Cerebral venous thrombosis in young adults
Experience in a stroke unit, 1988-1994

Partzigian T., Camerlingo M., Casto L., Censori B., Gazzaniga G.C., Belloni G.¹, Mamoli A.
Seconda Divisione di Neurologia,¹ Servizio di Neuroradiologia, Ospedali Riuniti, Bergamo, Italy

We report a series of nine patients younger than 45 years with angiographically-documented cerebral venous thrombosis, consecutively referred to our Stroke Unit from 1988 to 1994. Two of them were men and seven women. Eight patients initially complained of headache, often associated with other symptoms of increased intracranial pressure. Seven patients had focal motor deficits and four suffered from epileptic seizures. None of the patients died. Only one patient remained severely disabled, whereas the others recovered self-sufficiency within two months. The use of oral contraceptives was closely associated with the occurrence of venous thrombosis in the women.

Cerebral venous thrombosis is to be kept in mind in the differential diagnosis of stroke in the young.

Key Words: Cerebral venous thrombosis — Stroke — Oral contraceptives.

Introduction

Stroke is rare in patients aged less than 45 years. It accounts for less than 4% of all cerebrovascular accidents [9] and often has causes that are different from those usually observed in the elderly. Among these causes, cerebral venous thrombosis (CVT) is considered quite rare [11], and may vary widely in terms of its clinical presentation and evolution [2].

The etiologies or predisposing conditions include connective tissue diseases [15], malignant neoplasms [14], severe dehydration [8], and the use of oral contraceptives [4, 12]. The cause of CVT remains undetermined in 20-30% of cases [1], but cerebral angiography, magnetic resonance imaging (MRI) [13, 21] and, more recently, magnetic resonance angiography [20] are the most sensitive diagnostic tools for this entity.

We here report a series of nine CVT patients aged less than 45 years consecutively admitted to our Department during the period 1988-1994.

Patients and methods

Between 1988 and 1994, 2396 patients with symptoms due to acute cerebrovascular disease were admitted to our Stroke Unit, 105 of whom were aged <45 years (4.4%); the patients with life-threatening diseases were not considered for this study. All of the patients under 45 years underwent neurological examination upon admission, one, four, seven and 14 days later, and at the time of discharge. They also underwent routine blood and coagulation abnormality tests (Protein C and S, anti-phospholipid antibodies, antithrombin III); tests for vasculitis; EKG at entry and continuous EKG monitoring for four days; chest X-ray at entry; trans-thoracic echocardiography (transesophageal echocardiography from 1992); brain CT scan at entry and four days later; and cerebral angiography. Magnetic resonance imaging was carried out in some cases in order to monitor the evolution of the thrombotic process.

We here report a series of nine CVT patients aged less than 45 years consecutively admitted to our Department during the period 1988-1994.

Results

Nine patients had a diagnosis of CVT (two men and seven women, with a mean age of 29.2±5.5 years: range 18-35). At the time of diagnosis, five of the women had been taking oral contraceptives for a mean 5.2±4.1 months; another woman was in her first post-partum day when the symptoms started. There was no apparent cause in three patients (the two men and the remaining woman), and so their CVT was considered to be "idiopathic". None of the patients were smokers, or had hypertension, diabetes, dyslipidemia, migraine or any other disease associated with a procoagulant state.

The symptoms of all of the patients had started some days before hospital admission (mean 10.8±9.0 days) (Table I): episodic or increasingly intense headache was present at onset in eight cases, associated with other signs of intracranial hypertension in six, and with mild confusion in three. Two patients reported headache accompanied by focal symptoms: left arm paresthesias in one (No. 2) and left limb clumsiness in the other (No. 8). Later-
Table I. Clinical and angiographic features.

