

Case Report

Excessive Vagal Response During Left Atrial Ablation in a Patient with Paroxysmal Atrial Fibrillation

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Vagal reflexes can be induced by stimulation of select epicardial and endocardial areas of the left atrium. The present report describes the case of a 54-year-old woman with a history of recurrent symptomatic episodes of paroxysmal atrial fibrillation. During radiofrequency application around the left superior pulmonary vein, the patient exhibited an excessive vagal response with a sinus pause of 17 s.

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Vagal reflexes can be induced by stimulation of select epicardial and endocardial areas of the left atrium. Here we describe the case of a patient who exhibited an excessive vagal response during radiofrequency ablation for paroxysmal atrial fibrillation.

Case presentation

A 54-year-old woman underwent an electrophysiological study because of a 6-year history of frequent episodes of symptomatic, drug-refractory paroxysmal atrial fibrillation (AF). The AF was vagal, because most of the episodes occurred during rest and after meals.

Transesophageal echocardiography was performed prior to the procedure to rule out the presence of interatrial thrombus. Left ventricular ejection fraction and left atrial diameter were normal. Transseptal access was achieved under fluoroscopic guidance, using an 8-French transseptal sheath with a Brockenbrough's needle, applying the standard technique.¹ Intravenous unfractionated heparin was administered till the end of the procedure (a

starting dose of 50 IU/kg and then 1000 IU per hour). Continuous recording and storage of surface ECG and endocardial bipolar potentials was performed using a Prucka recording system (Prucka, Cardiolabs 4.1, USA). A three-dimensional electroanatomic mapping system (CARTO, Biosense-Webster, Inc., Diamond Bar CA, USA) was used. The radiofrequency energy (RF) was delivered by a 3.5 mm irrigated tip electrode catheter for mapping and ablation (Navi-Star, Thermocool Biosense-Webster) at the left atrium, with flow limited to 20 ml/h, energy limited to 30 W and temperature to 43°C. We performed circumferential ablation, during sinus rhythm, encircling the pulmonary veins (PVs) in pairs, left and right, at least 1 cm from their ostia, linear ablation between the left and right superior pulmonary vein, and linear ablation along the mitral isthmus. During the procedure we sought elimination of the atrial electrograms or reduction of the amplitude to <0.1 mV. The first 12 s of RF application at the posterior aspect of the ostium of the left superior PV led to an excessive sinus pause (17 s) and the patient's syncope (Figure 1). Energy delivery

