AF ABLASYONU DEVRİMSEL BİR TEDAVİDİR

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- Atriyal fibrilasyon (AF) en sık rastlanılan sürekli aritmidir.
- AF artmış kardiyak morbidite ve mortalite ile ilişkilidir.

Cardiovascular morbidity and mortality associated with atrial fibrillation

Event	Association with AF
Death	Increased mortality, especially cardiovascular mortality due to sudden death, heart failure or stroke.
Stroke	20–30% of all strokes are due to AF. A growing number of patients with stroke are diagnosed with 'silent', paroxysmal AF.
Hospitalizations	10–40% of AF patients are hospitalized every year.
Quality of life	Quality of life is impaired in AF patients independent of other cardiovascular conditions.
Left ventricular dysfunction and heart failure	Left ventricular dysfunction is found in 20–30% of all AF patients. AF causes or aggravates LV dysfunction in many AF patients, while others have completely preserved LV function despite long-standing AF.
Cognitive decline and vascular dementia	Cognitive decline and vascular dementia can develop even in anticoagulated AF patients. Brain white matter lesions are more common in AF patients than in patients without AF.

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Ritim kontrolü stratejisi

- Primer korumada randomize çalışma yok, epidemiyolojik çalışmalarda AF risk faktörleri (HT, DM, sigara, uyku apnesi, obezite, metabolik sendrom, alkol) belirlenmiş.

- AF pekçok risk faktörü ve yapısal problemlerin kombinasyonuna sekonder ortaya çıkar.

- HT en önemli risk faktörü olsa da, HT tedavisinin dahi AF riskini azalttığı kanıtlanamamıştır.

Ritim kontrolü stratejisi

- Ritim vs. hız kontrolü çalışmaları morbidite ve mortalite yararı göstermemiştir.
  - Antiaritmiklerin yetersiz etkisi
  - Gruplar arasında yüksek crossover
  - Antiaritmik ilaçların tehlikeli proaritmik etkileri
- AFFIRM: Sinüs kontrolü sağlanan hastalarda mortalitede anlamlı azalma sağlanmıştır.
- Teorik olarak atriyal fibrilasyonu düşük komplikasyon ile tedavi eden bir ilaç veya yöntemin mortalite ve morbiditeyi azaltması gerekmektedir.

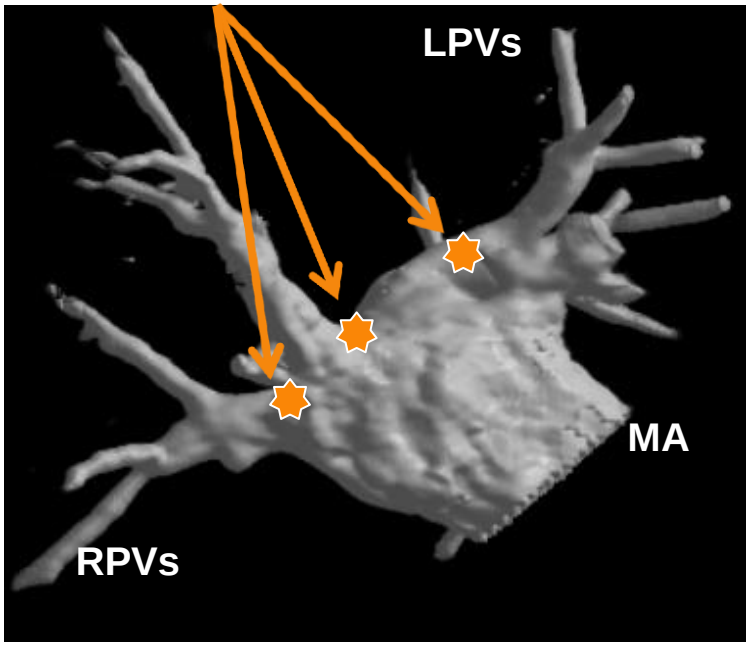
PV‘lerden kaynaklanan ektopik fokuslar

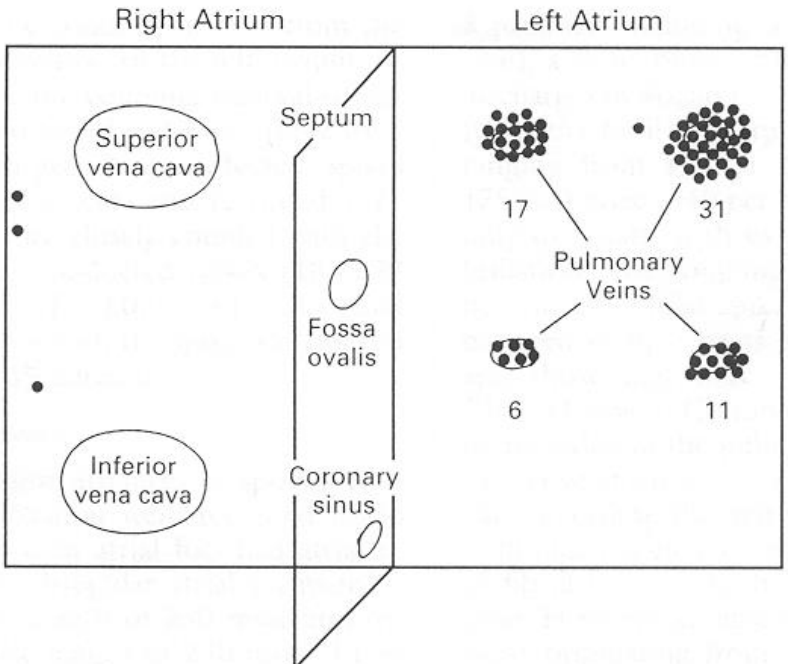
1998, Haissaguerre et al.

