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DOI:
10.4103/tjem.tjem_60_24

Local envenomation by green pit viper complicated with airway obstruction

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Abstract:

Snake-related injury (SRI) is one of the most common medical emergencies encountered in tropical countries such as Malaysia. The majority of snake bites are nonvenomous, while the less common venomous snakebite can cause major disability or even death. There are 16 pit viper species documented in Malaysia which can be categorized based on their habitat. We report a case of a 41-year-old male who presented to a district hospital 1 h after being bitten twice by a pit viper snake (*Trimeresurus sabahi fucatus*) on the left side of his face. He was given green pit viper anti-venom (GPAV). He later underwent an emergency tracheostomy due to progressive local swelling causing upper airway obstruction and required a second regime of antivenom. In our opinion, early recognition of snake species, clinical syndrome, and life-threatening conditions in patients with SRI is important. While careful clinical, laboratory, and patient observation is important in determining the need for anti-venom, a life-saving procedure such as intubation, in this case, should not be delayed. From our experience, SRI at the head with progressive swelling to zone 2 of the neck may signal a red flag to the attending clinician for the possibility of impending upper airway obstruction.

Keywords:

Airway obstruction, case report, green pit viper, snakebite, *Trimeresurus sabahi fucatus*

Introduction

Snake-related injury (SRI) is one of the medical emergencies encountered in tropical countries such as Malaysia. It is estimated that Malaysia has 400–650 snakebites per 100,000 population per year, which is possibly underreported as the data are scarce, and the actual burden of SRI to humans remains uncertain.^[1]

Snakebite cases posed some challenges to health-care services, especially in determining the species, the signs of envenomation, and the decision for antivenom administration. Although the majority of snake bites are nonvenomous, the less common venomous snakebite can cause major disability or even death.

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There are three medically significant families of snakes in Malaysia which are: Elapidae, Viperidae, and Coluridae.^[2] Snakes in the Viperidae family, such as vipers, can cause extensive local swelling, pain, local necrosis, and hemostatic dysfunction.^[3] At present, there are 16 pit viper species documented in Malaysia, which can be categorized based on their habitat.^[4] This case report aims to emphasize the rare and potentially catastrophic airway complication of pit viper snakebite and the need for early tracheal intubation.

Case Report

A 41-year-old male presented to a district hospital 1-h after being bitten twice by a snake on the left side of his face. He was bitten on his left forehead and parietal region while sleeping. Otherwise, he

How to cite this article: Selamat MA, Choon LK, Shamsuddin SR. Local envenomation by green pit viper complicated with airway obstruction. *Turk J Emerg Med* 2025;25:55-8.

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Submitted: 27-03-2024
Revised: 11-07-2024
Accepted: 12-07-2024
Published: 02-01-2025

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denied breathlessness, vomiting, abdominal pain, or unprovoked bleeding.

On examination on presentation, he was alert, not in respiratory distress, and well perfused. His blood pressure was 130/89 mmHg, respiratory rate of 16 breaths/min, saturation of 100% on room air, and pulse rate of 79 beats/min. A local examination of the face revealed swelling at the left forehead extended to the left cheek with bilateral periorbital swelling [Figure 1]. There is no obvious bite mark, necrotic patch, or active bleeding seen. Neurology and other systemic examinations revealed normal findings.

The snake was identified as *Trimeresurus sabahi fucatus* after consultation with Malaysia's Remote Envenomation Consultancy Services (RECS) [Figure 2]. Three vials of green pit viper antivenom (GPAV) were administered 3 h after the incident. However, at 12 h post-bite, the swelling worsened, involving the lips, submental, and neck. The patient also had increasing swallowing



Figure 1: The image shows swelling at the left forehead extended to the left cheek with bilateral periorbital swelling

difficulty, breathing, and mouth opening. In view of the high risk of a failing airway with no anesthesiology and otorhinolaryngology backup, he was then immediately transferred to our center for further care.

At 14 h post-bite, the swelling further extended to zone 2 of the neck [Figure 3]. Extensive swelling over the anterior facial region causing restrictive 2-finger breath mouth opening, inability to protrude the tongue, and change of voice was noted. Despite that, he is still fully conscious, speaks in sentences, is mild tachypneic, and well perfused. The coagulation profile was normal and the other laboratory investigation results were unremarkable [Table 1].

A flexible nasopharynx-laryngoscopy was performed by the otorhinolaryngology team and showed an edematous left side of the larynx and obscured vocal cord. Due to the further progression of the local swelling, a second 3 vials-regime of GPAV was administered, and subsequently, he underwent an emergency tracheostomy. Postoperative, he was admitted to the ward for further monitoring. Serial blood investigation did not show any sign of systemic envenomation and the facial swelling improved. There was no repeated antivenom given in the ward. The tracheostomy tube was weaned off on day 5 of admission and he was discharged home well [Figure 4]. Written consent approval was obtained from patient to publish this case.

