 and 2.

Glasgow coma score was used to depict the development of signs and symptoms after the bite until the time of discharge.

**Discussion**

The summary of signs and symptoms after snakebite of all reported cases are show in Table 7.

The Table 7 shows that the onset of signs and symptoms after the snakebite were similar among all four patients except case 3, which was slow. Onset of dyspnea, difficulty of speech, and opening eyelids were 30-60 minutes in three cases but could be delayed up to 5 hours as in case 3. Full ptosis was seen at 2-4 hours. Mydriasis was 4-5 hours. Respiratory paralysis was 2-3 hours. No response to stimuli was varied but was on the average 5-6 hours. In addition to the paralysis of cranial nerves, motor, and respiratory muscle, neurotoxicity of the venom includes the autonomic dysfunctions especially the anticholinergic syndrome as previously reported[3,6].

The recovery from neurotoxin venom with or without receiving antivenom is show in Table 8.

In Thailand, antivenom for Bungarus candidus was produced by Queen Saovabha Memorial Institute and available since July 2004. Before the availability of antivenom for Bungarus candidus, the treatment of snakebites was symptomatic and supportive, using a ventilator for respiratory failure until the patient gradually recovered from neurotoxin venom. Chanhome studied the *in vitro* neutralization of Bungarus snake venom by using Bungarus fasciatus antivenom. The result showed that antivenom could neutralize Bungarus candidus venom and Bungarus flaviceps venom[2].

However, in another study, five patients bitten by Bungarus candidus were reported. The efficacy of Bungarus fasciatus antivenom was questionable[3]. In

**Table 7.** The onset of signs and symptoms after snake bite comparing the reported cases and cases in this series

| Signs and symptoms | Spontaneous recovery | | | Received antivenom | | | |
|---|---|---|---|---|---|---|---|
| | Chaosirikul, 1993[2] | Pochanugool, 1997[3] | Laothong, 2001[4] | Leeprasert, (case 1) | Leeprasert, (case 2) | Leeprasert, (case 3) | Leeprasert, (case 4) |
| Dyspnea, difficulty with speech and opening eyelids | 20 minute | 1 hour | 1 hour | 30 minute | 1 hour | 5 hours | 1 hour |
| Full ptosis | 4 hours | 3 hours | 2 hours | 3 hours | 4 hours | 20 hours | 4 hours |
| Mydriasis and fixed pupils | 10 hours | 6 hours | 3 hours | 5 hours | 4 hours | 12 hours | 4 hours |
| Respiratory paralysis with intubation | 2 hours | 8 hours | 3 hours | 3 hours | 2 hours | 20 hours | 4 hours |
| No response to stimuli | 10 hours | No data | 3 hours | 6 hours | 4 hours | 20 hours | 10 hours |

**Table 8.** Time with signs and symptoms when recovery from neurotoxin venom between cases in the previous reported cases and this series

| Signs andSymptoms | Spontaneous recovery | | | Receiving antivenom (present study) | | |
|---|---|---|---|---|---|---|
| | Pochanugool, 1997[5] | Chaosirikul, 1993[4] | Laothong, 2001[6] | Leeprasert, (case 1) | Leeprasert, (case 2) | Leeprasert, (case 3) |
| Slight feet phalanxes movement | No data | 4 days | No data | 1 day | 1 day | No data |
| Motor power grade 1 and response to command | No data | 5 days | No data | 2 days | 2 days | 10 hours |
| Recovery to full consciousness | 1 day | 5 days | 8 days | 2 days | 2 days | 1 day |
| Motor power grade 4 | 3 days | 10 days | 10 days | 3 days | 3 days | 34 hours |
| Fully alert | 4 days | 10 days | 10 days | 3 days | 3 days | 34 hours |
| Opening eyelids | 4 days | 10 days | 10 days | 4 days | 4 days | 40 hours |
| Extubation of endotracheal tube | 4 days | 58 days | 27 days | 9 days | 3 days | 1 day |

addition, the report from at Srisaket Hospital, on the two patients who were bitten by a Bungarus candidus snake and received Bungarus fasciatus antivenom showed no improvement of clinical response[4].

Table 8 revealed the difference of time to recover between the patients who received and not received specific antivenom for Bungarus candidus. Slight movements of phalanxes of feet, motor power, and response to command were among the earliest signs and symptoms of responsiveness in the patients whom received specific antivenom. Returning of motor power to grade 4, fully alert consciousness, and full opening of eyelids were used as the indicator to compare the response of treatment. In patients who received specific antivenom. They seem to recover sooner than the patients who did not receive specific antivenom. However the number of cases were small, this observation must be confirmed if more cases are seen. The time to extubation of endotracheal tube was also varied but appeared to be earlier in the patients who received specific antivenom.

The recommended dosage of the specific antivenom for Bungarus candidus is still not conclusive. The dose used was higher than recommended in the package insert. Based on our patients, we believe that the loading dose should be 15 vials and maintenance dose should be given 4-6 vials every 6 hours until there is clinical improvement. Clinical response includes returning of motor power to grade 4 and good response to command. The criteria for the recovery from the respiratory failure are minute volume of 8-12 L/min, tidal volume over 300 ml, and respiratory rate of 16-20/min. If patient meets all criteria, then antivenom may be stopped.