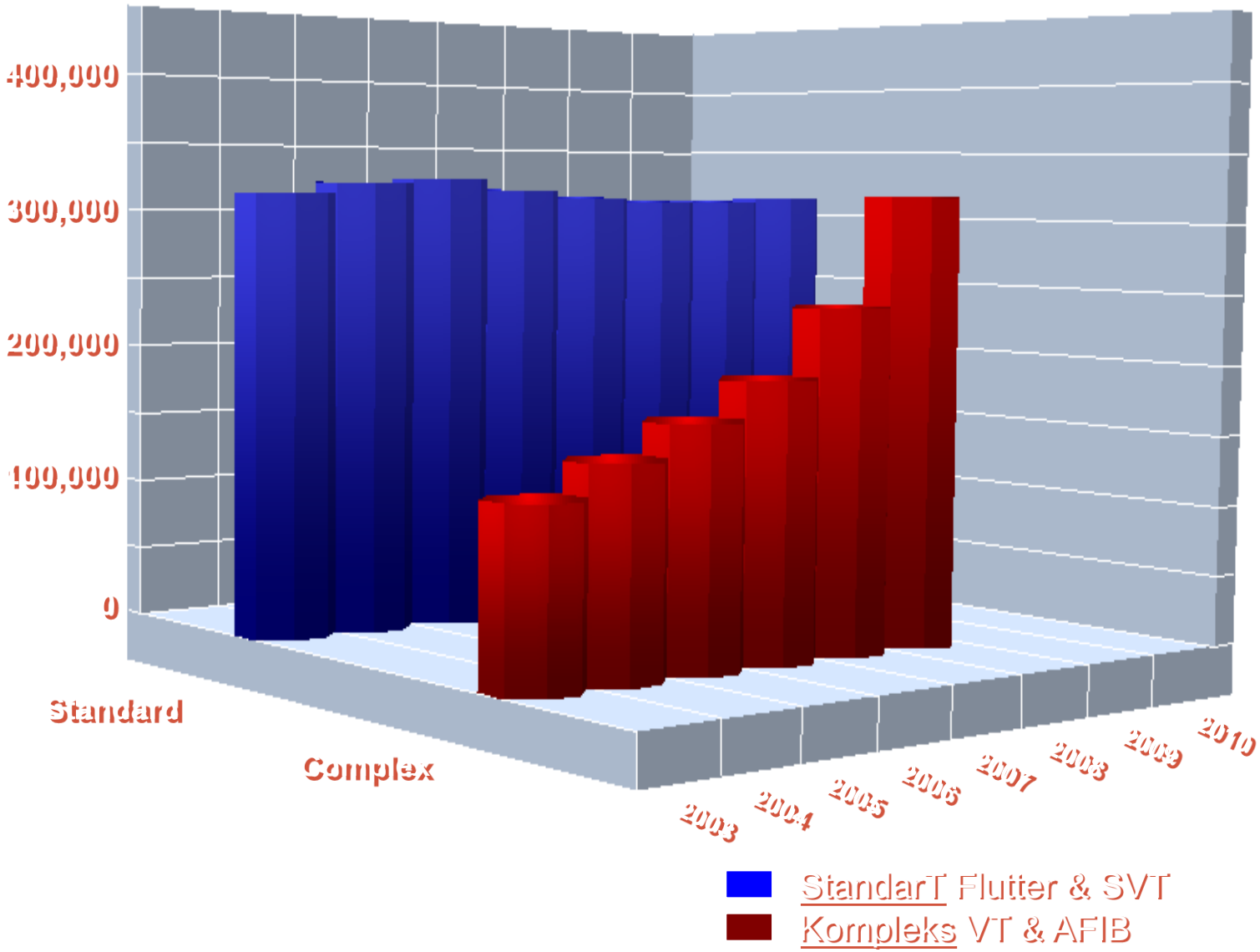
SPONTANEOUS INITIATION OF ATRIAL FIBRILLATION BY ECTOPIC BEATS ORIGINATING IN THE PULMONARY VEINS

MICHEL HAÏSSAGUERRE, M.D., PIERRE JAÏS, M.D., DIPEN C. SHAH, M.D., ATSUSHI TAKAHASHI, M.D., MÉLÈZE HOCINI, M.D., GILLES QUINIOU, M.D., STÉPHANE GARRIGUE, M.D., ALAIN LE MOUROUX, M.D., PHILIPPE LE MÉTAYER, M.D., AND JACQUES CLÉMENTY, M.D.

Ektopik Fokus Orijinleri



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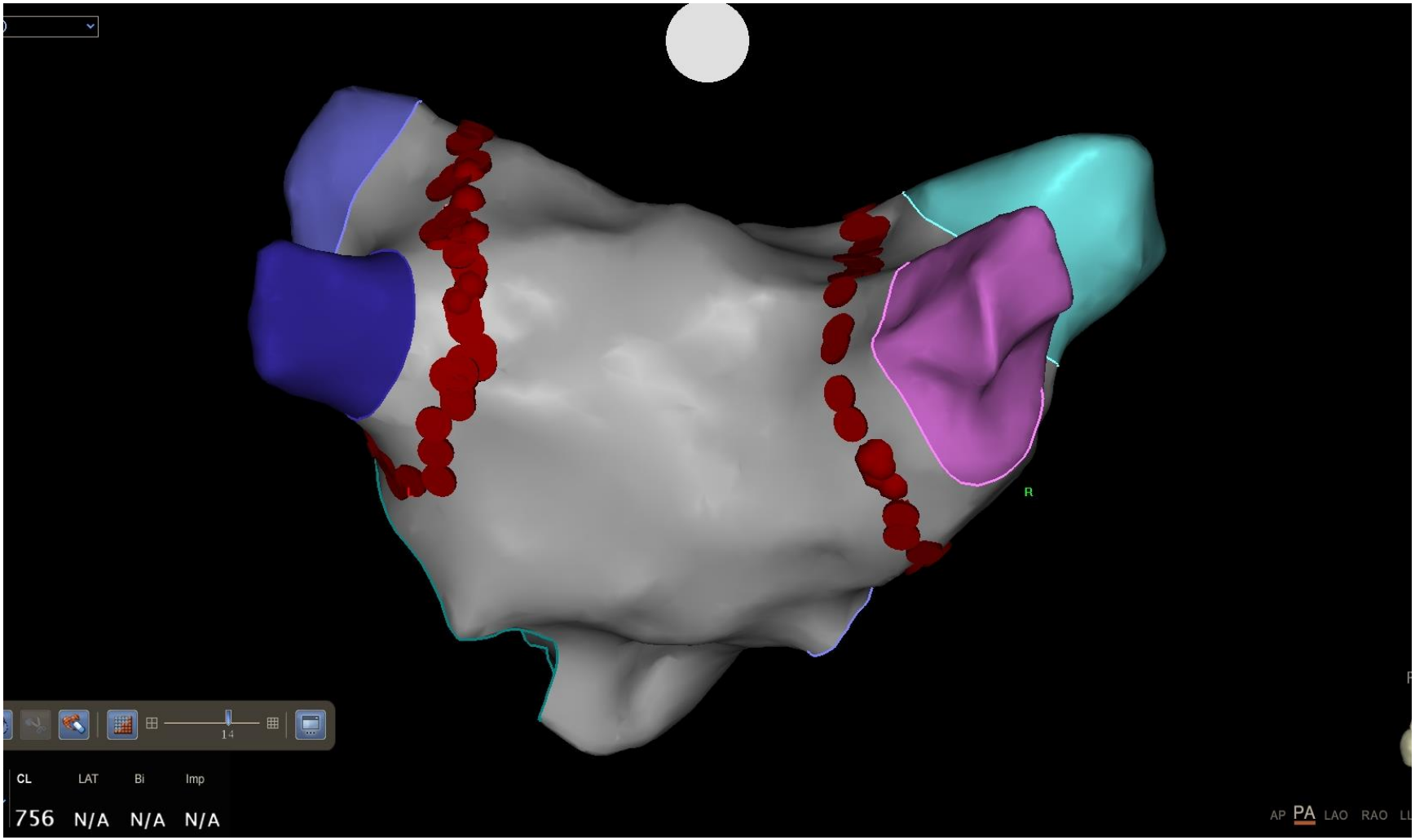
Atriyal fibrilasyon ablasyonu

