Short Communication

Splenic Rupture in Dengue Hemorrhagic Fever: Report of a Case and Review

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SUMMARY: Dengue is currently the most important arboviral disease in the world, particularly in tropical countries in which the environmental conditions favor the development and proliferation of the mosquito vector. Dengue hemorrhagic fever presents in two phases: an initial phase, which is characterized by sudden onset of fever and a variety of nonspecific signs and symptoms, and a critical phase, which is characterized by the recovery from fever and development of hemorrhagic symptoms and circulatory insufficiency. This report documents a case of splenic rupture in a patient with dengue hemorrhagic fever who developed hypovolemic shock and subsequently died. Although splenic rupture is a known complication of other acute infections such as malaria and mononucleosis, it is a rare complication of dengue; therefore, it may be misdiagnosed. In the case described here, the poor outcome mainly resulted from the sudden onset of complications; the patient died of splenic rupture less than 24 h after admission, and the cause of death was confirmed at necropsy.

Dengue is currently the most important arboviral disease in the world, particularly in tropical countries in which the environmental conditions favor the development and proliferation of the mosquito vector (1). The World Health Organization estimates that approximately 80 million people are infected annually (2).

The dengue virus belongs to the genus Flavivirus, family Flaviviridae and has four serotypes: DENV-1, -2, -3, and -4 (1,2). The virus is transmitted by the bite of the female Aedes aegypti mosquito. Factors such as accelerated urbanization, increased case of transportation between different geographic regions, and the failure of vector control programs favor an increase in disease transmission (3).

The first cases of dengue, diagnosed on the basis of clinical criteria, in Brazil were reported in Niterói, Rio de Janeiro in 1923. Since then, no recurrence of the disease was reported in Brazil until the 1980s. In 1986, a new dengue epidemic occurred in Brazil in the metropolitan region of Rio de Janeiro, with the reintroduction of DENV-1. From there, the same serotype spread to other states in the country, eventually reaching the state of Mato Grosso in 1992 (1). The 1990s saw the introduction of DENV-2, which rapidly expanded to several areas of Brazil. The introduction of DENV-3 to the country was confirmed in January 2001, and it was later responsible for the epidemic of 2002, in which approximately 800,000 cases were reported (4). In 2010, there were 1,026,742 cases recorded in Brazil; of these, 800,000 cases were reported (4). In 2010, there were 1,026,742 cases recorded in Brazil; of these, 800,000 cases were reported (4).

Splenic rupture, although a known complication of other acute infections such as malaria and mononucleosis, is a rare complication of dengue; therefore, it may be misdiagnosed (7–9).

A 33-year-old man who a lifelong resident of Barra do Garças municipality, Mato Grosso state (Brazilian Midwest region) was admitted to Tropical Diseases Hospital of Goiânia, Goiás state, Brazil, with a 5-day history of fever, pressure-like holocranial headache associated with retro-orbital pain, and generalized myalgia. After 3 days of headache, he began to experience episodes of postural hypotension, frequent dizziness, and intense pain localized in the upper abdominal region. The patient also presented with lower-limb and facial edema, dyspnea that had persisted for 1 day, anorexia, reduction of urinary volume, reduction of gas, and constipation, with the last evacuation 2 days before presentation. He denied bleeding or weight loss and had no history of fever in the past 6 months. On physical examination, the patient appeared to be in fair general health, even though he was dehydrated (2/4+), pale (+/4+), and had periorbital edema. The patient had no fever. His vital signs were as follows: blood pressure (BP), 130 × 70 mmHg; heart rate, 80 beats/min; and respiratory frequency, 36 breaths/min. The lung sounds were normal, and oxygen saturation was 96% when measured with an O₂ nasal saturation. The patient’s abdomen was distended, painful to palpation, and ascitic, but it was negative for rebound tenderness. His limbs were free of edema and cutaneous lesions. Intravenous administration of normal saline was initiated.

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The results of the laboratory tests were as follows: hematocrit, 49.8%; leukocyte count, 3,100/µL; platelet count, 27,000/µL; albumin level, 2.5 g/dL; gamma glutamyl transferase (γ-GT), 223 IU/L; alanine aminotransferase (ALT), 404 IU/L; Na+, 138 mEq/L; K+, 3.6 mEq/L; Ca2+, 8.4 mEq/L; total bilirubin, 3.4 mg/dL (direct, 2.2 mg/dL); and arterial pH, 7.38. Chest radiographs showed bilateral pleural effusion. Two hours after admission, the patient's condition changed, with worsening abdominal pain and the excretion of very small volumes of red-colored urine. His oxygen saturation was still 96%. Intravenous albumin was also administered to the patient at this time.

Twenty hours after admission, the patient presented with positive Blumberg's sign, BP of 80 × 40 mmHg, heart rate of 160 beats/min, weak pulse, oxygen saturation of 98%, respiratory frequency of 40 breaths/min, and generalized tonic-clonic convulsion and hypoxemia progressing to cardiopulmonary arrest and death, despite proper resuscitation maneuvers.

