TRANSCATHETER PATENT FORAMEN OVALE CLOSURE AND RADIOFREQUENCY ABLATION OF RIGHT ATRIAL TACHYCARDIA

Šime Manola[1], Robert Bernat[2], Nikola Pavlović[1], Vjekoslav Radeljić[1], Nikola Bulj[1] and Matias Trbušić[1]

[1]Clinical Department of Cardiology, Sestre milosrdnice University Hospital Center, Zagreb; [2]Clinical Department of Cardiology, Magdalena Clinical Hospital for Cardiovascular Medicine, Krapinske Toplice, Croatia

SUMMARY – Patent foramen ovale (PFO) can be found in approximately 25% of adult population. Transcatheter closure of PFO is a potential option in selected patients with PFO. We report a case of a female patient that underwent mapping and catheter ablation of atrial tachycardia and PFO closure in the same procedure.

Key words: *Foramen ovale, patent; Catheter ablation; Tachycardia, supraventricular, atrial; Case reports*

Introduction

The prevalence of patent foramen ovale (PFO) is estimated at 15%-25% in adult population according to previous studies[1,2], and the prevalence of atrial septal aneurysm at 2%-3%[1]. In patients with cryptogenic stroke, PFO was found in 43% of younger patients and 28% in older patients in the study by Handke *et al*.[3].

Although catheter closure of PFO is a matter of debate and current American Heart Association/ American Stroke Association guidelines for stroke prevention give it Class IIb recommendation[4], studies that compared closure with medical treatment showed a trend toward better outcomes in patients that underwent closure of PFO, especially those with more than one stroke[5].

Results from ongoing randomized trials are needed to answer the question regarding efficacy and safety of percutaneous closure of PFO compared to medical therapy only. Atrial arrhythmias are reported to occur more often in patients after PFO closure[6], whereas our patient presented with atrial tachycardia before the closure.

Case Report

A 60-year-old female with a history of hypertension presented to the cardiology outpatient clinic because of palpitation and nonspecific chest pain. In her medical history, she suffered a transient ischemic attack 8 years before and ischemic stroke 5 years before. Her physical examination was unremarkable, her blood pressure was 140/90 mm Hg, pulse 70/min and respirations were 14/min. The patient was taking aspirin 100 mg, propafenone 150 mg three times daily, candesartan 8 mg daily and atorvastatin 20 mg.

Electrocardiography (ECG) showed normal sinus rhythm, PR interval 160 ms, and normal axis. Chest x-ray was normal as well as standard laboratory results.

The patient was scheduled for 24-hour ECG, ECG stress test and echocardiography. ECG stress test was normal with no signs of arrhythmias, while 24-hour ECG showed a total of 18 non sustained and 2 sustained supraventricular tachycardias.

Correspondence to: *Nikola Pavlović, MD*, Clinical Department of Cardiology, Sestre milosrdnice University Hospital Center, Vinogradska c. 29, HR-10000 Zagreb, Croatia
E-mail: nikolap12@yahoo.com