- Pulmoner ven izolasyonu temel hedef
- CFAE ablasyonu
- Lineer ablasyon (roof, mitral, septal, anterior, posterior)
- Sol atriyal substrat analizi ve BİFA
- Rotor ablasyonu, otonom gangliyon ablasyonu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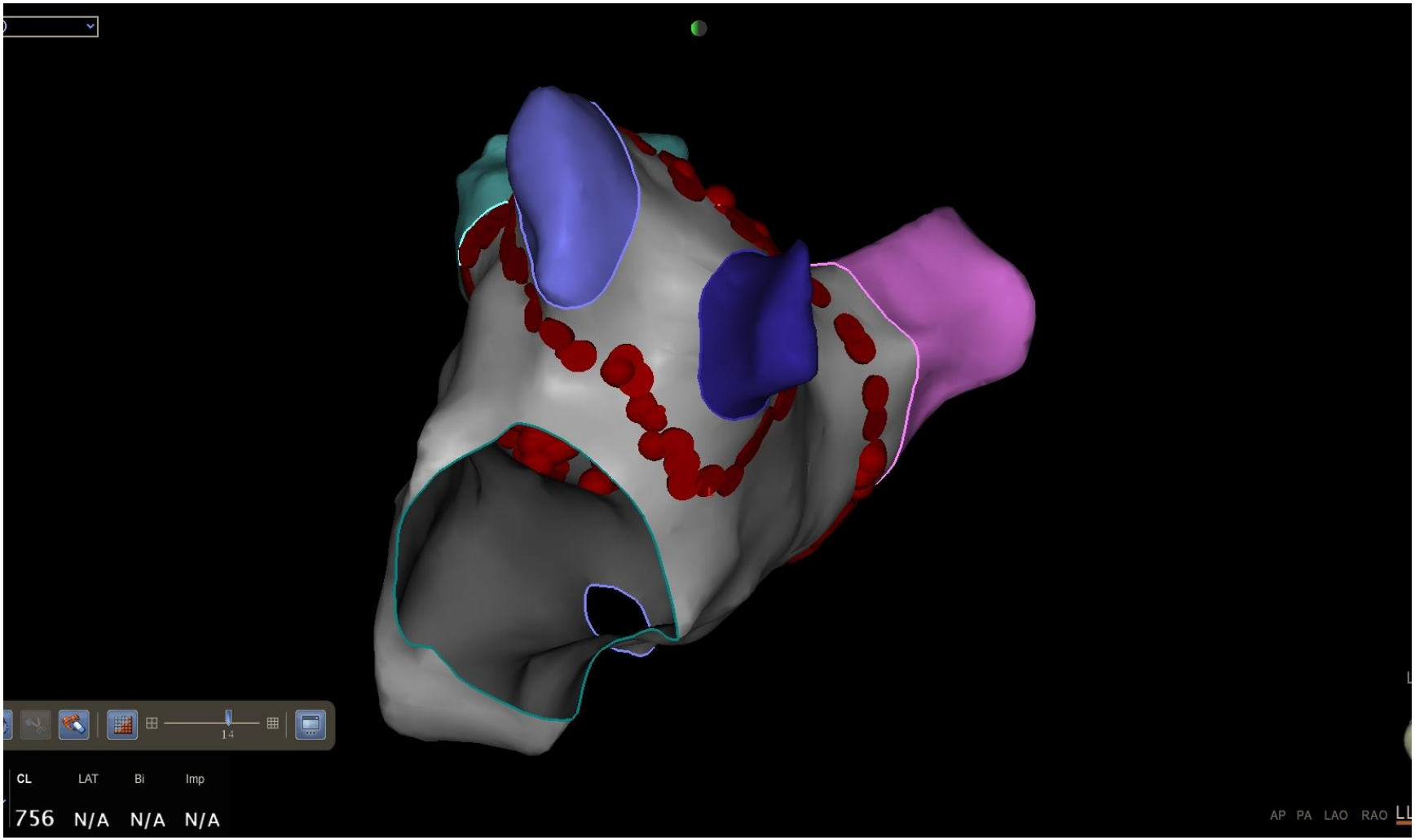
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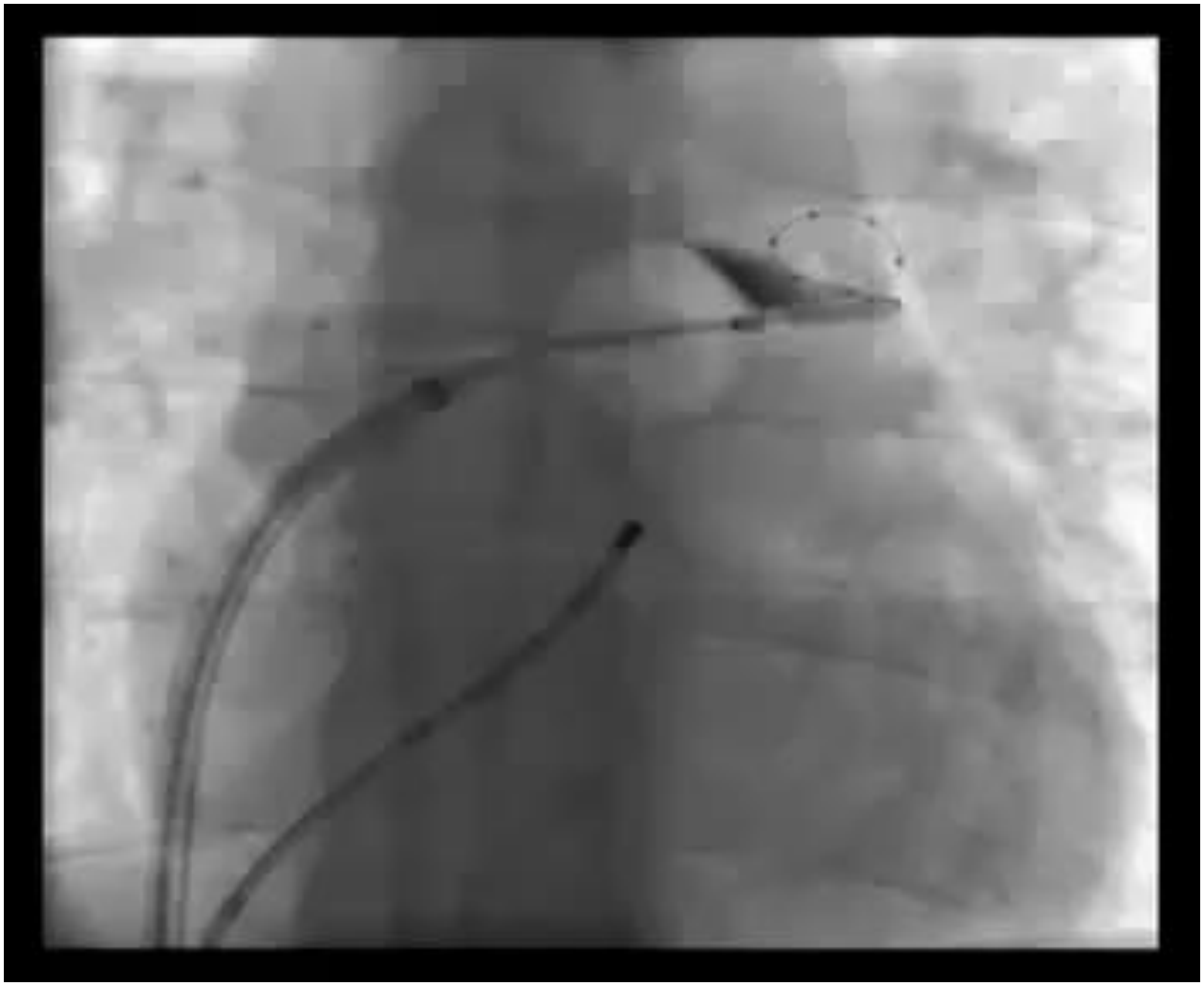

