

Case report

Role of noninvasive ventilation for acute respiratory failure due to snakebite

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Abstract

Introduction: Noninvasive ventilation (NIV) has revolutionised the management of diverse forms of respiratory failure.¹ **Case report:** An 18 year old male patient presented to the emergency department with a history of an Indian krait snake bite on his left upper limb about seven hours ago. He had signs and symptoms of local and systemic envenomation, left upper limb cellulitis and suspected acute tubular necrosis of the kidneys. He was administered anti-snake venom and given supportive care. He was shifted to the intensive care unit where a noninvasive ventilator was used for supporting his respiratory system *via* a full face mask. He received NIV for thirteen days intermittently alternating with 60 percent oxygen *via* a Venturi mask. Progressively, he showed significant improvement and was weaned off NIV. He was discharged from hospital with no neurological sequelae. **Conclusion:** NIV can be used in selected patients with acute neuromuscular respiratory failure while awaiting improvement from specific therapies.

Keywords: Noninvasive ventilation; Snake bite; Acute respiratory failure.

Introduction

Noninvasive ventilation (NIV) has revolutionised the management of diverse forms of respiratory failure.¹ Wide spread availability of the mechanical ventilators that are compatible with NIV has made it possible to support the lungs during respiratory failure by avoiding the tracheal intubation and related complications.^{2,3} Several forms of snake venom can cause respiratory muscle paralysis requiring mechanical ventilator support. The role of NIV in acute neuromuscular respiratory failure is controversial. We report a case of respiratory

muscle paralysis secondary to krait snake bite being effectively managed by NIV.

Case Report

An 18 year old male patient presented to the emergency department from a local hospital seven hours after snake bite. He was bitten on his left forearm by an Indian krait snake. He had signs and symptoms of local and systemic envenomation, left upper limb cellulitis and acute tubular necrosis. His heart rate was 100 beats/min, blood pressure 130/90 mm Hg, respiratory rate 23/min and oxygen saturation was 99 percent on room air. Arterial blood gases were within normal limits. He was administered anti snake venom and given supportive care. He had hyperkalaemia requiring haemodialysis on the second day of admission. He maintained oxygenation till the morning of the fourth day when he suddenly developed desaturation episodes which was initially treated with 60 percent oxygen using a Venturi mask.

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He was shifted to the intensive care unit where he was connected to a noninvasive ventilator *via* oro-nasal mask. His ventilation was supported using BiPAP mode with IPAP of 15 cm H₂O and EPAP of 5 cm H₂O with 40 percent inspired oxygen. He received NIV for 13 days intermittently alternating with 60 percent oxygen *via* a Venturi mask. Progressively, he showed significant improvement and was weaned off NIV. He had developed left lower lobe atelectasis which improved during the course of the treatment. He was discharged from hospital with no neurological sequelae.

Discussion

The decision to use NIV in acute neuromuscular respiratory failure depends not only on the severity of the ventilator failure, and the presence or absence of bulbar involvement but also on the availability of other specific therapies (as in myasthenia gravis and Guillain–Barre' syndrome), and the rapidity of reversal of the underlying disease. Hypercapnoea remains an indication for tracheal intubation as these patients are likely to fail with NIV. However, there is little clinical evidence concerning which patients are likely to benefit from NIV.

NIV has been used to prevent neuromuscular failure. The use of NIV prevented intubation in seven of 11 episodes of myasthenic crisis.⁴ Bulbar weakness was documented in seven episodes, including four in which NIV prevented intubation. The presence of hypercapnoea at the onset predicted failure of NIV. On another occasion NIV was used in a patient with Guillain-Barre' syndrome who had paradoxical diaphragmatic movements but no hypercapnoea.⁵ NIV was used previously in a patient with myasthenic crisis with a good outcome.⁶ NIV was also used in snake bite with good outcome.⁷ Neurotoxic snakebite with resultant quadriplegia and acute ventilatory failure (severe envenomation) is a common emergency in the tropical countries. However, if snake anti-venom is instituted early, the extubation time can be as little as 14 h.⁷⁻⁹ In the

present case, snake anti-venom was administered within six hour of the snake bite, and NIV probably bridged the time between the administration and the onset of action of anti-venom, and avoided tracheal intubation.

In conclusion, NIV can be used in selected patients with acute neuromuscular respiratory failure while awaiting improvement from specific therapies.

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