Case Report

Cervical epidural hematoma in a healthy donor presenting stroke mimic symptoms: a rare adverse event following peripheral blood stem cell apheresis

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Abstract
Peripheral blood stem cell apheresis from a healthy donor is indispensable for allogeneic peripheral blood stem cell transplantation. Here, we report a rare adverse event following peripheral blood stem cell apheresis. A female sibling donor, aged 61 years with an unremarkable medical history, complained of pain in the left neck and shoulder and numbness in the left upper limb 1 h after the end of peripheral blood stem cell apheresis. Paralysis of the left upper and lower limbs appeared consecutively. Computed tomography and magnetic resonance imaging of the head showed no abnormalities. Anticoagulant therapy was initiated according to the standard treatment of atherothrombotic brain infarction. Magnetic resonance imaging of the cervical cord on the following day revealed a cervical epidural hematoma. An emergency C4-C5 laminectomy was performed, and the paralysis was improved immediately after surgery. This report is the first case of cervical epidural hematoma in a healthy donor who underwent peripheral blood stem cell apheresis and presented symptoms confusingly similar to those of brain infarction.

Key words: PBSC apheresis, healthy donor, cervical epidural hematoma, adverse event

Introduction
Peripheral blood stem cells (PBSC) are among the most important stem cell sources for allogeneic hematopoietic cell transplantation (1,2). PBSC apheresis from a suitable healthy donor is essential for this treatment (3,4). Because occasional mortalities (5) and severe complications such as splenic rupture (6) have been reported after PBSC apheresis, a standardized reporting database of donor outcomes is of great importance (7). Recent comprehensive reports summarizing the adverse outcomes of PBSC donors have shown that PBSC apheresis from healthy donors is generally safe and that severe adverse events occur at low frequency (~0.6%) (8,9). Here, we report a case of cervical epidural hematoma following PBSC apheresis. Because complications after this procedure represent a fairly rare but serious medical problem, this detail should be considered in the development of donor follow-up programs.

Case report
A female sibling donor, aged 61 years and weighing 48 kg, underwent PBSC apheresis. The donor had an unremarkable medical history,
with no hypertension and no use of anticoagulant medication, and assessed in accordance with the Japan Society of Hematopoietic Cell Transplantation (JSHCT) eligibility criteria (9). The donor’s physical and physiological function tests, including electrocardiography, were normal, and her laboratory tests including complete blood count, electrolytes, biochemical tests and coagulation tests were within normal ranges (Table 1). Lenogastatin was administered for four consecutive days at a daily dose of 10 μg/kg s.c. Apheresis was performed using a COM.TEC blood cell separator (Fresenius HEMO CARE) for 3 h and 30 min, during which 9500 ml was processed. Central venous catheterization was not performed for vascular access. Acid citrate dextrose-A (ACD-A) and heparin sodium (500 units/ACD 500 ml) and 30 min, during which 9500 ml was processed. 

Central venous COM.TEC blood cell separator (Fresenius HEMO CARE) for 3 h during the apheresis.

During apheresis, the donor processing blood volume = 1:18) was used during the apheresis. dextrose-A (ACD-A) and heparin sodium (5000 units/ACD 500 ml) and 30 min, during which 9500 ml was processed. Central venous COM.TEC blood cell separator (Fresenius HEMO CARE) for 3 h during the apheresis.

Transplantation (JSHCT) eligibility criteria (9). The donor assessed in accordance with the Japan Society of Hematopoietic Cell with no hypertension and no use of anticoagulant medication, and as-