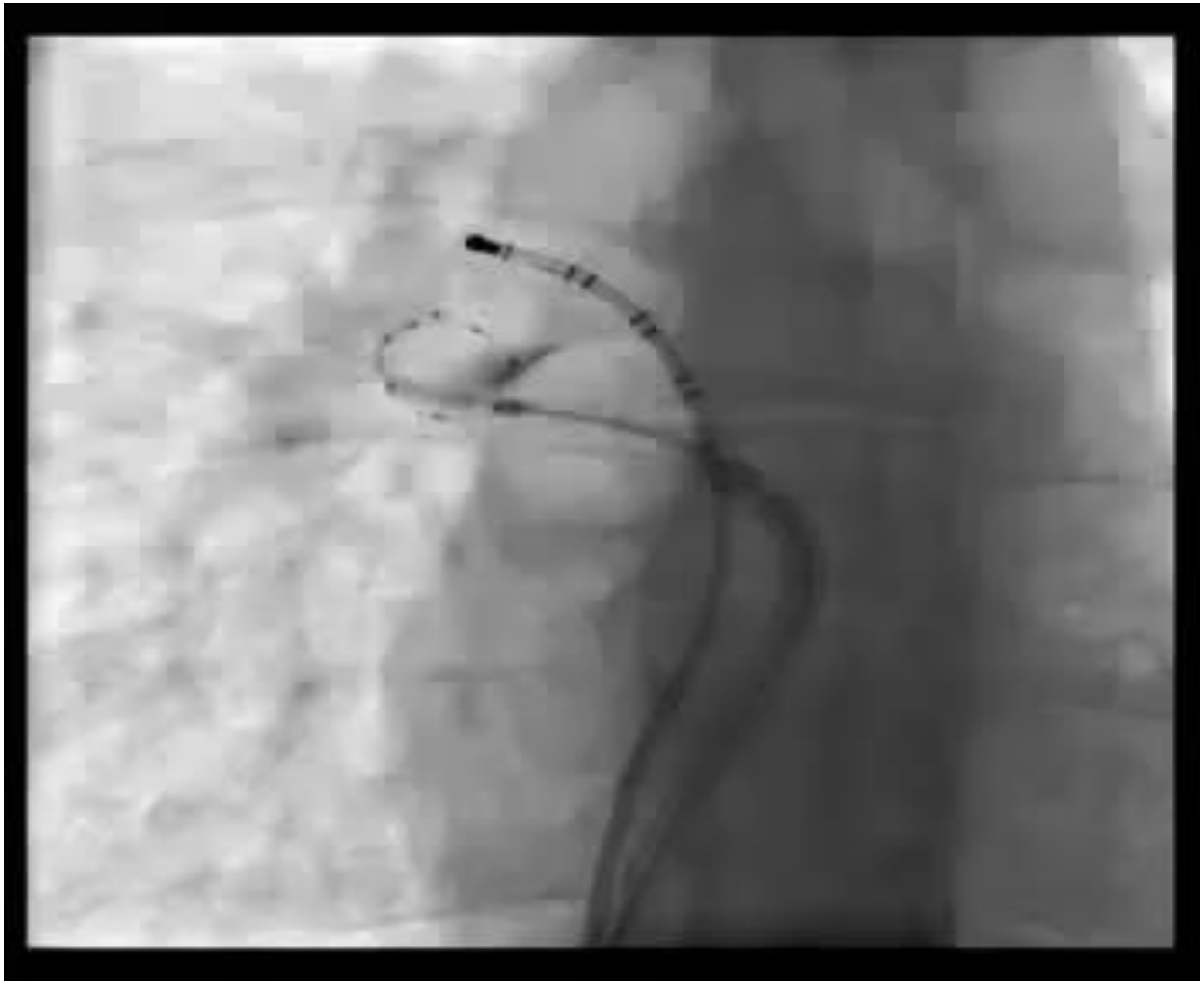

- Major komorbidite olmayan nispeten genç paroksismal AF hastalarında antiaritmiklere üstünlük kanıtlanmıştır.

- Persistan AF’ de ablasyon başarısı daha sınırlıdır.

1. Jenerasyon ablasyon

- İrrigasyonlu RF kateterler

- 1. jenerasyon ekvatoryal ablasyon yapan kriyobalon

	Number of patients	Atrial fibrillation pattern	Age (years)	Ablation as a first-line therapy	Ablation method	Outcome: sinus rhythm at 1 year		
						Ablation	AAD	p value
Krittayaphong et al (2003)[54]	30	Paroxysmal, persistent	55 (45–65; ablation); 47 (32–62; AAD)	No	Radiofrequency, PVI with LA lines; with CTI ablation and RA lines	79%	40%	0·02
Wazni et al (RAAFT study; 2005)[55]	70	Mainly paroxysmal	53 (45–61; ablation); 54 (46–62; AAD)	Yes	Radiofrequency, PVI	87%	37%	<0·001
Stabile et al (CACAF study; 2006)[57]	245	Paroxysmal, persistent	62 (53–71; ablation); 62 (52–72; AAD)	No	Radiofrequency, PVI with LA lines; with or without CTI ablation	56%	9%	<0·001
Oral et al (2006)[56]	245	Persistent	57 (48–66)	No	Radiofrequency, CPVA	70%	4%	<0·001
Pappone et al (APAF study; 2006)[57]	198	Paroxysmal	55 (45–65; ablation); 57 (47–67; AAD)	No	Radiofrequency, CPVA with CTI ablation	86%	22%	<0·001
Jais et al (A4 study; 2008)[58]	112	Paroxysmal	51 (40–62)	No	Radiofrequency, PVI with or without LA lines; with or without CTI ablation	89%	23%	<0·001
Forleo et al (2008)[59]	70	Paroxysmal, persistent	63 (54–72; ablation); 65 (59–71; AAD)	No	Radiofrequency, PVI with or without LA lines; with or without CTI ablation	80%	43%	0·001
Wilber et al (Thermocool study; 2010)[60]	167	Paroxysmal	56 (ablation); 56 (AAD)	No	Radiofrequency, PVI with or without LA lines with or without CFAEs; with or without CTI ablation with or without RA lines	66%	16%	<0·001
Cosedis Nielsen et al (MANTRA-PAF study; 2012)[61,62]	294	Paroxysmal	56 (ablation); 54 (AAD)	Yes	Radiofrequency, circumferential PVI with voltage abatement	85%	71%	0·01
Packer et al (STOP-AF study; 2013)[63]	245	Paroxysmal	57 (ablation); 56 (AAD)	No	Cryoablation, PVI; with or without LA lines	69·9%	7·3%	<0·001
Morillo et al (RAAFT2 study; 2014)[50]	127	Mainly paroxysmal	56 (ablation); 54 (AAD)	Yes	Radiofrequency, circumferential PVI with electrical isolation	45%	28%	0·02
Mont et al (SARA study; 2014)[53]	146	Persistent	55 (ablation); 55 (AAD)	No	Radiofrequency, PVI with or without LA lines with or without CFAEs	70%	44%	0·002
Di Biase et al (AATAC study; 2016)[39]	203	Persistent with heart failure, LVEF <40%, ICD	62 (ablation); 60 (AAD)	No	Radiofrequency, PVI with or without LA posterior wall isolation with or without LA lines with or without CFAEs with or without SVC isolation	70%	34%	<0·001