Received December 12, 2012, accepted January 30, 2014

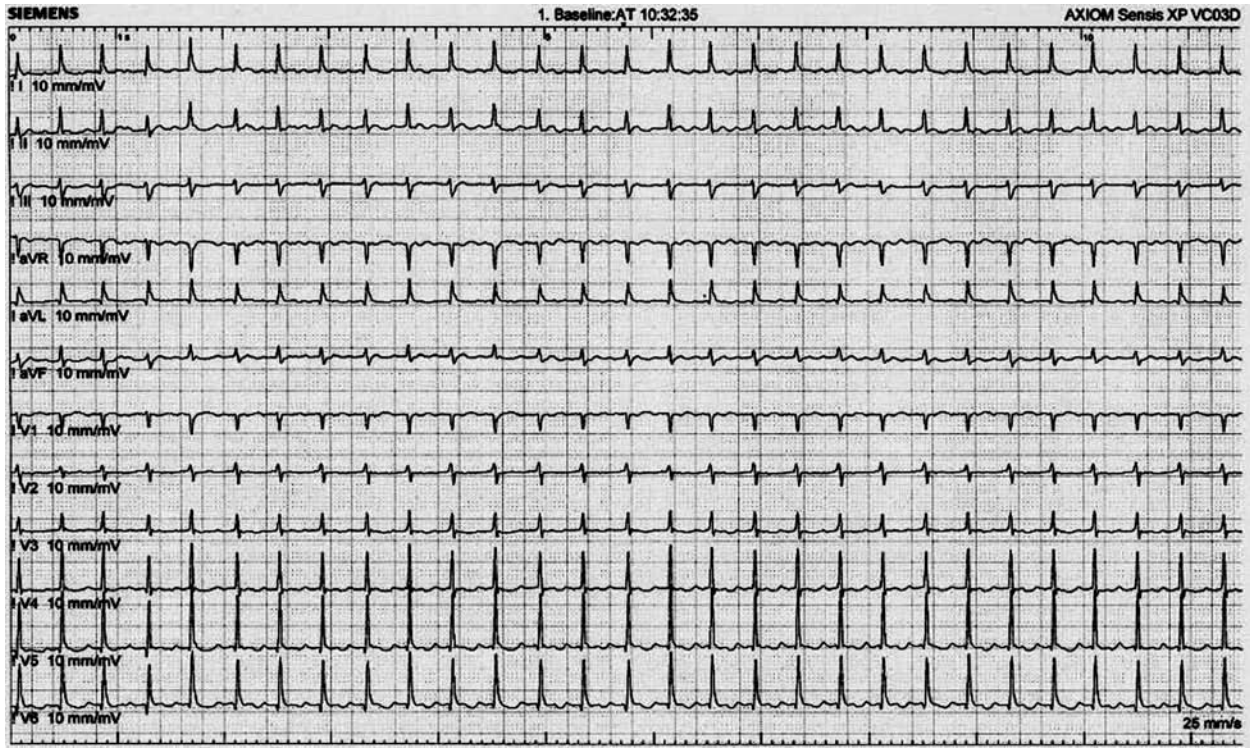

Fig. 1. 12-lead electrocardiogram of clinical atrial tachycardia recorded in the electrophysiology laboratory.

Echocardiography showed normal size of the ventricles, no dilatation of the atria, with left ventricular ejection fraction 60%. Transesophageal echocardiography was performed due to her history of recurrent stroke and showed PFO with clear right to left flow during the release phase of Valsalva maneuver. The size of the septum in fossa ovalis was 21 mm with 4.5 mm aortic rim. There was no thrombus in the left atrial appendage, with normal flow.

Since the patient had recurrent ischemic stroke in her medical history, indication for PFO closure was made. Also, the patient had palpitations with proven supraventricular tachycardia, which was highly symptomatic. After informing the patient, she was scheduled for electrophysiology (EP) study and transcatheter closure of PFO in the same procedure.

The EP study was performed after propafenone had been discontinued for 5 days and using minimal sedation. Four catheters were placed: coronary sinus catheter (10 pole), His bundle catheter (8 pole), right ventricle catheter (4 pole) and mapping catheter for 3D mapping (Navistar, D curve). During the EP study, spontaneous atrial tachycardia occurred (Fig. 1). The tachycardia could also be induced using isoproterenol infusion.

Activation mapping of both the left and right atria was performed (catheter for LA mapping was introduced through PFO) and the superior vena cava ostium was identified as the origin of atrial tachycardia. A total of 300 s of RF energy (40W, 48C) was applied to the SVC ostium and the tachycardia was interrupted (Fig. 2). After the ablation procedure, tachycardia did not occur spontaneously or after isoproterenol infusion.

After the ablation, the guide wire was passed across the PFO and than PFO closure was performed under fluoroscopy and transesophageal echocardiography guidance using Figulla Occlutech 23/25 mm closure device (Fig. 3).

The procedure was carried out without complications and the patient was discharged 2 days later with aspirin 100 mg, clopidogrel 75 mg, candesartan 8 mg, atorvastatin 20 mg and bisoprolol 2.5 mg.

On regular 3-month follow up, the patient was feeling well, had no symptoms and her 24-hour ECG showed no arrhythmia.

