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VALVULAR AND STRUCTURAL HEART DISEASES

Case Report

Patent Foramen Ovale With Right Atrial Septal Pouch

Yasufumi Kijima, MD, Pooya Bokhoor, MD, and Jonathan M. Tobis,^{*} MD, FSCAI

A patent foramen ovale (PFO) is a communication across the inter-atrial septum and a right atrial septal pouch (RASP) is an indentation of the atrial septum caused by an incomplete fusion of the septum primum and septum secundum with its base opening into the right atrium. A 63-year-old male who had a history of two strokes and episodes of transient neurological deficit was diagnosed to have a small right-to-left shunt. At the time of PFO closure, an angiogram of the atrial septum revealed a small PFO associated with a RASP. The small PFO was crossed with a straight-tipped guide wire and was closed using a 25-mm GORE CARDIOFORM Septal Occluder (W.L. Gore and Associates, AZ). It is hypothesized that stagnant blood in the RASP may generate a clot that can cross the PFO and cause an infarct. © 2015 Wiley Periodicals, Inc.

Key words: CLAS—closure; ASD/PDA/PFO; CONA—congenital heart disease; adults; EMBP—embolic protection devices; IAF—imaging; angiographic/fluoroscopic

INTRODUCTION

A patent foramen ovale (PFO) is an inter-atrial communication present in about 20% of the general population [1], and is associated with cryptogenic stroke [2]. An atrial septal pouch is an indentation of the atrial septum caused by an incomplete fusion of the septum primum and septum secundum, and could be present in either the left or right side of the atrial septum [3]. A right atrial septal pouch (RASP) creates stagnant blood pooling, and has the potential to trap or generate thrombus [4].

We describe a patient with a history of several cerebrovascular events who presented with a small PFO associated with a RASP and underwent percutaneous PFO closure. We hypothesize that the RASP, when accompanied by a residual right-to-left atrial shunt, could be the source of thrombi that produced the recurrent episodes of cryptogenic embolism.

CASE REPORT

A 63-year-old male with history of dyslipidemia, obstructive sleep apnea, two strokes, and episodes of transient neurological deficit, was referred to our institution for consideration of percutaneous PFO closure. After his initial cerebrovascular accident, he was started on therapy with aspirin and clopidogrel, and

ultimately had a recurrent stroke. Further workup with an event monitor did not demonstrate any significant arrhythmias and magnetic resonance angiography was unrevealing for significant carotid or intracranial atherosclerosis. Transesophageal echocardiography using agitated saline contrast revealed a small right-to-left shunt (RLS) and a pouch-like structure near the foramen ovale consistent with a RASP (Fig. 1, Supporting Information Movie 1). A right-heart catheterization was performed under fluoroscopy and intracardiac

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Additional Supporting Information may be found in the online version of this article.

Conflict of interest: Jonathan Tobis serves as a consultant for W.L. Gore and Associates, Inc. and St. Jude Medical, Inc. All other authors have no financial conflicts of interest to disclose.

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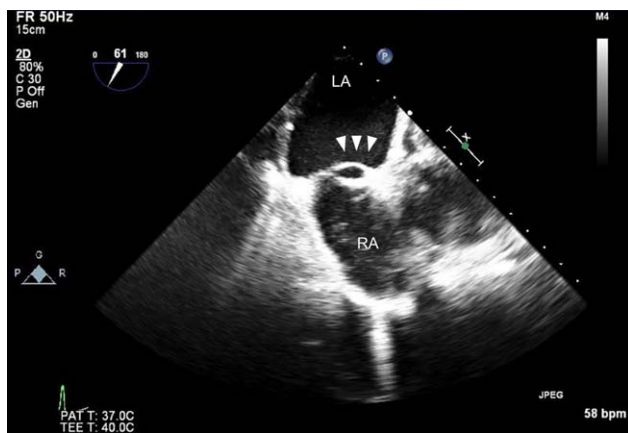