<table>
<thead>
<tr>
<th>Pt.</th>
<th>Age</th>
<th>Sex</th>
<th>Headache</th>
<th>LoC</th>
<th>Focal signs</th>
<th>Seizures</th>
<th>Occlusion site</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>33</td>
<td>F</td>
<td>at onset</td>
<td>normal</td>
<td>R. hemiparesis</td>
<td>absent</td>
<td>S S S</td>
</tr>
<tr>
<td>2</td>
<td>35</td>
<td>M</td>
<td>at onset, with signs of IH</td>
<td>normal</td>
<td>L. hemiparesis</td>
<td>absent</td>
<td>r. L + L LS</td>
</tr>
<tr>
<td>3</td>
<td>26</td>
<td>F</td>
<td>during hospitalization at onset, with signs of IH</td>
<td>clotted</td>
<td>Transient motor aphasia</td>
<td>tonic-clonic</td>
<td>I. LS + SS</td>
</tr>
<tr>
<td>4</td>
<td>33</td>
<td>F</td>
<td>at onset, with signs of IH during hospitalization at onset</td>
<td>clotted</td>
<td>L. hemiparesis</td>
<td>absent</td>
<td>r. SS + SS + I. LS</td>
</tr>
<tr>
<td>5</td>
<td>27</td>
<td>F</td>
<td>at onset, with signs of IH</td>
<td>clotted</td>
<td>R. hemiparesis</td>
<td>tonic-clonic</td>
<td>r. LS + r. JB + BV + r. Labbé’s v.</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>F</td>
<td>at onset, with signs of IH</td>
<td>clotted</td>
<td>Severe l. hemiparesis</td>
<td>partial motor*</td>
<td>r. LS</td>
</tr>
<tr>
<td>7</td>
<td>35</td>
<td>F</td>
<td>at onset, with signs of IH</td>
<td>clotted</td>
<td>R. hemiparesis</td>
<td>tonic-clonic</td>
<td>r. LS + cortical v.</td>
</tr>
<tr>
<td>8</td>
<td>27</td>
<td>F</td>
<td>at onset, with signs of IH</td>
<td>clotted</td>
<td>Severe l. hemiparesis</td>
<td>tonic-clonic status</td>
<td>SSS + r. LS + cortical v.</td>
</tr>
<tr>
<td>9</td>
<td>29</td>
<td>M</td>
<td>at onset, with signs of IH</td>
<td>clotted</td>
<td>R. hemiparesis</td>
<td>absent</td>
<td>S S S</td>
</tr>
</tbody>
</table>


Presented during hospitalization (No. 3). Four patients suffered seizures: tonic-clonic seizures were the presenting sign in one case (No. 3), whereas they appeared within ten days of the onset of other symptoms in three (one of whom was in “grand mal” status).

All of the patients were diagnosed after intra-arterial digital subtraction angiography (Fig. 1): the lateral sinus was involved in eight cases, the superior sagittal sinus in four, the straight sinus in two, the jugular bulb in one, Labbé’s vein in one, the basilar vein in one and a small cortical vein in two cases. The CT scans showed hyperdensity of the involved sinus in four cases, hemorrhagic infarction in five, and diffuse cerebral edema in two. In one case, the results of the CT scan were entirely normal. The “empty delta” sign was not visible in any of the patients.

Blood investigations showed borderline positivity for anti-phospholipid antibodies in one case. No other abnormalities were found. Six of the patients underwent EEG within six days of admission; only a diffuse, non-specific slowing was evident in four of them. The search for vasculitis, infections or neoplasms was negative in all cases.

After excluding intracranial bleeding and contraindications to anticoagulation, four of the patients were treated with intravenous heparin at doses ranging from 1000 to 1200 U/hr for four to ten days, trying to keep APTT at about 2.5. No bleeding complications were observed. After discharge, all of the patients were treated with oral warfarin for periods ranging from six months to one year without the occurrence of any bleeding. No further treatment was given after the interruption of anticoagulants.

Anti-edema agents were used in all cases during the first five days, either 10% intravenous glycerol or intramuscular dexamethasone.

The patients who experienced epileptic seizures during hospitalization were treated with anticonvulsant drugs after discharge for between six months and two years; none had any recurrent fits.

Mean follow-up was 23.2 ± 16.9 months (range 6-48 months). A favourable outcome without any residual deficits was documented in eight patients; the ninth was affected by persisting severe left hemiparesis and bradyphrenia, causing marked dependence. Headache, usually episodic and without any characteristic features, was a sequel in five cases. None of the other patients had any recurring symptoms. Partial epileptic seizures involving the left face and arm appeared in one patient 26 months after diagnosis; she had experienced left hemiparesis during the acute phase of the disease, which had completely resolved.

Magnetic resonance imaging was carried out in five cases between seven months and four years after first hospitalization: complete resolution of the thrombosis was documented in all cases.

Discussion

Patients under 45 years of age represented 4.4% of our total cerebrovascular population, nine of whom (8.6%) had an angiographically detectable cerebral venous thrombosis. This figure confirms the rarity of CVT even as a cause of stroke in young adults [11]. However, our data may have been influenced by two factors: 1) we did not include any patients with CVT associated with neoplasms or severe systemic disease, and 2) CVT may be present without any ictal signs, and may be unrecognized as the cause of symptoms. The latter possibility seems unlikely in this study, because we considered all of the cases with a diagnosis of CVT regardless of the symptom pattern.

The true prevalence of this entity is unknown, but recent clinical series suggest that it may be higher than previously thought on the basis of autopsy studies, for two main reasons: 1) the percentage of fatal cases is relative-