

AF ABLASYON KOMPLİKASYONLARI

PROF.DR.OKAN ERDOĞAN
MARMARA ÜNİVERSİTESİ TIP FAKÜLTESİ KARDİYOLOJİ
ABD,İSTANBUL

AF ABLASYONUNDA CEVAP BEKLEYEN SORULAR

- Plasebo etkisi?
- İnme, KKY ve ölüm üzerine etkinlik?
- Antikoagulasyon kesilebilir mi?
- Uzun dönem etkinlik?
- Maliyet/yarar analizi?
- Zarar (komplikasyon)/yarar risk değerlendirmesi?
- Gerçek hayatta yaygın uygulanabilirlik?

Treatment of Atrial Fibrillation With Antiarrhythmic Drugs or Radiofrequency Ablation

Two Systematic Literature Reviews and Meta-Analyses

Hugh Calkins, MD; Matthew R. Reynolds, MD, MSc; Peter Spector, MD; Manu Sondhi, MD, MBA; Yingxin Xu, PhD; Amber Martin, BS; Catherine J. Williams, MPH; Isabella Sledge, MD, MPH

Calkins H. Catheter ablation to maintain sinus rhythm. *Circulation* 2012;125:1439-45.

% 57

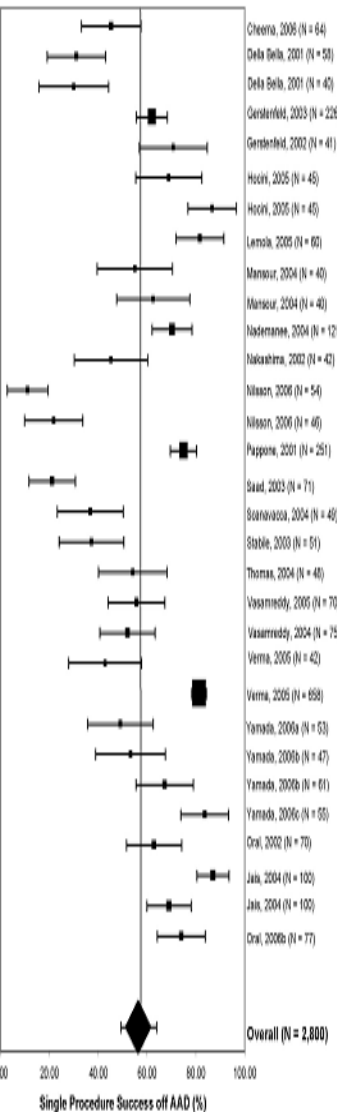


Figure 4. Efficacy of catheter ablation in patients with AF outcome presented as meta-analyzed proportion with 95% CIs, indicated with number of treatment arms and number of patients.

%52

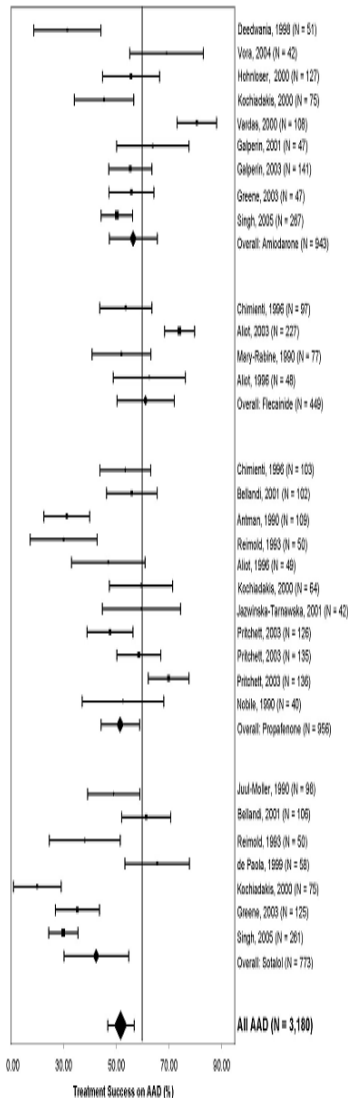


Figure 6. Efficacy of AADs in patients with AF outcome presented as meta-analyzed proportion with 95% CIs, indicated with number of treatment arms and number of patients.

Table 1. Estimates of success rate* for catheter ablation for atrial fibrillation for the outcome of restoration and maintenance of sinus rhythm

Procedure description	Success rate, % (95% CI)
Single procedure, no AAD	57 (50-64)
Multiple procedures, no AAD	71 (65-77)
Multiple procedures, with AAD or AAD "unknown"	77 (73-81)
AAD	52 (47-57)

AAD, antiarrhythmic drugs; CI, confidence interval.

* Freedom from electrocardiogram-documented atrial fibrillation via 1 or more of the following: 12-lead electrocardiogram, Holter monitor, or event recorder.

Data from Calkins.²

Six Year Follow-Up After Catheter Ablation of Atrial Fibrillation: A Palliation More Than a True Cure

Antonio Sorgente, MD^{a,b,*}, Patricia Tung, MD^a, Jack Wylie, MD^a, and Mark E. Josephson, MD^a

Long-term outcomes after pulmonary vein isolation for atrial fibrillation (AF) remain uncertain. In particular, the influence of rigorous arrhythmia monitoring on outcomes is not yet clear. In this study, 103 patients with symptomatic AF who underwent catheter ablation at a single academic medical center from 2002 to 2006 were evaluated, with a median follow-up time of 6 years. The primary end point was the success rate of catheter ablation, defined as the absence of any atrial arrhythmia recurrence lasting >10 seconds at the clinical visit and electrocardiographic or long-term cardiac rhythm recording after a single procedure and after the last procedure. In all, 153 procedures were performed, with a median of 1 (interquartile range 1 to 2) per patient as follows: 61 had 1, 35 had 2, 6 had 3, and 1 had 4 catheter ablations. Freedom from all atrial arrhythmias was present in 23% of patients at 6 years after a single procedure and in 39% of patients after the last procedure. No clinical predictors of AF recurrence were recognized after a single procedure, whereas after the last procedure, in univariate and multivariate Cox regression analysis, only nonparoxysmal AF (hazard ratio 1.92, 95% confidence interval 1.07 to 3.47, $p = 0.02$) was a predictor of recurrence. In conclusion, AF recurrence at 6-year follow-up after catheter ablation in a selected group of patients with symptomatic drug-refractory AF was relatively high, with 2/3 of AF relapses occurring in the first year of follow-up. Strict clinical surveillance after catheter ablation should be considered to help guide clinical decisions. © 2012 Elsevier Inc. All rights reserved. (Am J Cardiol 2012;109:1179–1186)