## Conclusion

The patients in group 1 who received specific antivenom had more rapid improvement of signs and symptoms when compared with the patient in group 2 who did not receive any. The authors believe that the initial dose of antivenom should be 15 vials and the following dose should be 5-10 vials every 4-6 hours until there is clinical improvement.

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# *การใช้เซรุ่มแก้พิษงูทับสมิงคลา*

***วิรัตน์ ลีประเสริฐ, สมิง เก่าเจริญ***

***ภูมิหลัง:*** *งูทับสมิงคลาเป็นงูที่มีพิษต่อระบบประสาท การรักษาหลังจากถูกงูกัดจะใช้เครื่องช่วยหายใจจนกว่าผู้ป่วยจะสามารถหายใจได้เอง หลังจากมีการผลิตเซรุ่มแก้พิษงูทับสมิงโดยสถานเสาวภาในเดือนมิถุนายน พ.ศ. 2547 ทางคณะผู้ศึกษาได้มีการใช้เซรุ่มเป็นครั้งแรกที่โรงพยาบาลอุดร เมื่อมิถุนายน พ.ศ. 2547*

***วัตถุประสงค์:*** *เพื่อศึกษาอาการและอาการแสดงของผู้ป่วยหลังจากถูกงูกัดและการตอบสนองของผู้ป่วยหลังจากได้รับเซรุ่มแก้พิษงูทับสมิงคลา ที่เข้ารับการรักษาที่โรงพยาบาลอุดร ระหว่าง พฤษภาคม พ.ศ. 2547 ถึง กันยายน พ.ศ. 2547*

***วัสดุและวิธีการ:*** *เป็นการศึกษาย้อนหลัง ผู้ป่วยที่ถูกงูกัดจำนวน 4 ราย แบ่งออกเป็น 2 กลุ่ม กลุ่มที่ 1 ได้รับเซรุ่มแก้พิษงูทับสมิงคลา จำนวน 3 ราย กลุ่มที่ 2 ไม่ได้รับเซรุ่มแก้พิษงูทับสมิงคลา จำนวน 1 ราย ข้อมูลของผู้ป่วยทั้ง 2 กลุ่มได้รับการวิเคราะห์และรวบรวมในเรื่อง อาการและอาการแสดงหลังจากถูกงูกัด, ระยะเวลาของอาการและอาการแสดงหลังจากถูกงูกัด, ปริมาณของเซรุ่มที่ได้รับและระยะเวลาที่ตอบสนองหลังได้รับเซรุ่ม*

***ผลการศึกษา:*** *ผู้ป่วยทั้ง 2 กลุ่มมี อาการและอาการแสดงหลังจากถูกงูกัด ใกล้เคียงกัน ไม่ว่าในเรื่องระบบทางเดินหายใจ, ระบบประสาทและระบบกล้ามเนื้อตา ระยะเวลาของอาการและอาการแสดงหลังจากถูกงูกัดของทั้ง 2 กลุ่มพบ การหายใจ ลำบาก, พูดลำบาก ใช้เวลา 30-60 นาที การใส่ท่อช่วยหายใจ ใช้เวลา 3 ชั่วโมง หนังตาตกและม่านตาขยายเต็มที่ อยู่ที่ 4 ชั่วโมง การตอบสนองหลังได้รับเซรุ่มในผู้ป่วยกลุ่มที่ 1 พบว่า ผู้ป่วยรายที่ 1 และ 2 เป็นเกรด 1 หลังได้รับเซรุ่มจำนวน 32-36 ขวด ไปแล้ว 40 ชั่วโมง และเปลี่ยนเป็นเกรด 4, ยักคิ้วได้ 100% หลังได้รับเซรุ่มจำนวน 60, 87 ขวด ไปแล้ว 65 และ 70 ชั่วโมงตามลำดับ ผู้ป่วยลืมตาได้เองหลังได้รับเซรุ่มจำนวน 80, 87 ขวด ไปแล้ว 90 และ 88 ชั่วโมงตามลำดับ ผู้ป่วยรายที่ 3 พบว่าปริมาณเซรุ่มและระยะเวลาของการตอบสนองหลังได้เซรุ่มจะลดลงครึ่งหนึ่งของผู้ป่วยรายที่ 1 และ 2 ผู้ป่วยในกลุ่มที่ 1 สามารถกลับบ้านได้ในวันที่ 11, 6 และ 4 ตามลำดับหลังจากเข้ารับการรักษาในโรงพยาบาล ผู้ป่วยรายที่ 4, กลุ่มที่ 2 ไม่ได้รับเซรุ่ม พบว่าผู้ป่วยหมดสติและไม่ตอบสนองต่อสิ่งกระตุ้นใน 10 ชั่วโมง หลังถูกกัด ผู้ป่วยได้รับการรักษาตามอาการและใช้เครื่องช่วยหายใจในวันที่ 2 และ 3 ผู้ป่วยมีความดันโลหิตต่ำและหัวใจเต้นผิดจังหวะ ในวันที่ 7 ญาติผู้ป่วยขอนำกลับบ้านเนื่องจากอาการไม่ดีขึ้น*

***สรุป:*** *ผู้ป่วยที่ได้รับเซรุ่มแก้พิษงูทับสมิงคลา จะมีอาการและอาการแสดงดีขึ้นอย่างเร็วกว่าและลดเวลาการเข้ารักษาตัวในโรงพยาบาลเมื่อเทียบกับผู้ป่วยที่ไม่ได้รับเซรุ่มแก้พิษงูทับสมิงคลา*