Catheter ablation of atrial fibrillation and atrial fibrillation surgery (1)

Recommendations	Class	Level
Catheter ablation of symptomatic paroxysmal AF is recommended to improve AF symptoms in patients who have symptomatic recurrences of AF on antiarrhythmic drug therapy (amiodarone, dronedarone, flecainide, propafenone, sotalol) and who prefer further rhythm control therapy, when performed by an electrophysiologist who has received appropriate training and is performing the procedure in an experienced centre.	I	A
Ablation of common atrial flutter should be considered to prevent recurrent flutter as part of an AF ablation procedure if flutter has been documented or occurs during the AF ablation.	IIa	B
Catheter ablation of AF should be considered as first-line therapy to prevent recurrent AF and to improve symptoms in selected patients with symptomatic paroxysmal AF as an alternative to antiarrhythmic drug therapy, considering patient choice, benefit, and risk.	IIa	B
All patients should receive oral anticoagulation for at least 8 weeks after catheter (IIaB) or surgical (IIaC) ablation.	IIa	B C
Anticoagulation for stroke prevention should be continued indefinitely after apparently successful catheter or surgical ablation of AF in patients at high-risk of stroke.	IIa	C
When catheter ablation of AF is planned, continuation of oral anticoagulation with a VKA (IIaB) or NOAC (IIaC) should be considered during the procedure, maintaining effective anticoagulation.	IIb	B C
Catheter ablation should target isolation of the pulmonary veins using radiofrequency ablation or cryothermy balloon catheters.	IIa	B

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Catheter ablation of atrial fibrillation and atrial fibrillation surgery (2)

Recommendations	Class	Level
AF ablation should be considered in symptomatic patients with AF and heart failure with reduced ejection fraction to improve symptoms and cardiac function when tachycardiomyopathy is suspected.	IIa	C
AF ablation should be considered as a strategy to avoid pacemaker implantation in patients with AF-related bradycardia.	IIa	C
Catheter or surgical ablation should be considered in patients with symptomatic persistent or long-standing persistent AF refractory to AAD therapy to improve symptoms, considering patient choice, benefit and risk, supported by an AF Heart Team.	IIa	C
Minimally invasive surgery with epicardial pulmonary vein isolation should be considered in patients with symptomatic AF when catheter ablation has failed. Decisions on such patients should be supported by an AF Heart Team.	IIa	B
Maze surgery, possibly via a minimally invasive approach, performed by an adequately trained operator in an experienced centre, should be considered by an AF Heart Team as a treatment option for patients with symptomatic refractory persistent AF or post-ablation AF to improve symptoms.	IIa	C
Maze surgery, preferably biatrial, should be considered in patients undergoing cardiac surgery to improve symptoms attributable to AF, balancing the added risk of the procedure and the benefit of rhythm control therapy.	IIa	A
Concomitant biatrial maze or pulmonary vein isolation may be considered in asymptomatic AF patients undergoing cardiac surgery.	IIb	C

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Pulmoner ven izolasyonu

- Gerçek yaşam verileri ise erken dönem eksper merkez sonuçlarından daha kötüdür.

- Metaanalizlerde, paroksismal AF, tek PVI işlemi %50-60, ikinci PVI ile başarı %70-80, persistan AF için ise %30-40 arası oranlar bildirilmiştir. (off antiaritmik olduğu unutulmamalı)

2. Jenerasyon ablasyon

- Yakın zamanlı gelişen yeni teknolojiler ve teknikler ile giderek daha olumlu sonuçlar bildirilmektedir (kontakt force kateter, 2. jenerasyon kriyobalon, FIRM)

Pulmoner ven izolasyonu

Study	Design	Patient population	N	Intervention	Comparator	Endpoints	(mean ± SD)	Outcomes
Contact force								
TOCCASTAR Reddy et al[60]	RCT Multicenter Noninferiority	Symptomatic drug-refractory PAF Pooled mean age 60 ± 10 years 65% male	295	Ablation with CF-sensing catheter	Ablation with non-CF catheter	*Primary:* Efficacy (acute PVI, freedom from symptomatic AF off AAD); safety *Secondary:* Optimal vs nonoptimal CF, quality of life	12 months	Efficacy: 67.8% CF vs 69.4% control (noninferiority endpoint met) Efficacy within stratified CF arm: 75.9% optimal CF vs 58.1% nonoptimal CF Serious adverse events in 2.0% CF vs 1.4% control (safety noninferior endpoint met)
Cryoablation								
FIRE and ICE Kuck et al[61]	RCT Multicenter Noninferiority	Symptomatic drug-refractory PAF Pooled mean age 60 ± 10 years 61% male	750	Cryoablation	Standard ablation	*Primary:* Efficacy (time to first recurrence of arrhythmia, AAD use, or repeat ablation), safety *Secondary:* Quality of life	18 months	Noninferiority efficacy and safety endpoints met No significant difference among the 4 types of ablation catheters
CFAE								
STAR AF Verma et al[62]	RCT Multicenter Superiority	Symptomatic drug-refractory PAF (65%) or persistent AF Pooled mean age 57 ± 10 years 74% male	100	CFE alone CFE + PVI	PVI alone	*Primary:* Freedom from AF *Secondary:* Freedom from any arrhythmia, complications, procedural characteristics	12 months	PVI + CFE had the highest freedom from AF vs PVI alone or CFE alone CFE alone had lowest success rate after 1 or 2 procedures, and higher incidence of repeat procedures required

Ven dışı ablasyon, persistan AF

- PVI'ın özellikle persistan AF de başarısızlığı, ven dışı ablasyonu gündeme getirmiştir.
- STAR AF II (CFAE, lineer ablasyon)
- Gangliyon ve rotor ablasyonu

