

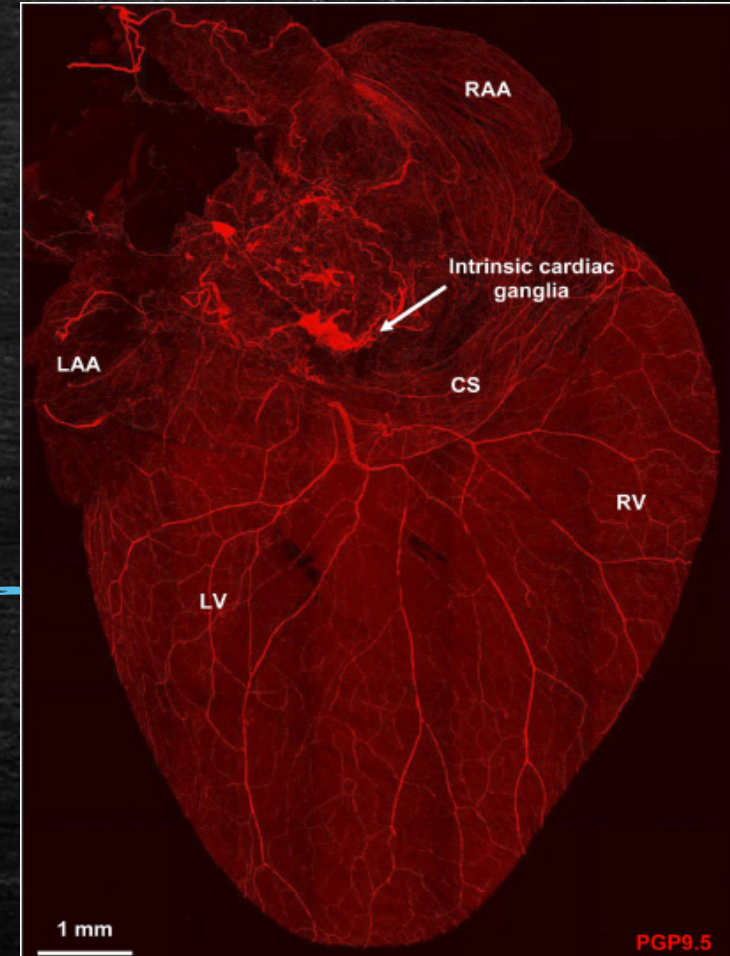
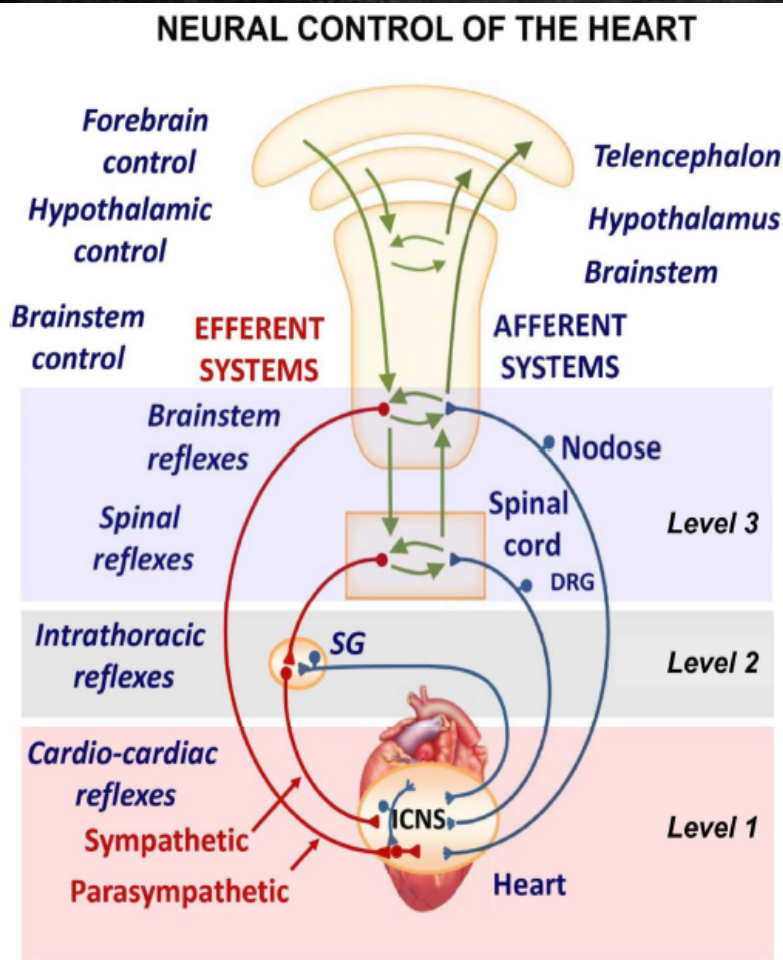


Amour e Psiche A. Canova

AF de GP Ablasyonu

Doç Dr Tolga Aksu
SBU

Kocaeli Derince Eğitim ve Araştırma Hastanesi





Doğru cevabı almak için, doğru soruyu sormalısın

Vanessa Redgrave

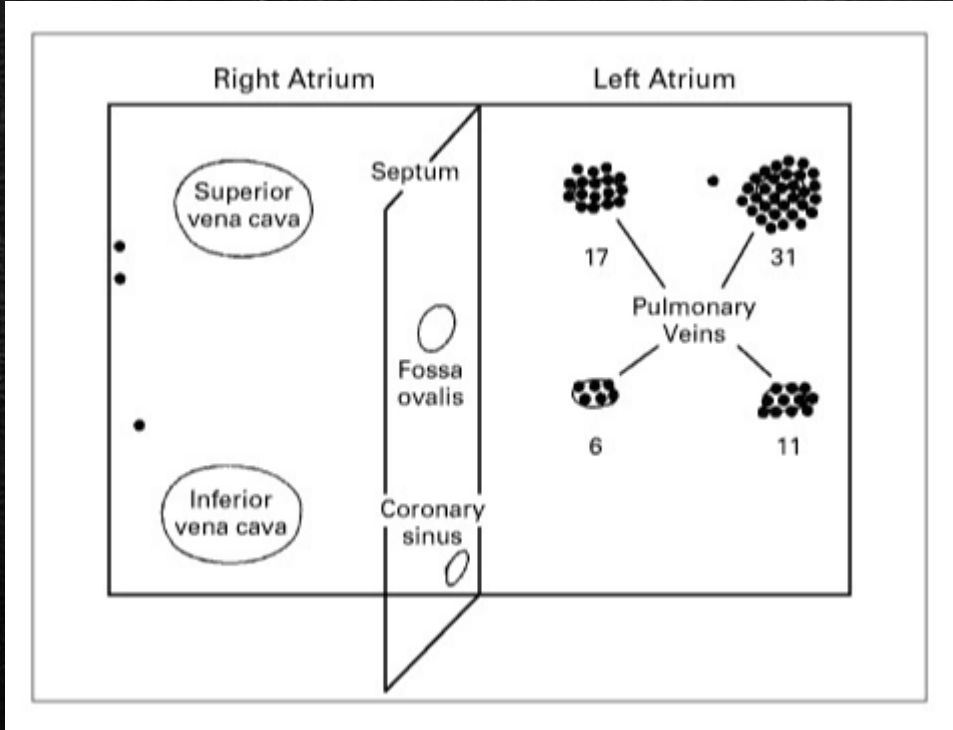
Cevaplanması Gereken Sorular

- (1) Parasempatik sistemin AF patofizyolojisinde herhangi bir klinik önemi var mıdır?
- (2) Parasempatik nöronları selektif olarak ablate edebilir miyiz?
- (3) EPS sırasında GP yerleşimlerini saptayabilir miyiz?
- (4) Uygun adayları nasıl seçeriz
- (5) En iyi ablasyon yaklaşımı nedir?
- (6) “Endpoint”ler ne olmalı?

AF etyopatogenesi'nin trigger temelli açıklaması-1

PAF için PV'ler ana tetikleyici ve devam ettirici odaklardır

Point by point veya balon teknolojileri ile PVI köşe taşı ablasyon yöntemidir



Haissaguerre M. NEJM1998;339:659-66.

