



## Case report

# Accident involving a 2-year-old child and *Lonomia obliqua* venom: clinical and coagulation abnormalities

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## ABSTRACT

Poisons of caterpillars have different effects on inflammatory and coagulation systems. This is a case report of a 2-year-old child that accidentally came in contact with several caterpillars of the species *Lonomia obliqua*. At first, the patient's exams presented abnormal coagulation and decreased fibrinogen, but the patient did not evolve to active bleeding or acute renal failure. The patient received antilonomic serum 15 h after the accident and the treatment was repeated after another 12 h due to persistent alterations shown by the coagulation exams. The venom of *L. obliqua* has several substances that act on the coagulation and inflammatory systems. The event is characterized by a hemorrhagic syndrome with decreases in fibrinogen. *L. obliqua* Stuart-factor activator (Losac) and *L. obliqua* prothrombin activator protease (Lopap) are components that act with procoagulatory effects. The pro-inflammatory action occurs due to metalloproteases, hyaluronidases and other substances with inflammatory activity. Studies on caterpillar venom can give new perspectives on the treatment of cancer and other diseases that cause dysfunction of the extra-cellular matrix.

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## Introduction

Caterpillars are the larval stage of butterflies and moths. Contact with the bristles of some caterpillars induce varied symptoms from mild discomfort to systemic bleeding.<sup>1</sup>

The earliest records of accidents involving lepidopteran caterpillars in Brazil were described by Zoroastro Alvarenga

in 1912, but it was only in 1967 that studies on this insect were intensified.<sup>1</sup> Between 1989 and 2001, 5673 accidents and 21 deaths occurred in the south of Brazil.<sup>2</sup>

Accidents with *Lonomia obliqua* (Figure 1) occur most frequently on the upper limbs of children and rural workers.<sup>1</sup> There is a seasonal distribution of accidents involving this caterpillar, with increased numbers of cases in spring and summer, the period that corresponds to the caterpillar stage.<sup>1</sup>

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**Figure 1 – *Lonomia obliqua*.**

*L. obliqua* releases toxins with anticoagulant properties through its bristles. These toxins in contact with the skin can cause pain, redness, swelling and a burning sensation at the site, and headache, nausea, vomiting, hematoma, hematuria, bruising, anemia and leucocytosis.<sup>2</sup>

The clotting time increases, coagulation factors levels decrease and fibrin degradation products increase after accidents with *L. obliqua*. The difference between *L. obliqua* poisoning and other coagulopathies is the absence of thrombocytopenia.<sup>1</sup>

### Case report

This is the case of JNF, a Caucasian infant boy of 2 years and 2 months, born and living in the city of São Paulo, Brazil.

The patient was brought to the emergency department with a history of an accident involving contact with caterpillars 10h previously. The patient had been on his father's lap in the garden at home when he touched the trunk of a tree and felt an intense burning pain in the palm of his hand. At this time, the father noticed that the child had touched a cluster of caterpillars. These caterpillars were described as being more or less 5 cm in length and covered with bristles, with a light brown/green color. The patient had a past medical history of respiratory atopy and regularly took montelukast, but with no other relevant family medical history. He was in a regular medical condition, eupneic, hydrated, acyanotic, anicteric, afebrile and active. His heart rate was 67 beats per minute, the respiratory rate was 20 breaths per minute, and blood pressure 97 × 47 mmHg. His weight was 14 kg, height 86 cm, and oxygen saturation was 97% in normal atmosphere. The physical examination was normal, except for micropapules on the left hand. No hematomas or petechiae were evidenced.

The patient was admitted to the intensive care unit. The accident was rated as moderately severe because of the alterations in clotting assays despite the lack of hemorrhagic manifestations. Fifteen hours after the accident, the patient received three ampoules of antilonomic serum. Before the infusions, he received 10 mg/kg of hydrocortisone and 1 mg/kg of diphenidramin. Twelve hours after the first administra-

tion of antilonomic serum, he received two more ampoules, because the coagulation tests were still abnormal. The patient evolved well, without bleeding, hematoma or hematuria, with good urinary excretion and without renal alterations. He was discharged with normal laboratory exams (Table 1).

### Discussion

The patient described in this report presented with prolonged coagulation times including prothrombin time and activated partial thromboplastin time as well as hypofibrinogenemia, which improved after the infusion of antilonomic serum. He did not present thrombocytopenia during hospitalization.