STAR AF II Verma et al[63]	RCT Multicenter	Symptomatic drug-refractory persistent AF Pooled mean age 60 ± 9 years 78% male	589	PVI + CFAE PVI + linear ablation	PVI alone	*Primary:* Freedom from atrial arrhythmia after index ablation off AAD or repeat ablation *Secondary:* Freedom from any AF after 2 procedures, freedom from any atrial arrhythmia, AAD use, complications, procedural characteristics	18 months	No significant difference in outcomes between groups after a first or repeat procedure PVI alone tended to be associated with shorter procedure and radiation times
Rotor modulation								
CONFIRM Narayan et al[64]	RCT Single-center	Symptomatic PAF (28%) or persistent AF Pooled mean age 62 ± 8 years 95% male	92	FIRM-guided ablation + conventional ablation	Conventional ablation: WACA (+LA roof line for persistent AF cases)	*Primary:* Acute procedural termination of AF, long-term freedom from AF, safety *Secondary:* Freedom from AF after first ablation, freedom from all atrial arrhythmias	Median 22 months	Acute procedural endpoint achieved in 86% FIRM-guided vs 20% conventional ablation cases Total ablation time same for both groups Greater freedom from AF for FIRM-guided (82%) vs conventional (45%) after single procedure Safety: No significant difference in complication rates between groups
Dominant frequency ablation								
RADAR AF Atienza et al[65]	RCT Multicenter Single-blind Noninferiority	Symptomatic PAF (50%) and persistent AF Pooled mean age 54 ± 10 years 80% male	232	PAF: HFSA Persistent AF: PVI	PAF: PVI Persistent AF: PVI + HFSA	*Primary:* Freedom from AF at 6 months after inde ablation *Secondary:* Freedom from AF/AT and 12 months, periprocedural complications, adverse events, quality of life.	12 months	*PAF:* HFSA noninferior to PVI at 12 months (failed to achieve noninferiority at 6 months) Fewer serious adverse events in HFSA group *Persistent AF:* No significant difference between HFSA and PVI for primary or secondary endpoints, but a trend toward more serious adverse events with PVI + HFSA

3. Jenerasyon ablasyon

- Ablasyon indexi (PAF %80 üstü başarı)
- Yüksek watt (90 watt), 4 sn aplikasyonlar (dinamik irrigasyon)
- Hasta bazlı yaklaşım (BİFA)

BİFA

- BİFA, persistan ve paroksismal atriyal fibrilasyonda PVI haricinde düşük voltaj alanlarının modifikasyonun, başarıyı arttırdığı gösterilmekle birlikte henüz yeni uygulanmaya başlanan bir yöntemdir. (persistan AF %73 başarı metaanaliz)

Pacing Clin Electrophysiol. 2017 Feb;40(2):199-212. doi: 10.1111/pace.13015.

Left Atrial Substrate Modification Targeting Low-Voltage Areas for Catheter Ablation of Atrial Fibrillation: A Systematic Review and Meta-Analysis.

Blandino A[1], Bianchi F[2], Grossi S[2], Biondi-Zoccai G[3,4], Conte MR[2], Gaido L[5], Gaita F[5], Scaglione M[6], Rametta F[1].

⊕ Author information

Abstract

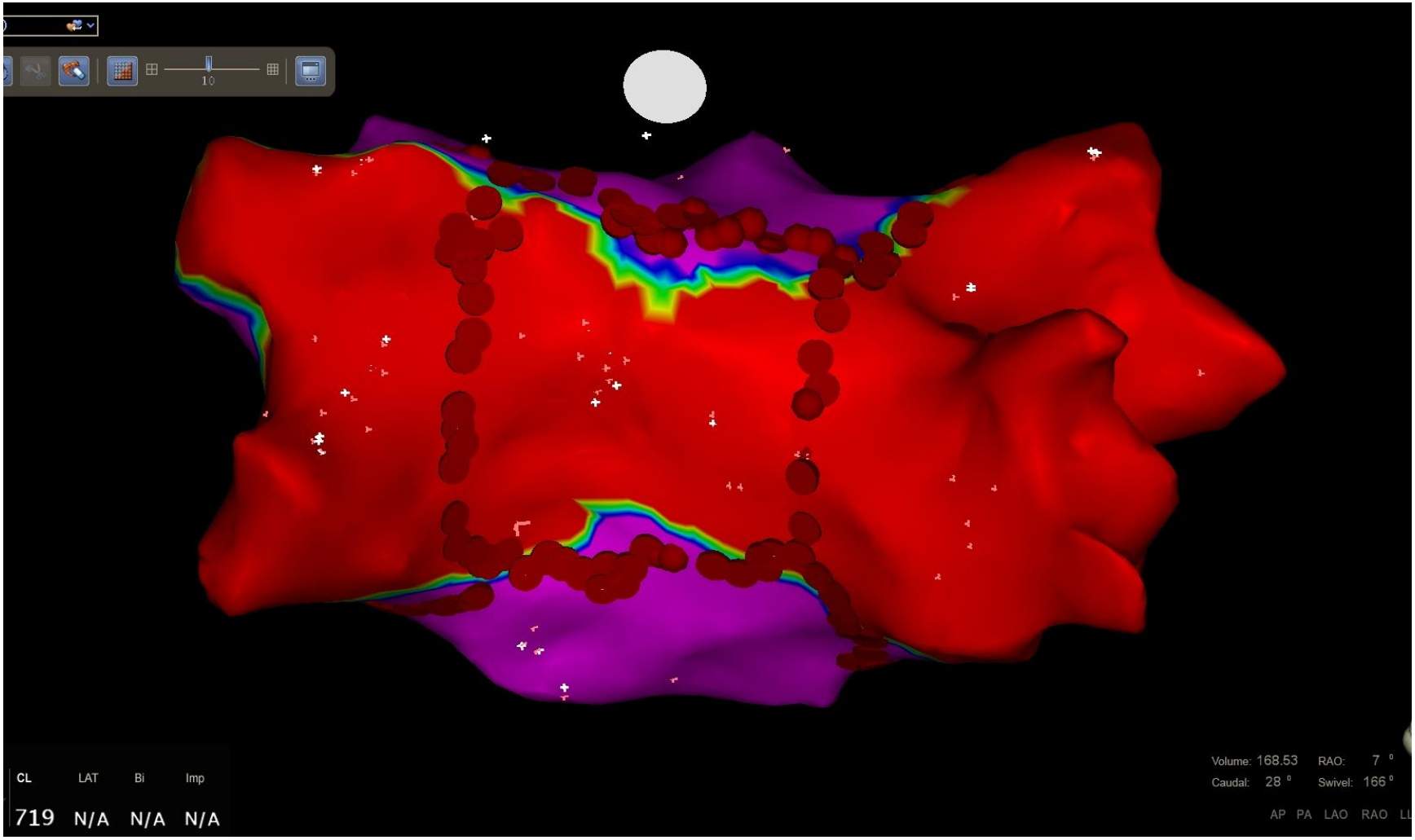
BACKGROUND: This meta-analysis aims to assess the impact of a voltage-guided substrate modification by targeting low-voltage area (LVA) in addition to pulmonary vein isolation (PVI) in patients undergoing catheter ablation for atrial fibrillation (AF).

METHODS: MEDLINE/PubMed, Cochrane Library, and references reporting AF ablation and "voltage* OR substrate* OR fibrosis OR fibrotic area*" were screened and studies included if matching inclusion and exclusion criteria.

