

Aortic dissection during transoesophageal echocardiography: a case report

Rin Hoshina, Hideyuki Kishima *, Takanao Mine , and Masaharu Ishihara

Department of Cardiovascular and Renal Medicine, Hyogo College of Medicine, 1-1 Mukogawa-cho, Nishinomiya 663-8501, Japan

Received 29 January 2020; first decision 15 April 2020; accepted 2 September 2020; online publish-ahead-of-print 12 November 2020

Background

Transoesophageal echocardiography (TOE) is a safe and useful tool. In our case, we are presenting a rare case of a patient with aortic dissection during TOE procedure.

Case summary

A 79-year-old woman was referred to our hospital for recurrent paroxysmal atrial fibrillation (AF) with palpitation. Pre-procedural cardiac computed tomography (CT) showed slight dilated ascending aorta (maximum diameter: 40 mm). We decided to perform catheter ablation (CA) for AF, and recommended TOE before the CA because she had a CHADS₂ score of 4. On the day before the CA, TOE was performed. Her physical examinations at the time of TOE procedure were unremarkable. At 3 min after probe insertion, there was no abnormal finding of the ascending aorta. At 5 min after the insertion, TOE showed ascending aortic dissection without pericardial effusion. After waking, she had severe back pain and underwent a contrast-enhanced CT. Computed tomography demonstrated Stanford type A aortic dissection extending from the aortic root to the bifurcation of common iliac arteries, and tight stenosis in the right coronary artery (maximum diameter; 49 mm). The patient underwent a replacement of the ascending aorta, and a coronary artery bypass graft surgery for the right coronary artery.

Discussion

Transoesophageal echocardiography would have to be performed under sufficient sedation with continuous blood pressure monitoring in patients who have risk factors of aortic dissection. The risk–benefit of TOE must be considered before a decision is made. Depending on the situation, another modality instead of TOE might be required.

Keywords

Aortic dissection • Transoesophageal echocardiography • Atrial fibrillation • Case report

Learning points

- Before catheter ablation, all patients should be evaluated for risk of aortic dissection.
- The most probable cause of the aortic dissection in our case report might have been a hypertensive surge. Therefore, transoesophageal echocardiography (TOE) would have to be performed under sufficient sedation with continuous blood pressure monitoring in patients who have risk factors of aortic dissection.
- The risk–benefit of TOE must be considered before a decision is made. Depending on the situation, another modality instead of TOE might be required.

* Corresponding author. Tel: +81 798 45 6553, Fax: +81 798 45 6551, Email: kishima@hyo-med.ac.jp

Handling Editor: Habib Khan

Peer-reviewers: Zaid Iskandar and Laszlo Gobolos

Compliance Editor: Stefan Simovic

Supplementary Material Editor: Deepti Ranganathan

© The Author(s) 2020. Published by Oxford University Press on behalf of the European Society of Cardiology.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com

Introduction

Transoesophageal echocardiography (TOE) is a useful tool that can examine parts of the heart that are difficult to evaluate with transthoracic echocardiography. Transoesophageal echocardiography is performed for detection of thrombi in patients with atrial fibrillation (AF) before the catheter ablation (CA) or cardioversion. However, TOE is an invasive and costly procedure, which provides high-quality images of cardiac structure. Incidence of complications has been reported to be <1% and are very seldom life-threatening. We present a case of a patient with aortic dissection during TOE procedure.

Timeline

The physical examination showed a regular pulse rate of 62 b.p.m. and a blood pressure of 117/84 mmHg before probe insertion
 At 3 min after probe insertion transoesophageal echocardiography (TOE) showed no abnormal finding of ascending aorta
 At 5 min after probe insertion TOE showed ascending aortic dissection without pericardial effusion
 Immediate computed tomography chest: Stanford type A aortic dissection extending from the aortic root to the bifurcation of common iliac arteries and tight stenosis in the right coronary artery
 Emergent replacement of the ascending aorta and a coronary artery bypass graft surgery for right coronary artery
 On the 60th postoperative day she was transferred to the rehabilitation hospital

Case presentation

A 79-year-old woman was referred to our hospital for recurrent paroxysmal AF with palpitation. She had a history of transient ischaemic attack and hypertension. She was on candesartan (8 mg once daily), amlodipine (2.5 mg once daily), and apixaban (2.5 mg twice daily). Her body weight was 39 kg, and height was 159 cm. All laboratory findings were within normal range. Electrocardiogram showed normal sinus rhythm and no evidence of ischaemic changes or ST elevation. Chest X-ray was unremarkable. She showed a dilated left atrium (LA diameter: 31 mm, LA volume index: 35 mL/m²) and normal left ventricular systolic function (left ventricular ejection fraction: 76%). Pre-procedural cardiac computed tomography (CT) showed four pulmonary veins, and slight dilated ascending aorta (maximum diameter: 40 mm, [Figure 1A](#)) with mild calcific plaques. We decided to perform CA for AF, and recommended TOE before the CA to assess the presence or absence of left atrial appendage thrombus (LAAT) because she had a CHADS₂ score of 4.

