

CASE REPORT

Open Access



Atrial septal defect closure in a young patient presenting with recurrent cryptogenic stroke: a case report

Rakan I. Nazer

Abstract

Background: Having an inter-atrial shunt in the form of a patent foramen ovale or atrial septal defect increases the risk of developing cryptogenic stroke. Prompt action is required in order to prevent stroke recurrence. The source of embolization may not be clear on stroke workup.

Case presentation: A young female acutely presented with recurrent embolizations to the eye and brain. She was found to have an atrial septal defect. No clear intra-cardiac source of embolization was detected on workup including trans-esophageal echocardiography. Given the options between surgical versus device closure, the attending team opted for the surgical closure which yielded on direct left heart inspection small organized clots adherent to the tips of the mitral valve leaflets.

Conclusions: The case report illustrates the potential advantages of the direct surgical closure in detecting and extracting the embolization source in patients who present with recurrent cryptogenic stroke.

Keywords: Stroke, ASD

Background

Cryptogenic stroke is defined as cerebral or retinal infarct without a clear source of embolization or thrombosis. This type of stroke accounts for 30 to 40% of all ischemic strokes [1]. Having a persistent shunt between the left and right atrium in the form of a patent foramen ovale (PFO) or atrial septal defects (ASD) is associated with an increased risk for cryptogenic strokes in patients younger than 55 years of age [2]. In the absence of any other cardiac source of embolization in patients with interatrial shunts, cardioembolic strokes can happen by either “paradoxical” embolization of a venous-based clot travelling through the shunt, or by developing atrial fibrillation as a consequence of left atrial remodeling and blood stasis in the left atrial appendage [3].

In the following report, we summarize a case of a young female who first presented recurrent embolization in the eye and brain and was found to have a small fenestrated ASD. A closer direct intra-cardiac examination of the left heart during the surgical closure revealed the source which was not detected on cardiac imaging prior to surgery.

Case presentation

A 22-year-old female is on chronic remission treatment for ulcerative colitis, initially presented acutely after experiencing a sudden loss of vision in the right eye. This was found to be secondary to an acute occlusion of the retinal artery. During her hospitalization, she experienced a sudden weakness in the left side of her body. The weakness gradually resolved over 72 h of onset. The patient was evaluated by the attending medical services and was diagnosed to have a cryptogenic stroke with

Correspondence: raknazer@ksu.edu.sa

Department of Cardiac Science, King Fahad Cardiac Center, College of Medicine, King Saud University, Riyadh 12372-7143, Kingdom of Saudi Arabia



© The Author(s). 2020 **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

recurrent embolization. She was initiated on low dose aspirin and the novel oral anticoagulant rivaroxaban.

As part of the screening of the embolization source, the patient had a magnetic resonance angiography of the brain which revealed nonspecific bilateral periventricular and subcortical white matter hyperintense foci. Ultrasound Doppler of both carotid arteries was negative. The screening for hematologic hypercoagulable conditions, autoimmune disease, and heparin induced thrombocytopenia was also negative. The holter ECG surveillance showed no evidence of arrhythmia. The tras-thoracic echocardiography revealed a small PFO with a restricted shunt from the left to the right side. Further cardiac evaluation by trans-esophageal echocardiography yielded a small fenestrated secundum ASD (0.8 cm × 1.2 cm) associated with mild right ventricular volume overload. The rest of the cardiac imaging was non-significant. Both the mitral and aortic valves were normal in structure and function with no evident clots in the left atrial appendage.

After addressing the patient's condition in the combined interventional cardiology and cardiac surgery meeting, it was decided that the patient would be better served by a surgical closure of the ASD as opposed to a device closure. The fenestrated ASD and the inability to conclusively exclude a possible embolization source within the heart by imaging were strong points for the surgical closure. The heart was approached via a median sternotomy. Cardio-pulmonary bypass was initiated through direct aortic and bi-caval cannulation. The heart was arrested with blood cardioplegia and the right atrium was opened. The fenestrated ASD and the floppy rims were conglomerated in one clean defect. Further inspection of the left heart through the defect was seemingly insignificant except when the cooptation margins of the P2/A2 scallops of the mitral valve leaflets were pulled in view from the left ventricular cavity. This unexpectedly revealed two discrete masses (0.3 cm × 0.2 cm × 0.2 cm) which were adherent to the margins of the P2/A2 scallops. They were easily picked-out using a tissue forceps (see [supplementary video](#)). The site of the extracted mass from the margins of the mitral leaflets left a central mitral regurgitation jet which was negated by placing an annuoplasty band.

Post-operatively, the patient made a quick recovery. Her post-operative echocardiographic study showed no residual shunting and a normally functioning mitral valve. She was discharged home on aspirin and rivaroxaban for 3 months, then to continue treatment with low dose aspirin indefinitely. Both the histopathology and culture of the specimens were negative for any organisms or growth. The findings were consistent with a mature clot formation. The patient continues to do well on all subsequent clinic visits.

Discussion and conclusions

Cryptogenic stroke is a devastating condition which usually affects younger groups without obvious atherogenic risk factors. It is estimated that 40% of patients with cryptogenic stroke will have some form of inter-atrial shunting and the risk of stroke seems independent of the shunt size [4]. Secondary stroke prevention is the cornerstone of management. Current evidence favor prompt intervention with percutaneous or surgical closure of the shunt to reduce the risk of recurrent strokes, yet it does not eliminate stroke risks [3]. This is due to the difficulty in estimating how much of the stroke burden is attributed solely to the shunt. The described case, stresses the need for an individualized assessment of each patient and potentially favors the direct surgical closure in those who present with recurrent embolization and ASDs. This entails the identification of shunts with high-risk morphological features and the utilization of the RoPE score to determine the probability of the shunt being responsible for causing the stroke [5]. Surgical closure may offer an extra advantage over device closure by allowing the direct inspection and extraction of a possible embolization source within the left heart not picked-up on preoperative imaging. This should be followed by vigilant rhythm monitoring and the consideration for anticoagulation.

Supplementary information

Supplementary information accompanies this paper at <https://doi.org/10.1186/s13019-020-01220-0>.

Additional file 1.

Abbreviations

ASD: Atrial septal defect; PFO: Patent foramen ovale

Acknowledgements

None.

Author's contributions

Rakan I. Nazer managed the case and wrote the manuscript. The author read and approved the final manuscript.

Funding

None.

Availability of data and materials

Available.

Ethics approval and consent to participate

The case report was reviewed and approved by the King Khalid University Hospital Ethics Board (E-19-3846).

Consent for publication

Informed consent for publication obtained.

Competing interests

None.

Received: 3 March 2020 Accepted: 8 July 2020

Published online: 25 July 2020

References

1. Yaghi S, Bernstein RA, Passman R, Okin PM, Furie KL. Cryptogenic stroke: research and practice. *Circ Res.* 2017;120(3):527–40.
2. Overell JR, Bone I, Lees KR. Interatrial septal abnormalities and stroke: a meta-analysis of case-control studies. *Neurology.* 2000;55(8):1172–9.
3. Leppert M, Poisson SN, Carroll JD. Atrial Septal defects and Cardioembolic strokes. *Cardiol Clin.* 2016;34(2):225–30.
4. Yuan K, Kasner SE. Patent foramen ovale and cryptogenic stroke: diagnosis and updates in secondary stroke prevention. *Stroke Vasc Neurol.* 2018;3(2):84–91.
5. Collado FMS, Poulin MF, Murphy JJ, Jneid H, Kavinsky CJ. Patent foramen ovale closure for stroke prevention and other disorders. *J Am Heart Assoc.* 2018;7(12):e007146.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