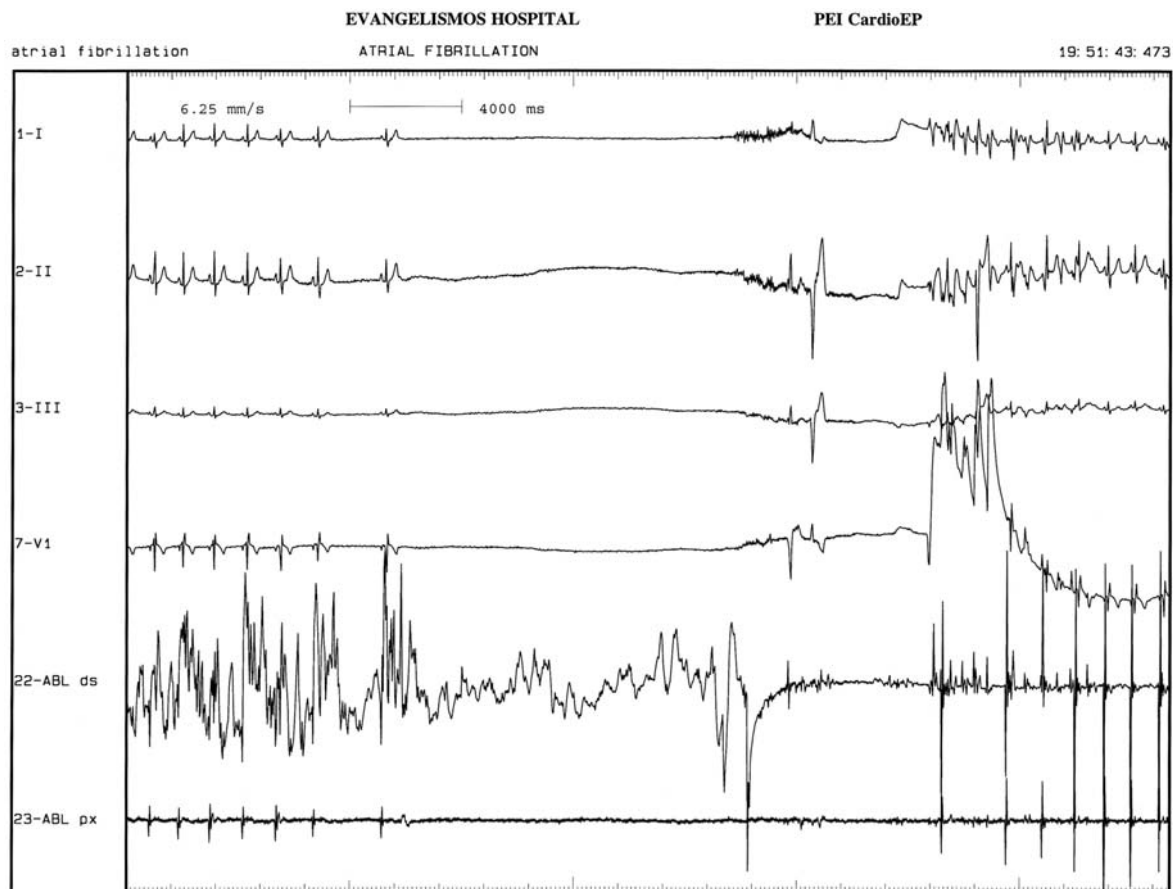


Figure 1. ECG (leads I, II, III, V1) and intracardiac electrograms (ablation catheter), showing an excessive sinus pause of 17 s during radiofrequency energy application at the posterior aspect of the ostium of the left superior pulmonary vein. ABL ds, ABL px – electrograms from the distal and proximal bipoles of the ablation catheter.

was not discontinued during the pause. Even though the pause was quite long, energy application was continued until the patient exhibited syncope. Additional RF applications at the posterior wall of the left atrium resulted in the elimination of the vagal response. We did not notice a similar reaction during ablation of the other veins. We have observed a vagal reaction during atrial ablation in 14% of patients undergoing ablation of atrial fibrillation in our center.

Discussion

Previous clinical observations have suggested that an increased parasympathetic tone is involved in the genesis of at least some forms of paroxysmal AF.²⁻⁴ In canine models, vagal stimulation shortens the atrial effective refractory period, increases its dispersion and decreases the wavelength of re-entrant circuits that facilitate the initiation and maintenance of AF.^{5,6} Catheter ablation is a reasonable alternative to phar-

macological therapy to prevent recurrent and symptomatic AF. The long-term success rate ranges from 60% to 90% in patients with paroxysmal AF, but is lower in patients with chronic AF.⁷⁻⁹ Currently, most ablation strategies for AF consist of pulmonary vein isolation, left atrial modification with ablation lines in the left atrium, and ablation of complex electrograms characterized by a short cycle length, fractionation and/or continuous electric activity. A new approach for AF ablation is the identification and ablation of the ganglionated plexus of the atria. Armour et al demonstrated that most of the autonomic ganglia were around the antrum of the pulmonary vein ostia.¹⁰ During left atrial stimulation, sinus bradycardia (increase in mean RR interval by >50%), asystole, AV block, or hypotension are considered as positive vagal responses.^{11,12} The stimulation of left-sided PV areas predominantly affects the sinus node, whereas stimulation of right-sided PV areas preferentially affects the AV node.¹¹ In an animal model, parasympa-

thetic nerve system modification by RF catheter ablation eliminated vagotonic AF.¹³ Complete vagal denervation, defined as abolition of all vagal reflexes around all PV ostia, has been associated with a significant reduction of AF recurrence during a 12-month follow-up period.¹¹ On the other hand, in a recent study AF recurred in 5 out of 7 patients with vagotonic AF, despite the elimination of vagal responses.¹²

In this patient the RF energy at the posterior aspect of the ostium of the left superior PV induced a sinus pause of 17 s. Additional RF applications at the posterior wall of the left atrium resulted in the elimination of the vagal response. The patient was discharged on atenolol and she has remained free of arrhythmia for the last 5 months.

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