

Acute Bilateral Internal Carotid Occlusion from Embolization of Left Atrial Thrombus During Transesophageal Echocardiography: Case Report

Syed Saad Mahmood, MDMPH¹, Sunil Manjila, MD³, Gagandeep Singh, MD², and Andrew R Xavier, MD⁴

¹Department of Medicine, Massachusetts General Hospital, Boston, MA, USA

²Department of Neurology, University Hospitals Case Medical Center, Cleveland, OH, USA

³Department of Neurological Surgery, University Hospitals Case Medical Center, Cleveland, OH, USA

⁴Department of Neurosurgery, Wayne State University, Detroit, MI, USA

Abstract

Background and purpose: Transesophageal echocardiography (TEE) is a relatively safe imaging modality used to visualize intracardiac thrombus.

Summary of case: We report on a unique, fatal complication during TEE of embolization of a pre-existing “smoking” left atrial thrombus causing acute bilateral internal carotid occlusion, confirmed on angiogram.

Conclusions: Patients with history of lung pathology, such as COPD, who experience retching and cough during transesophageal echocardiography may be more susceptible to embolization of pre-existing thrombi. A need exists to risk stratify such patients.

Keywords

Cardioembolic; echocardiography; stroke; transesophageal

INTRODUCTION

Management of patients with atrial fibrillation has substantially improved due to the use of echocardiography [1,2]. This imaging modality allows visualization of intracardiac thrombus providing clinicians insight into the optimal time for therapeutic interventions, such as ablation or cardioversion, while minimizing the likelihood of post-treatment embolism. Although transthoracic echocardiography can be used for identifying atrial thrombus, during the 1990s, the comparative superiority of transesophageal echocardiography for evaluating the presence of atrial masses was demonstrated [3–5]. TEE is a semi-invasive procedure with infrequently reported complications, such as hypoxia, hypotonia, laryngospasm, and esophageal tears [1]. We describe a unique case in which embolization of a pre-existing left atrial thrombi occurred in the setting of transesophageal echocardiography, causing catastrophic acute bilateral internal carotid occlusion.

CASE PRESENTATION

A 91-year-old female presented to the Wayne State University emergency department with one-day history of dyspnea and chest pain in the setting of rapid ventricular rate atrial fibrillation. She had a history of paroxysmal atrial fibrillation, chronic obstructive pulmonary disease (COPD) related to smoking, congestive heart disease (CHD) with mitral valve replacement three years prior, coronary artery disease with left anterior descending artery stent placement four years prior, primary pulmonary hypertension, gastroesophageal reflux disease. The patient had been nonadherent to warfarin.

On hospital Day 6, a transesophageal echocardiography (TEE) was performed, in preparation for pulmonary vein ablation. The patient's COPD was noted and she underwent conscious sedation with midazolam, morphine, lidocaine, and benzocaine. TEE showed spontaneous

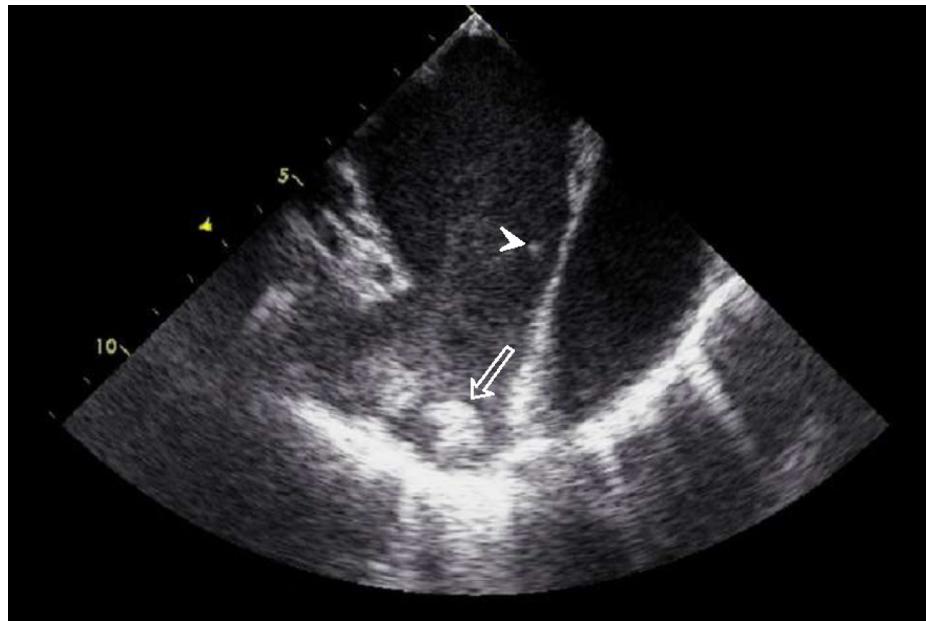


Figure 1: Transesophageal echocardiography demonstrating two left atrial thrombi (arrows) with ‘smoke.’