An autopsy revealed a large quantity of clotted blood in the abdominal cavity and splenic rupture to be the cause of death. There were no signs of trauma such as rib fractures or hematoma. Serological immunoenzymatic assay results were positive for dengue IgM and negative for dengue IgG (Bio-Manguinhos/Fiocruz, Rio de Janeiro, Brazil). An immunochromatography test for NS1 antigen was positive (Bio-Rad Laboratories, Marne La Coquette, France). Blood cultures and serological test results were negative for hepatitis A, B, and C.

Dengue hemorrhagic fever is usually a disease of children under 15 years of age, but it may also occur in adults. The initial phase is characterized by the sudden onset of fever, which usually lasts 2–7 days. The fever is accompanied by a variety of nonspecific signs and symptoms, particularly headache, myalgia, and arthralgia, that are similar to those found in classic dengue (10,11).

The second, critical phase is characterized by recovery from fever and the beginning of hemorrhagic symptoms and/or circulatory insufficiency (10,11). These signs consist of intense and continuous abdominal pain, postural and arterial hypotension, convergent BP (difference between systolic and diastolic pressures less than 20 mmHg), dizziness, major hemorrhaging, persistent emesis, painful hepatomegaly, cold extremities, cyanosis, a fast and weak pulse, agitation or lethargy, reduction of diuresis, hypothermia, and increased hematocrit. Thrombocytopenia, with values less than 100,000 platelets/µL, is a manifestation of vascular extravasation syndrome and characterizes hemorrhagic dengue.

The spleen is frequently congested in cases of dengue hemorrhagic fever, and subcapsular hematomas are found in 15% of necropsy cases. Splenic rupture, however, is extremely rare, and only few cases have been described in the literature (7,8,12–16).

This case report describes a young adult with non-specific initial symptoms (fever, headache, retro-orbital pain, and myalgia) accompanied by thrombocytopenia. The case progressed, in 5 days, to regression of fever and the appearance of hemorrhagic indicators such as postural and arterial hypotension, weak pulse, and continuous and intense abdominal pain.

Splenic rupture is believed to be caused by increased consumption of coagulation factors and severe thrombocytopenia. Although diagnosis of splenic rupture is difficult, it must be performed immediately. The diagnosis can be confirmed by abdominal ultrasound, magnetic resonance imaging (MRI), computed tomography (CT), or diagnostic peritoneal lavage. In this case, neither an imaging examination nor a peritoneal lavage was performed. These factors probably contributed to the poor patient outcome by precluding prompt diagnosis and correct disease management.

The correct management of this complication of dengue hemorrhagic fever includes splenectomy; however, recent reports have shown favorable results with conservative treatment. The correct therapeutic choice depends on the hemodynamic state of the patient.

Sharma and Kadhiravan reported a case of splenic rupture in a patient with positive serological test results for dengue; rupture was diagnosed by CT and paracentesis, with favorable changed observed after conservative treatment by transfusion of erythrocyte concentrate and crystalloids (7). Seravali et al. reported two cases of splenic rupture. The first case was identified by diagnostic peritoneal lavage and treated with splenectomy. The second case was diagnosed using CT and treated with splenectomy after failure of conservative treatment. After surgery, the patients in both cases recovered without complications (8). Miranda et al. reported another case of splenic rupture diagnosed by CT; in this case, the patient recovered after splenectomy (14). Redondo et al. reported a case of a 23-year-old woman with splenic rupture who died of secondary complications of splenectomy (15). Finally, Imbert et al. reported a case of a 35-year-old man who underwent splenectomy with favorable results (16). Table 1 summarizes the cases of splenic rupture due to dengue fever reported in the medical literature.

In the present case, the poor outcome resulted mainly from the sudden onset of the complication; the patient died of sudden splenic rupture less than 24 h after admission. Although splenic rupture can be confirmed by hemodynamic instability, this sign develops only in the

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**Table 1. Reported cases of spontaneous splenic rupture due to dengue fever**

<table>
<thead>
<tr>
<th>Study (ref. no.)</th>
<th>No. of cases</th>
<th>Gender/age (y)</th>
<th>Method of diagnosis</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imbert et al. (16)</td>
<td>1</td>
<td>Male/35</td>
<td>Paracentesis</td>
<td>Splenectomy</td>
<td>Survival</td>
</tr>
<tr>
<td>Redondo et al. (15)</td>
<td>1</td>
<td>Female/23</td>
<td>Ultrasound</td>
<td>Splenectomy</td>
<td>Death</td>
</tr>
<tr>
<td>Miranda et al. (14)</td>
<td>1</td>
<td>Female/52</td>
<td>CT</td>
<td>Splenectomy</td>
<td>Survival</td>
</tr>
<tr>
<td>Seravali et al. (8)</td>
<td>2</td>
<td>Male/27–Male/20</td>
<td>Peritoneal lavage–CT</td>
<td>Splenectomy–splenectomy</td>
<td>Survival–survival</td>
</tr>
<tr>
<td>Sharma and Kadhiravan (7)</td>
<td>1</td>
<td>Female/29</td>
<td>CT, paracentesis</td>
<td>Conservative</td>
<td>Survival</td>
</tr>
</tbody>
</table>

CT, computed tomography; y, years.
last moments of life. This case highlights the importance of clinical suspicion of splenic rupture in cases of dengue fever and the need for prompt action to reach a correct diagnosis and initiate suitable treatment.

Conflict of interest none to declare.

REFERENCES