

En-site

Prof. Dr. Fethi KILIÇASLAN

AF ablasyonu

- Zor ve kompleks bir işlemdir
- İşlem ve fluoroskopi süresi uzundur
- Pahalıdır
- Önemli komplikasyonları vardır
- Nüks oranı yüksektir

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

Background—Although radiofrequency catheter ablation (RFA) has evolved from an experimental procedure to an important treatment option for atrial fibrillation, the relative safety and efficacy of catheter ablation relative to that of antiarrhythmic drug (AAD) therapy has not been established.

Methods and Results—Two separate systematic reviews were conducted: one on RFA and the other on AAD to provide accurate and broadly representative estimates of the clinical efficacy and safety of both therapies in the treatment of atrial fibrillation. Electronic searches were conducted in EMBASE and MEDLINE from 1990 to 2007. For the RFA review, all study designs were accepted. For the AAD review, articles were limited to prospective studies on the following drugs of interest: amiodarone, dofetilide, sotalol, flecainide, and propafenone. Data were extracted by 1 reviewer, with a second reviewer performing independent confirmation of extracted data. Sixty-three RFA and 34 AAD studies were included in the reviews. Patients enrolled in RFA studies tended to be younger (mean age, 55 versus 62 years), had longer duration of atrial fibrillation (6.0 versus 3.1 years), and had failed a greater number of prior drug trials (2.6 versus 1.7). The single-procedure success rate of ablation off AAD therapy was 57% (95% CI, 50% to 64%), the multiple procedure success rate off AAD was 71% (95% CI, 65% to 77%), and the multiple procedure success rate on AAD or with unknown AAD usage was 77% (95% CI, 73% to 81%). In comparison, the success rate for AAD therapy was 52% (95% CI, 47% to 57%). A major complication of catheter ablation occurred in 4.9% of patients. Adverse events for AAD studies, although more common (30% versus 5%), were less severe.

Conclusions—Studies of RFA for treatment of atrial fibrillation report higher efficacy rates than do studies of AAD therapy and a lower rate of complications. (*Circ Arrhythmia Electrophysiol.* 2009;2:349-361.)

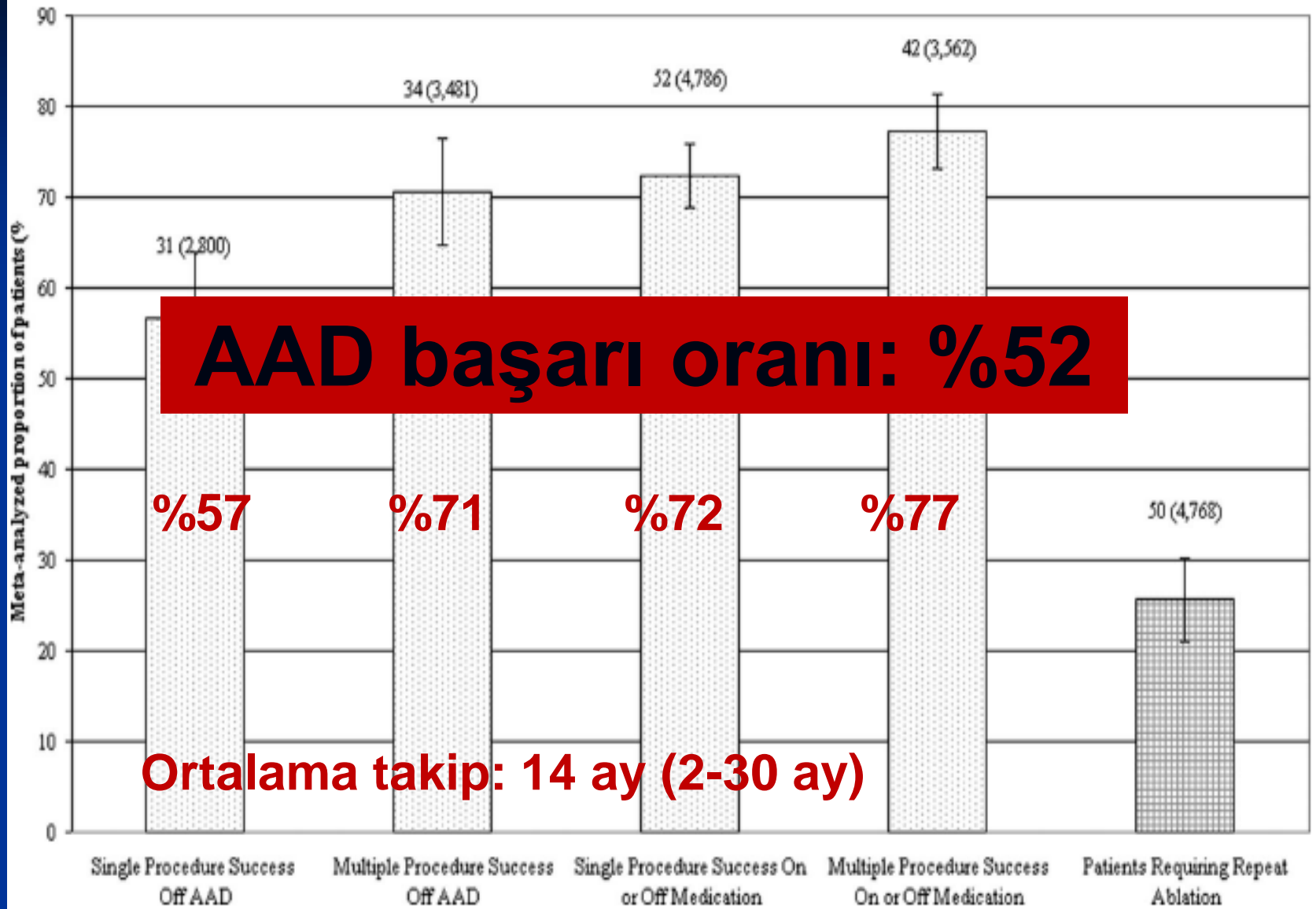


Figure 3. Efficacy of catheter ablation in patients with AF.

Table 5. Safety Outcomes for Patients With AF Undergoing Catheter Ablation

Outcomes	t	n/N	%
Mortality			
Death overall	65	42/5781	0.7
Procedure-related	64	0/5192	0.0
Vascular access complications			
Arteriovenous fistula	32	1/2885	0.0
Bleeding	33	1/2960	0.0
Hematoma	38	17/3719	0.5
Pneumothorax	34	0/2974	0.0
Femoral artery pseudoaneurysm	34	15/3032	0.5
Periprocedure events			
Stroke, ischemic	62	17/5665	0.3
TIA	60	13/5467	0.2
Cardiac tamponade	63	45/5723	0.8
PE	60	3/5496	0.1
DVT	56	1/4758	0.0
Other embolism	57	10/5347	0.2
LA-esophageal fistula	60	0/5496	0.0
Other fistula	58	3/5407	0.1
Pericardial effusion	64	36/5719	0.6
PV stenosis*	65	91/5831	1.6
AV block	60	1/5496	0.0
CHF exacerbation	60	0/5496	0.0
Need for a pacemaker	46	4/3902	0.1
Total No. of patients with events	28	97/1964	4.9

t indicates No. of treatment groups; n, No. of patients with this adverse event; N, No. of patients evaluated in studies reporting this adverse event; %, percent of patients with adverse event of interest; TIA, transient ischemic accident; PE, pulmonary embolism; DVT, deep vein thrombosis; LA, left atrial; PV, pulmonary vein; AV, atrioventricular; CHF, congestive heart failure.

*>70% Stenosis (early, <7 days after ablation; late, >7 days after ablation).

Table 6. Safety Outcomes for Patients With AF Receiving AAD Therapy

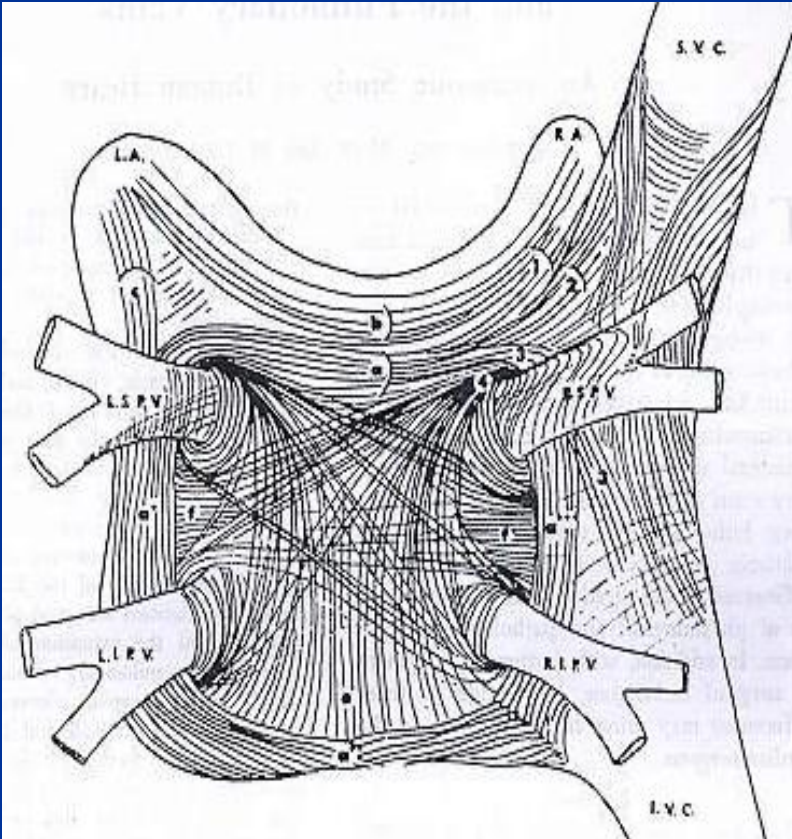
Safety Outcomes	Overall		
	t	n/N	%
Mortality			
Death overall	33	120/4291	2.8
Sudden death	21	18/2900	0.6
Treatment-related death	22	15/3179	0.5
Not treatment-related death	20	40/3023	1.3
Adverse events			
CV events	10	58/1572	3.7
Bradycardia	19	44/2349	1.9
GI	16	97/1499	6.5
Neuropathy	4	48/969	5.0
Thyroid dysfunction	5	19/576	3.3
Torsades	12	16/2238	0.7
Q-T* prolongation	12	5/2034	0.2
Total No. of patients with events	24	989/3318	29.8
Discontinuations			
Total	32	1035/4347	23.8
Due to AE	32	384/3682	10.4
Due to inefficacy	12	229/1694	13.5
Due to noncompliance	4	19/457	4.2

t indicates No. of treatment groups; n, No. of patients with this adverse event; N, No. of patients evaluated in studies reporting this adverse event; %, percentage of patients with adverse event of interest; CV, cardiovascular; GI, gastrointestinal; AE, adverse events.

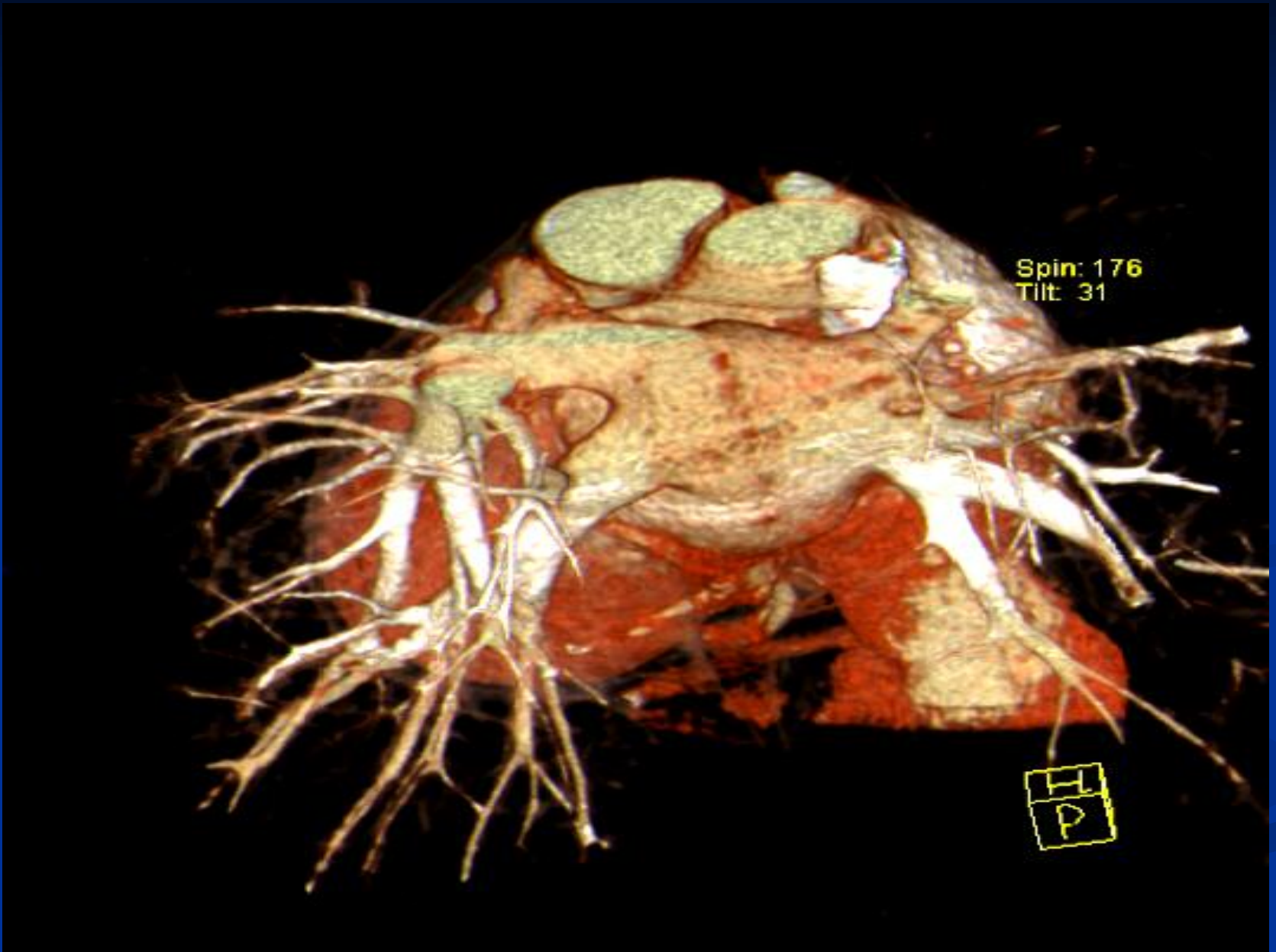
*Interval of the Q and T waves.

PVi

- Pulmoner ven izolasyonu AF ablasyonunun temel taşıdır.
- Hedef PV ile LA'nın elektriksel izolasyonudur.

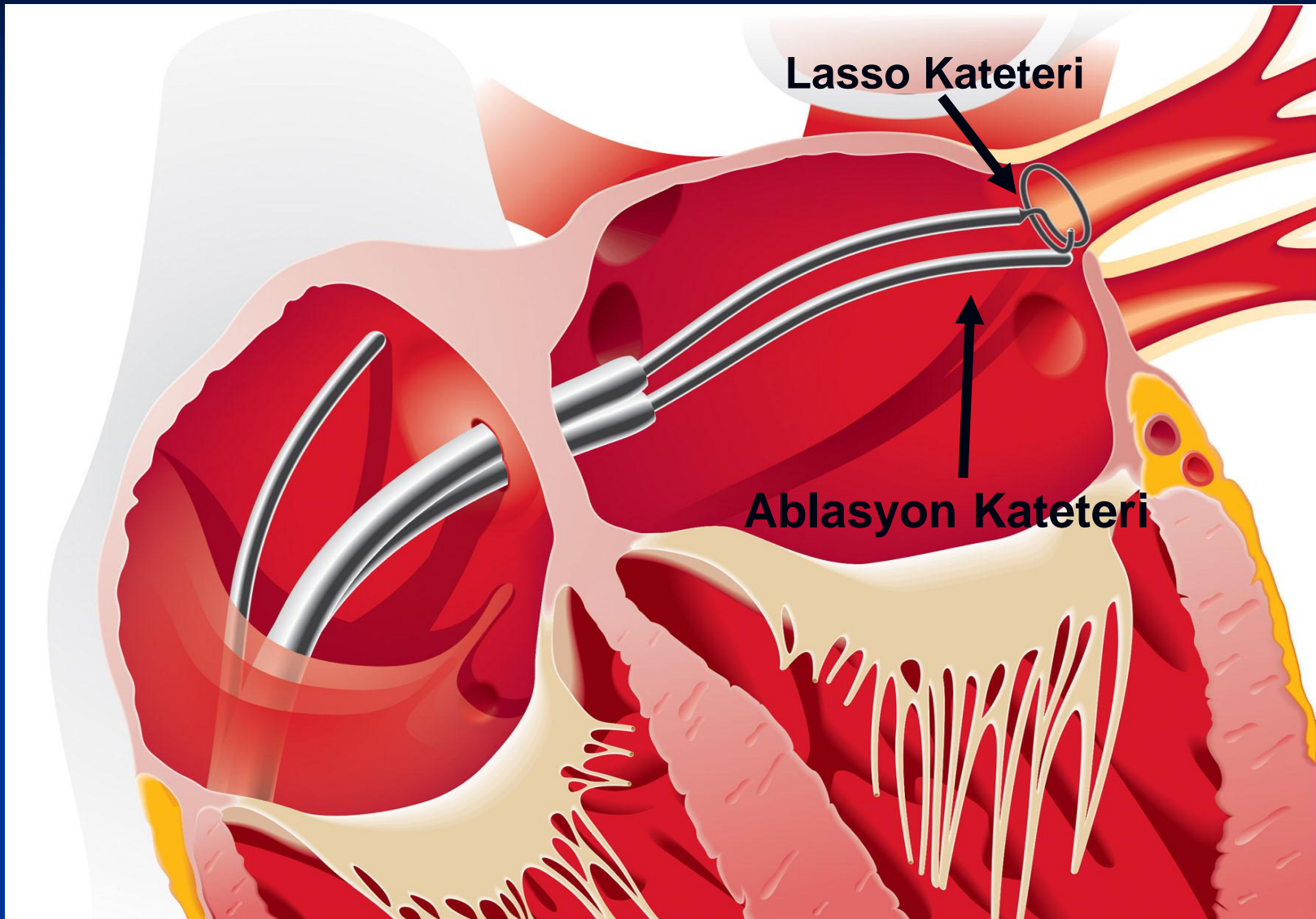


- **NSR sağlanırsa;**
 - Morbidite azalır
 - QOL düzelir
 - Fonksiyonel kapasite düzelir
 - Mortalite azalır?
- **Başarı oranı: %29-85**



Spin: 176
Tilt: 31

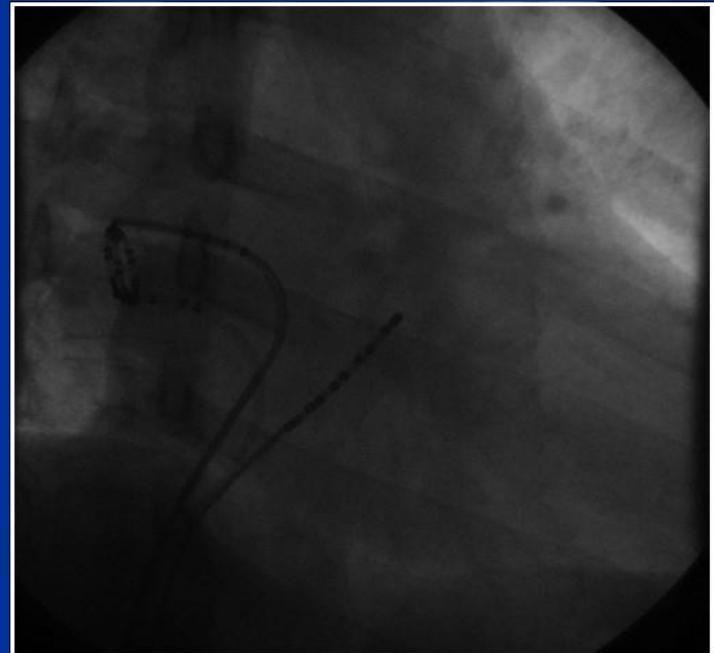
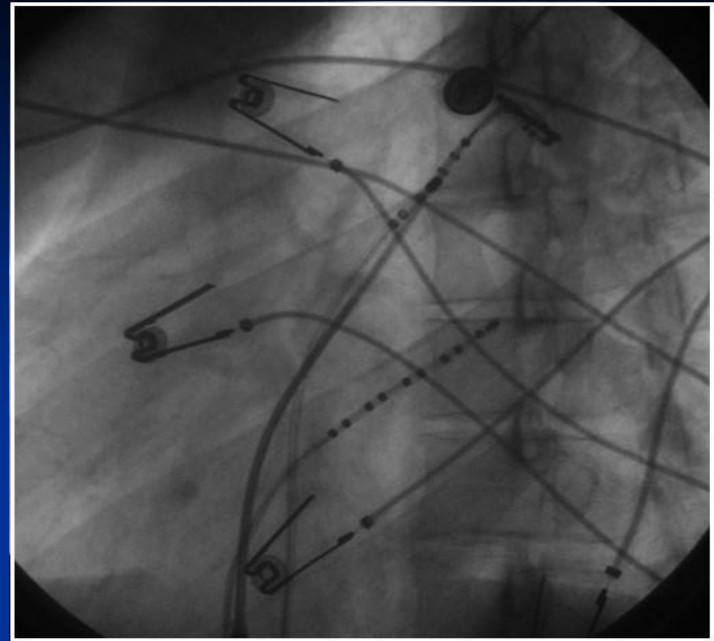
H
P



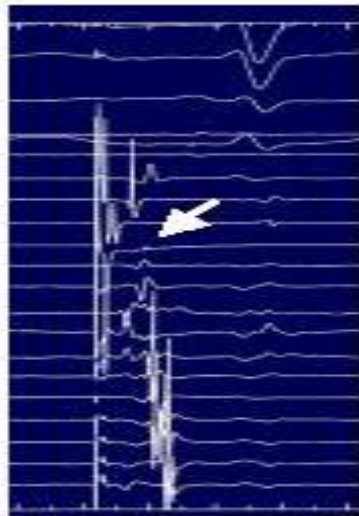
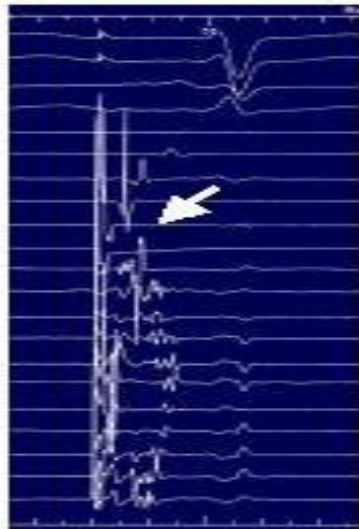
Lasso Kateteri

Ablasyon Kateteri

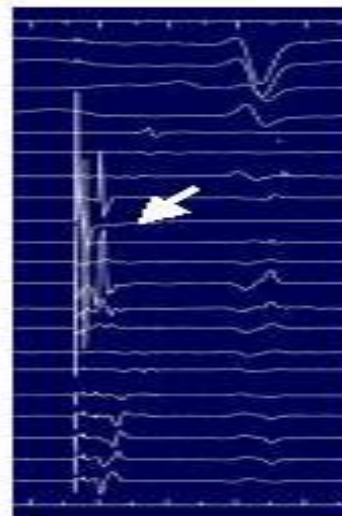
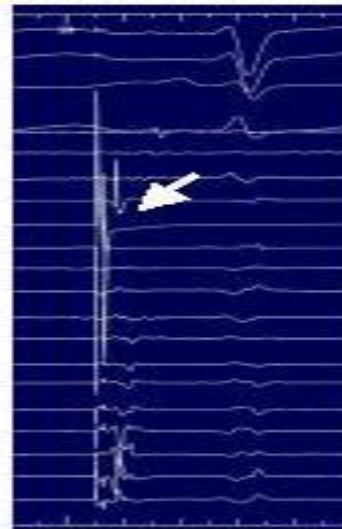
Lasso kateter

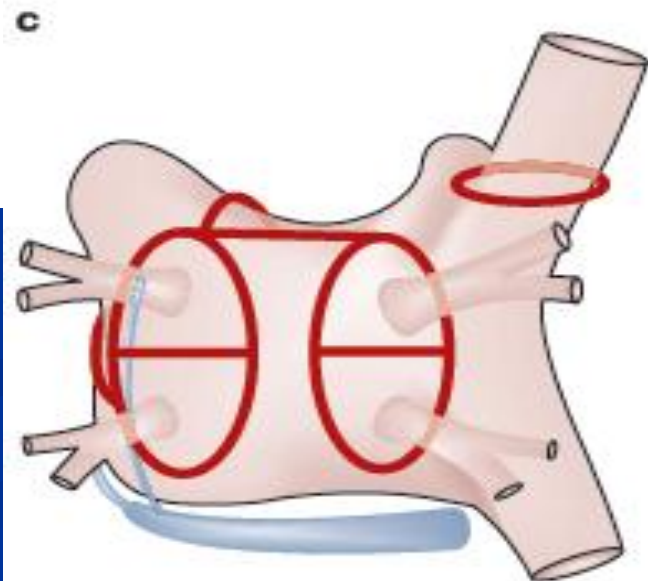
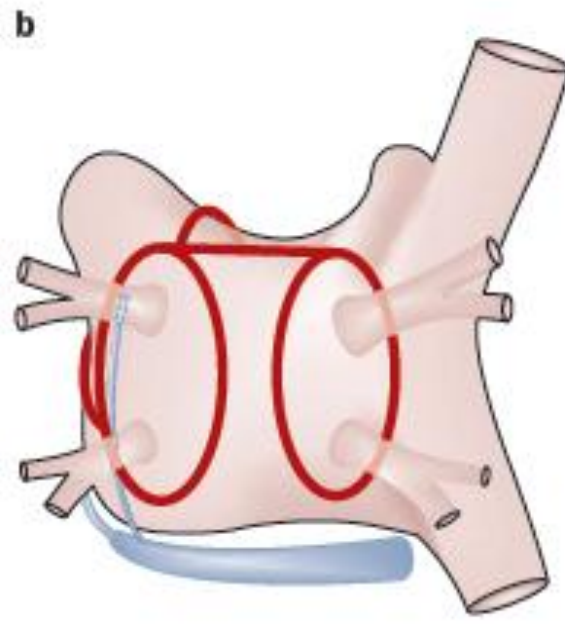
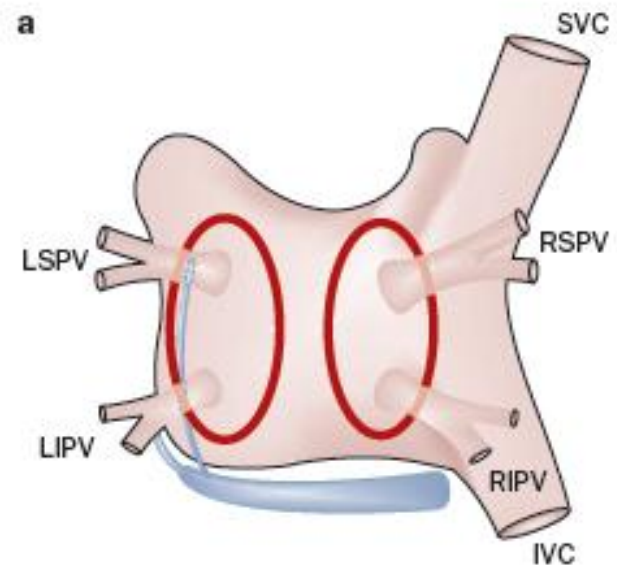


PRE



POST





AF ablasyonu komplikasyonları

Majör Komplikasyonlar

(Ort %10)

- PV stenozu
- Atriyoözefageal fistül
- SVO
- Sol atriyal taşikardi

Diğer komplikasyonlar

- Frenik sinir hasarı
- Katerin (Lasso) takılması
- Cx arter oklüzyonu
- Perikardiyal efüzyon
- Perikardiyal tamponad
- Radyasyon hasarı
- Giriş yeri ile ilgili vasküler komplikasyonlar



**Başarılı AF ablasyonu için
görüntüleme çok önemlidir**

Başarılı AF ablasyonu için görüntüleme çok önemlidir

- Akut başarı
- Nüks
- Komplikasyonların önlenmesi
- İşlem ve fluoroskopi süresinin kısaltılması

**AF ABLASYONUNDA KULLANILAN ÜÇ
BOYUTLU MAPPING VE NAVİGASYON
SİSTEMLERİ**

Ensite NavX

CARTO

En-Site

```
graph TD; A[En-Site] --> B[Ensite Array]; A --> C[Ensite NavX];
```

Ensite Array™

(Non – contact mapping)
(Temassız haritalama)

Ensite NavX™

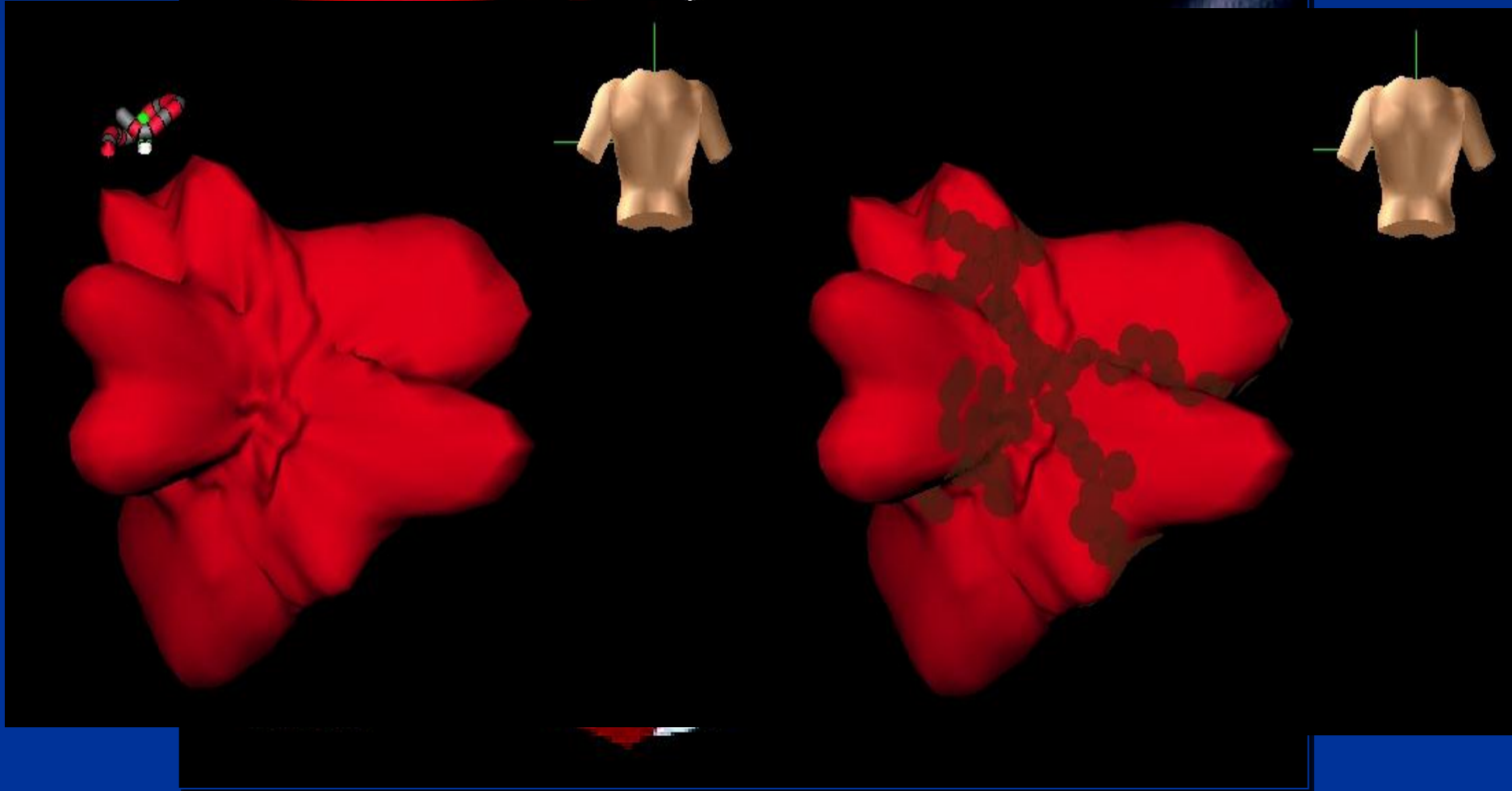
(Contact mapping)
(Temaslı haritalama)

AF ablasyonunda En-Site

- 3 boyutlu anatomik haritalama
- Voltaj haritalama
- Fluoroskopisiz kateter navigasyonu

AF ablasyonunda En-Site

- LA, PV, LAA, CS, RA anatomisi
- PV ostiumunun belirlenmesi
- PV-Mitral anulus ablasyon hattı
- Roof line ablasyon hattı
- CFAE mapping
- Özefagus lokalizasyonu
- Aorta lokalizasyonu
- AF'ye eşlik eden aritmilerin (Tipik AFL, AT) ablasyonu
- Transseptal ponksiyon









NavX

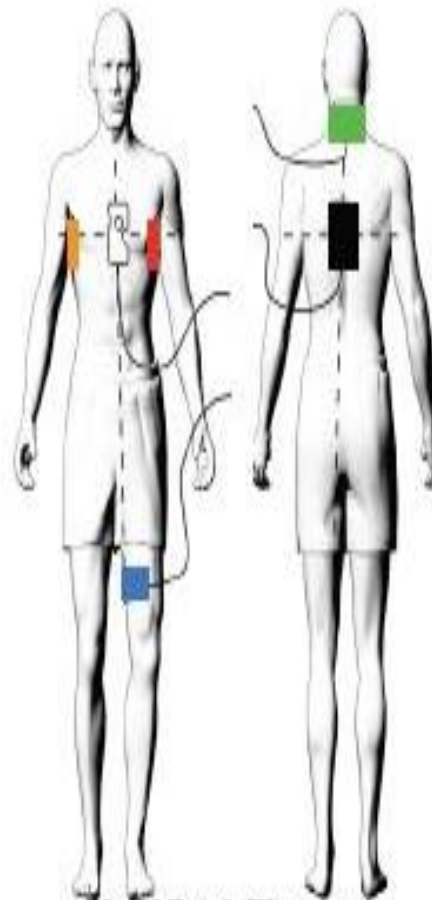
- Empedans bazlı bir görüntüleme sistemidir.
- Hastanın vücuduna 6 adet patch yapıştırılır.
- Patchler ile kateter elektrodları arasında devamlı düşük enerjili, yüksek frekanslı elektrik akımı vardır.
- Kateter hareketi sonucunda kateter ile patchler arasında ortaya çıkan impedans değişikliği kateterin x,y,z eksenlerinde üç boyutlu hareketinin izlenmesine imkan verir.



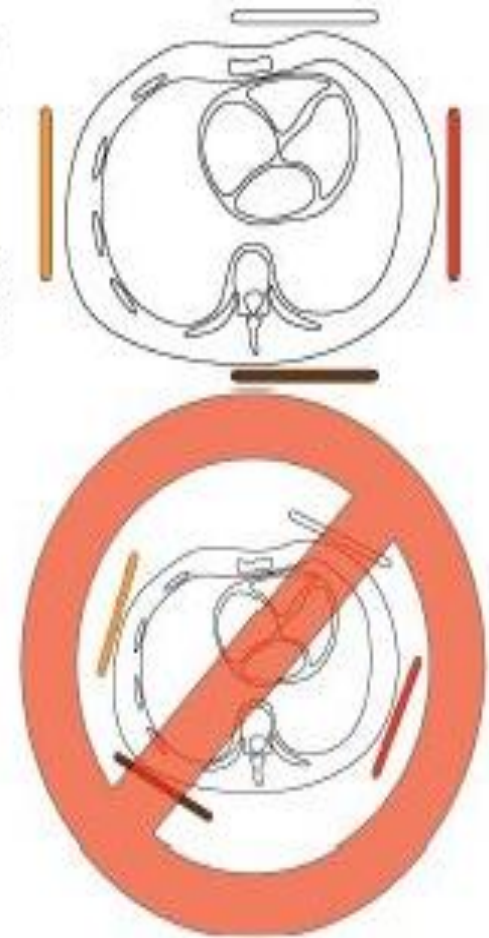
Attach the NavX patches as follows:

-  Back of Neck
-  Right side
-  Left side
-  Back
-  Front (middle of chest) slightly to left
(This patch features cutouts to allow for proper ECG electrode positioning).
-  Left Leg (inner thigh)

Once the patches are secured, the color coded, labeled connections can be made to the NavX cable.

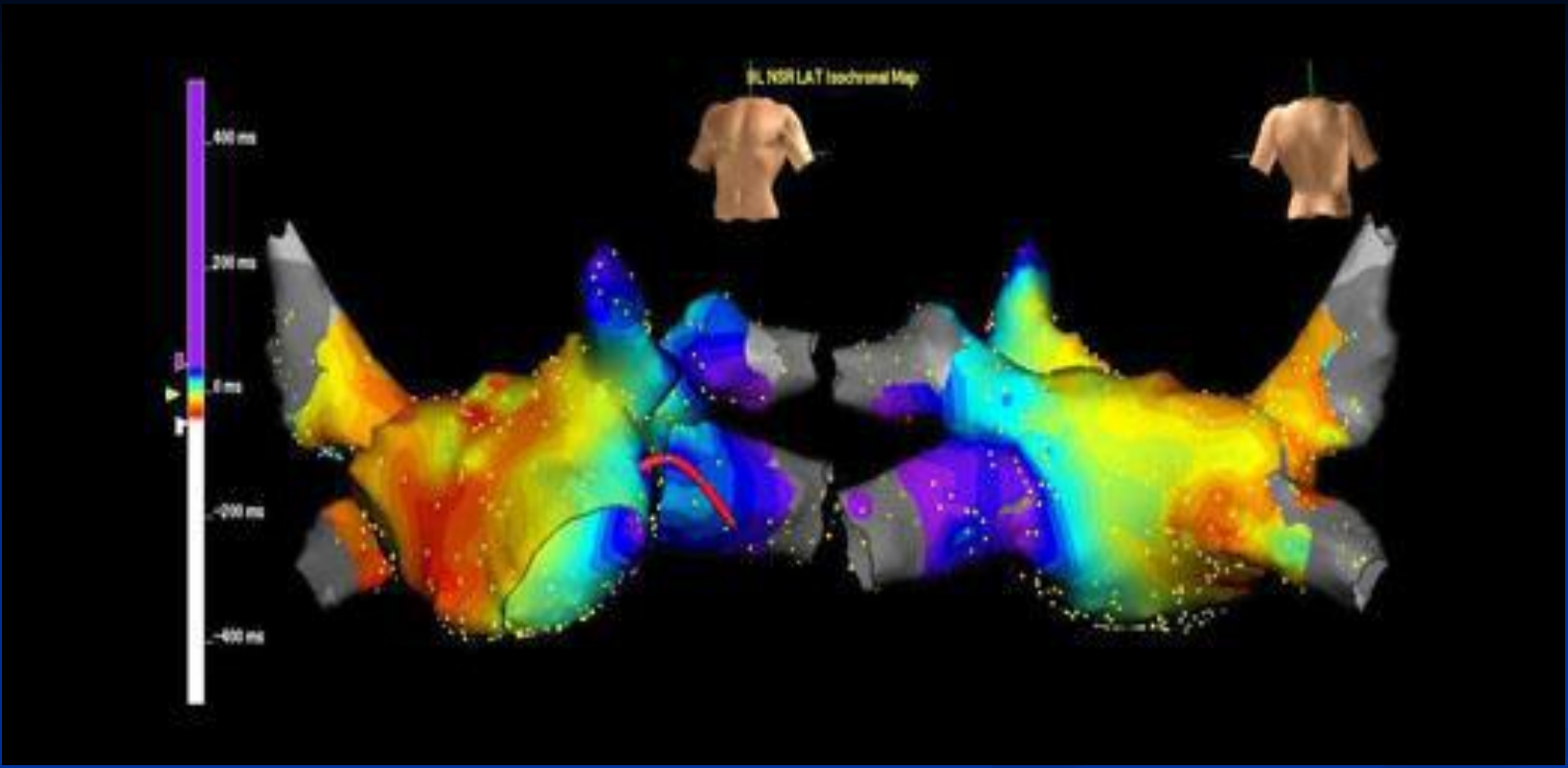


NavX Patch Placement

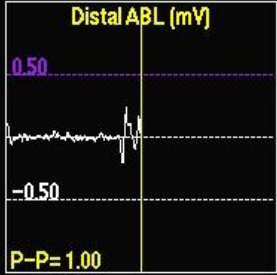


EnSite Velocity™ Advanced Mapping System'in Avantajları

- Aynı anda anatomik ve elektriksel mapping
- Aynı anda hem review hem de real-time görüntü izlenebilir
- Aynı anda farklı kateterlerin birden fazla elektrodundan kayıt ve görüntü alınabilir
- Sampling rate yüksektir (mapping kalitesinde artış)

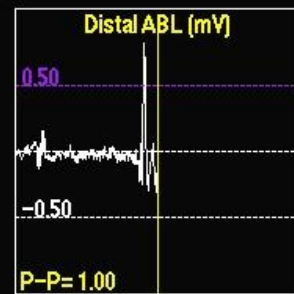
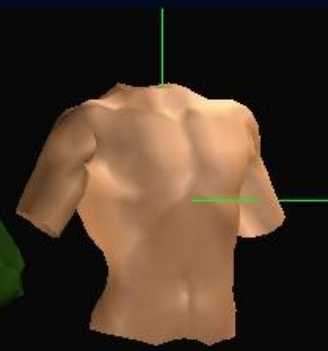
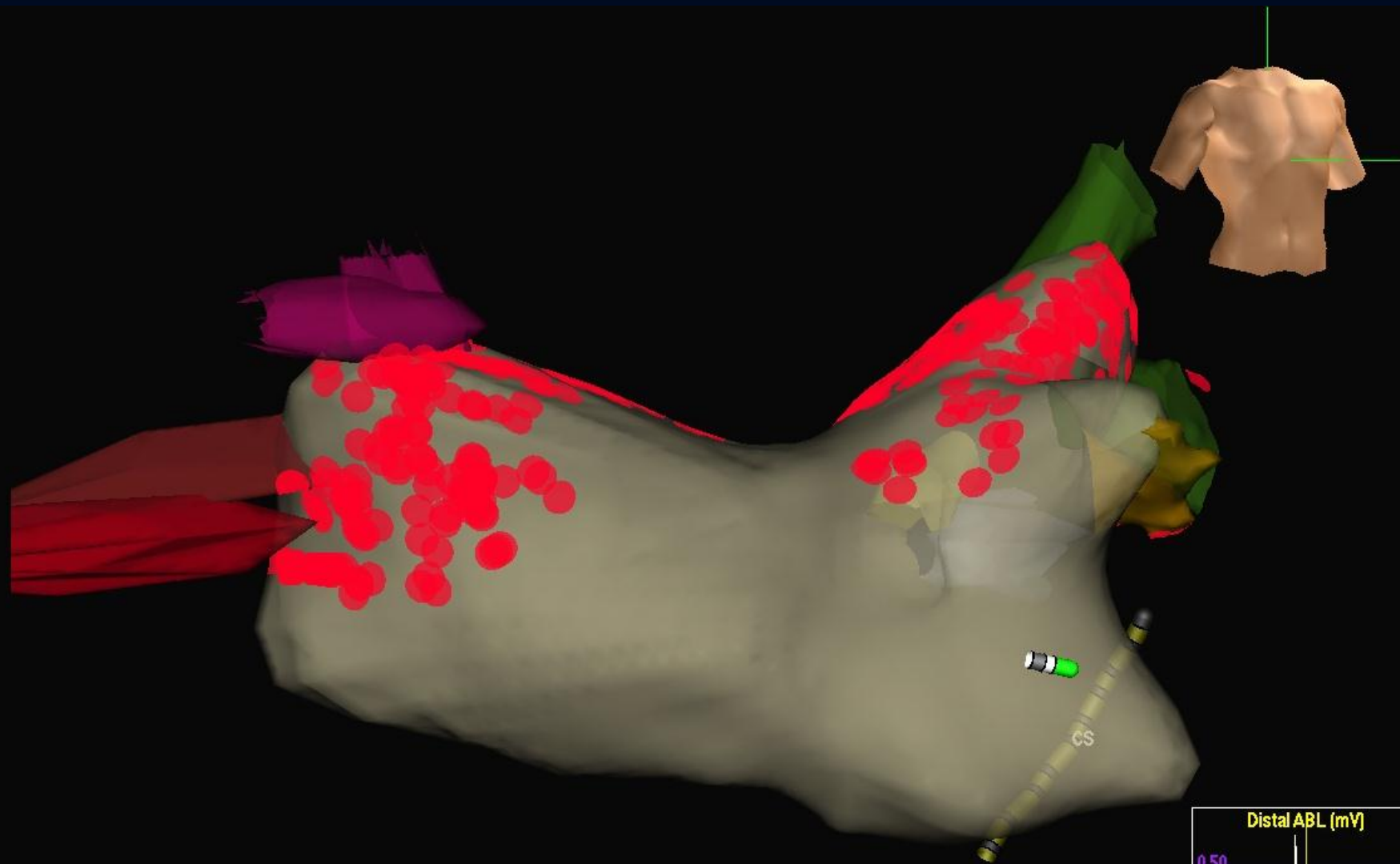


- 3 boyutlu kateter hareketleri hızlıdır.
- Gerçeğe çok yakın bir görüntü
 - Tüm kateterlerin tüm elektrodları saniyede 200 defa güncellenmektedir

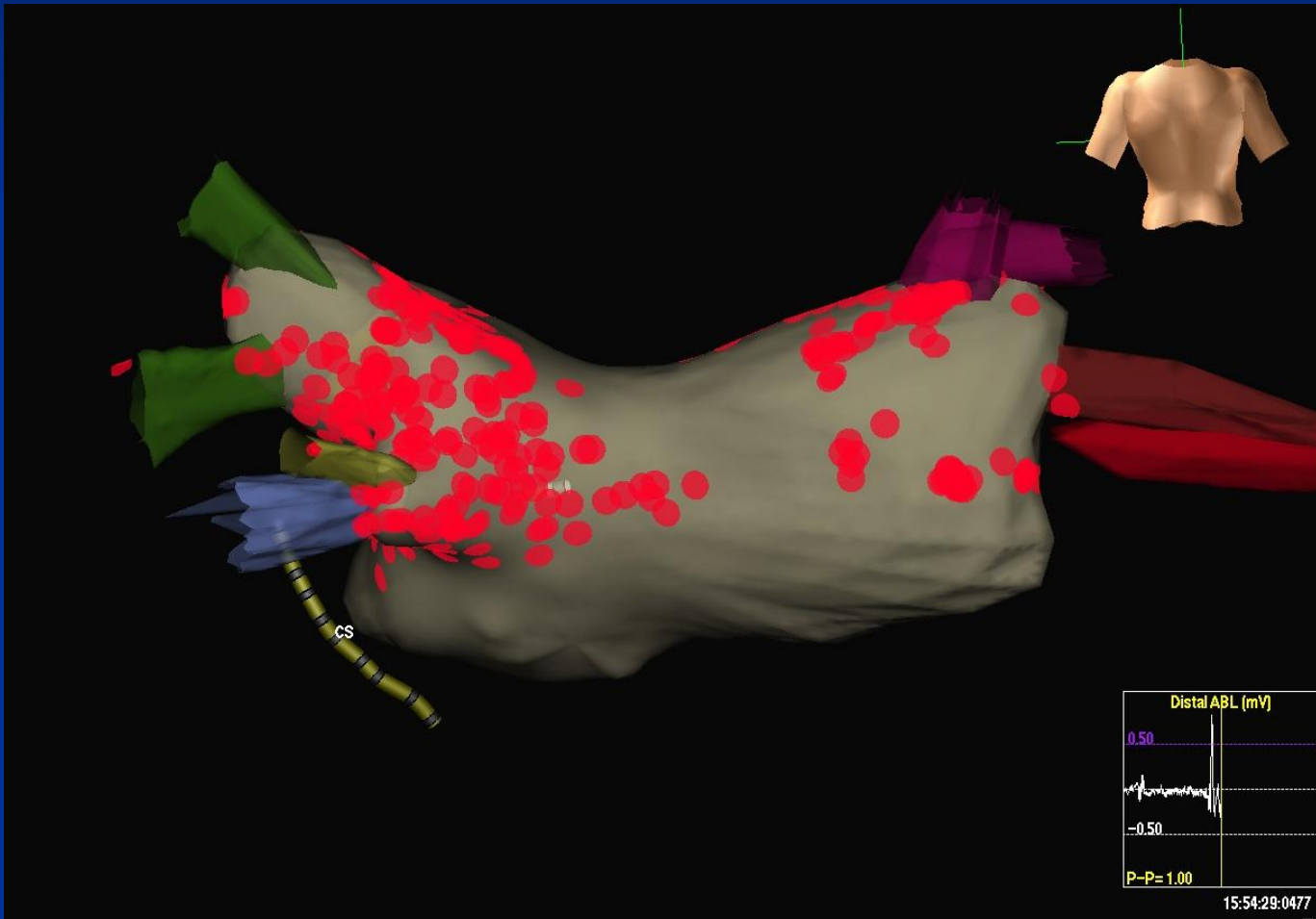


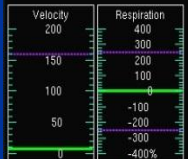
12:33:48:1003



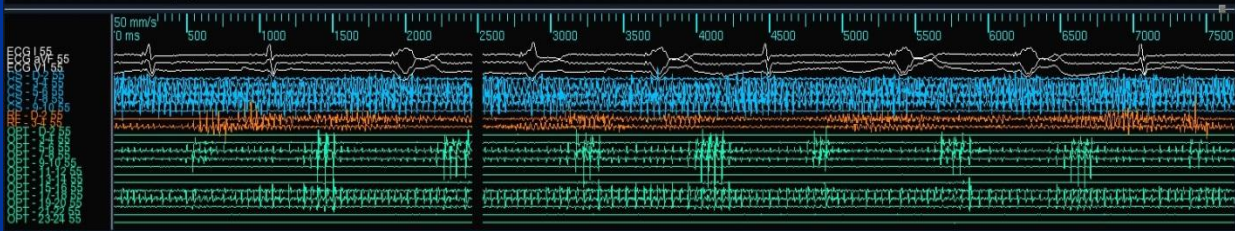


15:54:29:0477

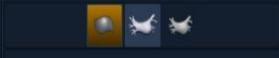




Electrode spacing: | Distal | D - 2 | 2 - 3 | 3 - 4 |
 | Nominal (mm) | 4.0 | 2.0 | 5.0 | 2.0 |



Record



Model

Surfaces	Visible	Selected
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
LA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Finish Model

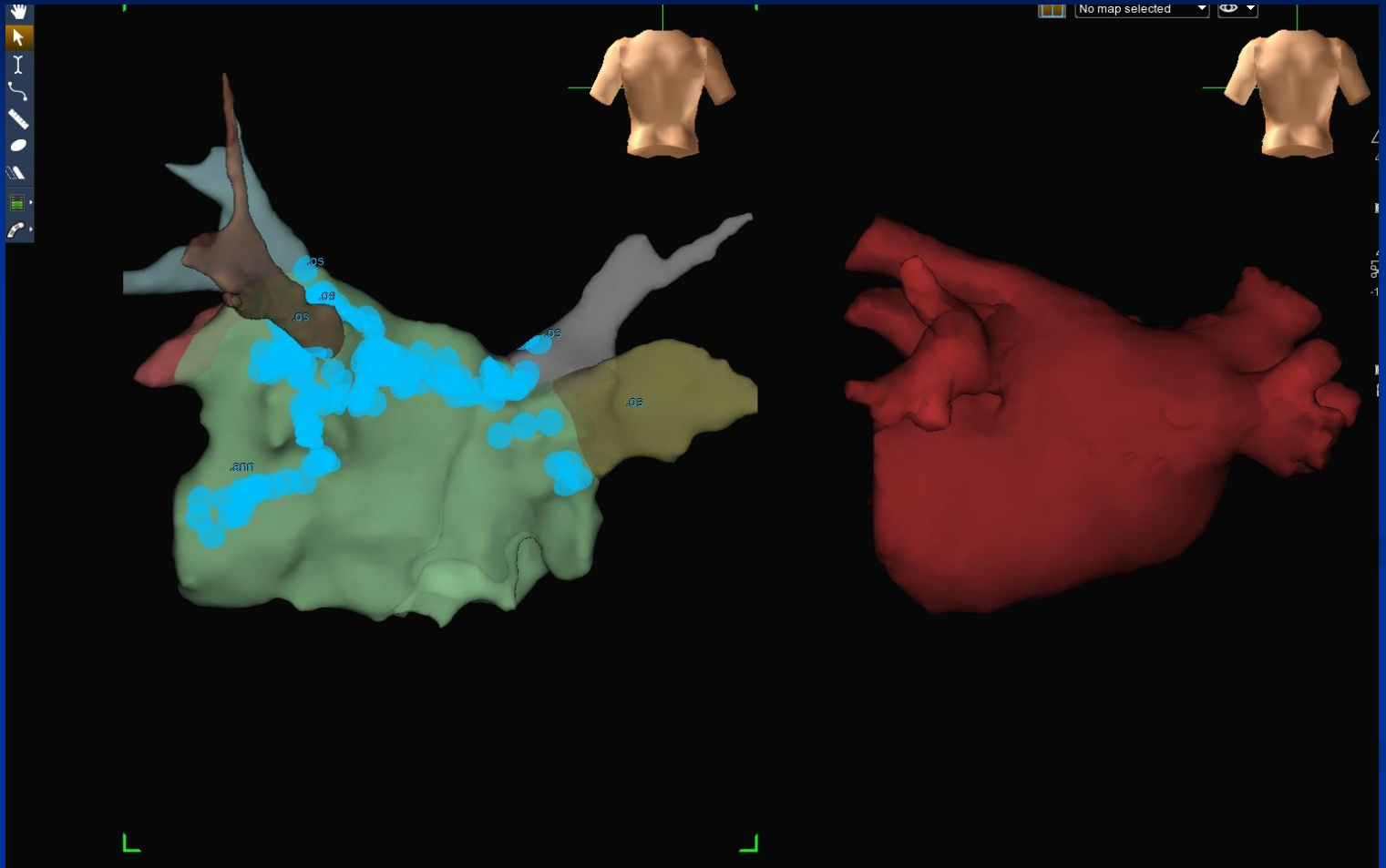
From Active EnGuide Stop Collecting Points

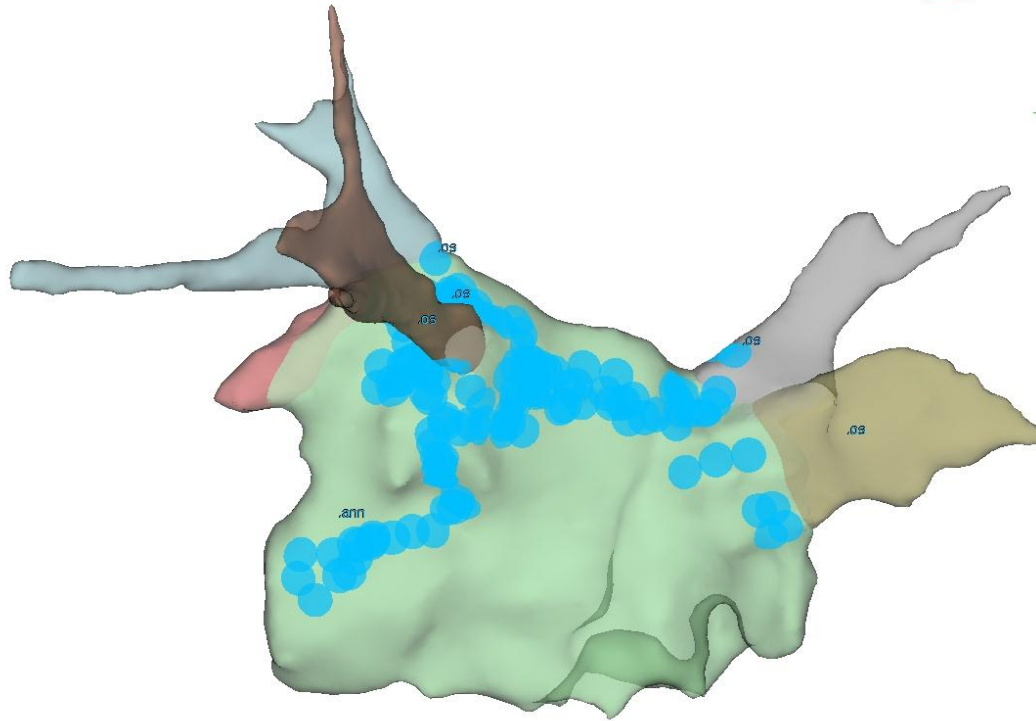
Name LA
 Group Left
 Type High Low OneModel
 Fill 10

