DOI:
10.1016/j.hjc.2018.11.004

Document Version
Publisher's PDF, also known as Version of record

Hellenic Journal of Cardiology 60 (2019) 264–265

Contents lists available at ScienceDirect

Hellenic Journal of Cardiology

journal homepage: http://www.journals.elsevier.com/hellenic-journal-of-cardiology/

Letter to the Editor

Understanding the anatomy of a perforated mitral valve: From 2D echocardiography to 3D printing

Keywords:
valve perforation
transoesophageal echocardiography
3D printing

We present a case of a 37-year-old man with a history of infective endocarditis, complicated with cerebral septic emboli, requiring an emergency aortic valve replacement (AVR) with a mechanical bileaflet prosthesis. He had a prolonged postoperative stay in intensive care unit for neurosurgical management of a cerebral abscess. A transthoracic echocardiogram (TTE) 10 days postoperatively, showed normal left ventricular (LV) systolic function, well-seated and well-functioning mechanical aortic valve prosthesis and a new jet of mild to moderate mitral regurgitation (MR) of unclear aetiology. An iatrogenic anterior mitral leaflet perforation during surgery was presumed. The patient was discharged, and the following two years had serial follow up TTEs, which showed gradual worsening of the MR to the level of severe with concomitant LV dilatation. The patient reported no cardiac symptoms, however his mobility was impaired due to right-sided hemiparesis. There were no clinical or laboratory findings suggestive of infective endocarditis and a transesophageal echocardiogram (TEE) was performed in view of imminent surgical treatment. The TEE showed perforation of the anterior mitral leaflet (Fig. 1A - arrow; Video S1) resulting in severe MR (Fig. 1B; Video S2). The exact anatomy of the lesion was demonstrated with 3D modality, and the perforation was well identified at the base of the A3 scallop (Fig. 2A - diastole, Fig. 2B – systole; Video S3). A 3D model of the mitral valve was created with 3D printing, providing anatomical details of the lesion. Based on that, the consensus was that the perforation would not be amenable to percutaneous intervention and the surgical team used the 3D model, to better understand the anatomy and plan the surgical strategy pre-operatively, reducing the operation and cardiopulmonary bypass times (Fig. 2C). In addition to the value of 3D echocardiography[1,2], it is believed that the modelling of cardiac structures with 3D printing, enhances the perception of complex anatomy and allows detailed preprocedural planning of percutaneous interventions or cardiac surgery.[3] The patient underwent endoscopic mitral valve repair with a pericardial patch and one year later there was no residual mitral regurgitation.

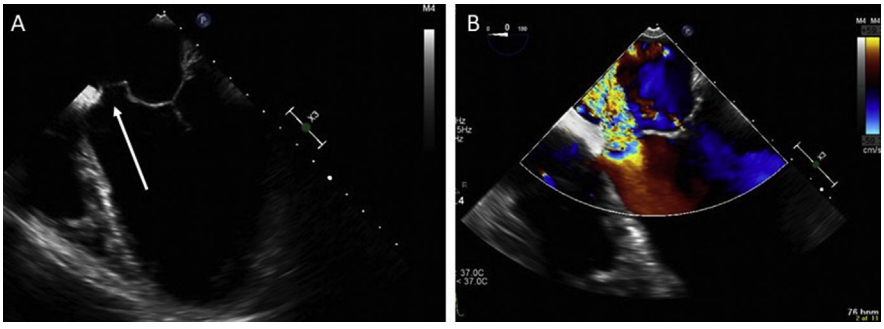

Fig. 1. Transesophageal echocardiogram (TEE). **A:** Mid-esophageal four chambers view, showing perforation of the anterior mitral leaflet (white arrow). **B:** Mid-esophageal four chambers view with colour flow Doppler, showing severe mitral regurgitation due to the perforation.

Peer review under responsibility of Hellenic Society of Cardiology.

