



Reversible lower limb deep vein thrombosis following haemotoxic snakebite—a case report

Nagarajan Natarajan, Aneesh Basheer, Sudhagar Mookkappan, Sivakumar Periyasamy

Department of General Medicine, Pondicherry Institute of Medical Sciences

CASE REPORT

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Corresponding Author:

Aneesh Basheer
Assistant Professor
Department of General Medicine,
Pondicherry Institute of Medical Sciences,
Ganapathichettikulam, Puducherry. 605014
Email: basheeraneesh@gmail.com

ABSTRACT

Haemotoxic snakebite, presenting with coagulopathy and bleeding manifestations, is quite common. Thrombotic manifestations are infrequently observed. We describe the unusual case of a young male who developed deep vein thrombosis (DVT) of the left lower limb following snakebite, despite an ongoing coagulopathy. Investigations revealed leucocytosis, prolonged 20-minute whole blood clotting time (20'WBCT), prolonged prothrombin time (PT), and activated partial thromboplastin time (aPTT). Doppler study revealed thrombosis of common femoral vein, superficial femoral, and profunda femoris veins. The patient underwent two fasciotomies and received anticoagulation after which patency of the veins was restored. Doppler sonographic imaging in patients with haemotoxic snakebite who present with increasing local swelling may assist with early anticoagulation therapy that has a potential to be limb-saving.

Key Words

Snake bite, DIC, DVT, Doppler ultrasound

What this study adds:

1. What is known about this subject?

Haemotoxic snakebite is known to cause a venom-induced consumptive coagulopathy with bleeding manifestations leading to fatality. Thrombotic manifestations are rare.

2. What is the key finding of this report?

In this case, the patient unusually developed a DVT of the lower limb, despite the presence of early disseminated intravascular coagulation (DIC) and prolonged coagulation times. The patency of deep veins was restored upon initiation of anticoagulants.

3. What are the implications for future practice?

Patients with haemotoxic snakebite and thrombotic indication (swelling) should be targeted for a Doppler sonographic examination, which enables timely detection of deep vein thrombosis. Anticoagulation, whilst appearing counterintuitive in such cases, may be limb-saving even in the setting of coagulopathy.

Background

Haemotoxic snakebites are common in the tropics.¹ The clinical manifestations of haemotoxic snakebite range from mild local swelling to fatal bleeding due to disseminated intravascular coagulation (DIC). Local reactions, considered relatively harmless, are often overlooked. Systemic envenomation from haemotoxic snakebite is a potentially pro-haemorrhagic condition associated with fatality. We report a case of haemotoxic snakebite where the patient developed a thrombotic complication in the form of deep vein thrombosis superimposed on the background of significant risk for bleeding associated with a venom-induced consumptive coagulopathy.

Case details

A 21-year-old male manual labourer was brought to the emergency department with a history of snakebite on his left foot. The incident occurred the previous noon, 20 hours prior to presentation, while he was in the field, for which he had sought treatment at a local hospital and had

been administered 16 vials of polyvalent ASV (anti-snake venom) prior to being to our department. He had pain and bleeding at the bite site and swelling of the left lower limb. There was history of vomiting and fever, but no history of decreased urine output, haematuria, drooping of eyelids, neck or limb weakness, or myalgia.

On examination, he was conscious, oriented, febrile, and had tender left inguinal lymphadenopathy. The left lower limb was swollen up to mid-thigh and was tender (Figure 1) with local calor and dolor. He had no focal neurological deficits, and other systems were within normal limits. His haemoglobin was 18.8gm% at admission, which later dropped to 10gm% over the next week. Total leucocyte count was 15,900cells/cu.mm with neutrophilic predominance. Peripheral smear was unremarkable. The 20-minute whole blood clotting time was prolonged beyond 20 minutes at admission. Coagulation profile revealed a prolonged aPTT and PT. Plasma D-Dimer and FDP levels were elevated. Urine examination revealed haemoglobinuria. Renal and liver functions were normal. He was administered 5 vials of ASV, and started on injections of Piperacillin/tazobactam and metronidazole.

Figure 1: Swelling of left lower limb at admission



The patient's condition remained unchanged for the next two days at which point the left lower limb pain became severe. On examination, there was severe tenderness up to the groin and an increase in the limb swelling (Figure 2). The

movements of the left lower limb, including toes were extremely painful. A provisional diagnosis of compartment syndrome was made and an urgent Doppler ultrasound study of the left lower limb was requested. The sonogram revealed non-compressibility of the common femoral vein, superficial femoral and profunda femoris veins indicative of a DVT. The patient was treated with unfractionated heparin and ASV, and monitored using aPTT. Over the next two days, he underwent two fasciotomies before his pain started to diminish with a reduction of swelling and tenderness, and an improvement of movement. A repeat Doppler was done three days later, which showed normal flowmetry of the deep veins. The patient was discharged on warfarin and advised to follow up with PT/INR regularly.