Center Auto
 Points
 Delete Points Undo Delete
 Discard Changes

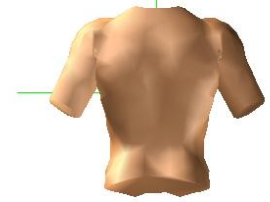
Show Field Scaling



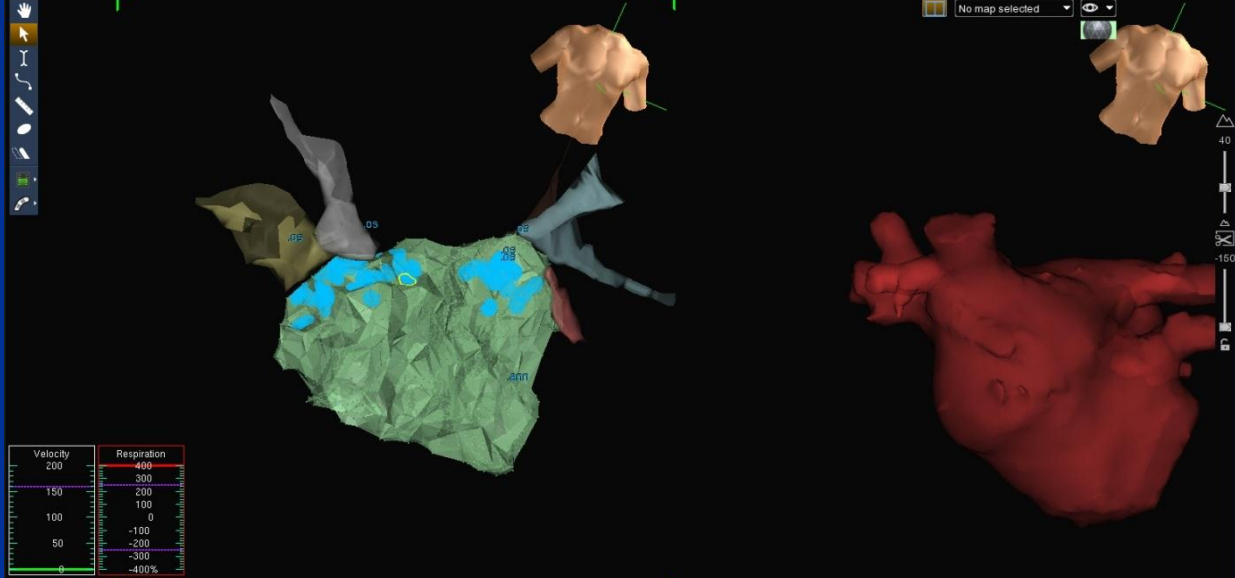




No map selected

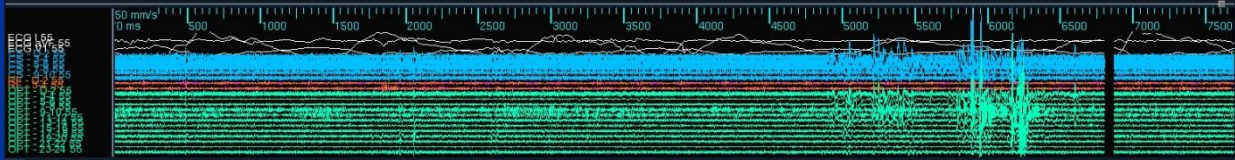


RF D Feb 27, 2013 04:17:19 PM AF No map selected



Velocity	Respiration
200	400
150	300
100	200
50	100
	0
	-100
	-200
	-300
	-400

Electrode spacing: [Distal | D - 2 | 2 - 3 | 3 - 4 | Nominal (mm) 4.0 2.0 5.0 2.0]



Record

- Model
- Surfaces
 - Left
 - LA ✓
 - LAA ✓
 - LSPV ✓
 - LIPV ✓
 - RSPV ✓
 - RIPV ✓