echocardiographic contrast in left atrium indicative of blood stasis and hypercoagulable environment. Two large thrombi in the left atrium were noted of size 2 cm \times 1.7 cm, and 2 cm \times 1.1 cm along with the presence of swirling spontaneous echo contrast or “smoke” (Fig. 1).

Approximately half-hour after TEE completion, the patient became unresponsive to verbal or painful stimulus, and had sluggish pupils. Flumazenil and naloxone did not improve responsiveness. Patient was emergently intubated for low Glasgow Coma Scale. Computerized tomography (CT) scan with contrast revealed reduced contrast of bilateral basal ganglia white matter differentiation and right middle cerebral artery infarct. Emergent catheter angiography revealed bilateral intracranial internal carotid occlusions that were resistant to revascularization (Fig. 2). By this time, patient was out of the tPA administration window. The patient’s neurological status did not improve. On Day 8, she was placed on terminal wean off ventilator, passing away shortly thereafter.

DISCUSSION

The American society of echocardiography lists a limited number of indications of first line use for TEE, including evaluation of left atrial thrombus prior to cardioversion or radiofrequency ablation [1]. Our case report identifies an unusual embolization of left atrial thrombi during transesophageal echocardiography, resulting in acute bilateral carotid occlusion causing

fatal neurological sequelae in the form of bihemispheric stroke.

TEE has been preferentially used for posterior cardiac imaging owing to the proximity of the esophagus with the posteromedial heart. A study of over 10,000 TEEs in 15 selected European centers concluded that the procedure was associated with an acceptable low risk when used by experienced operators under proper safety conditions [6]. Probe insertion and manipulation may cause nonfatal esophageal perforation, sustained tachycardia, severe angina, and trauma in the hypopharyngeal, esophageal, or gastric regions [6,7].

Some have hypothesized a link between retching or coughing and atrial thrombus embolization though there is a paucity of data to help stratify patients as to their risk of embolization [8,9]. Our patient with COPD and smoking history also underwent some retching and coughing. It has been speculated that a temporary superior laryngeal nerve block, or neuromuscular nerve block or even general anesthesia could be used to minimize the incidence of retching or coughing during the transesophageal echocardiography [8,9].

CONCLUSION

Inadvertent embolization of a left atrial thrombus during transesophageal echocardiography is a rare, but potentially fatal complication. Although retching or coughing

