Large atrial septal aneurysm in patient with atrial fibrillation: Just a structural deformation or a clinical problem?

Katarzyna Kurnicka[1], Tomasz Cader[2], Michał Machowski[1], Łukasz Kochanowski[1], Michał Ciurzyński[1], Piotr Pruszczyk[1]

[1]Department of Internal Medicine and Cardiology, Medical University of Warsaw, Warszawa, Poland
[2]Students` Scientific Association by Department of Internal Medicine and Cardiology, Medical University of Warsaw, Warszawa, Poland

Correspondence to:
Katarzyna Kurnicka, MD, PhD, Department of Internal Medicine and Cardiology, Medical University of Warsaw, Lindleya 4, 02–005 Warszawa, Poland,
phone: +48 22 502 11 44,
e-mail: kkurnicka@yahoo.pl

DOI: 10.33963/v.phj.101576

Received:
June 17, 2024

Accepted:
July 8, 2024

Early publication date:
July 9, 2024

We present the case of a 68-year-old man who was admitted with signs of exacerbation of heart failure in the course of atrial fibrillation (AF) with an unknown onset, with heart rate up to 170 bpm. Metoprolol and digoxin were ineffective in slowing heart rate, so landiolol was used and the patient was prepared for electrical cardioversion (ECV). Enoxaparin was started at daily dose of 2 × 100 mg.

Bedside transthoracic echocardiography did not show any significant valvular disease; however, reduced ejection fraction to 35%, atrial enlargement, and bulging of the interatrial septum (IAS) towards the right atrium were found (Figure 1A). N-terminal pro-B-type natriuretic peptide level was 10 963 pg/ml and the glomerular filtration rate was 40–60 ml/kg/min/1.73 m^2.

Routine transesophageal echocardiography (TEE) before ECV showed a spontaneous echo contrast in the left atrium, but no thrombus in the left atrial appendage (Supplementary material, *Figure S1*). Then we found a large atrial septal aneurysm (ASA) with dense blood in its cavity, an unexpected soft structure in the patent foramen ovale (PFO) channel on the border of the aneurysm (Figure 1B), and a small point shunt through the PFO (Figure 1C).

Due to the most probable *in situ* thrombus in the PFO channel and the potential risk of stroke, ECV was not performed.

TEE was repeated after 7 days of optimal treatment, at a slower heart rate. The PFO thrombus was much smaller, so the shunt through the PFO became more pronounced (Supplementary material, *Figure S2*); however, blood in the aneurysm cavity was more dense (Figure 1D). The 3D TEE showed an unusual morphology of the aneurysm. Two recesses, approximately 20–22 mm deep, separated by a septum and facilitating blood retention, were found (Figure 1E–F).

Given this situation, another ECV was not considered and long-term therapy with rivaroxaban was initiated. The patient was discharged in a stable clinical condition.

ASA is defined as an excursion of IAS above 10 mm beyond the septal plane into the right or left atrium [1]. It may be associated with an increased risk of stroke through paradoxical embolism, formation of thrombi in its cavity, or coexisting AF [1]. Interestingly, Węglarz et al. [2] did not confirm that ASA with PFO heightens the risk of ischemic stroke, although it is important to establish what type of ASA the studied patients had.

A large ASA may pose a significant challenge because it modifies the shape of the IAS, leads to local blood stasis at its bottom, and may promote the formation of a thrombus in the PFO [3]. Reduced LA function during AF and low LVEF are also undeniable prothrombotic factors.

Yan et al. [4] reported the association of an *in situ* PFO thrombus with episodes of stroke and migraine. PFO thrombus is a rare phenomenon in patients with AF, but it can influence therapeutic decisions, including ECV.

Tzimas et al. [5] described a fatal outcome in a patient with a huge ASA not recognized on preoperative transthoracic echocardiography who experienced a thromboembolic