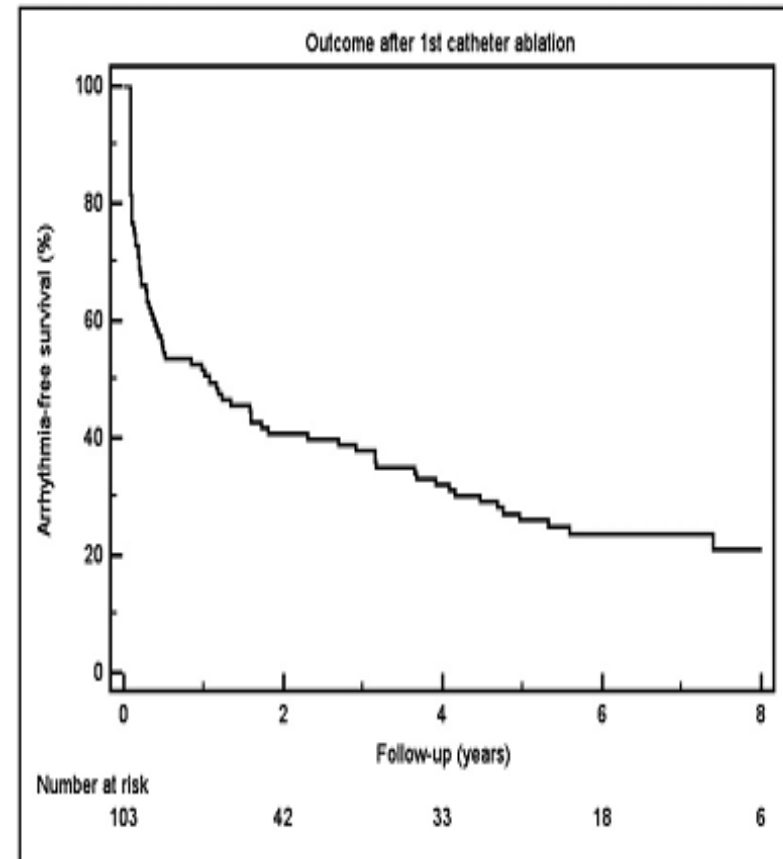


Figure 2. Kaplan-Meier arrhythmia-free survival curve after single catheter ablation of AF.

Cryoballoon ablation of paroxysmal atrial fibrillation: 5-year outcome after single procedure and predictors of success

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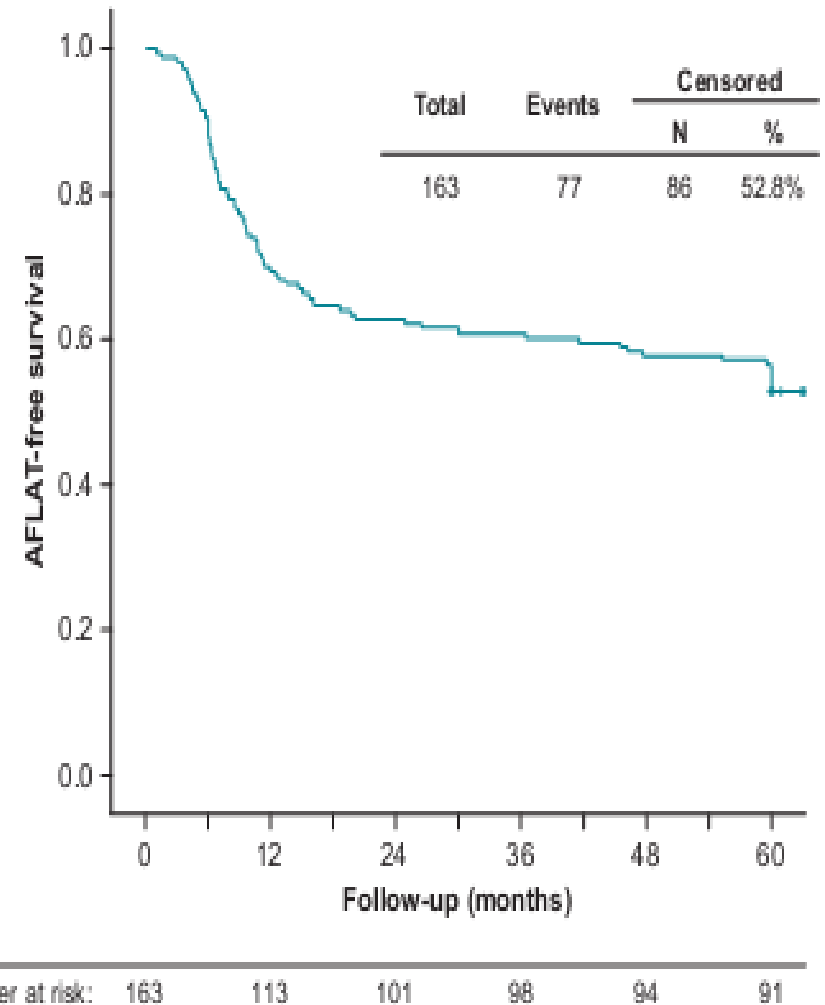
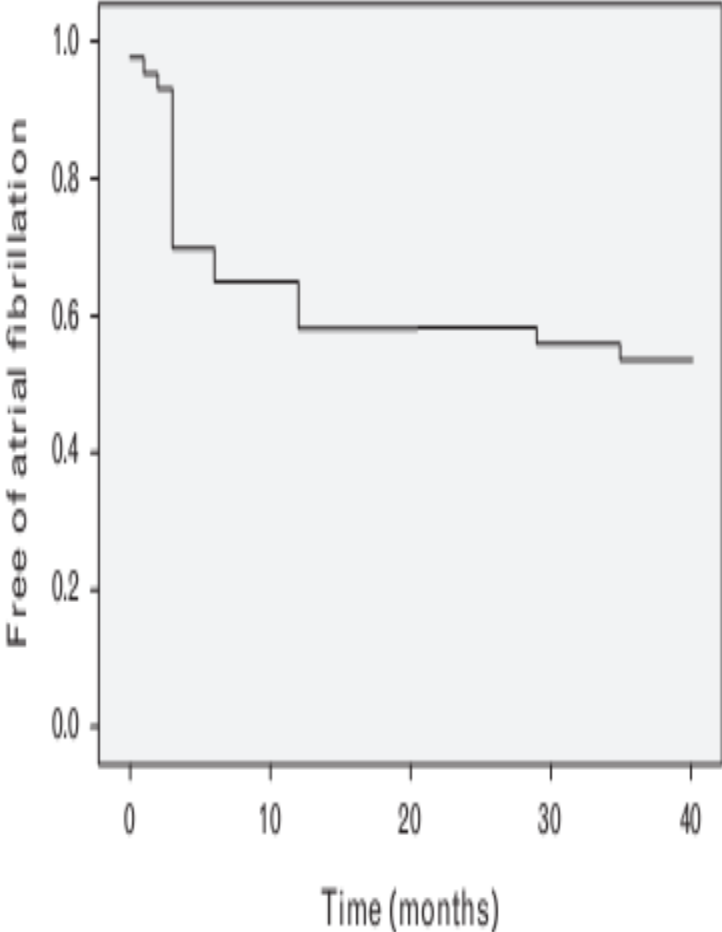


Figure 1 Five years outcome in patients with paroxysmal atrial fibrillation – Kaplan–Meier event-free survival curve after a single CB ablation procedure in patients with PAF.

Cryoballoon ablation as index procedure for paroxysmal atrial fibrillation: long-term results from a single center early experience

Jayakeerthi Yoganarasimha Rao*, Gian-Battista Chierchia*, Carlo de Asmundis, Ruben Casado-Arroyo, Ingrid Overeinder, Andrea Sarkozy, Gaetano Paparella, Lucio Capulzini, Antonio Sorgente, Moises Rodriguez-Manero, Danilo Ricciardi, Mehdi Namdar and Pedro Brugada

Fig. 1



Curve showing freedom from atrial fibrillation after a single procedure in the total study population.