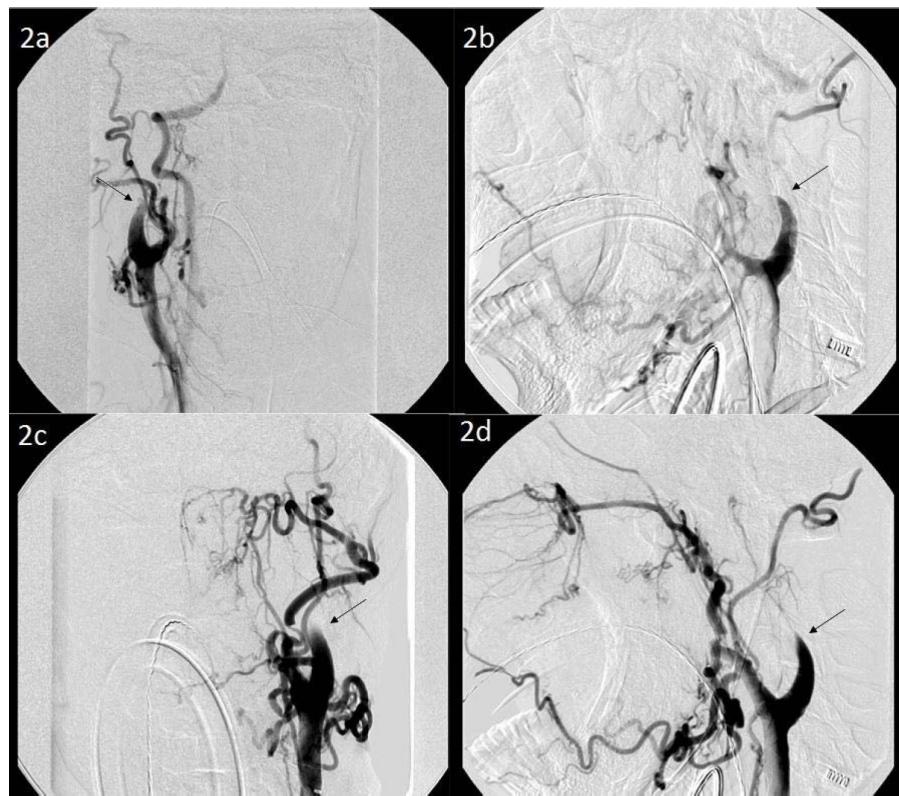


Figure 2: Right (a and b) and left (c and d) common carotid artery injection showing occlusion (arrows) of both internal carotid arteries resulting in absent intracranial filling.

was observed to be associated with such embolization, there is a paucity of data to help stratify patients for the risk of embolization. Overall, TEE continues to be a safe procedure, effective in empowering clinicians to evaluate atrial pathology and prepare for cardioversion.

REFERENCES

1. Wann LS, Curtis AB, January CT, Ellenbogen KA, Lowe JE, Estes NA 3rd, Page RL, Ezekowitz MD, Slotwiner DJ, Jackman WM, Stevenson WG, Tracy CM, Fuster V, Rydén LE, Cannon DS, Le Heuzey JY, Crijns HJ, Lowe JE, Curtis AB, Olsson SB, Ellenbogen KA, Prystowsky EN, Halperin JL, Tamargo JL, Kay GN, Wann LS, Jacobs AK, Anderson JL, Albert N, Hochman JS, Buller CE, Kushner FG, Creager MA, Ohman EM, Ettinger SM, Stevenson WG, Guyton RA, Tarkington LG, Halperin JL, Yancy CW. ACCF/AHA/HRS. 2011 ACCF/AHA/HRS focused update on the management of patients with atrial fibrillation (updating the 2006 guideline) a report of the American college of cardiology foundation/American heart association task force on practice guidelines. *J Am Coll Cardiol* 2011;57(2):223–42.
2. Mahmood SS, Levy D, Vasan RS, Wang TJ. The Framingham heart study and the epidemiology of cardiovascular disease: a historical perspective. *The Lancet* 2013;383(9921):999–1008.
3. ECHOCARDIOGRAPHY AUO. ACCF/ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR 2011 Appropriate use criteria for echocardiography. *J Am Soc Echocardiogr* 2011;24:229–67.
4. Pearson AC, Labovitz AJ, Tatineni S, Gomez CR. Superiority of transesophageal echocardiography in detecting cardiac source of embolism in patients with cerebral ischemia of uncertain etiology. *J Am Coll Cardiol* 1991;17(1):66–72.
5. Manning WJ, Silverman DI, Gordon S, Krumholz HM, Douglas PS. Cardioversion from atrial fibrillation without prolonged anticoagulation with use of transesophageal echocardiography to exclude the presence of atrial thrombi. *N Engl J Med* 1993;328(11):750–5.
6. Daniel WG, Erbel R, Kasper W, Visser CA, Engberding R, Sutherland GR, Grube E, Hanrath P, Maisch B, Dennig K, Schartl M, Kremer P, Angermann C, Iliceto S, Curtius JM, MPgge A, et al. Safety of transesophageal echocardiography. A multicenter survey of 10,419 examinations. *Circulation* 1991;83(3):817–21.
7. Min JK, Spencer KT, Furlong KT, DeCaro JM, Sugeng L, Ward RP, Lang RM. Clinical features of complications from transesophageal echocardiography: a single-center case series of 10,000 consecutive examinations. *J Am Soc Echocardiogr* 2005;18(9):925–9.
8. Shah CP, Thakur RK, Ip JH, Xie B, Guiraudon GM. Management of mobile right atrial thrombi: a therapeutic dilemma. *J Card Surg* 1996;11(6):428–31.
9. Cavero MA, Cristóbal C, González M, Gallego JC, Oteo JF, Artaza M. Fatal pulmonary embolization of a right atrial mass during transesophageal echocardiography. *J Am Soc Echocardiogr* 1998;11(4):397–8.