Figure 2: Increasing swelling of the left lower limb on the third day of hospitalisation



In this case, the patient developed a DVT having a prolonged aPTT and PT, with features of slowly evolving DIC, all of which predispose to increased risk of bleeding. There was complete resolution of thrombosis following heparin therapy. In a case of snakebite with profound local reactions that progress rapidly, it appears worthwhile undertaking a Doppler study to evaluate the affected region for venous thrombosis in order to institute anticoagulant therapy early.



Discussion

Snakebite is a common cause of morbidity and mortality in the tropics.¹ In fact, several studies have reported that the highest incidence and mortality from snakebite occurs in South Asia.²⁻⁴ The complications that follow envenomation by haemotoxic snakes are diverse. These may range from mild local reaction to fatal bleeding from DIC.⁵ Among the many complications, local reactions are considered relatively mild and the general notion is that these are associated with good prognosis. Though the vast majority of such reactions have an excellent prognosis, the role of careful observation and serial examinations cannot be neglected as a delay may lead to local reactions that can be disastrous. These include mild swelling at the bite site, localised cellulitis, rapidly spreading cellulitis, and compartment syndrome with local necrosis of muscles and soft tissues.⁶⁻⁸ The latter may lead to loss of the affected limb if left untreated or undetected.

Haematological abnormalities are very common with snakebites, particularly viper bites.⁹ These include isolated thrombocytopenia, DIC and prolonged bleeding and clotting times due to coagulation factor abnormalities. Thrombotic manifestations are less common. In a study of viper bites in Sweden, DVT and myocardial infarction were among the less commonly reported complications.¹⁰ In another study from Martinique, pulmonary embolism, cerebral infarction, and myocardial infarction were the thrombotic events encountered commonly, following *Bothrops lanceolatus* bite, which is prevalent in those parts.¹¹ These studies made no mention of DVT occurrence following haemotoxic snake bite.

The underlying mechanism for thrombotic complications is believed to be the imbalance between the pro-coagulant and anti-coagulant systems in the body. Haemotoxic snake venoms cause profound abnormalities in the coagulation system and platelets leading to the syndrome of DIC. This condition is associated with a tendency towards excessive bleeding following the uncontrolled activation of coagulation cascade resulting in a consumption coagulopathy. Thrombotic complications are probably the result of the initial phase where the coagulation cascade is activated.

Though local reaction to the venom may produce swelling and thrombosis of superficial veins, involvement of deep veins appears more unlikely in this setting. Moreover, the fact that DVT of the lower limb has been reported with bite on the upper limb¹² may indicate that systemic envenomation and coagulopathy has a definite role in genesis of DVT rather than being solely a local reaction.

Anticoagulants have been used in some studies to prevent thrombotic complications. However, the outcomes from

preventive anticoagulation in haemotoxic snakebite were discouraging.¹¹ Further, there is relatively scant information on the use of anticoagulants in established DVT following snakebite. Our case may represent one of the first reports of successful anticoagulant therapy for DVT due to snakebite. The anecdotal suggestion is that it may be safe to use heparin in snakebite even in the setting of DIC and prolonged clotting times, though this requires more formal investigation and confirmation. We initiated anticoagulation with unfractionated heparin in our patient and discharged him on warfarin with regular monitoring of the International normalisation ratio (INR). We discontinued warfarin after six months and the patient had no evidence of DVT thereafter.

Doppler ultrasound using venous compression is a relatively inexpensive, widely available and rapidly deployable tool with excellent diagnostic reliability and validity for DVT.^{13,14} Our case indicates that it appears worthwhile undertaking Doppler study of the limb(s) in patients who develop increasing swelling of one or more limbs after a snakebite. This could help with the early recognition and treatment of DVT, preventing further complications including post-phlebotic syndrome. This unusual case illustrates that despite the pro-haemorrhagic milieu created by haemotoxic envenomation, anticoagulation can be initiated safely and is effective in reversing DVT.

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PEER REVIEW

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

PATIENT CONSENT

The authors Nagarajan Natarajan, Aneesh Basheer, Sudhagar Mookkappan and Sivakumar Periyasamy, declare that:

1. They have obtained written, informed consent for the publication of the details relating to the patient(s) in this report.
2. All possible steps have been taken to safeguard the identity of the patient(s).
3. This submission is compliant with the requirements of local research ethics committees.