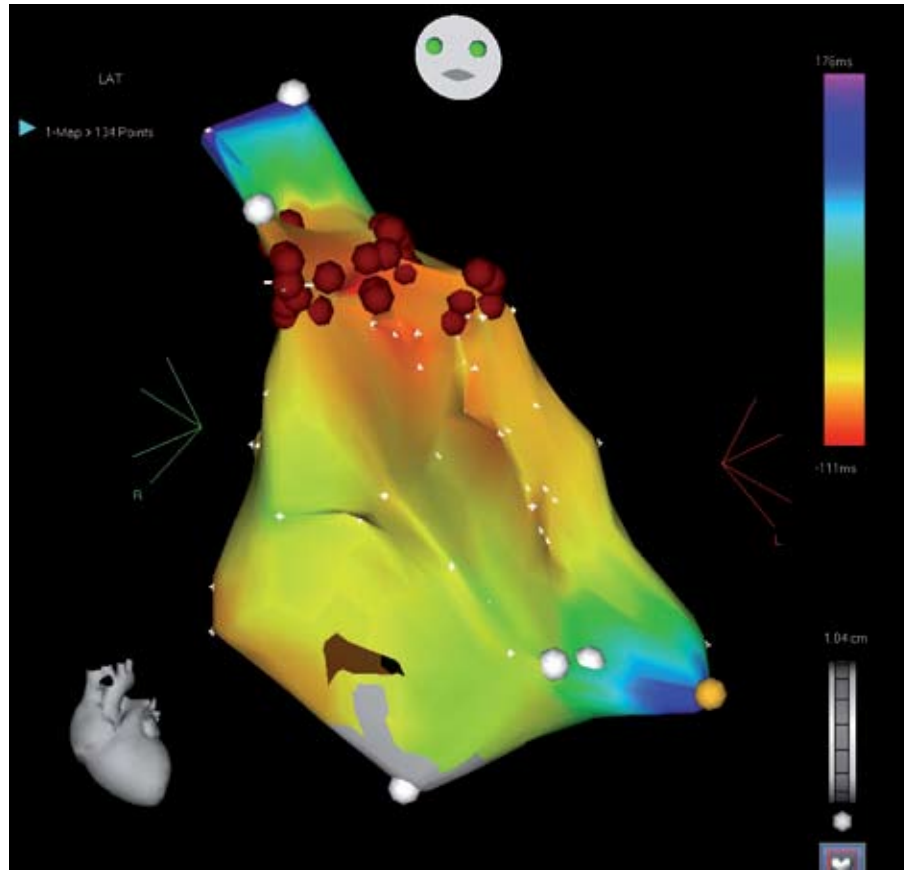

Fig. 2. Anteroposterior view on CARTO XP showing right atrium and ablation area in superior vena cava (SVC) ostium.

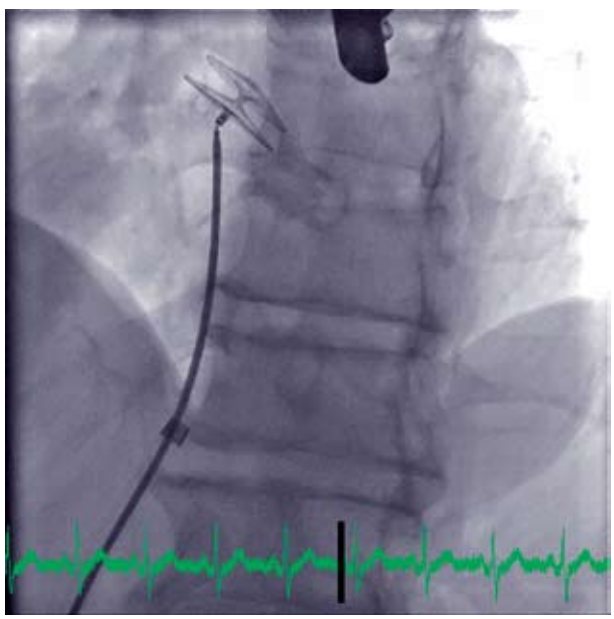

Fig. 3. Left anterior oblique (LAO) view of patent foramen ovale closure device in place.