Fig. 1. Echocardiography of a RASP. Transesophageal echocardiography shows a RASP (arrowheads). Abbreviation: LA, left atrium; RA, right atrium; RASP, right atrial septal pouch

echocardiography (ICE) guidance. ICE imaging with agitated saline bubble contrast demonstrated a small RLS, but did not show the morphology or position of a PFO. A J-tipped guide wire was unable to cross the inter-atrial septum. Angiography of the atrial septum was performed using a 6 Fr MP catheter to clarify the anatomy. This confirmed a small PFO with a RASP (Fig. 2, Supporting Information Movie 2A). Because of the small size, the PFO was crossed with a straight-tipped guide wire instead of a J-tipped wire. The narrow PFO allowed very little clearance for the 6 Fr MP catheter, but the catheter was eventually advanced across the PFO into the left atrium. Using a sizing balloon, the PFO diameter was measured at 2–3 mm. A 25-mm GORE CARDIOFORM Septal Occluder (GSO) (W.L. Gore and Associates, AZ) was successfully deployed in the atrial septum. After device deployment, angiography did not reveal a residual RLS or RASP (Movie 2B).

DISCUSSION

This case of a small PFO associated with a RASP is unusual because the atrial septal pouch was suspected as the source for embolic cerebrovascular events. A thorough workup of other common etiologies for his recurrent strokes had been unrevealing. If the pouch existed without a concomitant atrial communication, any emboli would have gone to the lungs. However, since a residual small right-to-left tunnel was present, there was a persistent pathway for emboli from the pouch to enter the left atrium and the systemic circulation. Recurrent stroke on medical therapy justified percutaneous closure even though the absolute size of the PFO was small. To the best of our knowledge, the present report shows the first angiographic image of a RASP and its relationship with a remnant PFO.

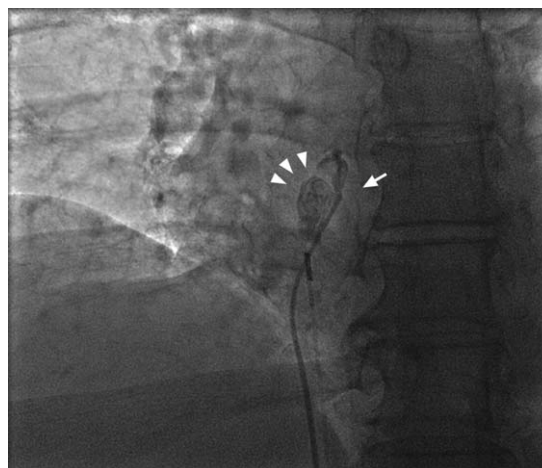


Fig. 2. Right atrial angiography of a RASP and a PFO. Angiography of the atrial septum demonstrates a RASP (arrowheads) and a narrow PFO (arrow). Abbreviation: PFO, patent foramen ovale; RASP, right atrial septal pouch.

A RASP is a pouch-like structure caused by an incomplete fusion of the septum primum and septum secundum with its base opening into the right atrium. A left atrial septal pouch (LASP), which has its base opening into the left atrium, was described to have a potential to form thrombi and cause embolic events [5,6]. However, Tugcu et al. reported a lack of association between the presence of a LASP and ischemic or cryptogenic stroke [7]. In their study, a LASP was distinguished from a RASP and a PFO, and the potential risk for cryptogenic stroke with a RASP in the presence of a PFO was not mentioned. A case of a thrombus in a RASP which was believed to have embolized from the lower extremity or may have formed de novo in the milieu of localized stasis was reported by Wayangankar et al. [4]. The size of a PFO is weakly associated with the incidence of cryptogenic stroke [8,9], thus there may be additional morphological characteristics which increase the potential risk of a PFO to permit passage of thromboembolism. The PFO in the present case was small and did not allow a J-tipped guide wire to cross.

The present case demonstrates the importance of performing right atrial angiography when the diagnosis of a PFO is not certain. Current percutaneous PFO closure is performed without routine right heart angiography. Although the sensitivity of noninvasive screening examinations for the detection of a PFO is frequently discussed, the ultimate method to diagnose or exclude the presence of a PFO is with right heart catheterization and probing the right side of the atrial septum. Right atrial angiography can help identify a PFO, especially in a situation where a guide wire will not cross the atrial septum in a straightforward manner.

CONCLUSION

Right atrial angiography revealed a RASP and a PFO in a patient who suffered from several cerebrovascular events. This case brings up the potential risk of a RASP as a source for cryptogenic embolism, when associated with an escape route such as a PFO.

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