Plasmatic D-dimers –
A test for left auricular thrombosis
in the persistent atrial fibrillation

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ABSTRACT
The study analyzes the relation between the plasmatic concentration of the D-dimers and the thromboembolic accidents in the persistent atrial fibrillation converted electrically to the sinus rhythm. 35 patients with the persistent atrial fibrillation were included in the study. The patients were allotted according to the data of the transesophageal echocardiography in two groups: a witness group consisting of 22 patients without thrombosis in the left atrial appendage and the second group consisting of 13 patients with thrombosis or suspicion of thrombosis in the left atrial appendage.

The plasmatic D-dimers had a concentration of 0.358±0.159 in patients in the witness group and a concentration of 0.921±0.678 in patients with the thrombosis or suspicion of left auricular thrombosis, with a significant statistical p value (p=0.000659; p<0.001). The interval of confidence for the plasmatic D-dimers was between 0.28-0.42 for 95% of patients without the auricular thrombosis and between 0.51-1.38 for 95% of patients with the left auricular thrombosis.

Key words: D-dimers, left auricular thrombosis, atrial fibrillation, transesophageal echography

INTRODUCTION
The plasmatic D-dimers are the indirect markers of the fibrin formation or the activation of the coagulation pathway. The role of the plasmatic D-dimers in the diagnosis of the thromboembolic disease was clarified, but the embolic risk for atrial fibrillation (AF) is not elucidated (1). The conversion of the persistent atrial fibrillation to the sinus rhythm (SR) is accompanied by the embolic risk (2,3). This can be reduced with a 3 weeks’ course of anticoagulant treatment and through locating the thrombi in the left atrial appendage or in other cardiac cavities with the aid of the transesophageal echocardiography (TEE) (4-7).

AIM
The study proposes to analyze the relationship between the plasmatic concentration of the D-dimers and the risk of
thromboembolic events in patients with persistent AF electrically converted to SR.

**MATERIAL AND METHOD**

There were selected for the study 35 patients, presenting the criteria for persistent atrial fibrillation, these patients being hospitalized in the Cardiology Centre of Craiova for the period between 01.09.2007-29.02.2008.

We didn’t include in this study the cases with atrial fibrillation and with increased plasmatic D-dimers due to other diseases (profound venous thrombosis (8), non-massive pulmonary thrombo-embolism, surgical interventions, severe infections, neoplasm).

The plasmatic D-dimers were performed using the micro-chromatography technique with a Cardia Reader apparatus. TEE was performed with the standard technique using a SONOS AGILENT 5500 echocardiograph. The echocardiogram was interpreted by 2 doctors through the real time observation of the image and through the reassessment of recorded images. The patients were assigned to 2 groups, according to modifications detected by TEE: a witness group which is formed by 22 patients without thrombus in the left atrial appendage and a group formed by the patients with thrombus image or with suggestive image of thrombus in the left atrial appendage on TEE. TEE was performed the same day with cardio-conversion.

The determination of the plasmatic D-dimers value preceded the TEE, but became operational after performing the TEE. TEE is considered the “gold” standard in localizing the auricular thromboses (1,9).

The concentration of the plasmatic D-dimers was considered suggestive for the auricular thrombosis if its value was > 0.50 micrograms/ml, consistent with the actual data from the literature (9). All 35 patients received the anticoagulant treatment (acenocumarol 2-4 mg/day) for 7 to 21 days and they had a INR=2-3 before the electrical conversion. The patients without the embolic risk were converted to SR through the application of a synchronic biphasic electrical shock of 100-150 J. The patients were followed-up for at least 3 months after their discharge. The values of the plasmatic D-dimers are presented as an average ± standard deviation of the average and related to TEE. The “t-test” test was used for the comparative analysis.

**RESULTS**

In this study, after the initial evaluation, 35 patients were included, among these 13 being females (37.2%) and 22 males (62.8%), with an average age of 56.2±9.7 (55.4±10.2 for females and 56±9.39 for males) (TABLE 1).

The characteristics of the 2 groups of patients included in this study are showed in TABLE 2. The left auricular thrombosis was detected through the TEE in 3 patients; in 10 patients, this thrombosis was suspected after the first TEE. In 22 patients, TEE excluded the thrombus in the left atrial appendage (FIGURE 1).