Immediate and medium-term outcomes of cryoballoon-based pulmonary vein isolation in patients with paroxysmal and persistent atrial fibrillation: single-centre experience

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Abstract

Background Pulmonary vein (PV) isolation with cryoballoon is a recently developed technique for the treatment of atrial fibrillation (AF) with acceptable mid-term results in terms of the success and safety. The purpose of our study is to identify the periprocedural complications, mid-term success rates and predictors of recurrence after AF ablation with cryoballoon.

Method A total of 236 patients (54 % male, mean age 54.6 ± 10.45 years and 79.6 % paroxysmal AF) with symptomatic AF underwent PV isolation with cryoballoon due to failure with ≥ 1 antiarrhythmic drug previously. Procedural success, complications and follow-up data were defined according to recent guidelines.

Results Acute procedural success rate was 99.5 %. Mean procedural and fluoroscopy times were 72.5 ± 5.3 and 14 ± 3.5 min. At a median of 18 (6–27) months follow-up, 80.8 % of paroxysmal AF patients and 50.0 % of persistent AF patients were free from AF recurrence. In multivariate regression analysis, body mass index (BMI) (hazard ratio (HR), 1.35; 95 % confidence interval (CI), 1.18–2.93, $p=0.001$), smoking (HR, 2.12; 95 % CI, 1.36–6.67, $p<0.001$), non-paroxysmal AF (HR, 1.26; 95 % CI, 1.12–2.56, $p=0.024$), duration of AF (HR, 1.42; 95 % CI, 1.18–2.61, $p=0.015$), left atrium (LA) diameter (HR, 2.42; 95 % CI, 1.64–5.88, $p<$

0.001) and early AF recurrence (HR, 4.88; 95 % CI, 2.86–35.6, $p<0.001$) were independent predictors of AF recurrence following cryoablation.

Conclusion Our results showed that AF ablation with cryoballoon is effective and safe. Non-paroxysmal AF, duration of AF, smoking, BMI, LA diameter and early recurrence were found to be the most powerful predictors and could be helpful to select patients for appropriate therapeutic strategy.

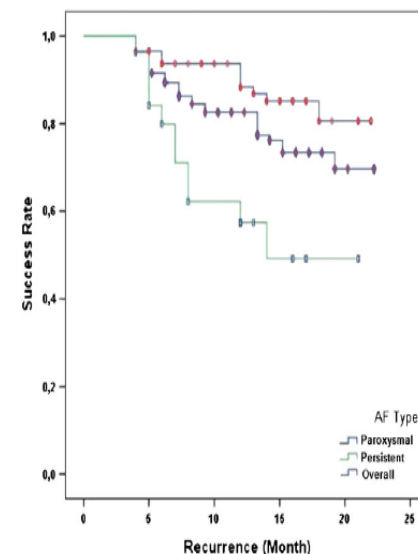
Keywords Atrial fibrillation · Pulmonary vein isolation · Cryoballoon · Recurrence

1 Introduction

The principle aim of catheter ablation for atrial fibrillation (AF) is the electrical disconnection of the pulmonary veins (PVs) from the atrial substrate through circumferential lesions around PV ostia [1]. It is more effective than antiarrhythmic drug therapy for the maintenance of sinus rhythm in patients with AF, mostly in patients without marked structural heart disease, with a low CHA₂DS₂-VASc (congestive heart failure, hypertension, age ≥ 75 years, diabetes mellitus, stroke, vascular disease, age 65–74 years, sex category) score and with paroxysmal AF [2–4]. Those study results have forced to upgrade evidence level in recently updated practice guidelines, which recommend PV isolation as a class I indication in the treatment of symptomatic paroxysmal AF refractory to drug therapy when performed by experienced operators and high-volume centres. Additionally, for patients with highly symptomatic paroxysmal AF with a low-risk profile for catheter ablation, first-line catheter ablation should be considered [5–8].

However, major complications of radiofrequency (RF) ablation like cardiac perforation, injury to neighbouring structures (esophagus, phrenic nerve and aorta) and PV stenosis are

Fig. 1 During median of 18 months follow-up, 74.5 % of the whole study population, 80.8 % of the paroxysmal AF patients and 50.0 % of the persistent AF patients were free from recurrent symptomatic AF



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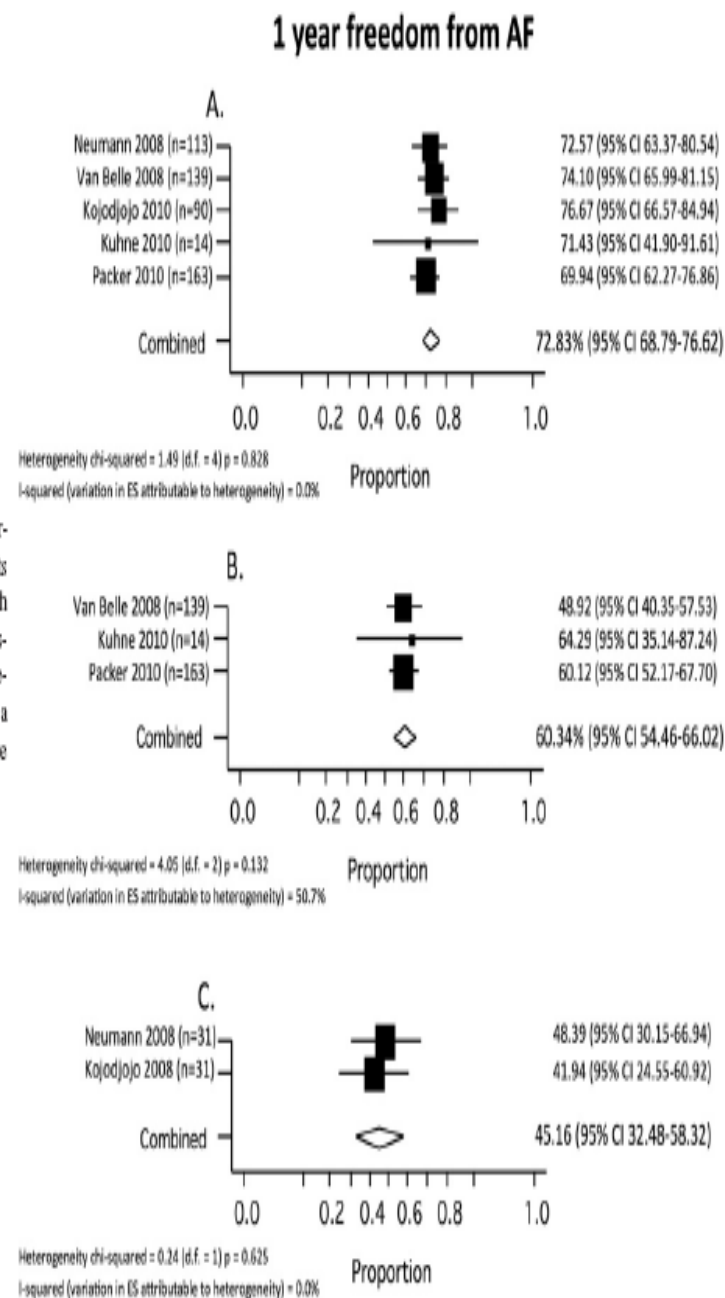
Efficacy and safety of cryoballoon ablation for atrial fibrillation:

A systematic review of published studies

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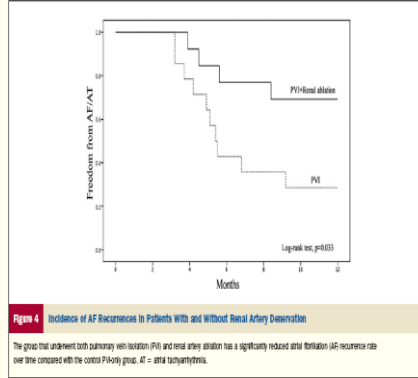
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Figure 3 One-year freedom from recurrent atrial fibrillation (AF). **A:** Patients with paroxysmal AF after a 3-month blanking period. **B:** Patients with paroxysmal AF without a 3-month blanking period. **C:** Patients with persistent AF after a 3-month blanking period. CI = confidence interval; ES = effect size.