https://doi.org/10.1016/j.hjc.2018.11.004

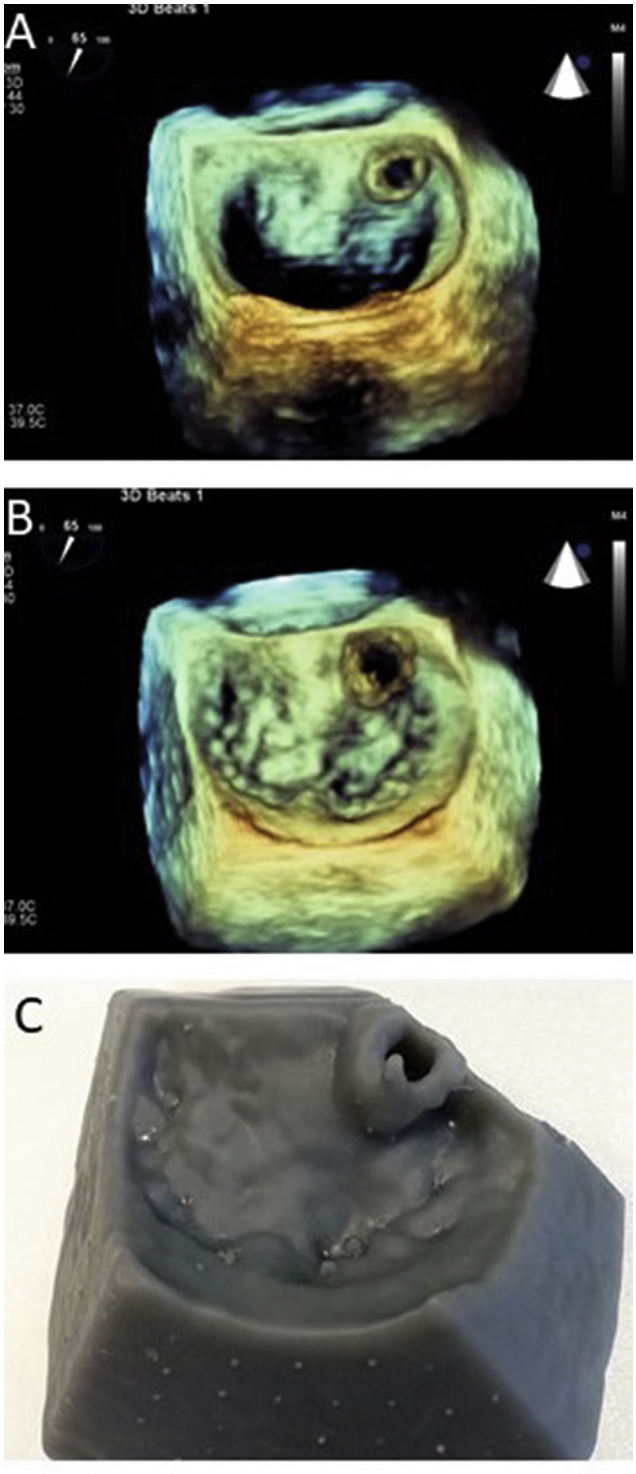

Fig. 2. A: TEE, 3D Zoom of the mitral valve in diastole, showing perforation of the anterior mitral leaflet (A3 scallop). **B:** TEE, 3D Zoom of the mitral valve in systole, showing the perforation. **C:** 3D model of the mitral valve created with a 3D printer. Printed models of cardiac structures can help either to explore percutaneous options of treatment with devices or to plan pre-operatively the surgical procedure.

Supplementary data related to this article can be found online at https://doi.org/10.1016/j.hjc.2018.11.004.

Disclosure

There are no conflicts of interest related to this case report for any of the authors.

Acknowledgements

None.

References

1. Patrianakos AP, Zacharaki AA, Skalidis EI, Hamilos MI, Parthenakis FI, Vardas PE. The growing role of echocardiography in interventional cardiology: The present and the future. *Hellenic J Cardiol.* 2017 Jan - Feb;58(1):17–31.
2. Rallidis LS, Makavos G, Lozos V, Antoniadis A, Paraskevaidis I, Lekakis J. Real-Time 3-Dimensional Transesophageal Echocardiography: Its Incremental Value over 2-Dimensional Echocardiography in Assessing Acute Mitral Regurgitation. *Hellenic J Cardiol.* 2015 May-Jun;56(3):260–261.
3. Bartel T, Rivard A, Jimenez A, Mestres CA, Müller S. Medical three-dimensional printing opens up new opportunities in cardiology and cardiac surgery. *Eur Heart J.* 2018 Apr 14;39(15):1246–1254.

Konstantinos C. Theodoropoulos*, Alexandros Papachristidis, Tiago Fonseca, Joseph Reiken, Mark J. Monaghan
Department of Cardiology, King's College, Hospital NHS Foundation Trust, London, UK

* Corresponding author. Department of Cardiology, King's College Hospital NHS Foundation Trust, Denmark Hill, SE5 9RS, London, United Kingdom., Fax: +442032991745, Tel: +44 7453880850.
E-mail addresses: konstantinos.theodoropoulos@nhs.net, ktheod2005@hotmail.com (K.C. Theodoropoulos), alexandros.papachristidis@nhs.net (A. Papachristidis), tfonseca@nhs.net (T. Fonseca), velocity1966@hotmail.com (J. Reiken), mark.monaghan@nhs.net (M.J. Monaghan).

19 September 2018
Available online 15 November 2018