

Accessory Embryonic Residual Vein Circulation in Adult Detected during Patent Foramen Ovale Percutaneous Closure

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Rec date: Jul 21, 2014; Acc date: Aug 23, 2014; Pub date: Aug 25, 2014

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Abstract

Inferior vena cava (IVC) anomalies may display with different anatomical features due to the complexity of the embryogenetic process. These vascular anatomical variants occur in 0.4-3.5% of patients. We present the case of a 41 year old woman with a previous transient ischemic attack, positive brain Computed Tomography (CT) scan and Magnetic Resonance (MRI) showing an ischemic frontal area and Patent Foramen Ovale (PFO) with right to left shunt. During the advancement of a .035" J-tipped guide wire via the right femoral vein for PFO closure, a paravertebral supplementary venous circulation was detected and confirmed by CT scan. The incidental diagnosis of venous accessory circulation associated with PFO raised the awareness to the existence of these rare anatomical variations for both the clinician and the interventionalist.

Keywords: Patent foramen ovale; Percutaneous closure; Supplementary paravertebral circulation

Introduction

Abnormalities of IVC are relatively common and usually asymptomatic. The complexity of the ontogenesis of the IVC, with numerous anastomoses formed between the primitive paired veins, can lead to a wide array of anomalies in the basic plan of venous return from the lower extremities and abdomen sometimes associated with other cardiac congenital defects [1,2].

Here we present an incidental angiographic detection of a residual embryonic complete venous circulation additional to a fully developed IVC in a patient with a patent foramen ovale.

Case report

A 41 year old woman with a previous transient ischemic attack occurred with aphasia and paresthesias underwent neurological evaluation with brain CT scan and MRI positive for an ischemic frontal area. Transthoracic echocardiogram showed Patent Foramen Ovale (PFO) with a right to left shunt at baseline and paradoxical shunting during Valsalva maneuver. Contrast transcranial Doppler assessed >50 microembolic signals during Valsalva. According to these results, percutaneous closure of PFO was planned. PFO closure was performed by standard technique by right and left femoral vein approach with 8F sheath introducers using intraprocedural Intracardiac Echo (ICE) guidance, (9F, 9 MHz Ultra ICE; EP Technologies, Boston Scientific Corporation, San Jose, CA, USA). The 8F left femoral vein sheath was exchanged with a 8.5F, 63 cm long, Slow-Curve introducer (St. Jude Medical, Inc, St. Paul, MN, USA). The Ultra ICE catheter was then advanced into the right atrium allowing for a clear evidence of a bulging septum primum with PFO. No difficulties were observed in catheter advancing along the inferior vena cava while a .035" J-tipped guide wire inserted via the right femoral

and iliac vein stopped at the renal level and contrast injection documented a paravertebral supplementary venous circulation with normal right femoral and iliac veins. Angiography showed an alternative venous pathway originating from distal right iliac vein (Figure 1).



Figure 1: Angiographic findings. Selective venous angiogram performed during PFO closure showing a paravertebral supplementary venous circulation with normal right femoral and iliac veins.

Therefore, a .035" J-tipped guide wire was retracted from the anomalous vein and advanced via the right femoral vein through the PFO into the upper pulmonary vein. An Amplatzer PFO occluder (AGA Medical Corporation, Golden Valley, MN) 25 mm in size was selected according to the atrial septum and fossa ovalis characteristics and deployed under fluoroscopy and ICE guidance. ICE was performed after device deployment to check for adequate positioning of the device, possible obstruction to systemic or pulmonary venous return and impairment of the atrioventricular valves. The device was

then released by counterclockwise rotation of the delivery cable. A control transthoracic echo was performed 24 hours later assessing the correct device position and no residual shunt. A total body CT scan showed a paravertebral venous circulation with two vessels sizing 7 mm and draining into the azygos vein (Figure 2). These accessory vessels seem to derive from persistence of paired embryonic posterior cardinal and subcardinal veins.



Figure 2: CT Findings. a. CT Volume rendering image of the persistent posterior cardinal and subcardinal veins with paravertebral circulation, b. CT curved multi planar reconstruction image showing accessory venous vessel course from the iliac vein to the azygos vein

Discussion and Conclusion

Azygos vein as continuation of the IVC results from a failure to form the right subcardinal hepatic anastomosis with atrophy at the

right subcardinal vein. Blood is shunted from the suprasubcardinal anastomosis through the retrocrural azygos vein [1,2]. IVC anomalies have a propensity to cause lower limb deep vein thrombosis (DVT) [3]. Although rarely suspected, recent studies have revealed that IVC anomalies are not so rare and display with different anatomical features due to the complexity of the embryogenesis of IVC. Moreover, a contrast-enhanced CT scan or an MRI is the only specific method to identify vascular anomalies, which are present in 0.4–3.5% of patients, given that nearly all of these patients are clinically asymptomatic. Unknowing these vascular abnormalities could lead to high risk of recurrent pulmonary embolism despite IVC filter positioning, to severe haemorrhages during surgical interventions on the retroperitoneal, cardiac and aoesophageal regions [4]. In our case, incidental detection of venous accessory circulation associated with patent foramen ovale raised the awareness to the existence of these rare anatomical variations for both the clinician and the interventionalist.

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