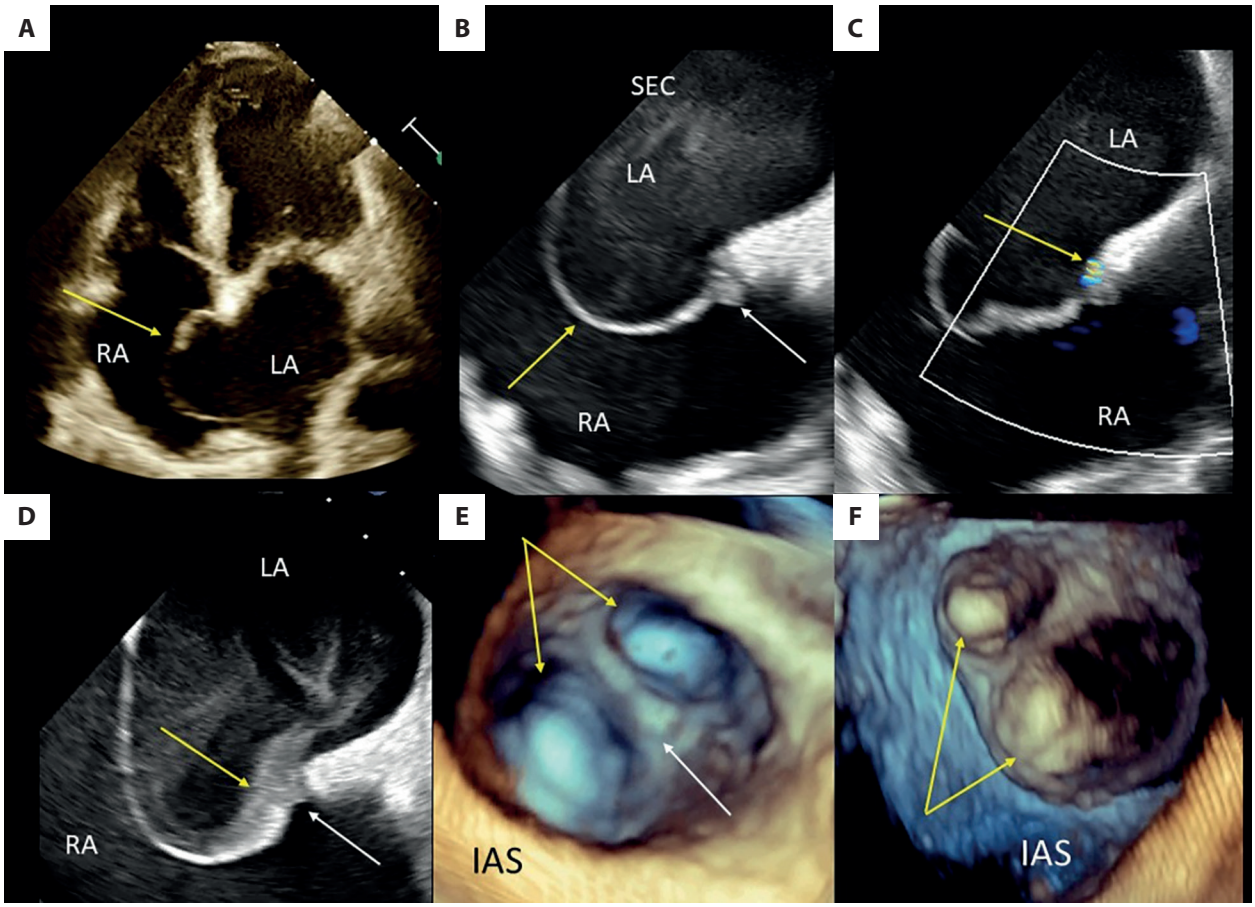

Figure 1. A. Atrial enlargement and bulging of the interatrial septum toward the right atrium (arrow); transthoracic echocardiography; a 4-chamber view. **B.** Large atrial septal aneurysm (yellow arrow) and small thrombus in the PFO channel on border of aneurysm (white arrow). **C.** Small point left-to-right shunt through PFO (arrow); 2-dimensional transesophageal echocardiography, color Doppler. **D.** Follow-up: more dense blood in aneurysm cavity (yellow arrow) and smaller PFO thrombus (white arrow); 2-dimensional transesophageal echocardiography. **E.** Unusual morphology of atrial septal aneurysm: two recesses separated by a septum (arrows), view from the left atrium. **F.** Atrial septal aneurysm — view from right atrium; 3-dimensional transesophageal echocardiography

Abbreviations: IAS, interatrial septum; LAA, left atrial appendage; LA, left atrium; PFO, patent foramen ovale; RA, right atrium

event during cardiac surgery, caused by thrombi from the ASA detached during cannulation.

In patients with AF, we usually look for a thrombus in the left atrial appendage. However, precise assessment of IAS morphology on TEE is mandatory for the detection of other potentially threatening abnormalities.

SUPPLEMENTARY MATERIAL

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

Article information

Conflict of interest: None declared.

Funding: None.

REFERENCES

1. Cohen A, Donal E, Delgado V, et al. EACVI recommendations on cardiovascular imaging for the detection of embolic sources: endorsed by the Canadian Society of Echocardiography. Eur Heart J Cardiovasc Imaging. 2021; 22(6): e24–e57, doi: 10.1093/ehjci/jeab008, indexed in Pubmed: 33709114.
2. Węglarz P, Węgiel M, Kuszewski P, et al. Atrial septum anatomy as a predictor of ischemic neurological episodes in patients with a patent foramen ovale. Pol Heart J. 2024; 82(3): 303–307, doi: 10.33963/v.phj.99619, indexed in Pubmed: 38493455.
3. Dudkiewicz D, Hołda M. Interatrial septum as a possible source of thromboembolic events. Translational Research in Anatomy. 2022; 27: 100190, doi: 10.1016/j.tria.2022.100190.
4. Yan C, Li H, Wang C, et al. Frequency and size of in situ thrombus within patent foramen ovale. Stroke. 2023; 54(5): 1205–1213, doi: 10.1161/STROKEAHA.122.041524, indexed in Pubmed: 36891906.
5. Tzimas P, Papadopoulos G. Huge interatrial septal aneurysm: a coincidental but rather fatal finding. Case Rep Med. 2011; 2011: 705260, doi: 10.1155/2011/705260, indexed in Pubmed: 21317987.