Discussion

SRI may be presented with distinctive local and systemic envenomation based on the species.^[2] Thus, rapid identification of the snake species is vital in the management of SRI. A targeted antivenom can be used since it is associated with a higher success rate and lower incidence of adverse effects such as anaphylaxis.^[5] In this case, the snake was identified as *Trimeresurus sabahi*

Table 1: Serial blood investigations of the patient

Investigation	1-h postsnakebite	12-h postsnakebite	23-h postsnakebite	96-h postsnakebite
Full blood count				
WCC (3.8–9.7 10 ⁹ /L)	10.9	11.3	12.7	-
Hb (13.5–17.4 g/dL)	14.4	16.0	15.4	-
PLT (167–376 10 ⁹ /L)	231	209	152	-
Blood urea and serum electrolyte				
Urea (2.8–7.2 mmol/L)	5.0	3.1	4.5	6.6
Na (136–146 mmol/L)	138	138	139	138
K (3.5–5.1 mmol/L)	3.1	4.0	4.5	4.15
Creatinine (59–104 µmol/L)	79	52	72	50
Coagulation profile				
INR	1.04	1.00	1.16	1.12
PT (11.7–14.7 s)	11.3	13.1	15.0	14.5
APTT (30–44.4 s)	30	65.1	>180	30.6
Creatinine kinase (<171 U/L)	210	203	-	349

WCC: White cell count, Hb: Hemoglobin, PLT: Platelet, PT: Prothrombin time, APTT: Activated partial thromboplastin time, INR: International normalized ratio

fucatus with the help of RECS. Based on a report in 2023, it is one of the pit viper species that were consulted to

RECS from 2017 to 2020 pertinent to our geographical distribution.^[4]



Figure 2: The image of the identified snake species as *Trimeresurus sabahi fucatus* (Green Pit Viper)

Snakebite by the pit viper is associated with extensive local effects and affects hemostasis. Localized pain at the bite site, progressive local swelling, and local necrosis has been reported with pit viper bite.^[3,4,6] The most common local complication reported was progressive local swelling.^[3] The most common bite site is over the limbs (finger, hand, and foot), while the head region is uncommon.^[3,4] Pit viper bite at the head, as seen in this patient, leading to progressive local swelling and upper airway obstruction, is very rare. A study in Thailand revealed that out of 288 GPV cases, only 1 case required intubation due to upper airway obstruction after being bitten on the forehead.^[3] To the best of our knowledge, no such case was reported in our local data.



Figure 3: The image shows worsening of the swelling extending to the Zone 2 of the neck at 12 h after the snake bite

Systemic effects caused by green pit venom are uncommon, as reported in Thailand.^[3] Unfortunately, no local data for Malaysia were available. It is reported that 65% of GPV bites presented with systemic effects, particularly abnormal blood results with the venous clotting time, whole blood clotting test, and international normalized ratio commonly affected.^[3] Serial blood investigation monitoring is important, as the effects are frequently seen at 72 h postbite. Fortunately for this patient, no systemic effects were detected until the patient was discharged on day 5 postbite.

Antivenom and the need for early elective intubation in green pit viper snakebite?

Antivenom is essential in managing patients with SRI. The decision of antivenom depends on the identification of envenomation signs based on local guidelines. Determining a local envenomation is subjective and was known to be challenging.^[1] Thus, clinical monitoring and observation of the patient, such as the rate of proximal progression, pain score, and progression of local tissue injury, is important.



Figure 4: The image shows the facial region and the tracheostomy scar (white arrow) at 3 months after discharged from the hospital

The evidence of antivenom efficacy for local envenomation is limited, likely due to ethical limitations.^[6] A randomized control trial in 2006 has shown that GPVAV can fasten the local edema resolution on day 1 and day 2 of antivenom administration; however, it is not clinically significant. The decision for antivenom administration should therefore be discussed with an expert in toxinology to prevent incorrect, delayed administration, and causing wastage of antivenom.

Although antivenom is the main key in managing the patient with envenomation, the resuscitation of the patient should not be delayed by the decision of antivenom administration. Airway patency, breathing effort, hemodynamic stability, the presence of muscle

weakness, and altered mental status should be assessed in all patients with SRI. In this patient, the decision for tracheostomy has been made because of the compromised airway patency.

Retrospectively, this brought us to ponder the need for early elective intubation in SRI on the head region as the tissue swelling may take some long period to improve despite antivenom administration. Delay in intubation may further jeopardize the chances of successful tracheal intubation, increase the difficulty of airway management, and likely complicate the process of tracheostomy. In our opinion, SRI at the head with progressive swelling to zone 2 of the neck might suggest a red flag in managing patients with SRI. At present, no guidelines or evidence are available to suggest early intubation in such cases.

Apart from that, the difficulty in assessing the rate of edema progression at the head region poses a great challenge in the decision for antivenom therapy. Perhaps incorporating bedside point-of-care ultrasound (POCUS) to detect subclinical tissue edema will increase the early detection of rapid edema progression. This was shown in a case report of desert viper envenomation, whereby POCUS was used to detect a further proximal subcutaneous edema that was not clinically apparent.^[7]

Conclusion

Early identification of snake species and recognition of the clinical syndrome is of utmost importance. Careful clinical, laboratory, and patient observation should be carried out to avoid delays in antivenom administration. We hypothesized that early tracheal intubation may be beneficial in preventing potentially complicated airway management in such cases.

Acknowledgment

The authors would like to express their gratitude to the Malaysia RECS for their assistance.

Author contribution statement

MAS: Conceptualization – Ideas, Data curation, Investigation, Project administration, Resources, Software, Visualization – Preparation,

Writing – original draft – Preparation, Writing – review and editing – Preparation.

LKC: Conceptualization – Ideas, Data curation, Investigation, Project administration, Resources, Software, Visualization – Preparation, Writing – original draft – Preparation, Writing – review and editing – Preparation.

SRS: Writing – original draft – Preparation, Writing – review and editing – Preparation.

Conflicts of interest

None Declared.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Funding

None.

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