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 ant between 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.

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. Between 1989 and 2001, 5673 accidents and 21 deaths occurred in the south of Brazil.

Accidents with Lonomia obliqua (Figure 1) occur most frequently on the upper limbs of children and rural workers. 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.

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E-mail address: daninasu@gmail.com (D.N.M. Medeiros).
In Lopap Thisafebrile site, through accidents this patient developed 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. 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.

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.

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 1 h after contact, but the venom is completely eliminated within 24 h, suggesting that the endothelium and coagulation factors are the venom’s most likely targets. Lopap is a protease with linear kinetics that activates prothrombin without forming the prothrombinase complex; its activity is inhibited by the antilonomic serum.

The pro-inflammatory action occurs due to metalloproteases, hyaluronidases and other substances with inflammatory activity. 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-1and inducible nitric oxide synthase. 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.

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.

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 4 h until coagulation is normalized. 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.
Experimental studies did not demonstrate a normalization of fibrinogen and clotting factors 1 and 6 h after the infusion of EACA, respectively.3

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.1,3 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.8

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.

REFERENCES


<table>
<thead>
<tr>
<th>Table 1 – Laboratory exams.</th>
<th>8 h after accident</th>
<th>27 h after accident</th>
<th>35 h after accident</th>
<th>At discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prothrombin time (s)</td>
<td>&gt;120.0</td>
<td>160.0</td>
<td>16.3</td>
<td>12.3</td>
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<tr>
<td>INR</td>
<td>12.8</td>
<td>10.0</td>
<td>1.34</td>
<td>1.0</td>
</tr>
<tr>
<td>APTT (s)</td>
<td>123</td>
<td>37.9</td>
<td>27.0</td>
<td>27.0</td>
</tr>
<tr>
<td>APTT ratio</td>
<td>3.71</td>
<td>1.32</td>
<td>0.9</td>
<td>0.9</td>
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<tr>
<td>Fibrinogen (mg/dL)</td>
<td>–</td>
<td>35</td>
<td>87</td>
<td>115</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>–</td>
<td>9.1</td>
<td>10.8</td>
<td>11.6</td>
</tr>
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<td>Hematocrit (%)</td>
<td>–</td>
<td>28.0</td>
<td>32.4</td>
<td>35.5</td>
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<td>Leukocytes (×10³/µL)</td>
<td>–</td>
<td>7.8</td>
<td>6.3</td>
<td>11.4</td>
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<tr>
<td>Platelets (×10³/µL)</td>
<td>–</td>
<td>237</td>
<td>264</td>
<td>352</td>
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<tr>
<td>Urea (mg/dL)</td>
<td>–</td>
<td>15</td>
<td>17</td>
<td>28</td>
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<tr>
<td>Creatinine (mg/dL)</td>
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<td>0.3</td>
<td>0.3</td>
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<tr>
<td>Sodium (mEq/L)</td>
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<td>127</td>
<td>139</td>
<td>–</td>
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<tr>
<td>Potassium (mEq/L)</td>
<td>5.9</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

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

27.0