On the day before the CA, TOE was performed with an iE33 (Philips Medical System, Andover, MA, USA) with a 4-MHz OmniPlane probe. After local pharyngeal anaesthesia with lidocaine

spray, the patient was placed in the left lateral position and midazolam (3 mg) was administered for mild sedation. Her physical examination showed a regular pulse rate (PR) of 62 b.p.m., a blood pressure (BP) of 117/84 mmHg, and a normal temperature. Her physical examinations at the time of TOE procedure were unremarkable. At 3 min after probe insertion, she had a BP of 117/84 mmHg, PR of 62 b.p.m., and there was no abnormal finding of the ascending aorta at that time ([Figure 2A](#), [Video 1](#)). We then administered additional midazolam (2 mg) due to body movement. At 5 min after the insertion, we confirmed that the absence of LAAT (BP: 95/40 mmHg, PR: 76 b.p.m.). However, TOE showed ascending aortic dissection without pericardial effusion ([Figure 2B](#), [Videos 2-3](#)). The probe was removed at the end of anaesthesia after flumazenil (0.2 mg) infusion. After waking, she had severe back pain, and underwent a contrast-enhanced cardiac CT. Cardiac CT demonstrated Stanford type A aortic dissection extending from the aortic root to the bifurcation of common iliac arteries, and tight stenosis in the right coronary artery (maximum diameter; 49 mm, [Figure 1B](#)). An electrocardiogram showed a normal sinus rhythm and no ST-segment abnormalities. The patient underwent a replacement of the ascending aorta, and a coronary artery bypass graft surgery for the right coronary artery. After surgery, the patient gradually stabilized, and she was transferred to a rehabilitation hospital on the 60th postoperative day. After 9 months of follow-up, the patient is doing well.

Discussion

Transoesophageal echocardiography before the CA for AF has become a routine clinical practice to exclude LAAT.

Transoesophageal echocardiography provides high-quality images of cardiac structure and function. However, it is an invasive and costly procedure with the risk of complications such as trauma, vagal reactions or aspiration due to probe insertion, allergic reactions to topical anaesthesia, and hypotension or hypoxia due to conscious sedation.¹ Recently, Ramalingam *et al.*² investigated the complications in patients who underwent peri-operative TOE. Of 22 314 examinations, there were 17 patients (0.08%) with a major complication (palatal injury or gastro-oesophageal disruption), and there were seven deaths (0.03%).

Various predictive factors of aortic dissection have been reported. A recent study reported factors including advanced age, male gender, long-term history of hypertension, the presence of aortic aneurysm, and genetic connective tissue disorder such as Marfan, Loeys–Dietz, or Ehlers–Danlos syndrome.³ Of these factors, our patient was of advanced age and had a history of hypertension. Moreover, CT before the TOE showed a dilated ascending aorta (40 mm). Furthermore, aortic dissection has been reported in several iatrogenic conditions such as intubation or bronchoscopy.⁴ Kim *et al.*⁵ reported a case of a 43-year-old woman with aortic dissection who died during TOE. She had Marfan syndrome, and presented with acute chest pain before the TOE. During the intubation, the patient developed acute pericardial tamponade which resulted in death in spite of cardiopulmonary resuscitation.