Discussion

We report a case of a 60-year-old female who underwent RF ablation of atrial tachycardia and PFO closure in the same procedure. There are previous reports on successful RF ablation with closure of PFO identified during the EP study[7]. This report describes a patient where PFO was diagnosed during the EP study[7], whereas we diagnosed PFO before the EP study. Although we diagnosed PFO before the EP procedure, there are several clinical problems that may have occurred.

First, the patient's tachycardia was not verified in 12 lead ECG before the procedure, so the possible origin could not be identified. If the PFO was closed before the EP study, it may have posed a difficulty if tachycardia would be found to originate from the left atrium or pulmonary veins. There are reports on the safety of transseptal puncture in patients with closure devices[8], but it should be avoided if possible.

On the other hand, if the ablation was performed first and PFO closure was performed as another procedure, the patient would have undergone two routine but still invasive procedures, as well as a probably higher risk of paradoxical embolism after the first RF ablation.

So, after explaining the risks and benefits to the patient, these two procedures were performed in one act with no complications. PFO closure added 20 minutes to the total procedure, with less than 1 minute fluoroscopy time added to the procedure.

References

1. MEISSNER I, KHANDHERIA BK, HEIT JA, PETTY GW, SHEPS SG, SCHWARTZ GL, *et al*. Patent foramen ovale: innocent or guilty? Evidence from a prospective population-based study. J Am Coll Cardiol 2006;47:440-5.
2. Di TULLIO MR, SACCO RL, SCIACCA RR, JIN Z, HOMMA S. Patent foramen ovale and the risk of ischemic stroke in a multiethnic population. J Am Coll Cardiol 2007;49:797-802.
3. HANDKE M, HARLOFF A, OLSCHEWSKI M, HETZEL A, GEIBEL A. Patent foramen ovale and cryptogenic stroke in older patients. N Engl J Med 2007;357:2262-8.
4. FURIE KL, KASNER SE, ADAMS RJ, ALBERS GW, BUSH RL, FAGAN SC. Guidelines for the prevention of stroke in patients with stroke or transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke 2011;42:227-76.
5. WINDECKER S, WAHL A, NEDELTCHEV K, ARNOLD M, SCHWERZMANN M, SEILER C, *et al*. Comparison of medical treatment with percutaneous closure of patent foramen ovale in patients with cryptogenic stroke. J Am Coll Cardiol 2004;44:750-8.
6. ALAEDDINI J, FEGHALI G, JENKINS S, RAMEE S, WHITE C, ABI-SAMRA F. Frequency of atrial tachyarrhythmias following transcatheter closure of patent foramen ovale. J Invasive Cardiol 2006;18:365-8.
7. MANOLIS AS, ANDRIKOPOULOS G, TSAGOU V, PYRROS J, KRANIDIS A. Transcatheter closure of patent foramen ovale during a radiofrequency ablation procedure. Clin Cardiol 2006;29:369-71.
8. LAKKIREDDY D, RANGISETTY U, PRASAD S, VERMA A, BIRIA M, BERENBOM L, *et al*. Intracardiac echo-guided radiofrequency catheter ablation of atrial fibrillation in patients with atrial septal defect or patent foramen ovale repair: a feasibility, safety, and efficacy study. J Cardiovasc Electrophysiol 2008;19:1137-42. Epub: 2008 Jul 25.

Sažetak

TRANSKATETERSKO ZATVARANJE OTVORENOG FORAMENA OVALE I RADIOFREKVENTNA ABLACIJA ATRIJSKE TAHIKARDIJE IZ DESNOG ATRIJA

Š. Manola, R. Bernat, N. Pavlović, V. Radeljić, N. Bulj i *M. Trbušić*

Otvoreni foramen ovale (PFO) može se naći u gotovo 25% populacije. Katetersko zatvaranje PFO je terapijska opcija u određenog broja bolesnika. Prikazujemo slučaj bolesnice kojoj je u istom aktu učinjeno mapiranje i ablacija atrijske tahikardije te zatvaranje PFO-a.

Ključne riječi: *Foramen ovale, otvoren; Kateterska ablacija; Tahikardija, atrijska, supraventrikularna; Prikazi slučaja*