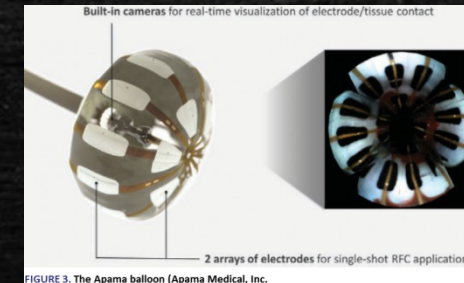
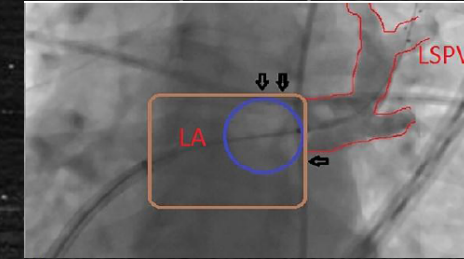
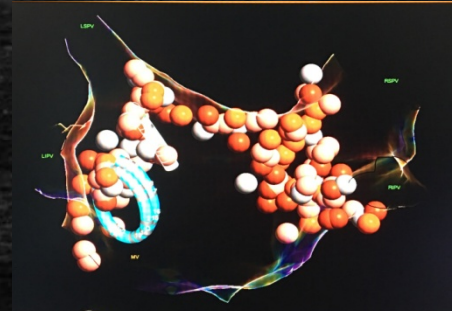


FIGURE 3. The Apama balloon (Apama Medical, Inc.).

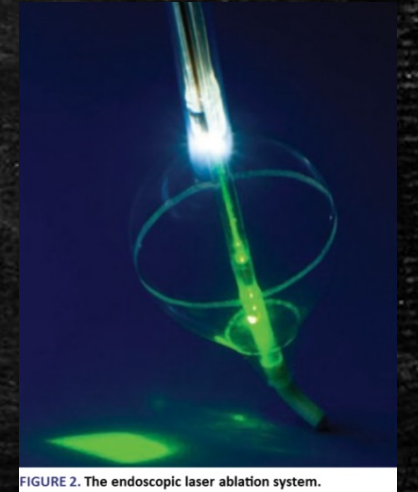
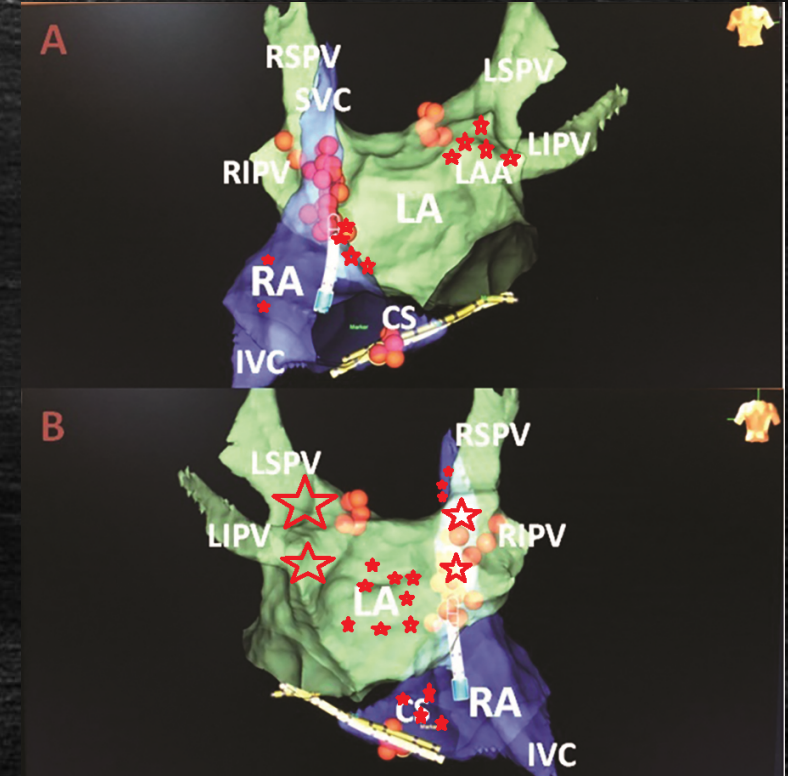
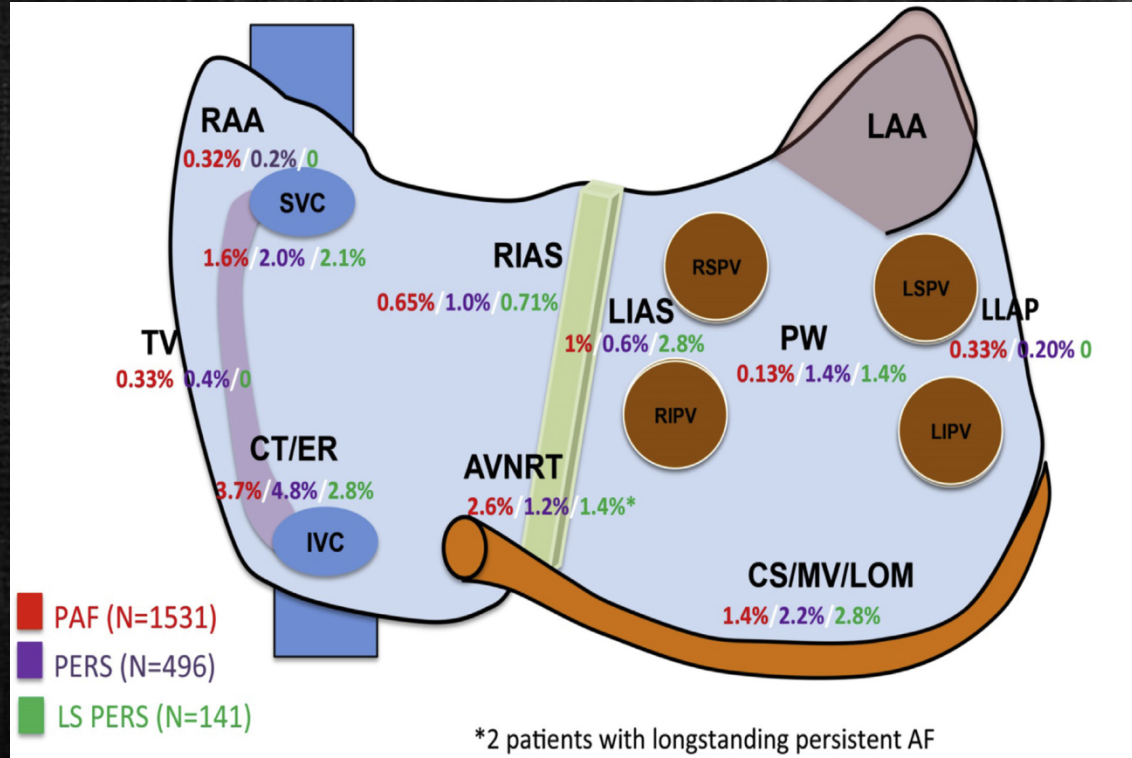


FIGURE 2. The endoscopic laser ablation system.

AF etyopatogenesi'nin trigger temelli açıklaması-2



Devamlı AF'nin non-PV trigger'lardan sürekli olarak başlatılabilirliği **11%**

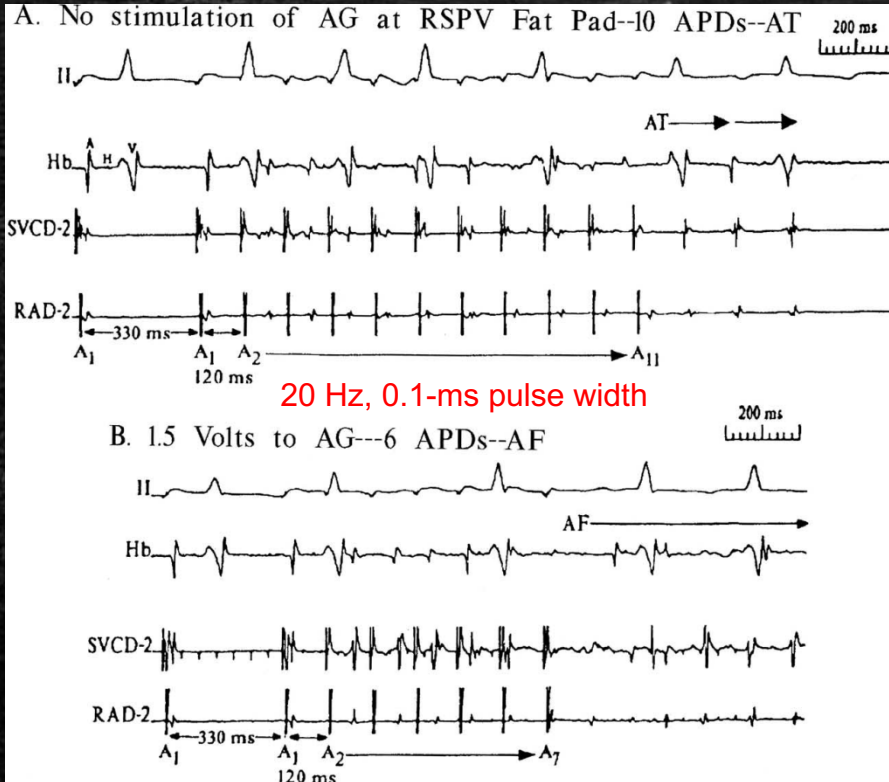
Farklı anatomik bölgeler

Aritmojenik aktivite artmış otomatisite, triggered activity ve lokalize microentrant halkaların kombine etkisi ile ortaya çıkar

