A 50-year-old man suffering from generalized convulsions and right quadrantic hemianopia was admitted to the hospital. Contrast-enhanced magnetic resonance imaging showed an enhanced ring in the left parieto-occipital lobe, suggesting a brain abscess (Figure 1). The patient underwent an immediate craniotomy and drainage. Culture of pus yielded \( \alpha \)-hemolytic streptococci. Brain abscesses are often caused by hematogenous spread of bacteria from a primary source. Although much effort was expended seeking the primary infection, the origin of the brain abscess in this patient remained unclear. After almost complete relief of his neurological symptoms, the patient was referred for further diagnostic workup in our hospital. Chest contrast-enhanced computed tomography in the arterial phase revealed an anomalous vessel bridging from the left superior pulmonary vein to the innominate vein (Figure 2). Transesophageal echocardiography in the supine position and the semi-Fowler position showed increased reverse flow of the left superior pulmonary vein in the supine position (Figure 3A and Movie I in the online-only Data Supplement). The reverse flow was decreased by a postural change from the supine to the semi-Fowler position (Figure 3B). On the left subclavian venography, the anomalous vessel could not be found in the supine position (Figure 4A [triangle] and Movie II in the online-only Data Supplement), whereas in the Fowler position, the anomalous vein was seen (Figure 4B [arrow] and 4C and Movie II). This indicated that the paradoxical blood flow was governed by the pressure balance between the pulmonary and innominate veins, which was affected by postural changes. We diagnosed a persistent left superior vena cava (PLSVC) draining into the left atrium through the left superior pulmonary vein. The sitting or upright position increases innominate venous pressure, leading to right-to-left shunt flow. This PLSVC was likely the pathway of the brain abscess. The patient had a skin infection involving the left thumb before the brain abscess developed. Subsequently, the PLSVC was ligated to prevent a recurrent brain abscess or paradoxical embolism (Figure 5). PLSVC is commonly asymptomatic because in 80% to 90% of cases the PLSVC drains into the right atrium through the coronary sinus.\(^1,2\) Although PLSVC draining into the left atrium is very rare, a simple postural change can alter the shunt flow direction and can elicit a paradoxical embolism.

Disclosures

None.

References

Figure 2. Axial image from multislice computed tomography of the chest. Postcontrast images (B–F) in the arterial phase show an anomalous vessel (arrow) bridging the left superior pulmonary vein and innominate vein. The innominate vein was enhanced in the proximal (B) but not distal (A, triangle) side.

Figure 3. Pulsed-wave Doppler signals demonstrating reverse flow (white arrow) in the left superior pulmonary vein. The reverse flow was increased in the supine position (A) but decreased in the semi-Fowler position (B).
Figure 4. Left subclavian venography in the supine (A) and Fowler (B) positions. The persistent left superior vena cava (PLSVC) could not be found in the supine position (A) but appeared in Fowler’s position (B, arrow). Note the filling defect (A, triangle) in the innominate vein in the supine position, indicating left-to-right shunt flow. The PLSVC is connected to the left superior pulmonary vein on the opposite side (C).

Figure 5. Surgical procedure image of the persistent left superior vena cava (PLSVC) before ligation. The solid arrow points to the connection with the left superior pulmonary vein (LSPV).
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