Finish Model

From Active EnGuide Collect Points

Name LA

Group Left

Type Patch Connect

Fill

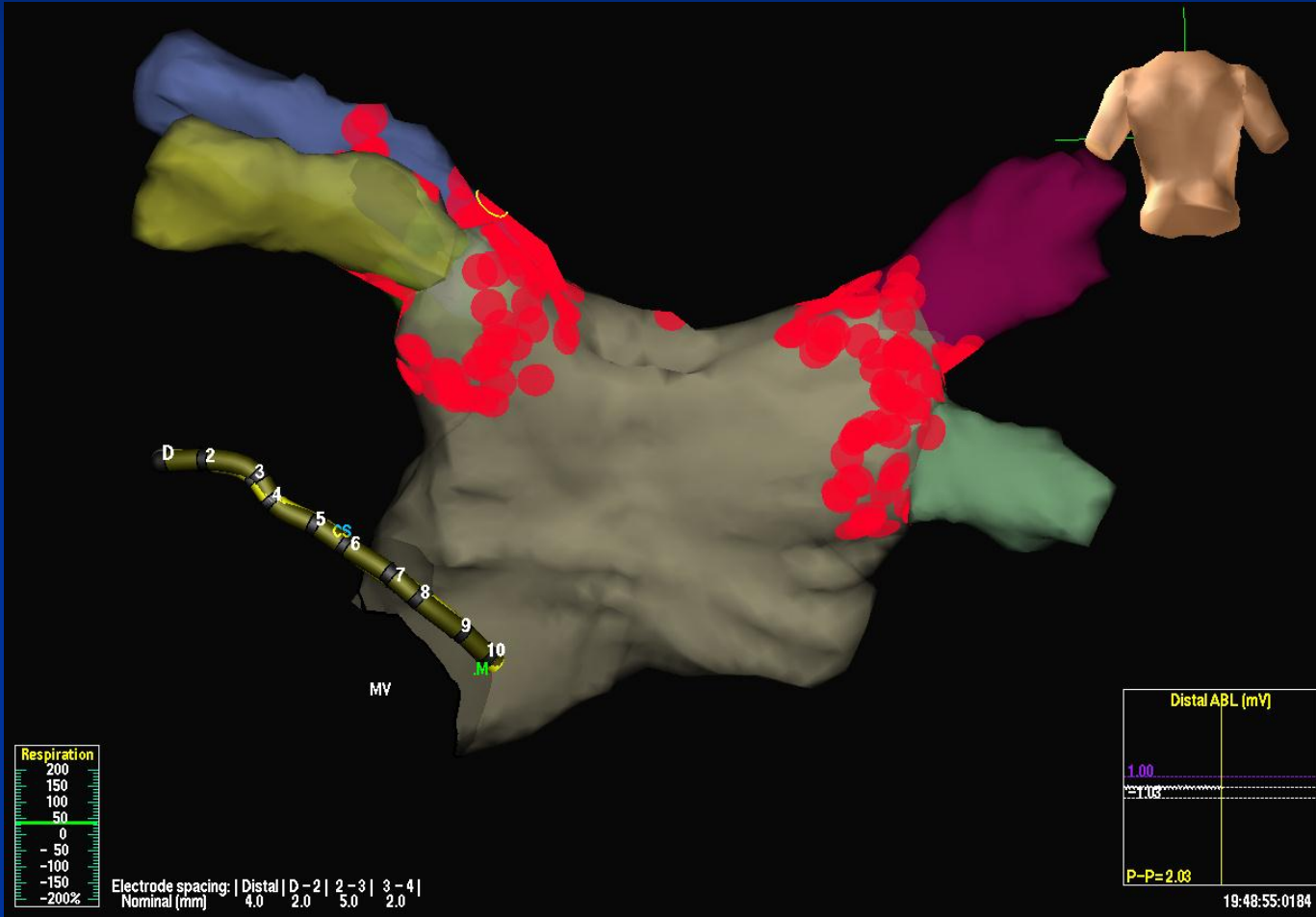
Center Au

✓

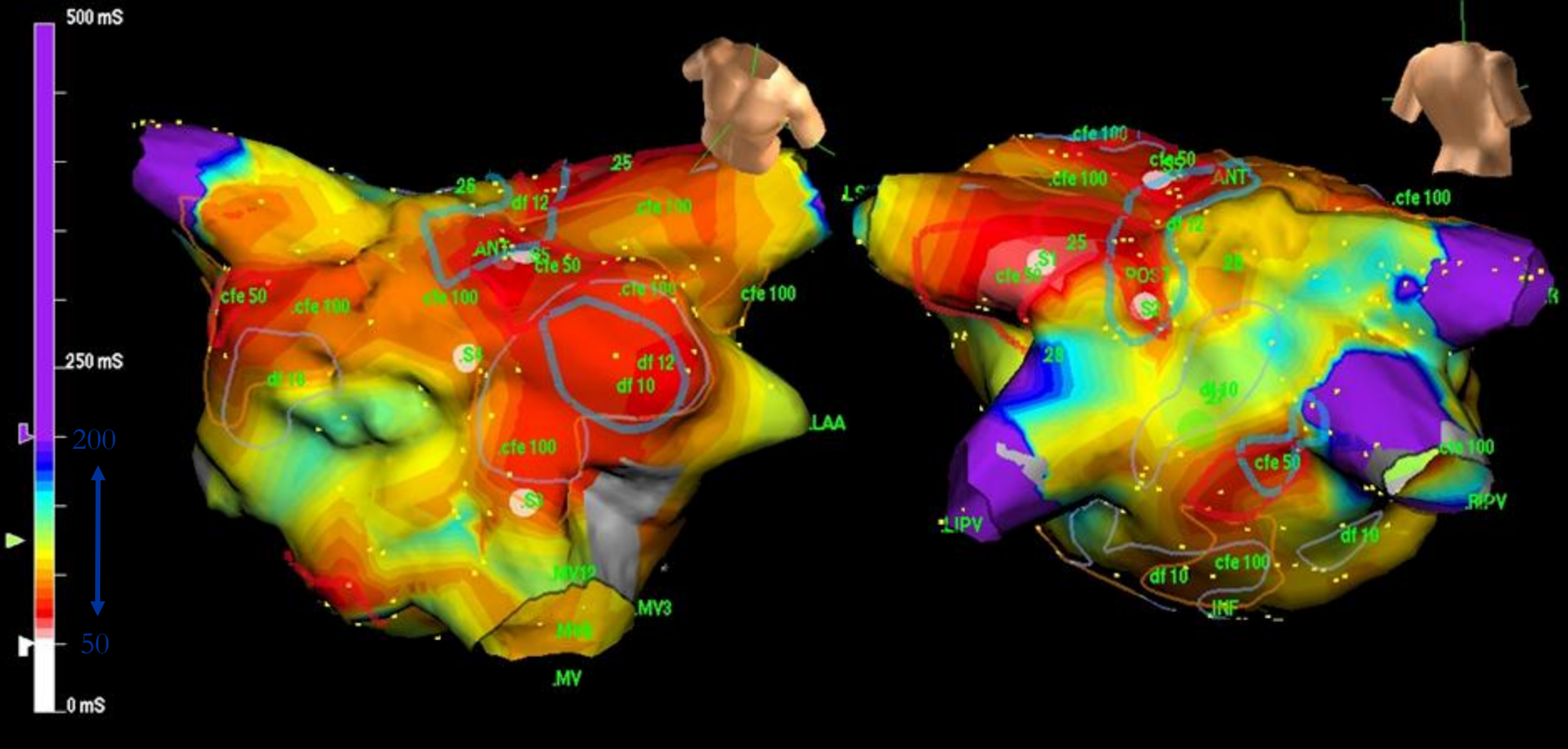
Delete

Show Fit

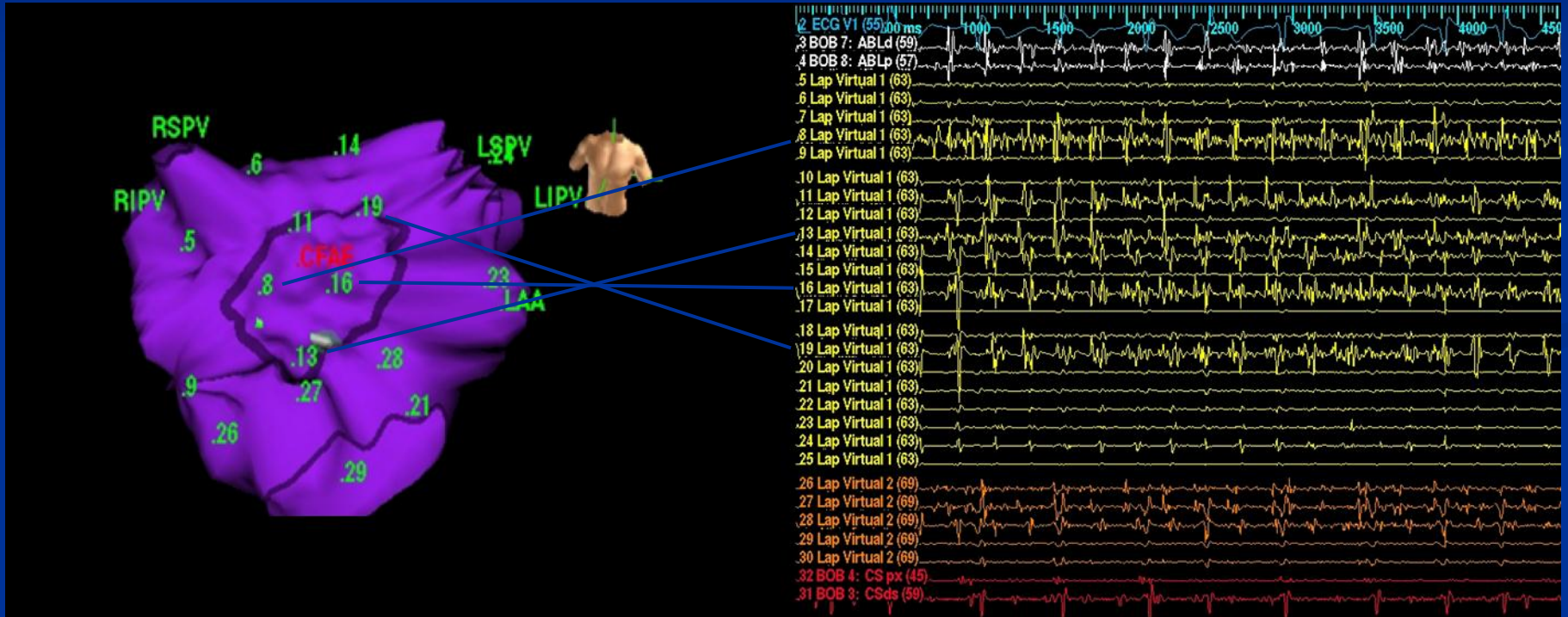
Front Patch Disconnected



CFE Map (Mean Cycle Length)



Non-Contact Mapping: CFAE-Map



ÜÇ BOYUTLU HARİTALAMA VE NAVİGASYON SİSTEMLERİ

SİSTEM	PRENSİP	AKTİVASYON HARİTALAMA	VOLTAJ HARİTALAMA
CARTO	Manyetik alan	Var	Var
ENSITE NavX	Elektriksel alan	Var	Var

ÜÇ BOYUTLU HARİTALAMA VE NAVİGASYON SİSTEMLERİ

SİSTEM	ÇOKLU KATETER	ÖZEL KATETER	İMAJ İNTEGRASYONU
CARTO	Hayır*	Evet	Var
ENSITE NavX	Evet	Hayır	Var

ÜÇ BOYUTLU HARİTALAMA VE NAVİGASYON SİSTEMLERİ

SİSTEM	AVANTAJ	DEZAVANTAJ
CARTO	Aktivasyon, voltaj haritalama Anatomik görüntü	Stabil aritmi gerekiyor
ENSITE NavX	Çok elektrodu aynı anda gösteriyor Anatomik görüntü Aktivasyon, voltaj haritalama	Stabil aritmi gerektiriyor

Ensite Velocity System

Carto 3 System

Doğruluk

< 1 mm

~ 1mm

Görüntüleme

İstediğiniz kadar kateter
128 elektrod- Özel kat. yok

En fazla 5 kateter
Özel kateter gerekir.

Hızlılık

Artık hızlı (One map)

Hızlı

CRYOBALON

- Başarı oranları benzer
- Avantaj
 - Nispeten kolay, son-noktası basit, daha kısa
 - Komplikasyon daha az
- Dezavantaj
 - Substrat ablasyonu yapılamaz
 - CFE Map yapılamaz
 - Roof, MV, CS ablasyon hattı yapılamaz.
 - PV anatomik varyasyonları
 - PV ostiumları büyük, küçük, oval, bitişik, çapraz vb varyasyonda olabilir
 - Maliyet

A randomised comparison of Cartomerge vs. NavX fusion in the catheter ablation of atrial fibrillation: The CAVERN Trial

Malcolm C. Finlay • Ross J. Hunter • Victoria Baker • Laura Richmond • Farai Goromonzi • Glyn Thomas • Kim Rajappan • Edward Duncan • Muzahir Tayebjee • Mehul Dhinoja • Simon Sporton • Mark J. Earley • Richard J. Schilling

Abstract

Purpose Integration of a 3D reconstruction of the left atrium into cardiac mapping systems can aid catheter ablation of atrial fibrillation (AF). The two most widely used systems are NavX Fusion and Cartomerge. We aimed to compare the clinical efficacy of these systems in a randomised trial.

Methods Patients undergoing their first ablation were randomised to mapping using either NavX fusion or CartoMerge. Pulmonary vein isolation by wide area circumferential ablation was performed for paroxysmal AF with additional linear and fractionated potential ablation for persistent AF. Seven-day Holter monitoring was used for confirmation of sinus rhythm maintenance at 6 months.

Results Ninety-seven patients were randomised and underwent a procedure. There was no difference in the primary endpoint of freedom from arrhythmia at 6 months (51% in the Cartomerge group vs. 48% in the NavX Fusion group, $p=0.76$). 3D image registration was faster with Cartomerge (24 vs. 33 min, $p=0.0001$), used less fluoroscopic screening (11 vs. 15 min, $p=0.039$) with a lower fluoroscopic dose (840 vs. 1,415 mGyCm², $p=0.043$). There was a strong trend to lower ablation times in the Cartomerge group, overall RF time (3,292 s vs. 4,041, $p=0.07$). Distance from 3D lesion to 3D image shell was smaller in the Cartomerge group (2.7 ± 1.9 vs. 3.3 ± 3.7 mm, $p<0.001$).

Conclusions Cartomerge appears to be faster and uses less fluoroscopy to achieve registration than NavX Fusion, but overall procedural times and clinical outcomes are similar.

CARTO-guided vs. NavX-guided pulmonary vein antrum isolation and pulmonary vein antrum isolation performed without 3-D mapping: effect of the 3-D mapping system on procedure duration and fluoroscopy time

Yaariv Khaykin · Richard Oosthuizen ·
Lauren Zarnett · Zaev A. Wulffhart · Bonnie Whaley ·
Carol Hill · David Giewercer · Atul Verma

Abstract

Purpose Pulmonary vein antrum isolation (PVAI) guided by intracardiac echocardiography and a roaming circular mapping catheter is an effective treatment modality for atrial fibrillation. Unfortunately, the complexity of this technique leads to long procedure times and high fluoroscopy exposure. This study examined the effect of two different mapping systems on the procedural characteristics and clinical outcomes of PVAI for atrial fibrillation.

Methods Referred patients underwent PVAI using a magnetic-based 3-dimensional (3-D) mapping (CARTO® System; group 1), a current-based system (EnSite NavX™; group 2), or fluoroscopy without 3-D mapping (group 3) between February 2004 and November 2009.

Results Data were analyzed from 71 patients in group 1, 165 patients in group 2, and 197 patients in group 3. Baseline characteristics and measured long-term outcomes did not differ between the groups. Although patients in group 1 were more likely to undergo a concurrent flutter ablation ($P=0.01$), they had significantly shorter procedure time, fluoroscopy time, and radiofrequency energy delivery time compared with group 2 and 3 patients. No difference was detected among the groups with respect to recurrence, mean time to recurrence, or number of PVAI procedures.

Conclusions Use of a magnetic-based 3-D mapping system, which allows precise spatial localization of the ablation catheter, was associated with significantly lower procedure time, fluoroscopy duration, and radiofrequency energy delivery time during catheter ablation for atrial fibrillation compared with a current-based system and ablation performed without 3-D mapping, although measured short- and long-term clinical outcomes were similar.