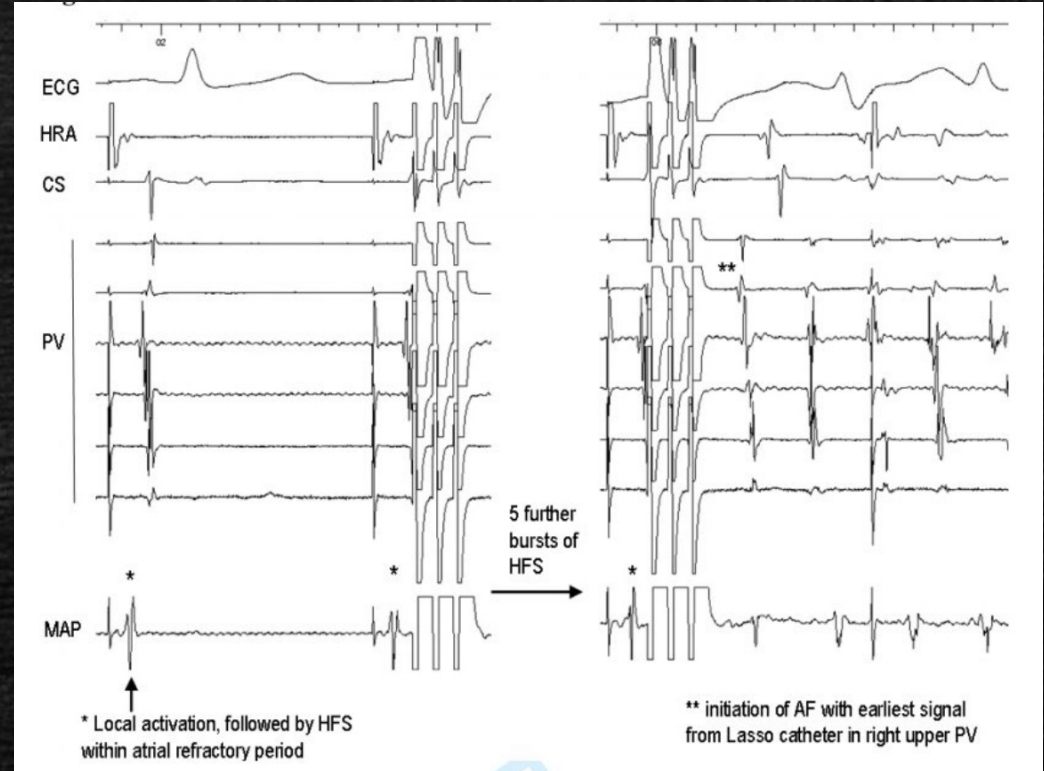
Parasempatik sistemin AF patofizyolojisinde herhangi bir klinik önemi var mıdır?

Benzer PV ve miyokardiyal sleeve anatomik özelliklerine rağmen, Neden bazı kişilerde ortaya çıkarken diğerlerinde izlenmemektedir.

Hayvan verisi

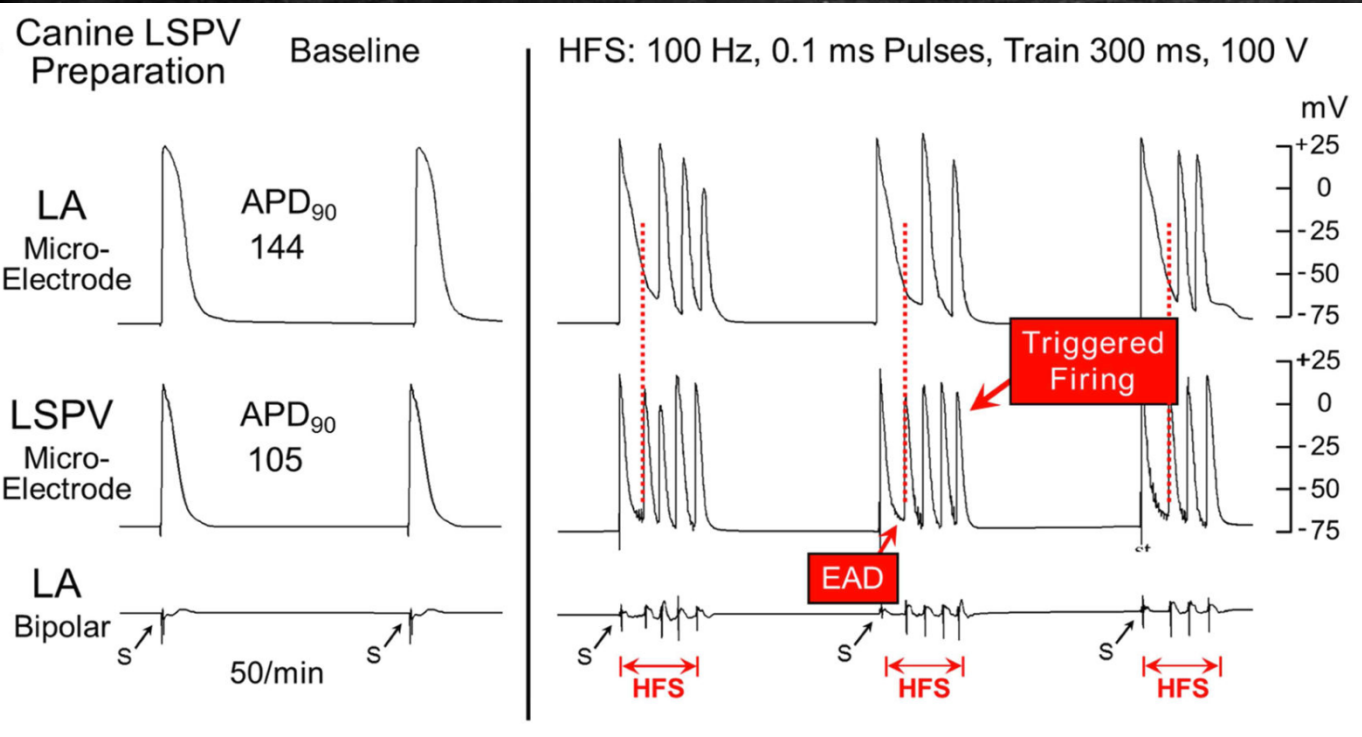


İnsan deneyimi



GP'lere Acetylcholine enjeksiyonu yakın PV'lerde fokal ateşleme ve sustain AF gelişimine neden olabilir

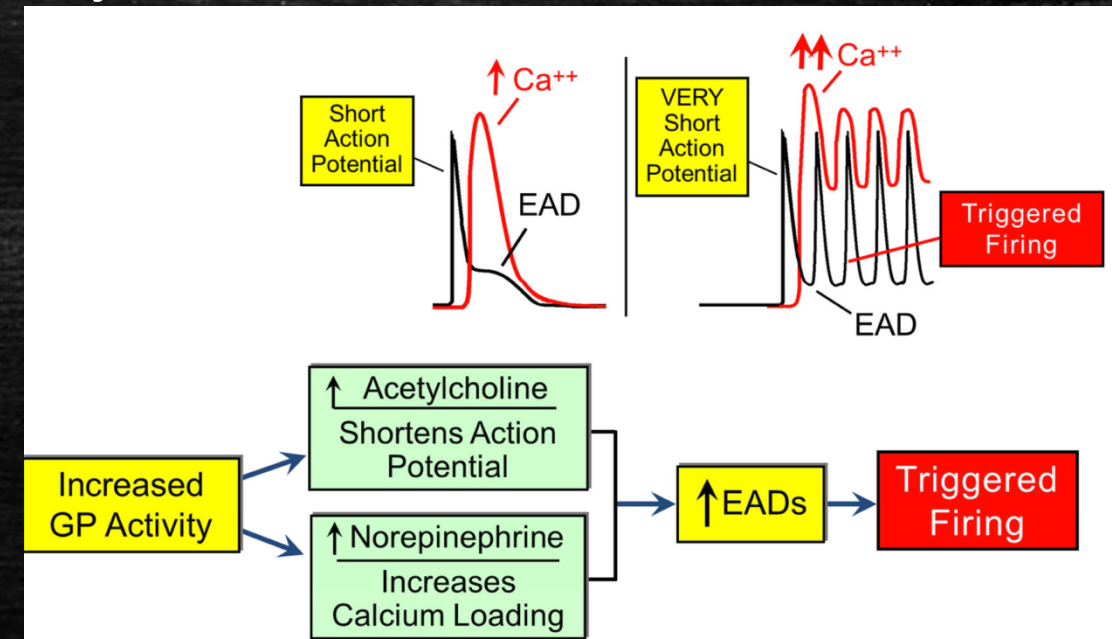
Neden AF genellikle PV'lerden kaynaklı ekstra atımlarla başlar



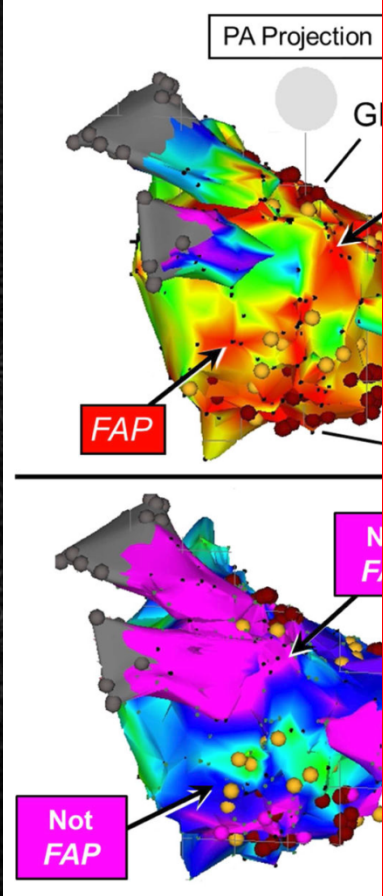
ANS uyarımında ➡ PV sleeve APD

Muskarinik reseptör blokajı APD kısalmasını önler ve fire'ı baskılar

PV'ler otonomik uyarıma LA'dan daha duyarlıdır



GP'ler yalnızca trigger olarak değil, daha da önemlisi AF'nin devamlılığında role sahiptir



Tüm bu dataalara rağmen AF'nin karmaşık etyopatogenezezi dikkate alındığında GP'ler Vagal aracılı AF hastaları dışında ana suçlu ve tek hedef olarak görülmemelidir

F'de

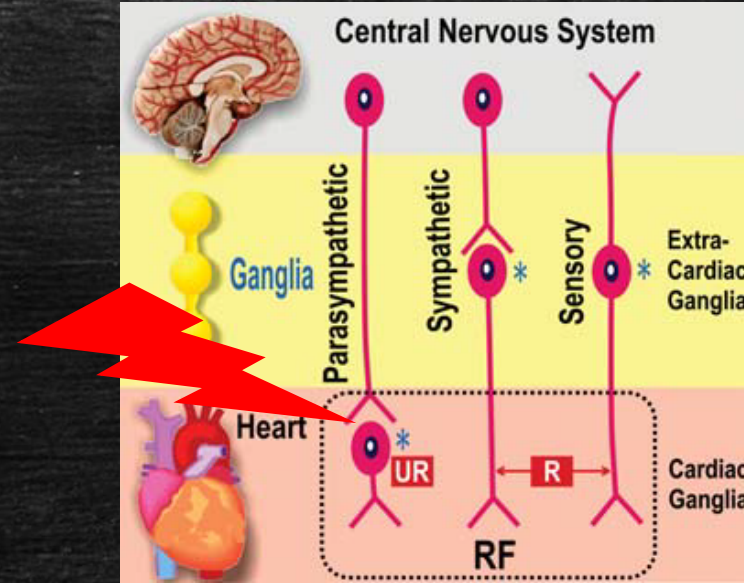
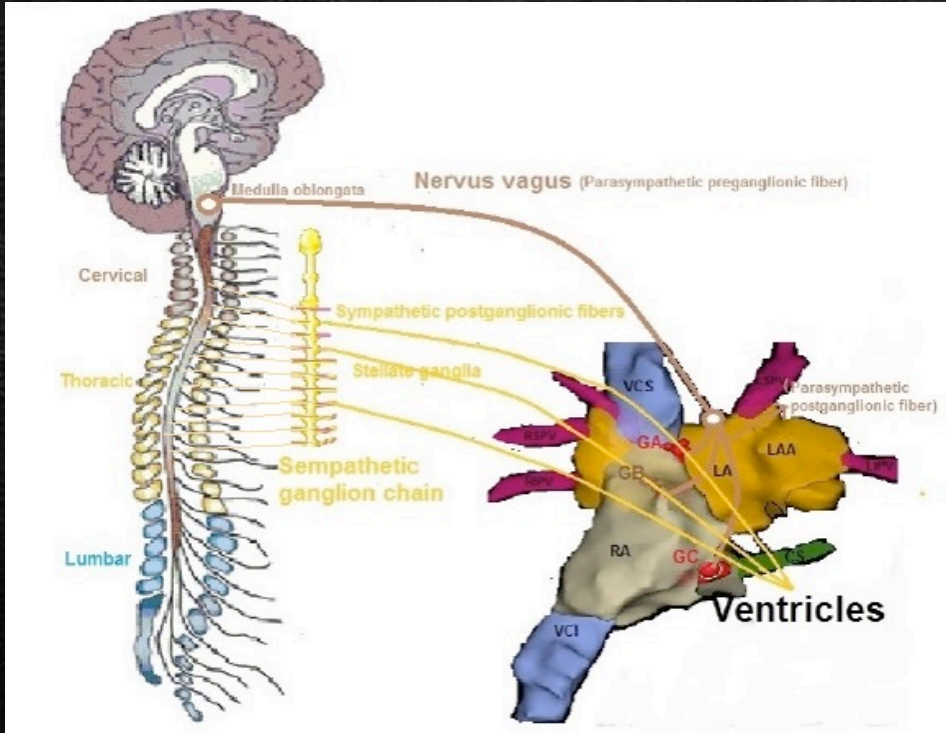
ve sonrası
(ncesi)

nsiyel
8 cm²'ye

rar

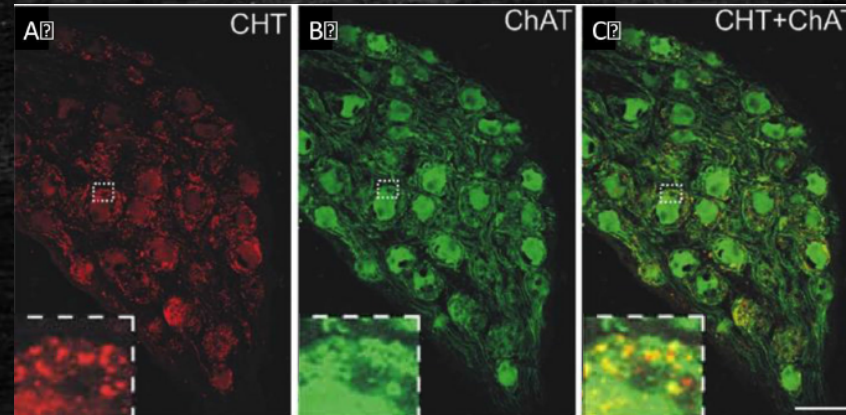
Parasempatik nöronları selektif olarak ablate edebilir miyiz?