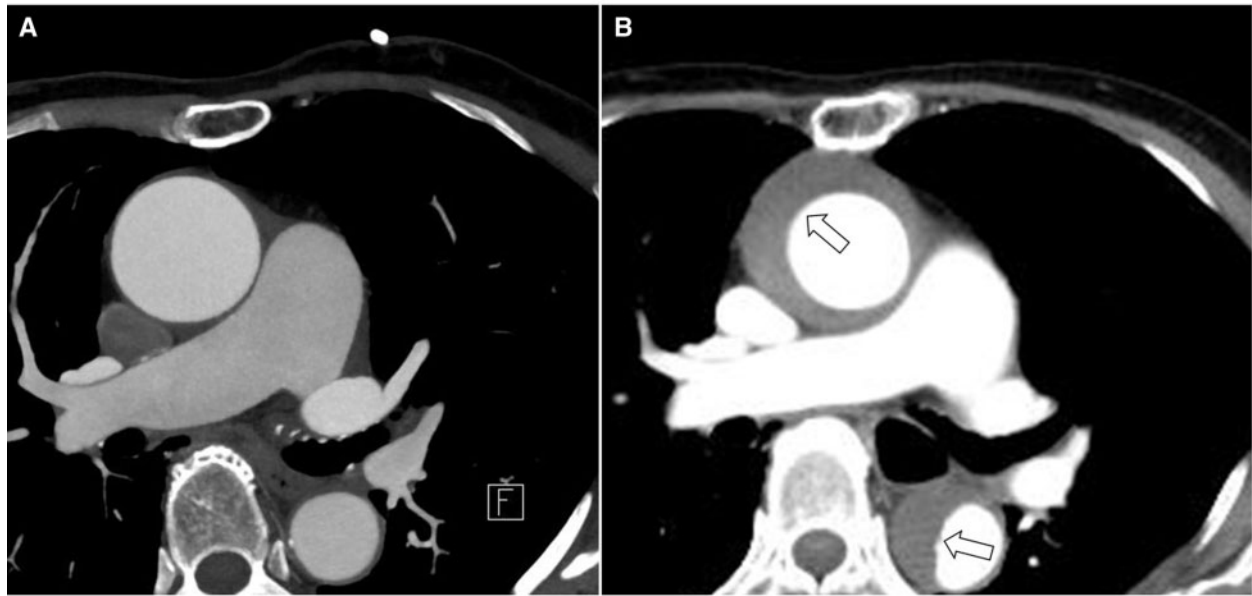


Figure 1 (A) Pre-procedural cardiac computed tomography showed no abnormal finding of the aorta (maximum diameter: 40 mm). (B) Cardiac computed tomography showed Stanford type A aortic dissection (white arrows, maximum diameter: 49 mm) after transoesophageal echocardiography.

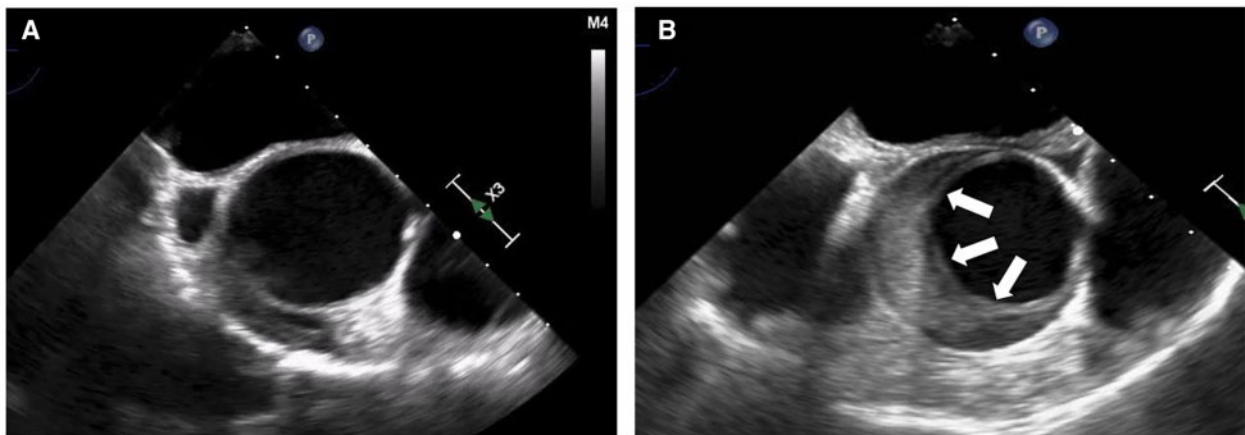
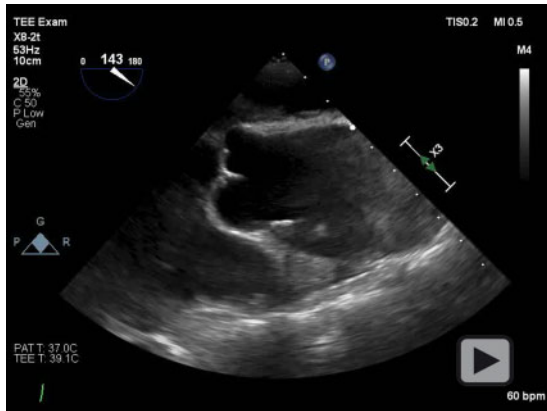


Figure 2 (A) Transoesophageal echocardiography showed no abnormal finding of the ascending aorta at 3 min after probe insertion. (B) Transoesophageal echocardiography demonstrated ascending aortic dissection (white arrows) at 5 min after probe insertion.