In accidents involving *L. obliqua* poisoning, the most severe manifestations are renal failure and intracerebral hemorrhage; this patient evolved with neither of these signs. The pathophysiology of these alterations is poorly understood. Intracerebral hemorrhage is the main cause of death.<sup>3</sup> In the state of Paraná in the south of Brazil, hemorrhage was present in 50% of the patients suffering accidents involving *L. obliqua*. Hematuria is frequently observed and some histological reports show acute tubular necrosis.<sup>3</sup>

The venom of *L. obliqua* has several substances that act on the coagulation and inflammatory systems. The event is characterized by a hemorrhagic syndrome with a decrease in fibrinogen; decreases in fibrinogen and thrombocytopenia are severity markers.<sup>3</sup>

In the coagulation system, Losac and Lopap have procoagulatory effects with Losac being described first. The enzyme activates factor X at levels that depend on the concentration of venom and the FXa complex formed integrates the prothrombinase complex. Blood and kidney venom levels are high 1h after contact, but the venom is completely eliminated within 24h, suggesting that the endothelium and coagulation factors are the venom's most likely targets.<sup>4</sup> Lopap is a protease with linear kinetics that activates prothrombin without forming the prothrombinase complex; its activity is inhibited by the antilonomic serum.<sup>5,6</sup>

The pro-inflammatory action occurs due to metalloproteases, hyaluronidases and other substances with inflammatory activity.<sup>7</sup> Injecting *L. obliqua* venom in rats increased the expression of endothelial E-selectin, and vascular cell adhesion protein 1 and caused the activation of leukocyte, and the induction of necrosis factor kappa-β, cyclooxygenase-2, heme oxygenase-1 and inducible nitric oxide synthase.<sup>8</sup> Lopap and Losac also play a role in the up-regulation of the expression of pro-inflammatory molecules such as interleukin 8, and intercellular adhesion molecule-1.<sup>4</sup>

Treatment consists in the injection of antilonomic serum which was developed in Brazil in 1996 by obtaining antibodies extracted from horses immunized with extracts from the bristles of caterpillars. This serum contains the F(ab') fragment of G immunoglobulin.<sup>9</sup>

Another antifibrinolytic agent that can be used is epsilon aminocaproic acid (EACA) at an initial dosage of 30 mg/kg IV, followed by 15 mg/kg every 4h until coagulation is normalized.<sup>10</sup> This was the recommended treatment prior to the development of the antilonomic serum, based on the treatment results of other types of *Lonomia* sp. Envenomation.<sup>3</sup>

**Table 1 – Laboratory exams.**

	8 h after accident	27 h after accident	35 h after accident	At discharge
Prothrombin time (s)	>120.0	160.0	16.3	12.3
INR	12.8	10.0	1.34	1.0
APTT (s)	123	37.9	27.0	27.0
APTT ratio	3.71	1.32	0.9	0.9
Fibrinogen (mg/dL)	–	35	87	115
Hemoglobin (g/dL)	–	9.1	10.8	11.6
Hematocrit (%)	–	28.0	32.4	35.5
Leukocytes ( $\times 10^3/uL$ )	–	7.8	6.3	11.4
Platelets ( $\times 10^3/uL$ )	–	237	264	352
Urea (mg/dL)	–	15	17	28
Creatinine (mg/dL)	–	0.3	0.3	0.3
Sodium (mEq/L)	–	127	139	–
Potassium (mEq/L)	–	5.9	4.5	–

INR: international normalized ratio; APTT: activated partial thromboplastin time.

Experimental studies did not demonstrate a normalization of fibrinogen and clotting factors 1 and 6 h after the infusion of EACA, respectively.<sup>3</sup>

The understanding of the components and the action of the venom may be useful in treating diseases and developing drugs. Lopap is rich in lipocalin, a protein involved in cellular regeneration and remodeling and in control of apoptosis. The study of this substance may help in the treatment of diseases in which there is dysfunction of the extra-cellular matrix, such as diabetes, renal failure, and pulmonary and heart diseases.<sup>1,3</sup> Lopap was also studied in rats in order to reverse the anticoagulant effect of low molecular weight heparin. The outcome is interesting as protamin, the antidote currently available, reverses only 60% of the effect caused by low molecular weight heparin.<sup>8</sup>

This report emphasizes the importance of knowing the hemorrhagic and inflammatory effects of *L. obliqua* venom, as well as its treatment. Studying the substances involved enables the development of new treatments for current diseases.

## Conflicts of interest

The authors declare no conflicts of interest.

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