Kalbin innervasyonu parasempatik, sempatik, ve duysal sistemden oluşur



Semp aktivite (kırmızı) kardiyak nöronların çevresindeki sinir liflerinde yoğun, hücre gövdelerinde yoktur

Parasem aktivite (yeşil) ise hücre gövdelerinde yoğunlaşmıştır



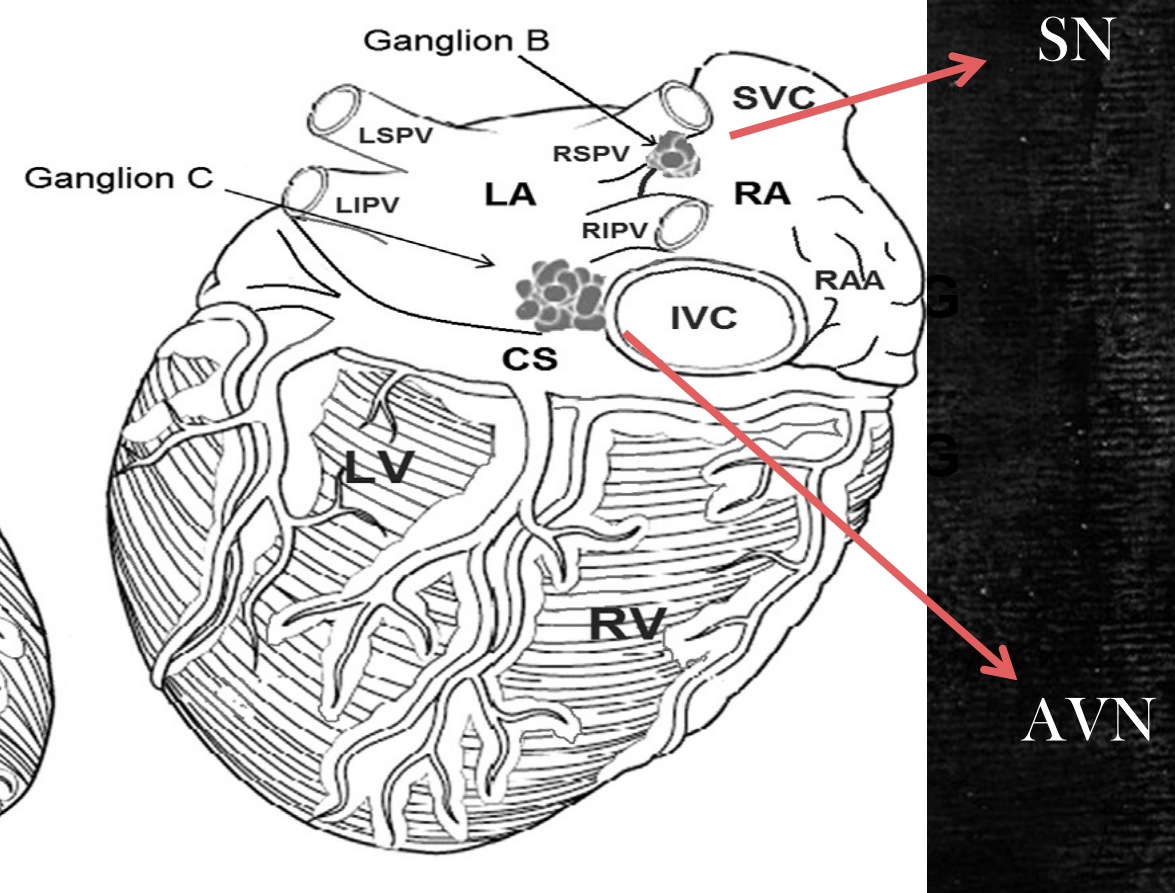
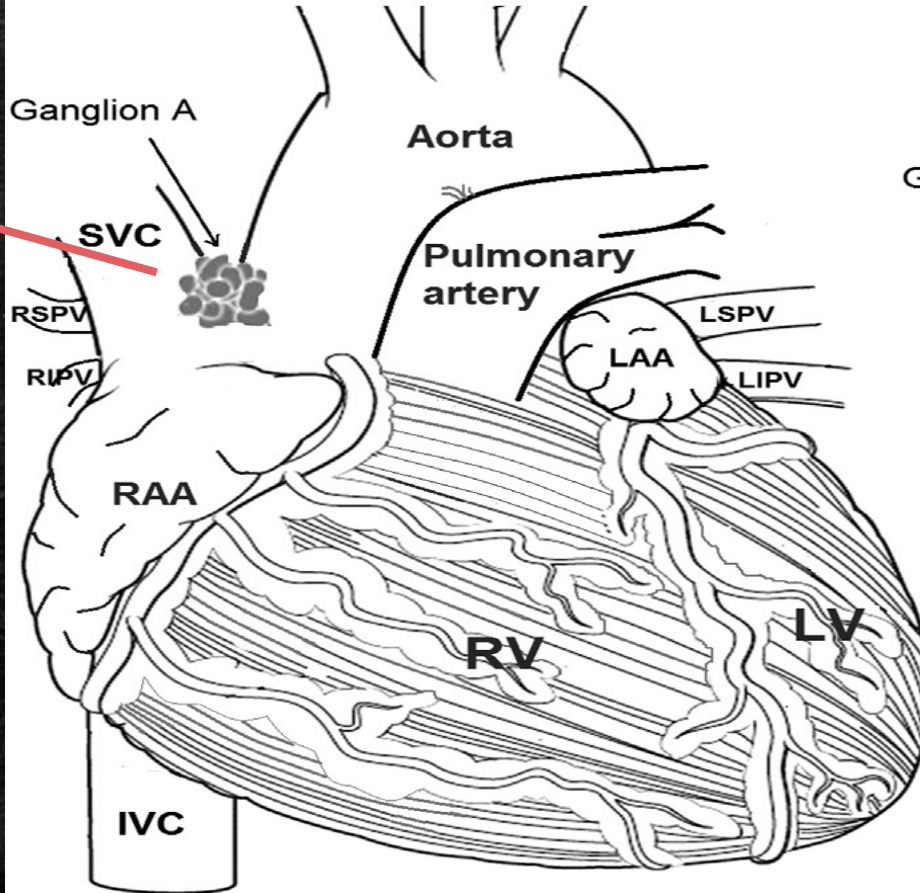
Bazı hücrelerde her iki sistemde bulunur (sarı)

O halde GP'yi bir kez saptarsan kalıcı ablate edebilirsin

EPS sırasında GP'leri nasıl saptarız? -1

Anatomistlere göre-1

Ana
istasyon
(Atriyum,
SN ve
AVN)