RESULTS: Six studies were included. Patients enrolled were 885 (517 in the study group and 368 in the control group). Median age was 60 years; 92% had nonparoxysmal AF. At a mean follow-up of 17 months, 70% of patients in the study group vs. 43% in the control group were free from AF/atrial tachycardia (AT) recurrences (odds ratio [OR] = 3.41, 95% confidence interval [CI] 2.22-5.24). LVA ablation in addition to PVI was more effective than PVI alone and PVI + conventional wide empirical ablation (70% vs. 43%, OR = 3.41, 95% CI 2.22-5.24), without increasing the adverse event rate (2.5% vs. 6%, OR = 0.43, 95% CI 0.15-1.26). Compared to PVI + conventional wide empirical ablation, LVA ablation reduced the occurrence of postablation AT (14% vs. 46%, OR = 0.16, 95% CI 0.07-0.37), procedure time (176 min vs. 220 min, OR = 0.36, 95% CI 0.24-0.56), fluoroscopy time (25 min vs. 31 min, OR = 0.22, 95% CI 0.12-0.39), and radiofrequency time (55 min vs. 90 min, OR = 0.49, 95% CI 0.27-0.90).

CONCLUSIONS: A voltage-guided substrate modification by targeting LVA in addition to PVI is more effective, safer, and holds a lower proarrhythmic potential than conventional ablation approaches. Further randomized studies are necessary to confirm these findings.

