Acute Unilateral Renal Infarction in the Setting of an Inherited Thrombophilia and Atrial Septal Defect

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1. Introduction

Paradoxical embolism is a rare but increasingly recognized cause of embolic events. An atrial septal abnormality such as a patent foramen ovale (PFO) or an atrial septal defect (ASD) serves as a pathway for a thrombus from the peripheral veins, bypassing the lungs, and entering the systemic circulation [1]. Cryptogenic stroke is the most commonly described presentation in patients with paradoxical embolism [2]. Renal infarction secondary to paradoxical embolism has rarely been described. Here, we report a case of a paradoxical embolism caused by ASD involving only one kidney in the setting of an inherited thrombophilia.

2. Case Presentation

A 43-year-old female was seen in consultation at our thrombosis clinic. She had a stroke at age 14 and had presented with collapse and left sided hemiparesis. Her thrombophilia work-up was positive for a prothrombin G20210A gene mutation in heterozygous form. She had been on aspirin 81 mg daily since age 14.

Prior to being diagnosed with a renal infarct at age 42, the patient presented with nausea, vomiting, hematuria, and left flank pain and was initially diagnosed as renal colic. She subsequently had a computerized tomography scan of the abdomen and pelvis, which showed evidence of a wedge-shaped area in the lower pole of the left kidney consistent with a renal infarction. She was not on an oral contraceptive. We started treatment with intravenous heparin and transitioned to warfarin for 15 months without any further thromboembolic events.

Given that cardioembolic sources are well-documented causes of renal infarction [3], the patient had loop monitoring for two weeks and echocardiograms, which did not detect atrial fibrillation. Transthoracic and transesophageal echocardiograms showed no thrombus. However, there was a small shunt due to an atrial septal defect (ASD). She was treated with warfarin and had device closure of her ASD. This was a suspected case of paradoxical embolism through an ASD leading to renal infarction.
Table 1: Case reports of renal infarction associated with paradoxical embolism in the setting of a patent foramen ovale.

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal (unilateral versus bilateral, side)</td>
<td>Unilateral, left side</td>
<td>Unilateral, right side</td>
<td>Unilateral, right side</td>
<td>Unilateral, left side</td>
<td>Unilateral, left side</td>
<td>Unilateral, left side</td>
</tr>
<tr>
<td>Venous thromboembolism detected</td>
<td>No investigations performed</td>
<td>No DVTs detected</td>
<td>No DVTs or PE detected</td>
<td>No investigations performed</td>
<td>No DVTs detected</td>
<td>No DVTs detected</td>
</tr>
<tr>
<td>Thrombophilia</td>
<td>No investigations performed</td>
<td>Negative screen</td>
<td>Negative screen</td>
<td>Negative screen</td>
<td>Prothrombin G20210A mutation</td>
<td>Negative screen</td>
</tr>
<tr>
<td>Other VTE risk factors</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>OCP</td>
<td>After bariatric surgery</td>
</tr>
<tr>
<td>Other organ involvement</td>
<td>Myocardial infarction</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Anticoagulation</td>
<td>Oral anticoagulation type and duration unspecified</td>
<td>Secondary prevention with aspirin 100 mg daily</td>
<td>IV heparin</td>
<td>Enoxaparin 60 mg twice daily</td>
<td>IV heparin transitioned to warfarin, 6-month duration</td>
<td>Warfarin, 6-month duration</td>
</tr>
<tr>
<td>Device closure</td>
<td>Yes</td>
<td>Not specified</td>
<td>Planned</td>
<td>Not specified</td>
<td>Not planned</td>
<td>Planned</td>
</tr>
</tbody>
</table>

DVT: deep vein thrombosis; IV: intravenous; OCP: oral contraceptive pill; PE: pulmonary embolism.

3. Discussion

Prothrombin gene mutation is the second most common inherited thrombophilia with a prevalence of approximately 2% [5]. The risk of VTE in individuals who are heterozygous for the prothrombin G20210A mutation is approximately 3-4 fold compared with a control group [6, 7]. It is unclear if the prothrombin gene mutation increases the risk of VTE recurrence, with some studies suggesting an increased risk [8] while others not [9, 10]. It is generally known that the prothrombin gene mutation is not associated with an increased risk of arterial thrombosis. However, a 2017 meta-analysis reported a slightly increased risk of stroke in children and young adults with the prothrombin gene mutation [11].

There are several case reports of paradoxical embolism causing renal infarction through a PFO in presence or absence of a thrombophilia (Table 1) [12–17]. However, to our knowledge, this is the first report of a renal infarction due to paradoxical embolism in the setting of an ASD and thrombophilia. Paradoxical embolism is a rare cause of renal infarction; however the role of an atrial septal abnormality as a source of embolic events in various organs is increasingly recognized.

4. Conclusions

Our case report identifies paradoxical embolism causing renal infarction through an ASD and highlights the need for immediate identification of a paradoxical embolism so that anticoagulation can be started and device closure can be considered to prevent further embolic events in other organs.

Consent

Informed consent was obtained from the patient to publish the case report.

Conflicts of Interest

Siavash Piran has nothing to disclose; Sam Schulman reports receiving consulting fees from Boehringer Ingelheim, Bristol-Myer-Squibb, Bayer, and Daichii and grant support from Boehringer Ingelheim, Baxter, and Octapharma.

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