CLINICAL CASE REPORT

Emergency treatment for a venomous snakebite accident in rural southern Mexico

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In Latin America, 51,995 emergencies and 337 deaths are caused by snakebites yearly. Prompt and adequate treatment is crucial after an envenomation. We here report the case of a 40-year-old male agriculturalist, who was bitten by a venomous snake. Hours after the bite, he was admitted at the nearest clinic, diagnosed with type IV envenomation. After initial antivenom treatment he was transported to an urban hospital. Hemorrhage persisted and the patient developed compartmental syndrome and renal failure. The patient died 3 days after the accident. To reduce fatalities from snakebite envenomation, such as the case we here presented, there is a need for coordinated and multilevel approach, collaborative work and continual medical training.

Keywords: antivenoms, compartment syndrome, Mexico, snakebite.
hypovolemic and distributive shock along with acute renal failure.

Table 1: Christopher-Rodning classification of the signs, symptoms and initial treatment with antivenom for snakebite envenomation of the family *Viperidae*

<table>
<thead>
<tr>
<th>Severity class</th>
<th>Signs and symptoms</th>
<th>Initial dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Pitpoint bite marks without envenomation, probable dry bite (10–20% of cases)</td>
<td>Not required</td>
</tr>
<tr>
<td>I</td>
<td>Mild envenomation; pain, no greater than 10 cm edema circumferential to the area of the lesion</td>
<td>4 vials</td>
</tr>
<tr>
<td>II</td>
<td>Moderate envenomation; intense pain, more than 15 cm edema circumferential to the area of the lesion, skin and regional changes, nausea</td>
<td>5 vials</td>
</tr>
<tr>
<td>III</td>
<td>Severe envenomation; edema of the entire affected limb, vomiting, vertigo, fever, very noticeable changes in the skin (ecchymosis, blisters, petechiae, pain/esthesia, rigidity)</td>
<td>6-8 vials</td>
</tr>
<tr>
<td>IV</td>
<td>Very severe envenomation: active bleeding, extensive ecchymosis and petechiae, disseminated intravascular coagulation data, acute renal failure, respiratory distress, hypertension and multiple organ failure</td>
<td>25 vials</td>
</tr>
</tbody>
</table>

**Ethics approval**

A relative of the patient provided written consent (approval number CE0162017).

**Discussion**

We have presented the case of a patient that experienced a snakebite, an envenomation accident, followed by craniocerebral trauma whilst being geographically and socially isolated. The isolation and lack of timely treatment at the local hospital delayed the initiation of medical attention.

Many aspects of this case can be analysed to improve knowledge and enhance the medical attention given to future patients in similar conditions of social and geographical isolation, considering that the clinical evolution of the patient was congruent with that previously described in existing literature. However, rural medical personnel face a lack of resources and training, and thus procedures are not always adhered to follow the National Clinical Practice Guidelines to treat envenomation.

The time that elapsed between the bite and the initial treatment might have contributed to the patient’s fatal outcome. The priorities for the initial approach of the envenomation treatment for a patient bitten by a viper include the prompt medical attention, because the prognosis for envenomation is directly related to a timely diagnosis and treatment. However, the transport is difficult in rural agricultural sectors of south-eastern Mexico, as in many other rural areas of Latin America.

The use of tourniquets is contraindicated because they result in higher morbidity by facilitating necrosis and fibrinolysis of the peripheral nervous system and when removed can provoke massive envenomation. In the present case it was known that the patient arrived with a tourniquet on the affected limb. It is therefore important to acknowledge that if a tourniquet or compression bandage has been fitted, it should be left in place and only be removed after antivenom infusion has commenced.

The administration of antivenom is based on the Christopher-Rodning envenomation criteria (Table 1). Prior to the persistence or aggravation of the clinical manifestations, the antivenom should be administered at an initial therapeutic dose every 4 hours. In the present case, the antivenom was applied as a single dose, because the administration of the total 15-vial dose was suspended during the patient’s transfer instead of re-evaluating the conditions of the patient after administration.

In accordance with Christopher-Rodning IV criteria, the indicated therapeutic dose for envenomation grade IV is 25 or more, instead of the 15 vials that the patient received. Some protocols still dictate that corticosteroids be administered in conjunction with the antivenom for specific cases, but these are generally found as contraindications because they affect coagulation and their use could aggravate underlying conditions. The administration of several medicines with the antidote overwhelms metabolic capacity, which is already diminished by the cellular destruction that the venom causes.

Fasciotomy is indicated in patients that have evidence of high compartmental pressure and also in those who have capacity for homeostasis. When patients have impaired coagulation ability it favours haemorrhage, loss of systemic arterial pressure and, eventually, distributive shock or hypovolemia. Some authors recommend fasciotomy in all cases of envenomation due to snake bite, but in the present case the hemodynamic stabilization in the patient could have been achieved before the fasciotomy and not after the procedure.

An alternative treatment to compartmental syndrome is the use of hyperbaric oxygen therapy. Although its specific use in ophidian envenomation is still experimental, the Hyperbaric Medicine Society approves its use for different types of envenomation as well as for compartmental syndrome and necrotizing fasciitis. Early use of hyperbaric oxygenation reduces the risk of necrosis and secondary cellular ischemia; before the risk assessment it should have been considered as an alternative that does not implicate incisions nor bleeding.

We emphasize the importance of primary prevention and health promotion that can favour the management and adequate transfer of patients at high risk of snakebite envenomation, as well as ongoing training of health personnel and the updating and contextualization of clinical practice guidelines, to the resources that are available in rural areas. Specific guidelines for improving the initial management and transfer of patients from isolated areas should be implemented, but also taught to the first-contact health personnel to promote evidence-based clinical practice.
Conclusion

To reduce fatalities from snakebite envenomation, such as in the case presented here, there is a need for a coordinated multilevel approach of proximate and distant barriers, such as the correct registration of cases, the anticipation of higher risk seasons, collaborative work and continual medical training.

REFERENCES:


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