Table 1. Time course of laboratory tests

<table>
<thead>
<tr>
<th></th>
<th>Normal range</th>
<th>At medical checkup for PBSCa</th>
<th>At PBSCa (appearance of symptoms)</th>
<th>5 h after PBSCa (appearance of symptoms)</th>
<th>12 h after symptom appearance</th>
<th>24 h after symptom appearance (at operation)</th>
<th>5 days after operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC (×10³/μl)</td>
<td>3.04–8.54</td>
<td>6.25</td>
<td>32.12</td>
<td>33.77</td>
<td>36.59</td>
<td>22.61</td>
<td>7.48</td>
</tr>
<tr>
<td>Hb (g/dl)</td>
<td>10.8–14.9</td>
<td>13.9</td>
<td>13.3</td>
<td>12.4</td>
<td>12.7</td>
<td>11.0</td>
<td>11.9</td>
</tr>
<tr>
<td>Pt (×10³/μl)</td>
<td>150–361</td>
<td>205</td>
<td>196</td>
<td>133</td>
<td>139</td>
<td>120</td>
<td>180</td>
</tr>
<tr>
<td>AST (U/L)</td>
<td>13–33</td>
<td>22</td>
<td>–</td>
<td>–</td>
<td>20</td>
<td>–</td>
<td>17</td>
</tr>
<tr>
<td>ALT (U/L)</td>
<td>6–27</td>
<td>15</td>
<td>–</td>
<td>–</td>
<td>13</td>
<td>–</td>
<td>34</td>
</tr>
<tr>
<td>T-bil (mg/dl)</td>
<td>0.3–1.2</td>
<td>0.7</td>
<td>–</td>
<td>–</td>
<td>0.4</td>
<td>–</td>
<td>0.8</td>
</tr>
<tr>
<td>Na (mEq/l)</td>
<td>87–10.3</td>
<td>9.1</td>
<td>–</td>
<td>9.0</td>
<td>9.7</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>K (mEq/l)</td>
<td>3.6–4.9</td>
<td>3.9</td>
<td>–</td>
<td>3.6</td>
<td>4.0</td>
<td>–</td>
<td>4.0</td>
</tr>
<tr>
<td>Cl (mEq/l)</td>
<td>99–120</td>
<td>105</td>
<td>–</td>
<td>106</td>
<td>110</td>
<td>–</td>
<td>107</td>
</tr>
<tr>
<td>Ca (mg/dl)</td>
<td>8.7–10.3</td>
<td>9.1</td>
<td>–</td>
<td>9.0</td>
<td>9.7</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>PT-INR</td>
<td>0.85–1.15</td>
<td>0.98</td>
<td>–</td>
<td>–</td>
<td>1.19</td>
<td>1.03</td>
<td>–</td>
</tr>
<tr>
<td>APTT (s)</td>
<td>25.1–36.5</td>
<td>33.4</td>
<td>–</td>
<td>–</td>
<td>45.3</td>
<td>35.1</td>
<td>–</td>
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<tr>
<td>Fibrinogen</td>
<td>155–415</td>
<td>316</td>
<td>–</td>
<td>–</td>
<td>285</td>
<td>293</td>
<td>–</td>
</tr>
<tr>
<td>FDP (μg/ml)</td>
<td>0–4.9</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>2.7</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>D-dimer (μg/ml)</td>
<td>0–0.9</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.4</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

PBSCa, peripheral blood stem cell apheresis; WBC, white blood cell; PT-INR, prothrombin time-international normalized ratio; APTT, activated partial thromboplastin time; FDP, fibrin degradation product.

T2-weighted images (Fig. 1). The diagnosis was cervical epidural hematoma (C4–C5). The donor underwent an emergency C4–C5 laminectomy, and a well-circumscribed clot was removed from the corresponding epidural space. The paralysis of both the upper and lower left limbs improved immediately after surgery. The time course of the laboratory tests is summarized in Table 1.

Discussion
To our knowledge, this report is the first case of cervical epidural hematoma in a healthy donor who underwent PBSC apheresis, although several hemorrhagic adverse events have been reported (9,11). Spinal epidural hematoma is a rare disease (12) and has been reported in patients between 1 and 79 years of age, with a peak in the 60s (13). The condition has no significant correlation with gender. Urgent surgical decompression and evacuation of the hematoma are the mainstay of treatment for spinal epidural hematoma. In a previous review article, 474 of 538 spinal epidural hematoma patients (88%) underwent surgery (14). Although the change of circulatory dynamics due to PBSC apheresis may have triggered the onset of this adverse event, its cause is unknown, as the donor was originally considered to be completely healthy in accordance with the JSHCT eligibility criteria.

Because an anticoagulant is necessary for PBSC apheresis, ACD-A + heparin is widely used (15,16). The ACD/weight ratio in the present case was 11.0 ml/kg, well below the average of 14.21 ml/kg reported in a previous case (16). In addition, the total dose of injected heparin was only 5270 units. It is therefore unlikely that the anticoagulants used during the PBSC apheresis procedure induced a tendency to bleed.

This case indicates that the symptoms of cervical epidural hematoma can be confusingly similar to those of brain infarction (17). We first made the diagnosis of brain infarction in this case for the following reasons: (i) the donor presented paralysis on the left side of the body, (ii) thromboembolic adverse events have previously been observed after PBSC apheresis (11) and (iii) the frequency of brain infarction is much higher than that of epidural hematoma. The pain in the left
neck was the most important symptom in the retrospective review of this case, although it was relieved 5 h after the end of apheresis. Because one-sided symptoms were commonly associated with brain lesion, we remained skeptical about no abnormalities of the head MRI. In this case, it was important to extend the examination to neck lesion when MRI of the brain was normal. Epidural hematoma may be a rare differential diagnosis of paralysis after PBSC apheresis.

We experienced a case of cervical epidural hematoma in a healthy donor after PBSC apheresis. It would have been difficult to prevent this rare adverse event even based on a retrospective review of this case, as there was no obvious cause for this reaction before or during PBSC apheresis. Although the rate of serious adverse events among healthy PBSC donors is quite low (8,9), the accumulation of case data can lead to safer PBSC apheresis practices.

Conflict of interest statement
None declared.

References