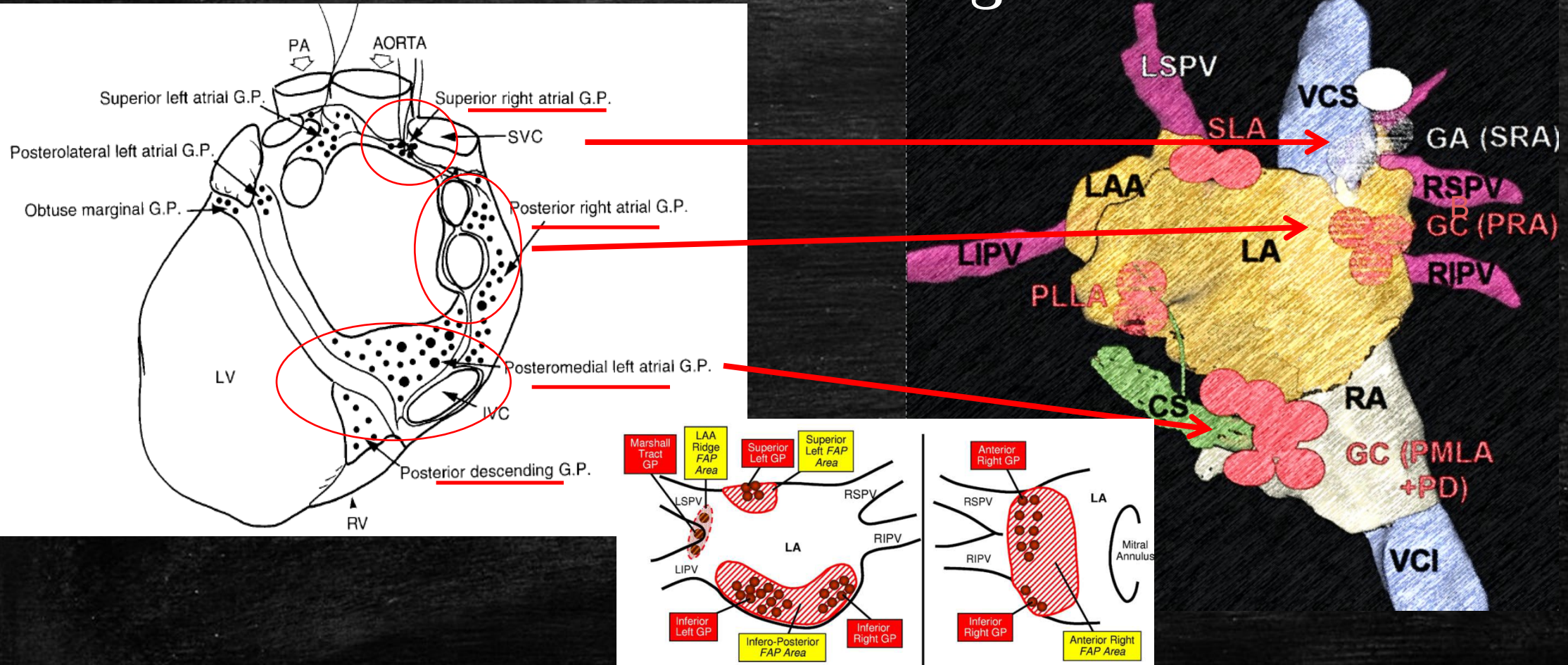


SN

AVN

EPS sırasında GP'leri nasıl saptarız? -2

Anatomistlere göre-2



EPS sırasında GP'leri nasıl saptarız? -3

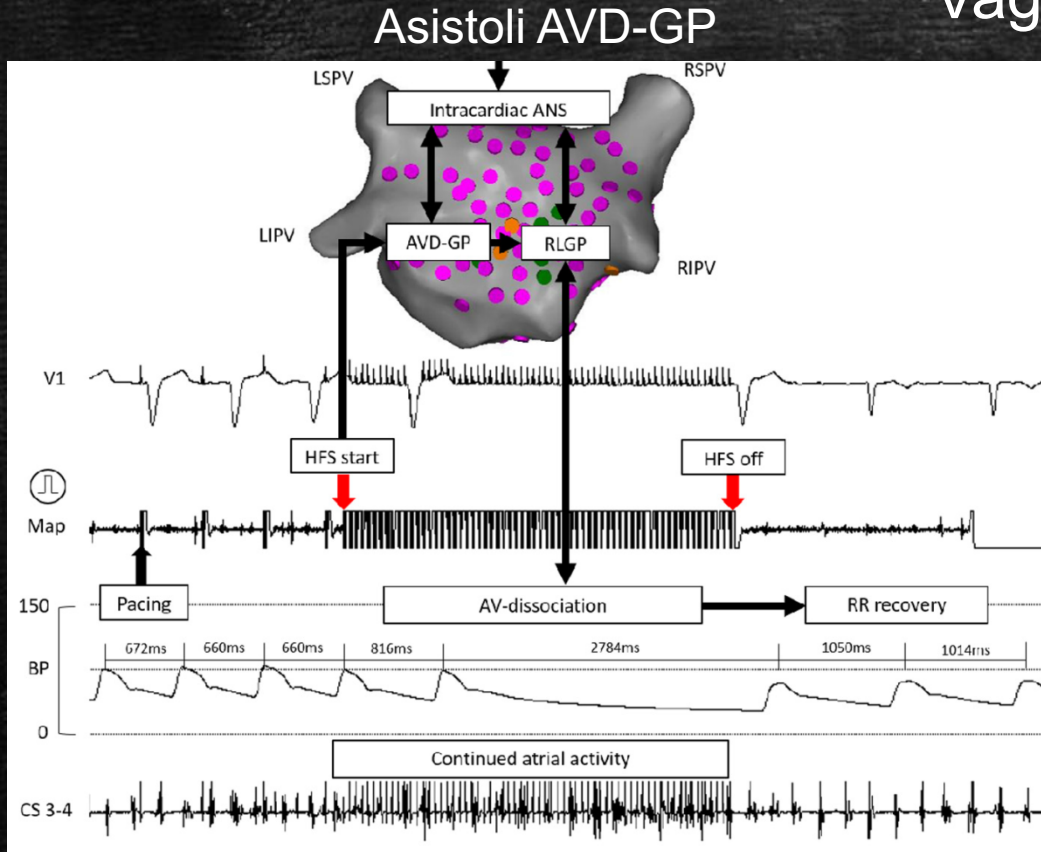
Elektrofizyologlara göre-1

- Anatomik varsayımlara rağmen bireysel farklılıklar mevcuttur
- Daha objektif verilere ihtiyacımız var
- Bugüne kadar kullanılan yaklaşımlar:
 - (1) high frequency stimulation (HFS);
 - (2) spectral analysis (SA);
 - (3) anatomic approach (AA).

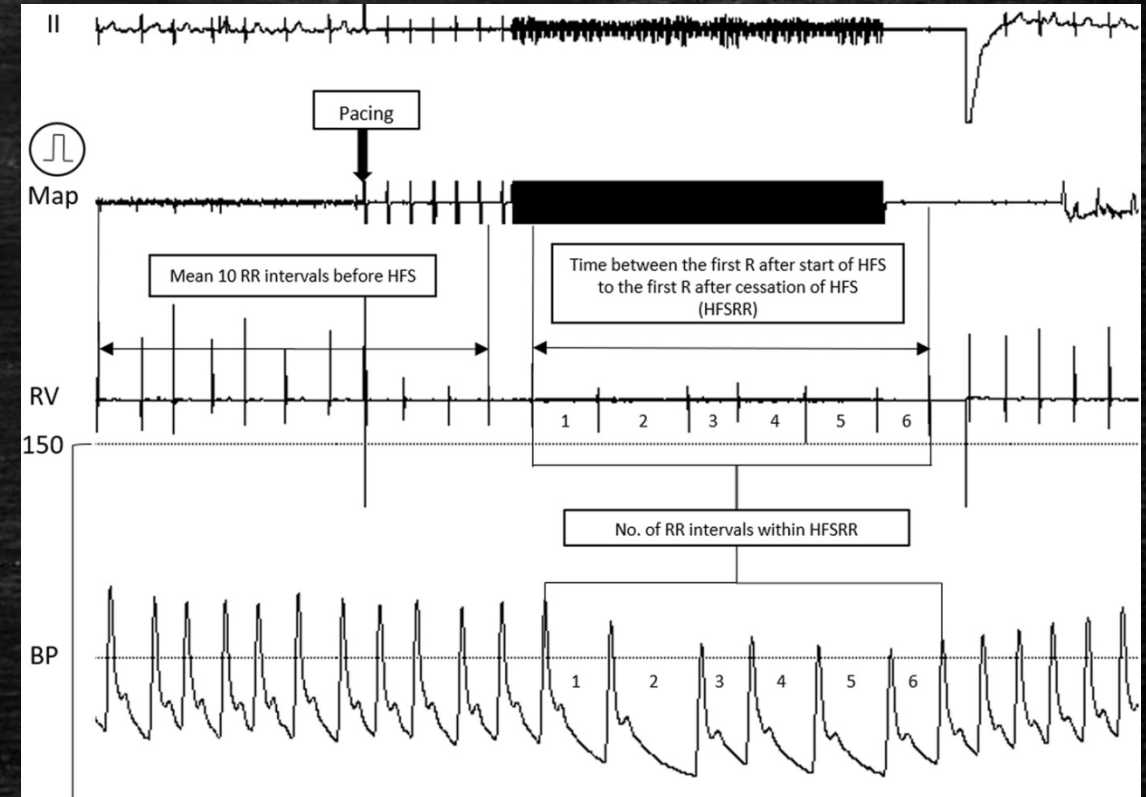
High Frequency Stimulation

20 Hz, 0.1-1 mA veya 10-30 V, 1-10 ms puls süresi Her alanda 5-10 sn

Vagal Yanıt



Bradikardi AVD-GP



A normal response characterized by the absence of any effect or <50% changes on the PR or RR intervals

HFS'nin dezavantajları

Zaman kaybettirici (HFS mapping zamanı 63.3 ± 24.8 dk
Kim'in çalışmasında)

Uygun protokol???

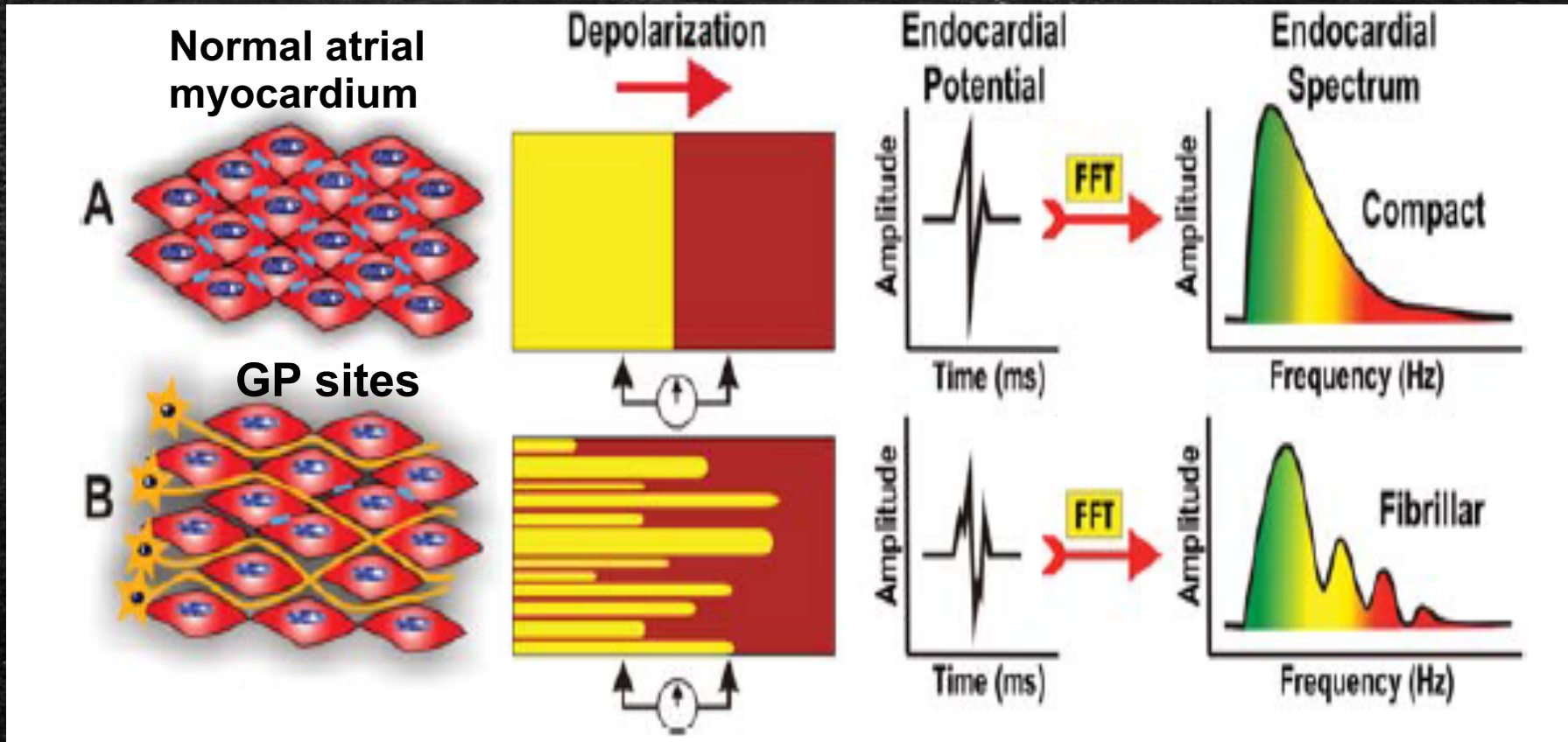
(+) yanıt için kriter ??? (PR veya RR da herhangi bir uzama,
25% or 50% artış, asistoli ya da 2.-3. derece AVB)

Ağrılı (Genel anestezi şart)

AF uyarımı riski yüksek

Spectral Analysis

FFT ile , atriyal EGM'ler farklı bir forma çevrilir



SA dezavantajı

Dönüştürücü ihtiyacı
3D Mapping sistemleri ile entegre değil

Anatomik ablasyon

Ablasyon ampirik olarak belirlenen alanlarda yapılır

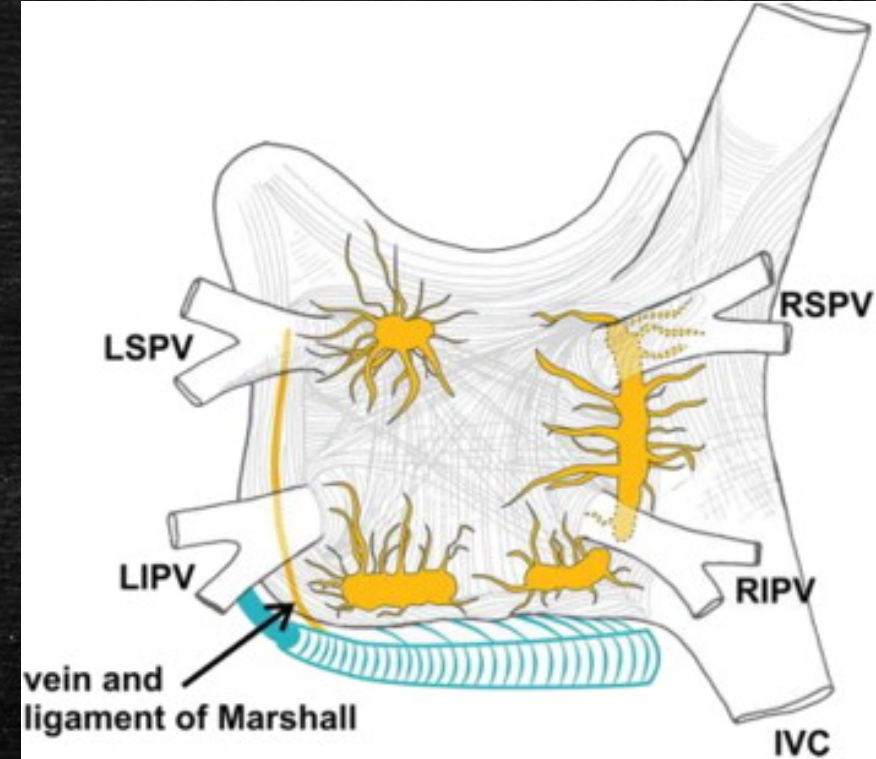
1) Tek strateji olarak
VEYA

2) SA, HFS veya her ikisine ek

**AA'nın
handikapları**



Subjektif
Endpoint?
Geniş ablasyon?

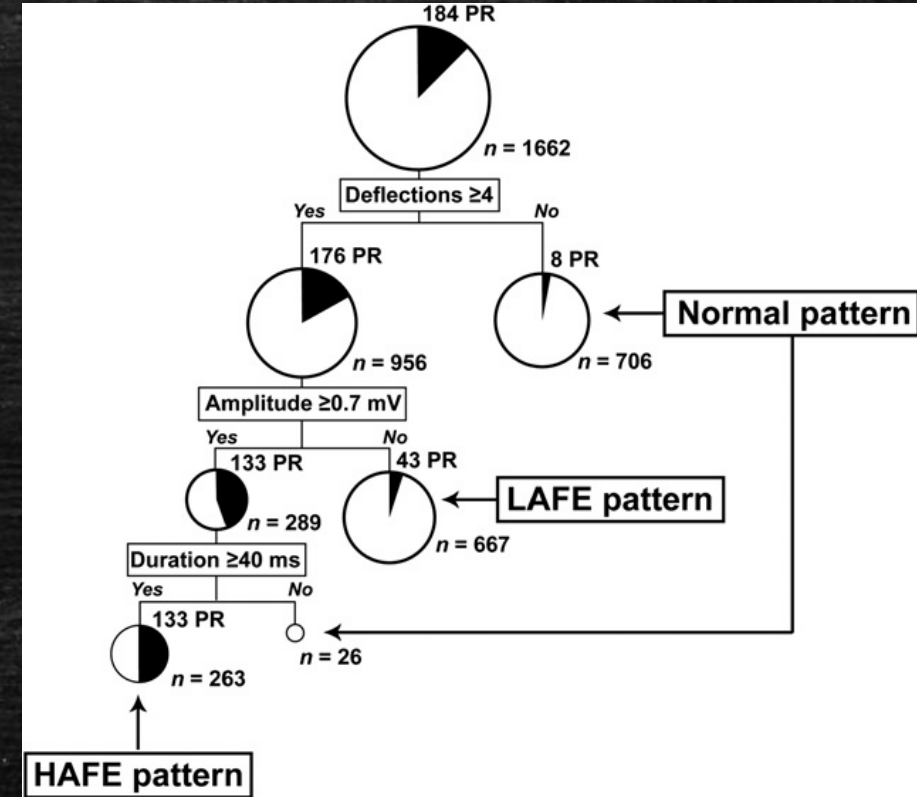
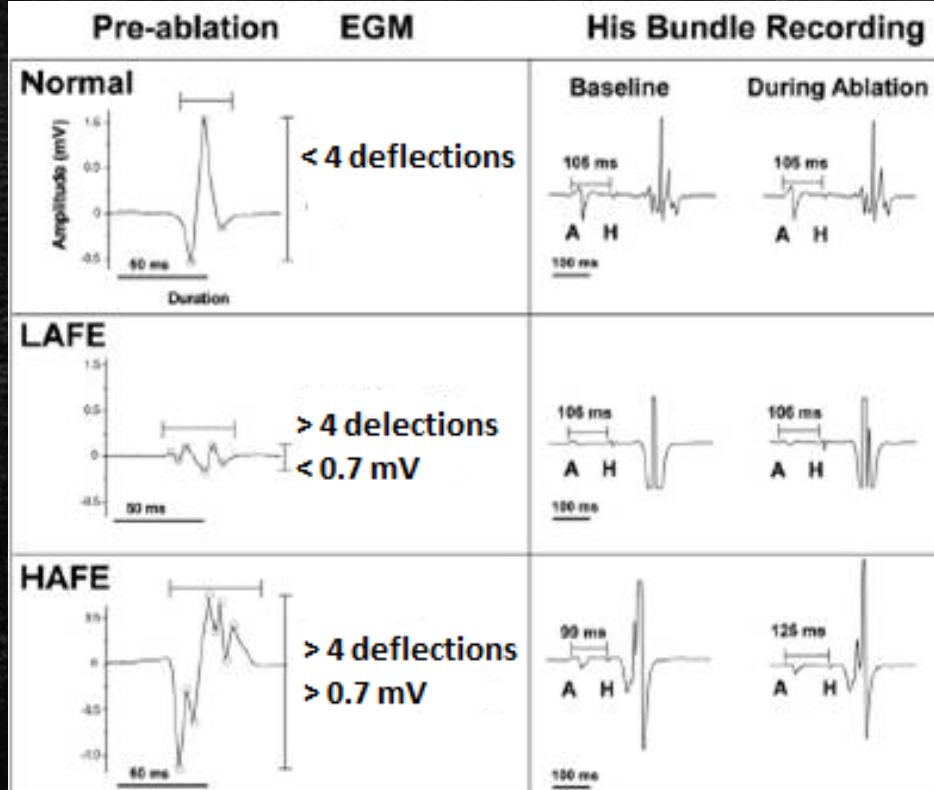