A Randomized Comparison of Pulmonary Vein Isolation With Versus Without Concomitant Renal Artery Denervation in Patients With Refractory Symptomatic Atrial Fibrillation and Resistant Hypertension

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EDITORIAL COMMENT

Catheter Ablation for the Treatment of Atrial Fibrillation

Have We Been Targeting the Wrong Organ?*

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- Objectives** The aim of this prospective randomized study was to assess the impact of renal artery denervation in patients with a history of refractory atrial fibrillation (AF) and drug-resistant hypertension who were referred for pulmonary vein isolation (PVI).
- Background** Hypertension is the most common cardiovascular condition responsible for the development and maintenance of AF. Treating drug-resistant hypertension with renal denervation has been reported to control blood pressure, but any effect on AF is unknown.
- Methods** Patients with a history of symptomatic paroxysmal or persistent AF refractory to ≥ 2 antiarrhythmic drugs and drug-resistant hypertension (systolic blood pressure >160 mm Hg despite triple drug therapy) were eligible for enrollment. Consenting patients were randomized to PVI only or PVI with renal artery denervation. All patients were followed ≥ 1 year to assess maintenance of sinus rhythm and to monitor changes in blood pressure.
- Results** Twenty-seven patients were enrolled, and 14 were randomized to PVI only, and 13 were randomized to PVI with renal artery denervation. At the end of the follow-up, significant reductions in systolic (from 181 ± 7 to 156 ± 5 , $p < 0.001$) and diastolic blood pressure (from 97 ± 6 to 87 ± 4 , $p < 0.001$) were observed in patients treated with PVI with renal denervation without significant change in the PVI only group. Nine of the 13 patients (69%) treated with PVI with renal denervation were AF-free at the 12-month post-ablation follow-up examination versus 4 (29%) of the 14 patients in the PVI-only group ($p = 0.033$).
- Conclusions** Renal artery denervation reduces systolic and diastolic blood pressure in patients with drug-resistant hypertension and reduces AF recurrences when combined with PVI. (Combined Treatment of Resistant Hypertension and Atrial Fibrillation; NCT01117025) (J Am Coll Cardiol 2012;60:1163-70) © 2012 by the American College of Cardiology Foundation

- AF ablasyonu uygulanacak tüm hastalara ya da sadece hipertansiyon eşlik edenlere mi renal denervasyon beraberinde yapılmalı?
- AF ablasyonu yerine sadece renal denervasyon yeterli olur mu?
- Ya da hiçbir girişim yapmadan sadece hipertansiyonun ilaçla kontrolü AF tekrarlarını önleyebilir mi?

KOMPLİKASYON GELİŞİMİYLE İLGİLİ BAŞLICA FAKTÖRLER

- İşlem öncesi hasta hazırlığı (MR, CT..)
- Operatör tecrübesi ve işlem sayısı
- Merkez tecrübesi ve hasta hacmi
- Kateter tipi, enerji miktarı ve uygulama yerleri
- Uygulama yöntemi , süresi ve yaygınlığı
- Hasta özellikleri, klinik durumu ve komorbiditeleri
- Kanama kontrolü ve kullanılan antikoagulan ilaçlar
- ICE, esof. ısı kontrolü vs. yardımcı alet ve teknik kullanımı
- İşlem sonrası hasta takibi ve uygun tedavisi

Table 1 Complications associated with ablation of atrial fibrillation

Generalized (i.e., can occur at various steps during the procedure)	Embotic complications Bleeding complications (including cardiac tamponade)
Specific	
A. Vascular access	Hematoma Pseudoaneurysm Arteriovenous fistula Retroperitoneal hemorrhage Pneumothorax (subclavian/jugular access) Hemothorax (subclavian/jugular access) Puncture of aorta (aortic dissection, fistula) Puncture of right atrial free wall (cardiac tamponade) Tear of left atrium (cardiac tamponade) Air embolism Thromboembolism
B. Transseptal access	Tear of left atrium (cardiac tamponade) Mitral valve avulsion
C. Trauma from catheter manipulation	
D. Energy delivery	Cardiac:
1. Damage to adjacent structures from energy delivery	Vagal reflexes Sinus node injury Atrioventricular block Coronary artery occlusion Pericarditis Myocardial rupture (cardiac tamponade)
	Extracardiac:
	Pulmonary vein stenosis Esophageal injury/atrio-esophageal fistula Gastroparesis (periesophageal vagal injury) Phrenic nerve paralysis Cough (left recurrent laryngeal nerve) Superior vena cava stenosis/occlusion
2. Unintended side effects from energy delivery	Left atrial edema Congestive heart failure Iatrogenic tachycardias Loss of atrial contractility Thromboembolism
E. Procedural components	
1. Sedation and anesthesia	Aspiration Acute respiratory distress syndrome Skin injury Malignancy
2. Radiation	Protamine reactions Sepsis Renal failure Death
Miscellaneous	

TABLE 1. Complications of Catheter Ablation of AF in 2 Series

Complication	Rate % (Cappato et al) ¹⁴ N = 16,309	Rate % (Dagres et al) ¹⁶ N = 1000
Death	0.15	0.2
Tamponade	1.31	1.3
Pneumothorax	0.09	Not reported (NR)
Hemothorax	0.02	NR
Sepsis, abscesses, or endocarditis	0.01	0.2
Permanent diaphragmatic paralysis	0.17	NR
Femoral pseudoaneurysm	0.93	0.9
Arteriovenous fistula	0.54	0.3
Valve damage requiring surgery	0.07	NR
Atrial-esophageal fistula	0.04	0.2
Stroke	0.23	0.3
Transient ischemic attack	0.71	0.1
PV stenosis requiring intervention	0.29	0.1
Total	4.54	3.9

Cappato et al.

Ciddi komplikasyonlar:

- 25 ölüm
- 37 inme
- 115 TIA
- 213 tamponad
- 216 PV stenozu
- 7 AE fistül

PV STENOZ

- >% 70 darlık ciddi,
- Ven içine yüksek enerji uygulama
- Fibrosis, neointimal hiperplazi
- Asemptomatikler (Gerçek sıklık daha yüksek)
- Öksürük, hemoptizi, pnömoni, dispne
- Tanı testleri yetersizliği (Spiral CT, TEE, 3D MR)
- Semptom ve pulm hip önlemek için girişim gerekebilir
- Önleme ICE ve ven içi uygulama yapmamakla
- Tedavi angioplasti/stent, tekrarlama yüzdesi % 40- 60



From: Pulmonary Vein Stenosis Complicating Ablation for Atrial Fibrillation: Clinical Spectrum and Interventional Considerations

J Am Coll Cardiol Interv. 2009;2(4):267-276. doi:10.1016/j.jcin.2008.12.014

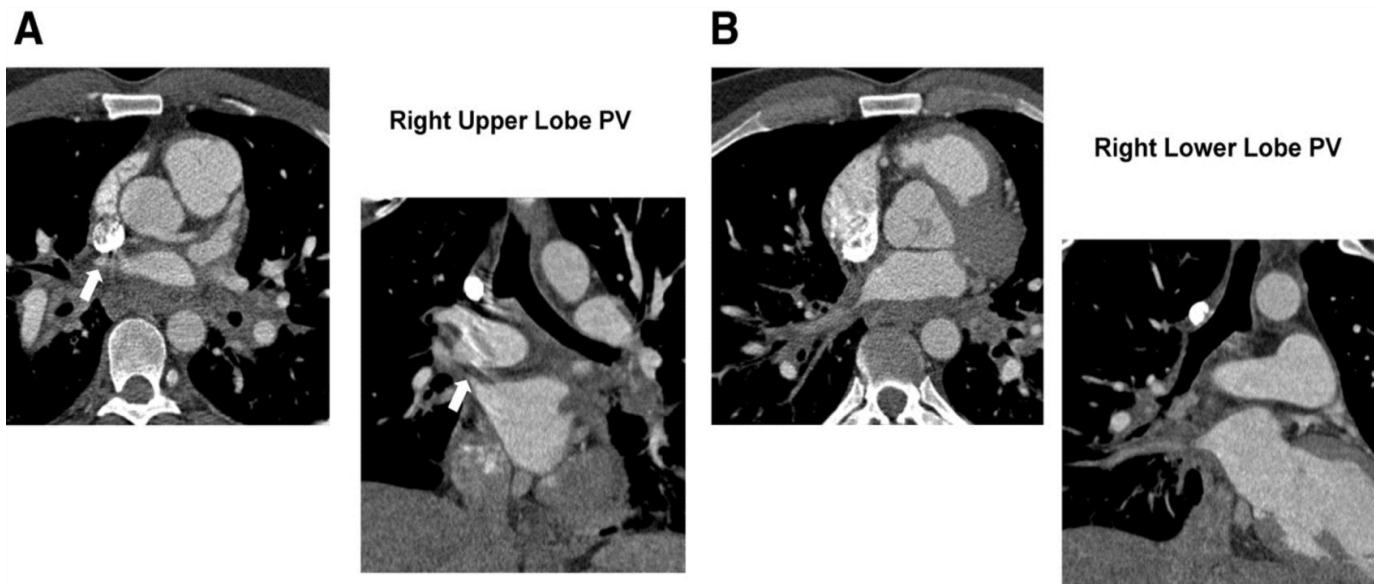


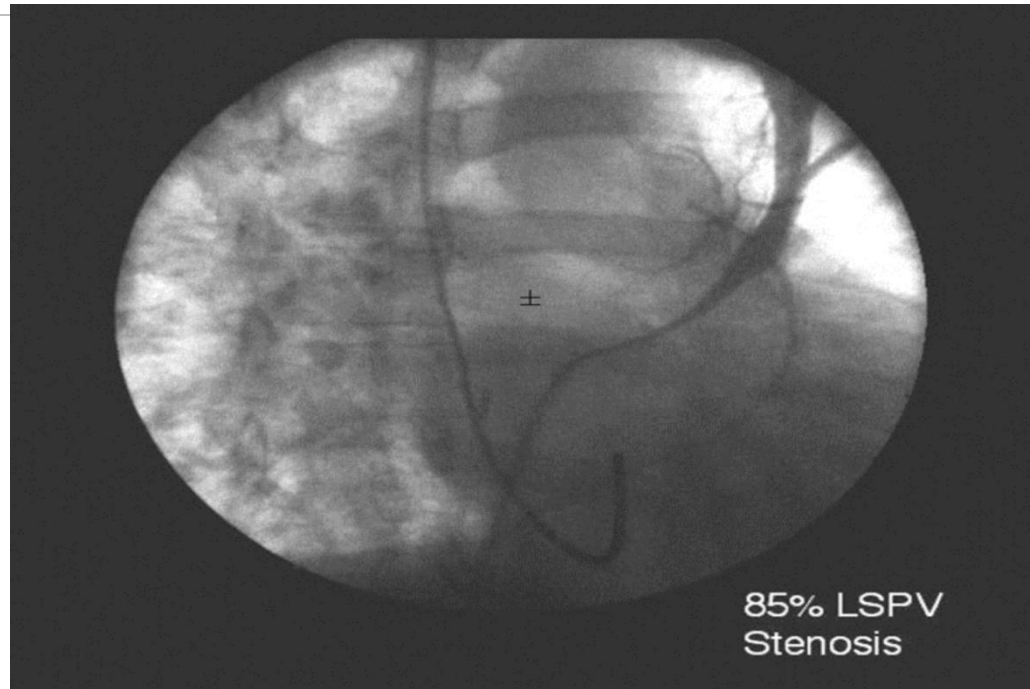
Figure Legend:

Right Upper and Lower Lobe PV

Computed tomography images in (A) 2 views of the right superior pulmonary veins (PV) and (B) 2 views of the right inferior PV documenting severe stenosis (arrows).

From: Pulmonary Vein Stenosis Complicating Ablation for Atrial Fibrillation: Clinical Spectrum and Interventional Considerations

J Am Coll Cardiol Interv. 2009;2(4):267-276. doi:10.1016/j.jcin.2008.12.014



Balloon diameter 10±3
Length 23±5

Stent diameter 10±3
Length 17±3

Figure Legend:

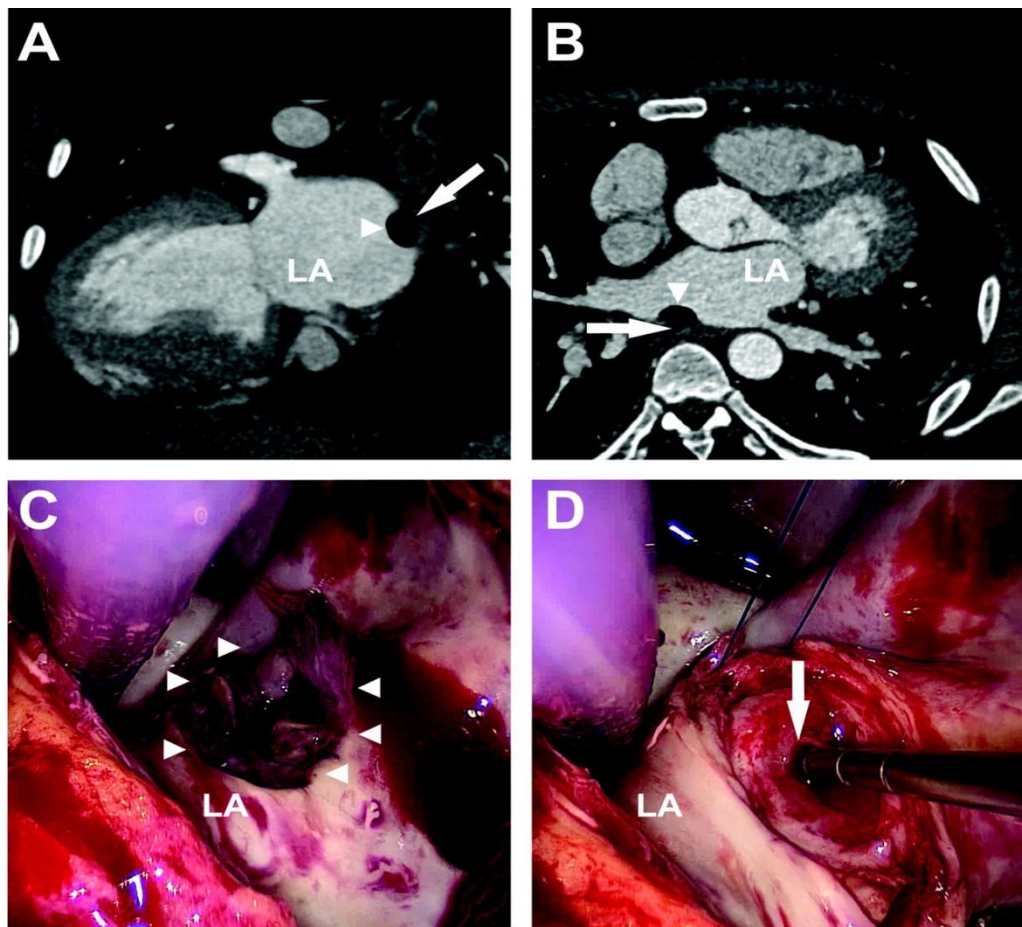
Percutaneous Intervention

Although the severity and length of stenosis can vary, angiography usually reveals long diffuse disease as seen in this left superior pulmonary vein (LSPV).

ATRİYO-ÖSEFAGEAL FİSTÜL

- Seyrekdir ancak ölümcül
- Genellikle sol atriyal posterior duvarı yüksek enerji uygulamaları
- 1-4 hafta sonra ortaya çıkar
- Ateş, göğüs ağrısı, hematemez, TIA, hava embolisine bağlı nörolojik semptomlar
- Tanıda kontrastlı CT, MR
- Önleme ösafagusta ısı takibi, arka duvara düşük enerji, pompa inh
- Tedavi cerrahi

Top, Computed tomography scans with intravenous contrast showing an air pocket (arrowhead) traversing the esophageal wall (arrow) and the posterior wall of the left atrium (LA), indicating a transmural fistulous tract (A, sagittal scan; B, axial scan).



Tancevski I et al. *Circulation*. 2012;125:966

DİĞER KOMPLİKASYONLAR

- Giriş yeri ile ilgili
 - Hematom, pseudoanevrizma (Warfarin altında işlem, arteryel ponksiyona dikkat!)
- Pilorik spazm ve gastroparezi
 - % 1 sıklık, vagal plexus hasarı, sol atriyal arka duvarda minimal RF enerji, tedavi palyatif veya botulinium toxini
- Sol atrial ödem
 - Akut kalp yetersizliğine neden olabilir
- Transseptal ponksiyon komplikasyonları
- Taşiaritmiler
 - Sol atriyal fokal, mikro-makro reentran, flutter, ısrarcı atriyal

AÇIK YIKAMALI (OPEN IRRIGATION) ABLASYON KATETERİ

- Sıvı yüklenmesi
- Plevral ve perikardiyal efüzyon oluşumu

KİRİYOBALON ABLASYON KOMPLİKASYONLARI

- Frenik sinir hasarı
 - Genellikle sağ üst pulmoner ven, 23 mm balon tatbikinde
 - Frenik pacing ile ablasyon esnasında takip yapılmalı
- Geçici ösafagus ülserasyonları (% 17 hastada)
- Perikardiyal sıvı oluşumu
- Mikroemboli

Efficacy and safety of cryoballoon ablation for atrial fibrillation: A systematic review of published studies

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Lena Rivard, MD,* Laurent Macle, MD,* Bernard Thibault, MD, FHRS,* Mario Talajic, MD, FHRS,*
Denis Roy, MD, FHRS,* Marc Dubuc, MD, FHRS*

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Complication Rates

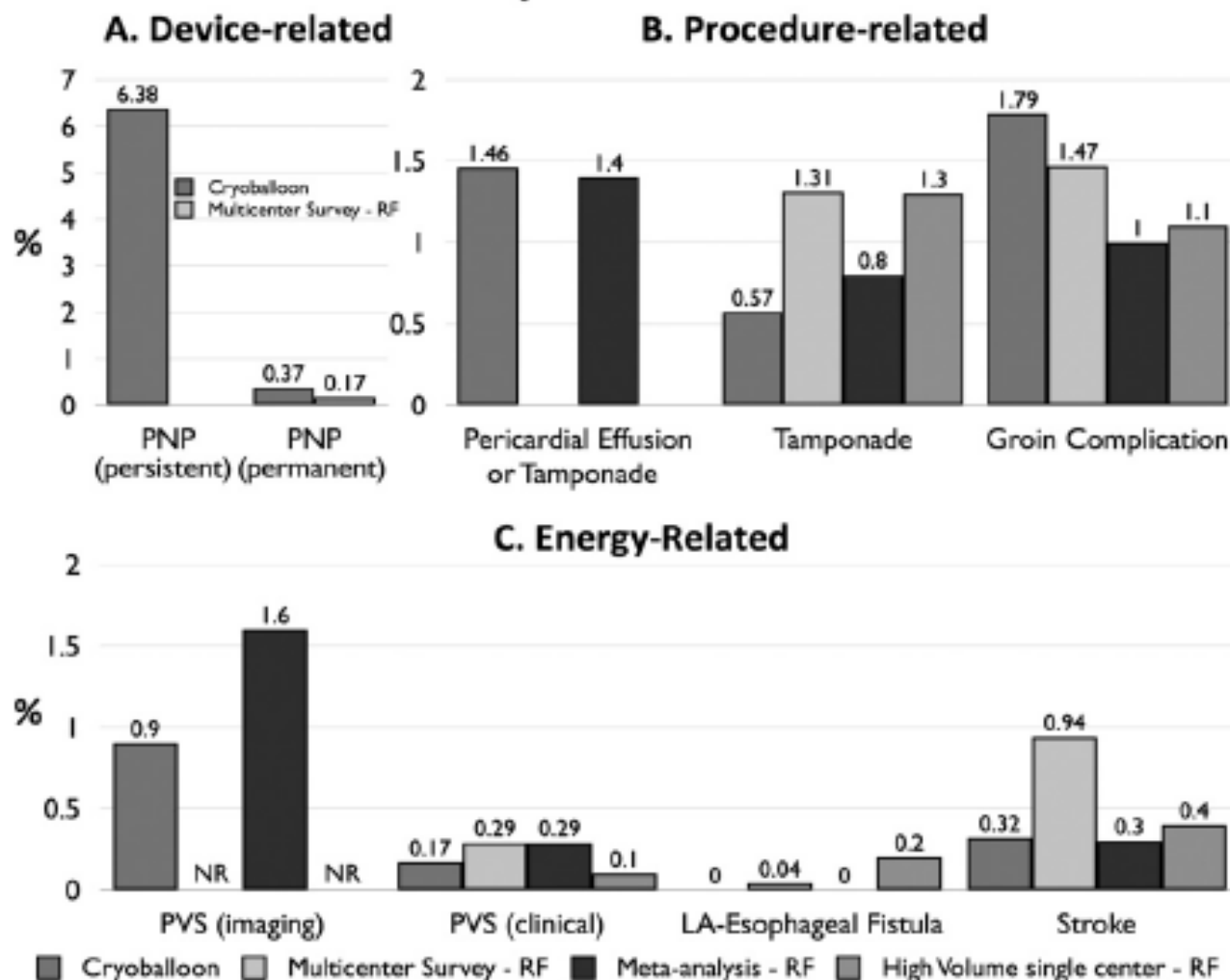


Figure 4 Complication rates for cryoballoon atrial fibrillation ablation. **A:** Device-related complications. **B:** Procedure-related complications. **C:** Energy-related complications. For comparison, three studies reporting complications with radiofrequency (RF) ablation are depicted: a multicenter survey,⁴ a meta-analysis,² and a high-volume single center.³ LA = left atrium; NR = not reported; PNP = phrenic nerve palsy; PVS = pulmonary vein stenosis.

YENİ TANIMLANAN KOMPLİKASYONLAR

İYATROJENİK ASD GELİŞİMİ

SOL ATRİYAL KAYNAKLI PULMONER HİPERTANSİYON

SESSİZ BEYİN EMBOLİLERİ

GASTROİNTESTİNAL SİSTEM



Iatrogenic atrial septal defects following atrial fibrillation transcatheter ablation: a relevant entity?

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Received 6 October 2013; accepted after revision 9 January 2014

Aims

The previous literature has suggested that the iatrogenic atrial septal defects (IASDs) may follow left atrial (LA) access by transeptal (TS) puncture, especially in the case of a single TS for more than one catheter. The aim of the present study is to describe the prevalence of patent foramen ovale (PFO) and IASDs in a cohort of atrial fibrillation (AF) patients undergoing redo catheter ablation (CA) procedures in a high-volume centre accessing LA by a standardized single TS puncture.

Methods and results

Patients ($n = 197$) who underwent at least one redo AFCA, between 2004 and 2012, were retrospectively enrolled. Transoesophageal echocardiography was performed before each procedure during which LA was accessed via a PFO, if present, or by single TS for both the mapping and ablation catheters. At baseline, PFO was detected in 43 (21.8%) patients. Clinical and echocardiographic parameters recorded did not differ within patients presenting with or without PFO. Left atrium was accessed via PFO in 39 (90.7% of those with PFO) patients during the first procedure. New-onset IASD occurred in 11 (5.6%) patients following the first procedure and in 1 (2.2%) patient following the second procedure. The clinical and echocardiographic parameters did not differ within the patients irrespective of whether IASD was reported or not. No TS-related complications occurred.

Conclusion

In the present cohort, LA access by PFO or single TS for both the mapping and ablation catheters lead to a small risk of asymptomatic IASD, not increased by redo procedures, confirming that it represents a safe approach. No clinical and/or echocardiographic parameters seemed to predict IASD occurrence.

Keywords

Atrial fibrillation • Ablation • Iatrogenic atrial septal defects • Patent foramen ovale • Transeptal puncture

SOL ATRİYAL HİPERTANSİYON

(Kasılamayan ve gevşeyemeyen sol atriyum= stiff left atrium))

Sol atriyum kompliyansının azalması ve rezervuar fonksiyonunun kaybı

Yeni başlayan dispne

- [M. Benjamin Shoemaker](#), MD, et al. **Left Atrial Hypertension After Repeated Catheter Ablations for Atrial Fibrillation.** [Journal of the American College of Cardiology Volume 57, Issue 19](#), 10 May 2011, Pages 1918–1919
- Gibson DN , et al. [Stiff left atrial syndrome after catheter ablation for atrial fibrillation: clinical characterization, prevalence, and predictors.](#) Heart Rhythm. 2011 Sep;8(9):1364-71.

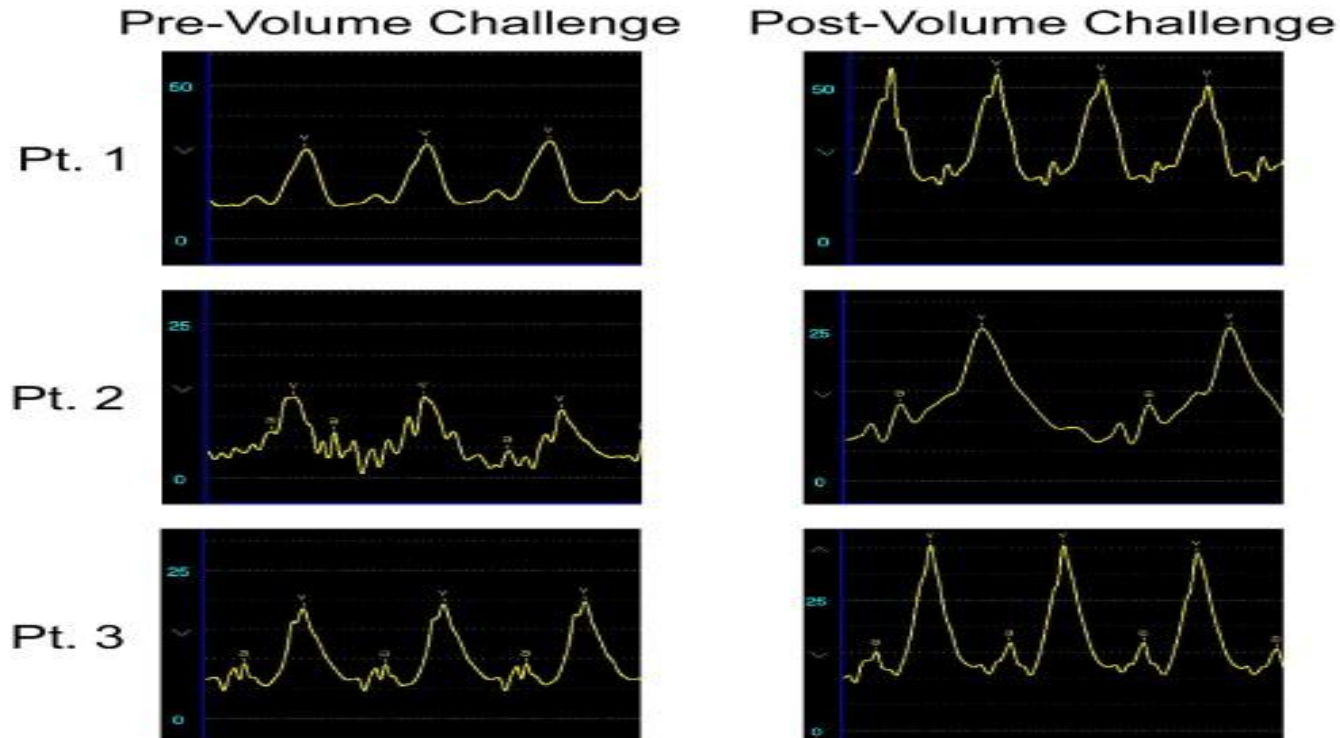


Figure 1 Pulmonary Wedge Pressure Tracings With Large V Waves That Increase With Volume Challenge Patient #1 underwent volume challenge with a 500-ml normal saline fluid bolus, Patient #2 with 150 ml of contrast during coronary angiography, and Patient #3...

Radiofrequency Catheter Ablation of Atrial Fibrillation: A Cause of Silent Thromboembolism?

Magnetic Resonance Imaging Assessment of Cerebral Thromboembolism in Patients Undergoing Ablation of Atrial Fibrillation

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Background—Radiofrequency left atrial catheter ablation has become a routine procedure for treatment of atrial fibrillation. The aim of this study was to assess with preprocedural and postprocedural cerebral magnetic resonance imaging the thromboembolic risk, either silent or clinically manifest, in the context of atrial fibrillation ablation. The secondary end point was the identification of clinical or procedural parameters that correlate with cerebral embolism.

Methods and Results—A total of 232 consecutive patients with paroxysmal or persistent atrial fibrillation who were candidates for radiofrequency left atrial catheter ablation were included in the study. Pulmonary vein isolation or pulmonary vein isolation plus linear lesions plus atrial defragmentation with the use of irrigated-tip ablation catheters was performed. All of the patients underwent preprocedural and postablation cerebral magnetic resonance imaging. A periprocedural symptomatic cerebrovascular accident occurred in 1 patient (0.4%). Postprocedural cerebral magnetic resonance imaging was positive for new embolic lesions in 33 patients (14%). No clinical parameters such as age, hypertension, diabetes mellitus, previous history of stroke, type of atrial fibrillation, and preablation antithrombotic treatment showed significant correlation with ischemic cerebral embolism. Procedural parameters such as activated clotting time value and, in particular, electric or pharmacological cardioversion to sinus rhythm correlated with an increased incidence of cerebral embolism. Cardioversion was also associated with an increased risk of 2.75 (95% confidence interval, 1.29 to 5.89; $P=0.009$).

Conclusions—Radiofrequency left atrial catheter ablation carries a low risk of symptomatic cerebral ischemia but is associated with a substantial risk of silent cerebral ischemia detected on magnetic resonance imaging. Independent risk factors for cerebral thromboembolism are the level of activated clotting time and, in particular, the electric or pharmacological cardioversion to sinus rhythm during the procedure. (*Circulation*. 2010;122:1667-1673.)

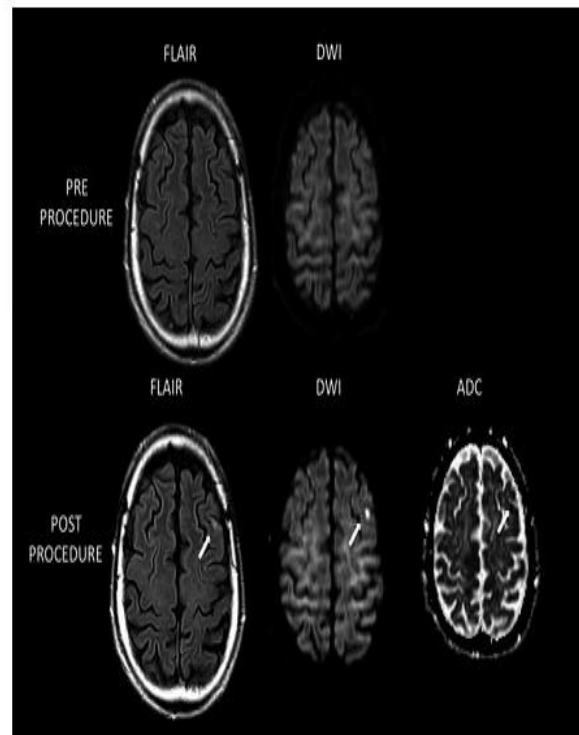


Figure. Preprocedural and postprocedural cerebral MRI, with T2-weighted FLAIR, DW image (DWI), and apparent diffusion coefficient (ADC) map. White arrows indicate a bright lesion in the cortical-subcortical left frontal region corresponding to a signal hypointensity in the apparent diffusion coefficient map, consistent with acute embolic cerebral infarction.

Incidental and ablation-induced findings during upper gastrointestinal endoscopy in patients after ablation of atrial fibrillation: A retrospective study of 425 patients

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BACKGROUND Although rare, atri-esophageal fistula is a serious and often lethal complication of radiofrequency catheter ablation in patients with atrial fibrillation (AF). Consequently, esophago-gastroduodenoscopy after AF catheter ablation has been suggested to detect thermal esophageal lesions.

OBJECTIVE To report the incidence of thermal lesions and other incidental gastrointestinal (GI) abnormalities in patients with AF after radiofrequency catheter ablation.

METHODS Four hundred twenty-five (mean age 59 ± 10 years; 64% men) consecutive patients with symptomatic AF who underwent left atrial radiofrequency catheter ablation were scheduled for upper GI endoscopy 1–3 days after the procedure. Patients were asymptomatic for GI diseases, that is, exhibiting no dysphagia, heart burn, or abdominal pain.

RESULTS Pathological GI findings were observed in 328 (77%) patients and included gastric erosions (22%), esophageal erythema (21%), gastroparesis (17%), hiatal hernia (16%), reflux esophagitis (12%), thermal esophageal lesion (11%), and suspected Barrett's

esophagus (5%). Biopsies were performed in 70 (17%) patients, showing gastritis (84%), *Helicobacter pylori* colonization (17%) and mucosa-associated lymphoid tissue (17%), esophagitis (9%), and Barrett's esophagus (4%). Further diagnostic workup or treatment was initiated in 105 (25%) patients.

CONCLUSIONS Upper GI pathologies are observed frequently in asymptomatic patients. Half of all patients have a requirement for treatment. Among the findings, thermal esophageal lesions and gastroparesis can be attributed to AF catheter ablation. The high incidence of gastroparesis is a novel finding that deserves further investigation.

KEYWORDS Incidental findings; Gastroparesis; Gastric hypomotility; Atrial fibrillation; Radiofrequency ablation

ABBREVIATIONS AF = atrial fibrillation; EGD = esophago-gastroduodenoscopy; GI = gastrointestinal; LA = left atrial/atrium; PV = pulmonary vein

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Table 2 Incidental and ablation induced findings

Characteristic	n (%)
Gastric/duodenal erosions	94 (22)
Gastric/duodenal erythema	91 (21)
Gastroparesis	70 (17)
Hiatal hernia	68 (16)
Reflux esophagitis	50 (12)
Grade I	34 (8)
Grade II	11 (3)
Grade III	1 (0)
Thermal lesions	48 (11)
Gastric/duodenal erosions	
Fibrin layer	73 (17)
Hemorrhagic	17 (4)
Barrett's esophagus	21 (5)
Cystic glands	19 (5)
Ectopic gastric mucosa in the proximal esophagus	16 (4)
Glycogen acanthosis	14 (3)
Polyps	13 (3)
Varicosis	8 (2)
Mucosal atrophy	6 (1)
Candidal esophagitis	5 (1)
Neoplasm	5 (1)
Duodenal ulcer	4 (1)
Gastric ulcer	4 (1)
Gastritis	3 (1)

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