Neurotoxic Snake Bite

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Introduction

- Snake bite is an important medical emergency in many parts of SEA Region.
- Occupational disease.
- Scale of mortality and acute or chronic morbidity uncertain because of inadequate reporting
- Still remain as a public health problem
Incidence of snake bite in Myanmar (Ministry of Health)

2007-
• total snake bite per year is between 8800-14600
• Mortality is between 336 – 649 (3.8-7.3%)

2009-
• Mortality is still between 500-1000 deaths/year

2011-
• Number of death dropped (252), mortality rate- 2.19%
Snake bite admission to 4 main hospitals in Yangon City (2014)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Viper</th>
<th>Cobra</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>YGH</td>
<td>497</td>
<td>248</td>
<td>41</td>
<td>208</td>
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<td></td>
<td></td>
<td>55/78 (ICU)</td>
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<tr>
<td>YSH</td>
<td>111</td>
<td>111 (23%)</td>
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<tr>
<td>TSGH</td>
<td>125</td>
<td>104 (14%)</td>
<td>46</td>
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<tr>
<td>NOGH</td>
<td>96</td>
<td>77</td>
<td>12</td>
<td>7</td>
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</table>
- According to toxicity – Haematotoxic
  - Neurotoxic
  - Myotoxixc
Majority of neurotoxic snake bites in Myanmar

- Cobras (Naja Kaouthia)
- King cobra (Ophiophagus Hannah)
- Branded kraits (Bungarus fasciatus)
Cobras (Naja Kaouthia)
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King cobra (Ophiophagus Hannah)
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King cobra (Ophiophagus Hannah)
Branded kraits (Bungarus fasciatus)
Case 1

- A 25 year old man presented to ED
- History of being bitten by snake within an hour at his right leg
- Drowsiness, weakness of all limbs, shallow respiration
- Followed by unconscious and respiratory arrest at ED during preparing for ASV administration
• Intubated immediately
• Monovalent anti snake venom ASV (Cobra)
• transfered to ICU for mechanical ventilation
• Complete recovery after 6 hour and extubated

Case 2
• Referal from another town to Yangon General Hospital when the patient condition didn’t improve after 24 hours of treatment with ASV and mechanical ventilatory support
• Mechanical ventilation continued at ICU
• I.V Neostigmine infusion 0.02 mg/kg /hr infusion is given
• Still unconscious and no respiratory effort until 2\textsuperscript{nd} day but vital signs are stable
• On 3\textsuperscript{rd} day, regained consciousness with full muscle power and respiratory effort
• Extubated on 4\textsuperscript{th} day
Case 3

• A 6 year old girl bitten by snake at her home, arrived to ED one hour after bite at her right foot

• Drowsiness, slurred speech, ptosis, weakness of limbs

• Polyvalent ASV

• Kept in ICU for monitoring
• Symptoms did not improve much and Neostigmine 0.02 mg/kg for two dose was given
• She could open her eyes and move her limbs
• But on next day, she became drowsy, ptosis and limbs weaken again
• Another dose of polyvalent ASV was given.
• Her condition improved quickly.
Case 4
• 20 year old man, a Zoo worker bitten by branded krait
• Presented with neurological symptoms
• ASV available is only for Naja kaouthia but it was given twice for him
• Put him on ventilatory support for nearly a month
• Discharge after successfully weaned from ventilator
Snake Venom

- Cobra venom contains mainly postsynaptic neurotoxins which bind and block Ach receptors of NMJ
- Krait venom in addition contains presynaptic toxins that damage nerve endings
• Progressive descending paralysis is the hallmark of systemic envenoming by elapid snakes
• Bilateral ptosis is early signs of paralysis
• Difficulty in speaking, swallowing
• Limb weakness, loss of tendon reflexes, fixed dilated pupil may follow
• paralysis of diaphragm and intercostal muscles may lead to respiratory failure
• Clinical signs of neurotoxic envenoming by cobra and kraits are similar
• Both cause respiratory failure within 30 minutes of bite
• Krait envenoming is often associated with delayed onset and prolonged period of paralysis due to lethal components of krait venoms, beta-bungarotoxins which destroy nerve terminals
Diagnosis

• Identification of snake species is crucial for optimal clinical management
• Misidentification is common → receiving ineffective antivenom
• Rely on circumstances of bite and clinical features of envenoming
Management of snake bite victims

First aid

• Transport as quickly as possible to medical center to be evaluated by medical staff where antivenoms are available
• Reassurance of victims
• Immobilization of bitten limb
Antivenoms

• Antivenom is the only specific treatment
• Monovalent or polyvalent
• Success of therapy depends on ability of immunoglobulins to bind, extract and eliminate toxins present in the body
• But the ability to prevent tissue damage and reverse neurotoxicity is controversial
• Neurotoxic envenoming (cobra bites) – improve within 30 minutes but usually takes several hours

• Krait bite victims with established respiratory failure does not reverse paralysis (often excessive amount of antivenom is used)

• Treatment outcome vary with geographical area as the venom composition and antigenic properties of toxins can be highly variable across the range of snake species.
Supportive treatment

• Artificial ventilation in patients with respiratory paralysis

• Complete recovery from severe neuromuscular paralysis without antivenom after prolonged ventilatory support
Anticholinesterase

• It can partly overcome blockade by postsynaptic neurotoxins, have efficacy in cobra bite envenoming

• Edrophonium, neostigmine → → to avoid respiratory muscle paralysis, respiratory failure and death
WHO guideline for management of Snake Bite, 2010

• **Co-administration** of anticholinesterase with antivenom reduce the time to resolution of neurotoxicity

• **Even given without antivenom**, the potential to improve neuromuscular function

• **A trial of anticholinesterase** –recommended by WHO for cobra bite - Neostigmine I.M 0.02mg/kg or endrophonium I.V 10 mg along with atropine
• Observed by improvement of ptosis, muscle power and ventilatory capacity (Peak Flow, FEV1)
• If improvement is seen, regular neostigmine and atropine can be followed
• **Regular IM/IV injection** Neostigmine 0.5-2.5 mg every 1-3 hours for adult or 0.01-0.04 mg/kg for children
• **Continuous IV infusion** 0.02 mg/kg/hr
• **P.O atropine** 0.6 mg twice each day, neostigmine 15 mg four times each day or pyridostigmine 60 mg four times each day
• Specific ASV required
• Antivenon treatment alone cannot be relied upon to save the patient with bulbar and respiratory paralysis.
• Ventilatory support is necessary.
• Anticholinesterase should be added in patient who has persisting muscle weakness despite antivenon treatment and respiratory support.