Very few reports have focused on aortic dissection during TOE. The most probable cause of the aortic dissection in our case report might have been a hypertensive surge. However, this cannot be verified as we did not use continuous BP measurement during the TOE procedure. Therefore, the mechanism linking TOE and aortic dissection remains unclear.

Aortic dissection is a very rare but life-threatening complication of TOE with a lethality rate of 1–2% per hour after symptom onset in

untreated patients. Therefore, indication of TOE has to be carefully decided. Yamashita *et al.*⁶ evaluated clinical predictors of LAAT in patients with AF. In their study, none of the 136 patients with paroxysmal lone AF who were below 60 years had LAAT thrombus prior to CA. Scherr *et al.*⁷ also investigated the incidence and predictors of LAAT in 585 patients with AF. Left atrial appendage thrombus was present in 0.3% of patients with CHADS₂ scores of 0. According to their findings, it might be reasonable to omit TOE in younger



Video 1 At five minutes after probe insertion.



Video 2 At five minutes after probe insertion.



Video 3 At three minutes after probe insertion.

paroxysmal lone AF patients with low CHADS₂ score. However, our case required TOE before the CA because she had a CHADS₂ score of 4 (history of transient ischaemic attack, hypertension, and older age). In our case, the patient was a 79-year-old chronic hypertension that was not very well controlled (suggested by elevated left ventricular ejection fraction: 76%), and having calcific plaques in an aorta. Moreover, the size of ascending aorta (aortic height index: 4.0 cm/1.59 m = 2.52 cm/m) indicates moderate risk of aortic dissection according to previous report.⁸ Therefore, TOE would have to be performed under sufficient sedation with continuous BP monitoring in patients who have risk factors of aortic dissection. Furthermore, depending on the situation, another modality instead of TOE might be required.

Conclusions

The risk–benefit of TOE must be considered before a decision is made. Particular attention is required for patients with risk of aortic dissection during TOE.

Lead author biography



Rin Hoshina, MD, graduated from Hyogo College of Medicine, Japan. She has been a doctor for 3 years in Department of Cardiovascular and Renal Medicine at Hyogo College of Medicine. She is interested in pursuing catheter ablation and further career in cardiology.

Supplementary material

[Supplementary material](#) is available at *European Heart Journal - Case Reports* online.

Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as [Supplementary data](#).

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.

References

1. Fatkin D, Scalia G, Jacobs N, Burstow D, Leung D, Walsh W et al. Accuracy of bi-plane transesophageal echocardiography in detecting left atrial thrombus. *Am J Cardiol* 1996;**77**:321–323.
2. Ramalingam G, Choi SW, Agarwal S, Kunst G, Gill R, Fletcher SN et al; on behalf of the Association of Cardiothoracic Anaesthesia and Critical Care. Complications related to peri-operative transoesophageal echocardiography—a one-year prospective national audit by the Association of Cardiothoracic Anaesthesia and Critical Care. *Anaesthesia* 2020;**75**:21–26.
3. Gawinecka J, Schönrrath F, von Eckardstein A. Acute aortic dissection: pathogenesis, risk factors and diagnosis. *Swiss Med Wkly* 2017;**147**:w14489.

4. Yamada Y, Inomata S, Tanaka M. A patient with difficult airway who died from acute aortic dissection after intubation. *Masui* 2017;**66**:393–395.
5. Kim CM, Yu SC, Hong SJ. Cardiac tamponade during transesophageal echocardiography in the patient of circumferential aortic dissection. *J Korean Med Sci* 1997;**12**:266–268.
6. Yamashita E, Takamatsu H, Tada H, Toide H, Okaniwa H, Takemura N et al. Transesophageal echocardiography for thrombus screening prior to left atrial catheter ablation. *Circ J* 2010;**74**:1081–1086.
7. Scherr D, Dalal D, Chilukuri K, Dong J, Spragg D, Henrikson CA et al. Incidence and predictors of left atrial thrombus prior to catheter ablation of atrial fibrillation. *J Cardiovasc Electrophysiol* 2009;**20**:379–384.
8. Zafar MA, Li Y, Rizzo JA, Charilaou P, Saeyeldin A, Velasquez CA et al. Height alone, rather than body surface area, suffices for risk estimation in ascending aortic aneurysm. *J Thorac Cardiovasc Surg* 2018;**155**:1938–1950.