The plasmatic concentration of the D-dimers in the witness of patients (22 patients without signs of thrombosis or suspicion of thrombosis in the left atrial appendage), had an average ± standard deviation interval of 0.921±0.678 with statistically significant p value (p<0.001; p=0.000659) (TABLE 3).

In 13 patients with thrombosis or suspicion of thrombosis in left atrial appendage, the plasmatic D-dimers determinations and the TEE were repeated after 3 to 5 days (all the patients were under anticoagulant treatment with an INR of 2 to 3). TEE was analyzed by 2 cardiologists and the left auricular thrombosis was excluded in 8 patients. The plasmatic D-dimers values in these patients had an average 0.361 ± 0.121. The suspicion of left auricular thrombosis using the TEE was caused by the structural anomalies of the left atrial appendage and of the pectinated muscles (FIGURE 2).

<table>
<thead>
<tr>
<th>Sex</th>
<th>Females</th>
<th>Males</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nr. Patients</td>
<td>13</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>Percentage</td>
<td>37.2</td>
<td>62.8</td>
<td>100</td>
</tr>
<tr>
<td>Average age</td>
<td>55.4±10.2</td>
<td>56±9.31</td>
<td>56.2±9.7</td>
</tr>
</tbody>
</table>

**TABLE 1.** Age and sex distribution of patients included in the study

<table>
<thead>
<tr>
<th>Patients characteristics</th>
<th>Nr. patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent atrial fibrillation</td>
<td>35</td>
</tr>
<tr>
<td>Systemic hypertension</td>
<td>18</td>
</tr>
<tr>
<td>Coronary disease</td>
<td>13</td>
</tr>
<tr>
<td>Diabetus mellitus</td>
<td>3</td>
</tr>
<tr>
<td>Mitral valvulopathy</td>
<td>11</td>
</tr>
<tr>
<td>Left ventricle ejection fraction &lt;35%</td>
<td>4</td>
</tr>
<tr>
<td>Left atrium&gt;45mm</td>
<td>4</td>
</tr>
</tbody>
</table>

**TABLE 2.** Morbid characteristics of patients included in the study
The sensitivity and specificity of the diagnosis of left auricular thrombosis through TEE were 86%, respectively 73%. The plasmatic D-dimers test had average values of 1.31±0.51 for the 5 patients. From these, 3 patients have had thrombosis detected at the first TEE and 2 patients have had thrombosis in the left atrial appendage confirmed at the second TEE examination and through the D-dimers test. An 95% confidence interval for the plasmatic D-dimers tests in the 22 patients without auricular thrombosis (the witness group) was 0.28-0.42, and for the group with the auricular thrombosis it was 0.51-1.38.

In patients with the coronary disease and high blood pressure, the level of the D-dimers was between 0.71±0.57, respectively between 0.92±0.60.

**DISCUSSIONS**

The TEE excludes the presence of the thrombus in the left atrial appendage and defines a low risk of thrombo-embolism in patients with persistent FA. The 22 patients without thrombosis and with plasmatic D-dimers values < 0.358±0.59 micrograms/ml were converted electrically to SR without thrombo-embolic events during the hospitalization and for the first 3 months after discharge.

One patient presented a negative test of D-dimers (and the TEE detected a calcified thrombus in the left atrial appendage).

A particular anatomical structure of the left atrial appendage was interpreted at the first TEE exam as thrombosis in 8 patients, but the plasmatic D-dimers values were <0.358±0.159 micrograms/ml. Re-doing a TEE and a plasmatic D-dimers determination excluded the left auricular thrombosis. The cardioversion was achieved also in these patients, without embolic events during hospitalization and for 3 months after discharge.

**Preliminary data**

1. The patients with persistent FA have thromboembolic risk at a confidence interval for the plasmatic D-dimers at...
PLASMATIC D-DIMERS – A TEST FOR LEFT ATRICULAR THROMBOSIS IN THE PERSISTENT ATRIAL FIBRILLATION

0.51-1.32. A confidence interval for the plasmatic D-dimers tests of 0.28-0.48 excludes the thromboembolic risk in patients with persistent FA.

2. The thromboembolic risk in patients with persistent FA increases when there have co-morbidities like high systemic blood pressure, coronary heart disease or mitral valvulopathy.

3. An extended similar study may lead to the introduction of this biochemical marker (plasmatic D-Dimers) in the clinical medical practice along with the transesophageal echocardiography for the assessment of the thromboembolic risk in patients with the atrial fibrillation.

REFERENCES:


