RELATO CASO / CASE REPORT

Acute renal failure secondary to snakebite by Bothrops: a case report and critical analysis of treatment

Insuficiência renal aguda secundária a acidente ofídico por serpente do gênero Bothrops: relato de caso e análise criteriosa do tratamento

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Rev Panam Infectol 2014;16(3):187-190

Received: 23/05/2012
Approved: 8/9/2013

The Fundação de Medicina Tropical Dr. Heitor Vieira Dourado approved and supported the study financially. Conflict of Interest: All the authors of this MS do not have any conflict of interest.

ABSTRACT
Bothrops accidents are of epidemiological importance in Brazil and mostly come with local manifestations secondary to acute inflammation of the poison. The occurrence of systemic complications and death is unusual, occurring by delay in the administration of specific antivenom or your incorrect use. We report a case of acute renal failure secondary to Bothrops accident in a 33 years old woman, previously healthy, and our objective is to analyze the treatment carefully, emphasizing that there are potentially preventable complications if the approach is done correctly on a doable time.

Keywords: Acute renal failure; Snakebite venom; Bothrops

RESUMO
Acidentes botrópicos são de importância epidemiológica no Brasil e cursam em sua maioria com manifestações locais secundárias à inflamação aguda do veneno. A ocorrência de complicações sistêmicas e óbito não é o habitual, estando relacionadas em parte pelo atraso na administração de antiveneno específico ou uso incorreto. Nós relatamos um caso de insuficiência renal aguda secundária a acidente botrópico em uma mulher de 33 anos, previamente hígida, e temos por objetivo analisar criteriosamente o tratamento realizado enfatizando que existem complicações possivelmente evitáveis desde que o tratamento seja realizado em tempo hábil e corretamente.

Palavras chaves: Insuficiência renal aguda; Acidente ofídico; Bothrops

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INTRODUCTION
Snakebites are an important health problem because of their frequency and severity. The World Health Organization estimates that each year there are approximately 125,000 deaths in 2.5 million snakebites worldwide\(^1\). In Brazil, during 2008, 26,156 accidents were recorded, corresponding to a national incidence of 13 cases per 100,000 population and 119 deaths, with a mortality rate of 0.5% (119/26,156)\(^2\). The North region of Brazil has the highest risk, it is possible that there is a high rate of underreporting, since there is limited access to health services and most accidents occur in rural areas. The vast majority of accidents caused by venomous snakes is attributed to the genus Bothrops, popularly known as “surucucurana” or “jararaca”, which represent 90% of the species involved, followed by the genera Crotalus, Lachesis and Micrurus\(^3-^4\). The occurrence in general, has relation to climatic factors and human activity in agriculture. It is not observed seasonality on the North region, occurring uniformly throughout the year. In Brazil, most accidents involve men at the age of 15-39 years, rural workers, and lower limbs as most affected member \(^2\). Even when the snake is not captured, the differentiation can be made based on clinical manifestations. The properties of poisons differ between snake genus, proteolytic and coagulant being the predominant effect in Bothrops accidents, with local pain, swelling, blistering, bruising and bleeding as clinical manifestation. Local complications include secondary infections and gangrene. The Bothrops venom also has nephrotoxic action and may cause severe systemic manifestations, but those are more commonly in Crotalus accidents\(^5\).

CASE REPORT
A 33 years old, obese female, previously healthy, was admitted at an emergency department of the Amazon Tropical Foundation Dr. Heitor Vieira Dourado, Manaus, Brazil, approximately twelve hours after being bitten by unidentified snake. Accident occurred at night, in open forest of the city Cardrero Castanho, Manaus. She appeared in good general condition, hemodynamically stable, with complaints of pain and swelling in left leg, making it difficult for her to walk. Two punctate lesions on the dorsal surface of the left foot with perilesional edema and ecchymosis extending to the ankle were noticed on physical examination. She denied use of tourniquets and any spontaneous bleeding. As there was no identification of the snakes genus, the proposed hypothesis was of a moderate Bothrops accident based on clinical presentation and epidemiology in the region. Five ampoules of Bothrops specific anti-venom were administered. The patient was previously medicated intravenously with symptomatic aiming to reduce possible reactions of immediate-type hypersensitivity. Received a single dose intravenously of a non-steroidal anti-inflammatory and hydration. Harvested exams whose initial results were clotting time: incoagulable, hemoglobin: 13 g/dL, hematocrit 37.4%, total leukocyte: 19.010 (neutrophils: 88%, lymphocytes: 10%, monocytes 1%, eosinophils: 1%; basólifos: 0%), platelets: 294,000, creatinine: 2.7 mg/dL, urea: 59 mg/dL, potassium: 5.0 mmol/L, sodium: 141 mmol/L. With these tests a repeated dose of the serum was made and the patient kept under observation in the ward. During the hospitalization, she presented clinical and laboratory signs of progressive impairment of renal function unresponsive to vigorous hydration, developed with 11 mg/dL creatinine, and 182 mg/dL urea. Hypertensive peaks requiring the introduction of antihypertensive medication. The urinalysis showed protein + and hemoglobin ++++. Ultrasonography of the urinary tract showed no changes. Started hemodialysis at the 4th day of hospitalization, a total of five sessions, which took place on the 5th, 7th, 9th and 12th days of hospitalization. From the second week on, an increase in urinary volume and gradual resolution of hematuria was noted. The clinical picture presented itself satisfactorily and was discharged with normal renal function at the end of the third week, while maintaining the use of antihypertensive medication.