Hasta bazlı yaklaşım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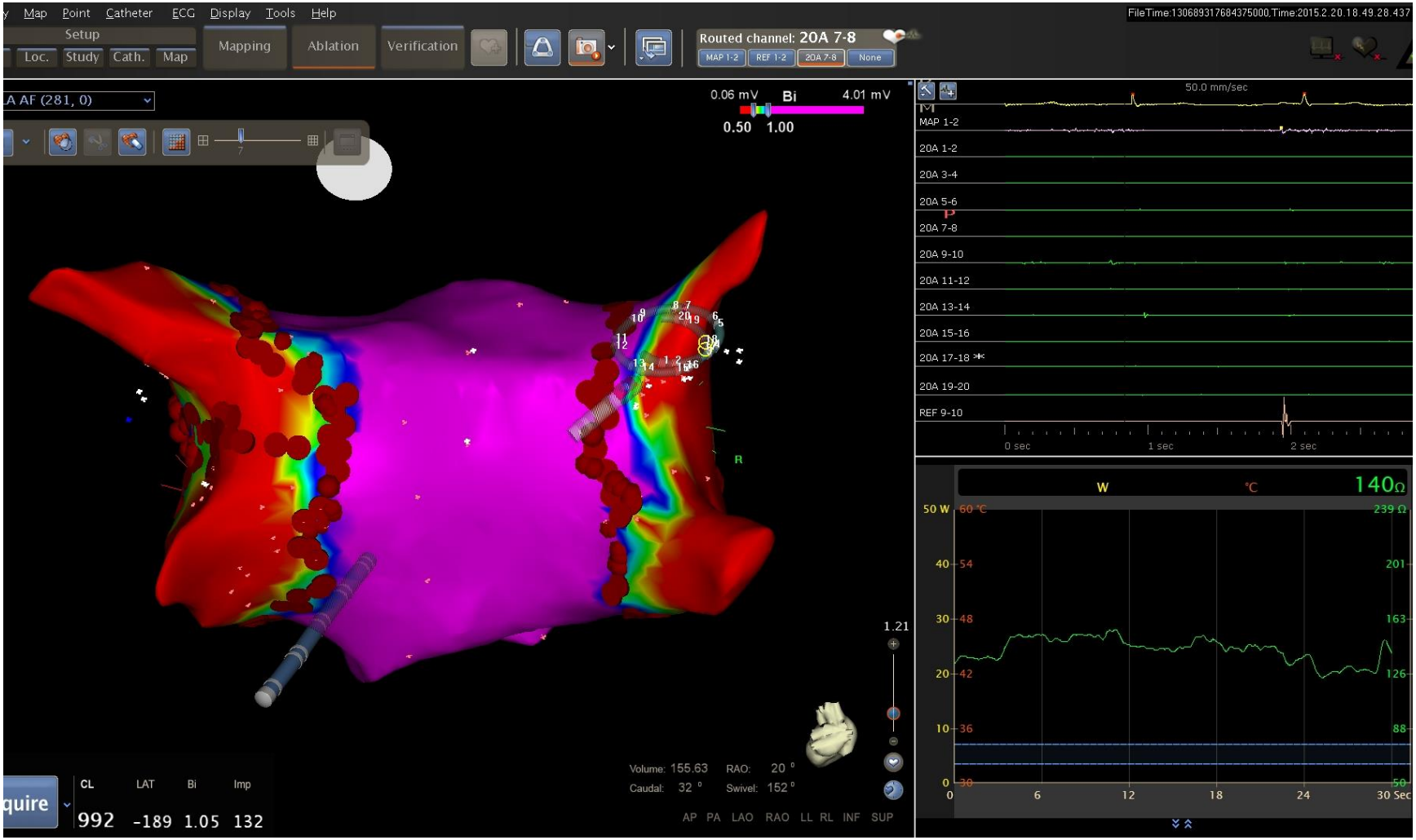
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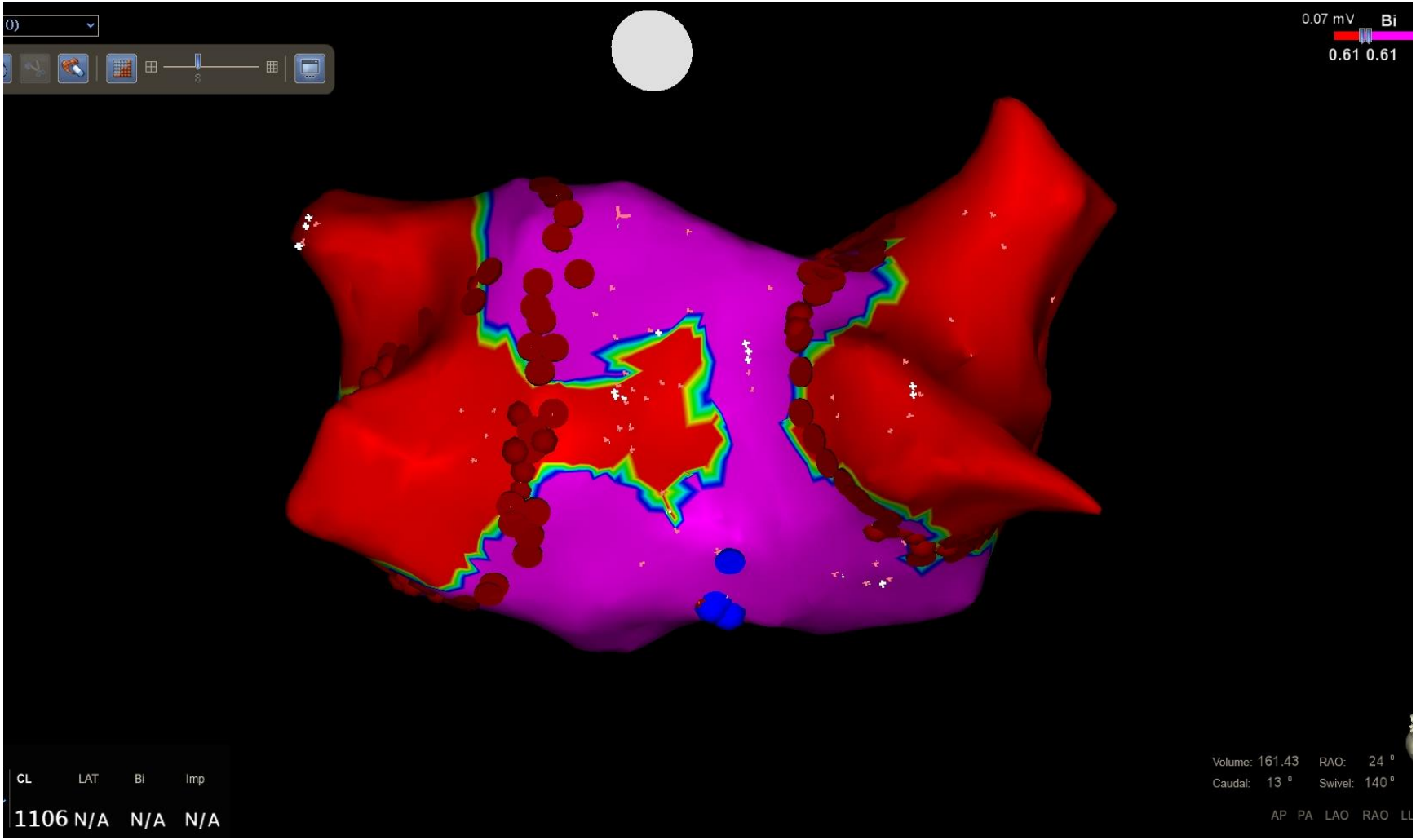
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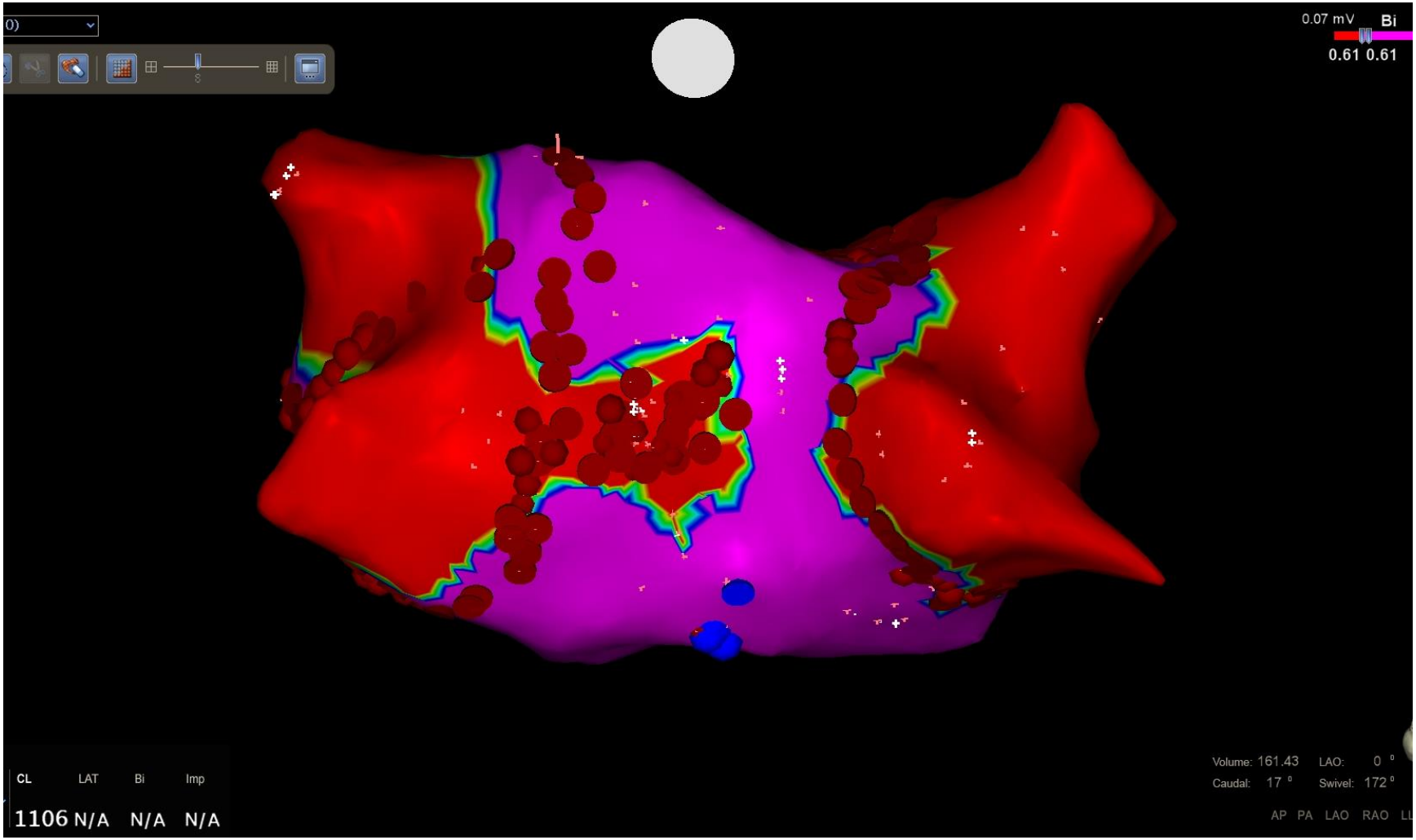
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- CABANA
- CASTLE-AF
  - Mortalite etkisini araştıran devam eden çalışmalardır.

Özet

- Anatomik ablasyon stratejisini belirlemede AF subtipi (paroksismal vs persistan) yeterli değildir.
- Atriyal substrat (fibrozis varlığı) uygulanacak ek ablasyonlar açısından kritik önemdedir ve BİFA başarıyı arttırır.
- PVI için contact force ve 2.jenerasyon kriyobalon
- Ablasyon indeksi gibi parametreler ve 3. jenerasyon kontakt force ve irrigasyonda ısı takibi sağlayabilen kateterler başarıyı arttırmaktadır
- İzoproterenol ile ven dışı odak aranması, gangliyon ablasyonu

AF ablasyonu devrimsel bir tedavidir

- AF ablasyonu antiaritmik tedaviye üstündür.
- AF ablasyonu başka tedavi yönteminin olmadığı hastalarda semptomatik iyileşme sağlar ve alternatifi yoktur.
- AF ablasyonu atriyal fibrilasyon yükünü azaltır.
- AF ablasyonu henüz bir kür olmasa da gelişen teknoloji ve etyopatogenezin daha iyi anlaşılması ile başarı giderek artmaktadır.