DISCUSSION
This was a Bothrops snakebite in previously healthy patient. The snake bites can be classified as mild, moderate and severe, with a greater risk of complications conform the class assembled\(^3\) (Table 1).

<table>
<thead>
<tr>
<th>Site manifestations: pain, edema, ecchymosis</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systemic manifestations: serious hemorrhage, shock, anuria</td>
<td>Absent or discrete</td>
<td>Evident</td>
<td>Intense</td>
</tr>
<tr>
<td>Clotting time (CT)</td>
<td>Normal or altered</td>
<td>Normal or altered</td>
<td>Normal or altered</td>
</tr>
<tr>
<td>Anti-venom therapy (quantity of ampoules)</td>
<td>2-4</td>
<td>4-8</td>
<td>12</td>
</tr>
<tr>
<td>Route</td>
<td>IV</td>
<td>IV</td>
<td>IV</td>
</tr>
</tbody>
</table>

Normal CT: up to 10 min, prolonged CT: from 10 to 30 min, non clotting CT:>3 min

Data from the manual of diagnosis and treatment of accidents caused by poisonous snakes, Brazilian Ministry of Health, 2001

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**Table 1. Accident Bothrops. Classification of the gravity and recommended anti-venom**
In *Bothrops*, systemic complications are not common. Ribeiro *et al.* in a series of 3139 accidents caused by *Bothrops* snake genus, reported the presence of acute renal failure in 1.6% of cases. When present, the acute renal failure is a major systemic complication and is associated with increased mortality. The delay in serotherapy is considered an important risk factor for acute renal failure. It is reported that two hours after the bite occurs, a glomerular deposition of fibrin and acute tubular necrosis can already be observed. Castro *et al.* demonstrated optimal renal protection only when the poison and the anti-venom were administered simultaneously. The kidney injury has been attributed to direct proteolytic action of the poison on the glomerulus that is accompanied by morphological and functional changes. Other factors that may contribute are the vasodilator effect - hypotension, precipitation in renal tubules as pigments myoglobin and hemoglobin, glomerular deposition of microtombos and cell damage induced by proinflammatory cytokines. The most commonly associated renal lesion is the acute tubular necrosis, but all kidney structures may be involved. Amaral *et al.* documented the renal cortical necrosis. Underlying diseases such as hypertension and diabetes mellitus as well as use of anti-inflammatory drugs and aminoglycoside antibiotics can make the injured more vulnerable to the effects of the venom. We do not know if the previous use of anti-inflammatory contributed to the evolution of the patient. Other factors associated with the development of acute renal failure in snakebites are age, with children more susceptible, the size of the snake, and the degree of hydration of the patient. Acute renal failure generally is precocious and often presents as oliguric evolving with need for dialysis. Tends to be reversible if treated early. There are few data in the literature evaluating strategies for prevention and treatment of acute renal failure in snakebite. Most information available about the mechanisms involved are derived from experimental studies. Barone *et al.* obtained partial renal protection with the use of lipoic acid and sinvastatin after induction of renal failure in rats poisoned by *Bothrops* jararaca, generating a new perspective on research supporting the drug as a adjuvant in the treatment of *Bothrops* accidents.

Still, the management of these patients end up being similar to patients with acute renal failure from other causes. We approached in a fluxogram a orientation in order to prevent acute renal failure due to *Bothrops* snakebite given the high frequency of accidents in our region (Figure 1).

![Figure 1: Flow chart with recommendations for the initial treatment of snakebite.](image-url)
CONCLUSION

Having knowledge of the risk of developing kidney damage after the *Bothrops* accident, immediate care should include adequate intravenous hydration. Nephrotoxic drugs should be avoided. However, the primary treatment is an early and appropriate specific anti-venom, and it should be available in rural areas with trained professionals to act in a timely manner.

Acknowledgement: We thank the patient for authorizing us to use her clinical examination.

REFERENCES


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