Bu kısıtlılıkları aşmak için

- Kolay anlaşılır,
 - Kolay uygulanır,
 - 3D mapping sistemleri ile uyumlu
 - Ek ekipman gerektirmeyen
- bir tekniğe ihtiyac var

EGM guided ablasyon fikri

30- to 500-Hz bandpass filter

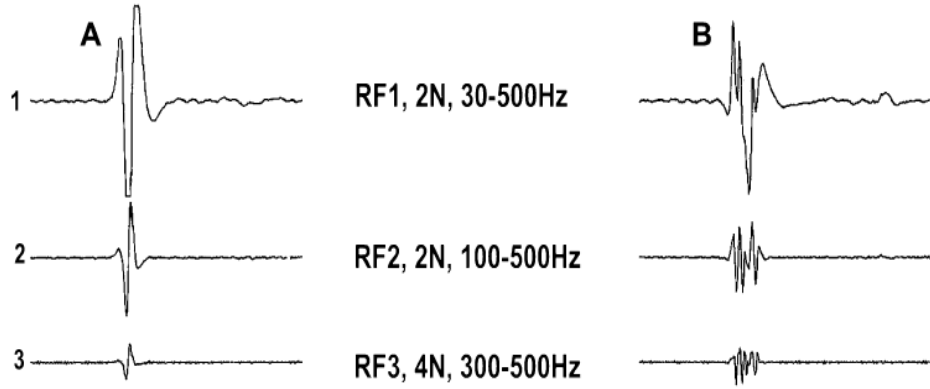


VR en iyi ön gördürücüsü ablasyon bölgesindeki EGM defleksiyon sayısı
Diğeri ise EGM amplitude'ünün > 0.7 mV olması

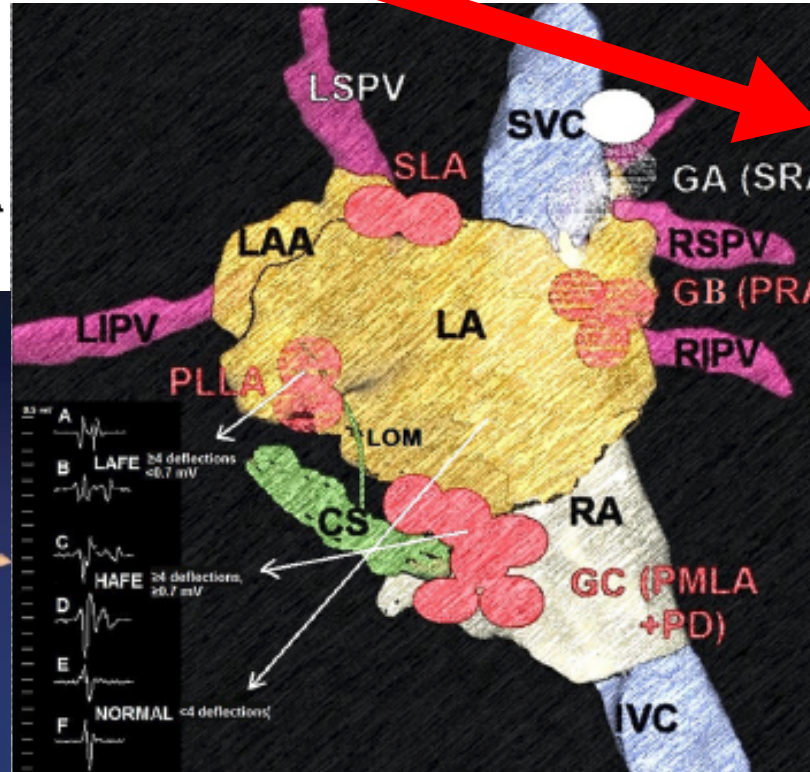
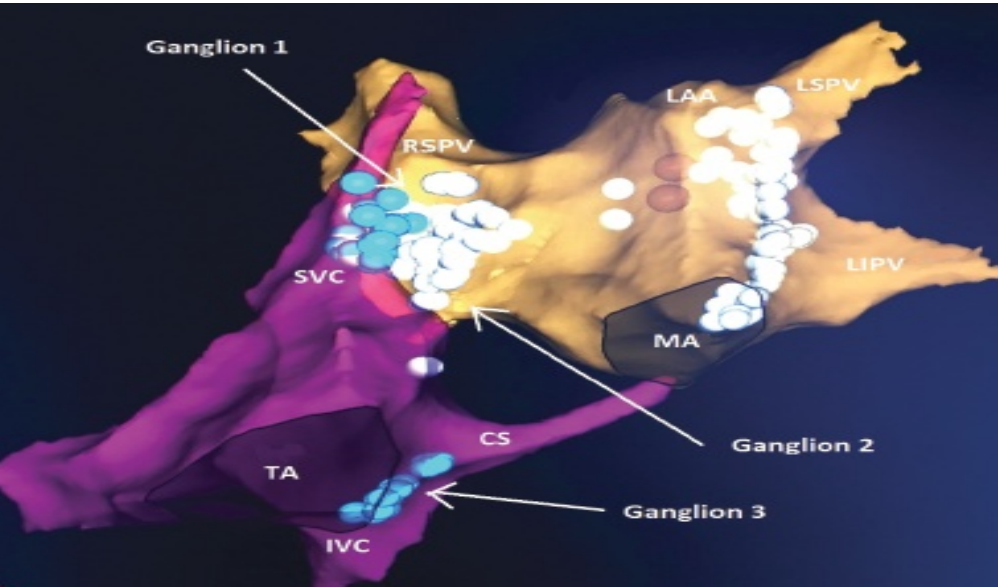
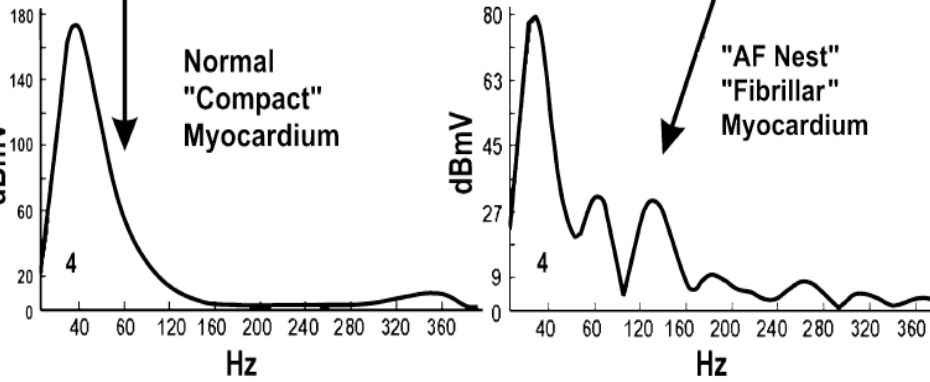
Electroanatomic-mapping-guided cardioneuroablation versus combined approach for vasovagal syncope: a cross-sectional observational study

Tolga Aksu¹  • Tumer Erdem Guler¹ • Ferit Onur Mutluer² • Serdar Bozyel¹ • Sukriye Ebru Golcuk³ • Kivanc Yalin⁴

Received: 8 May 2018 / Accepted: 18 July 2018
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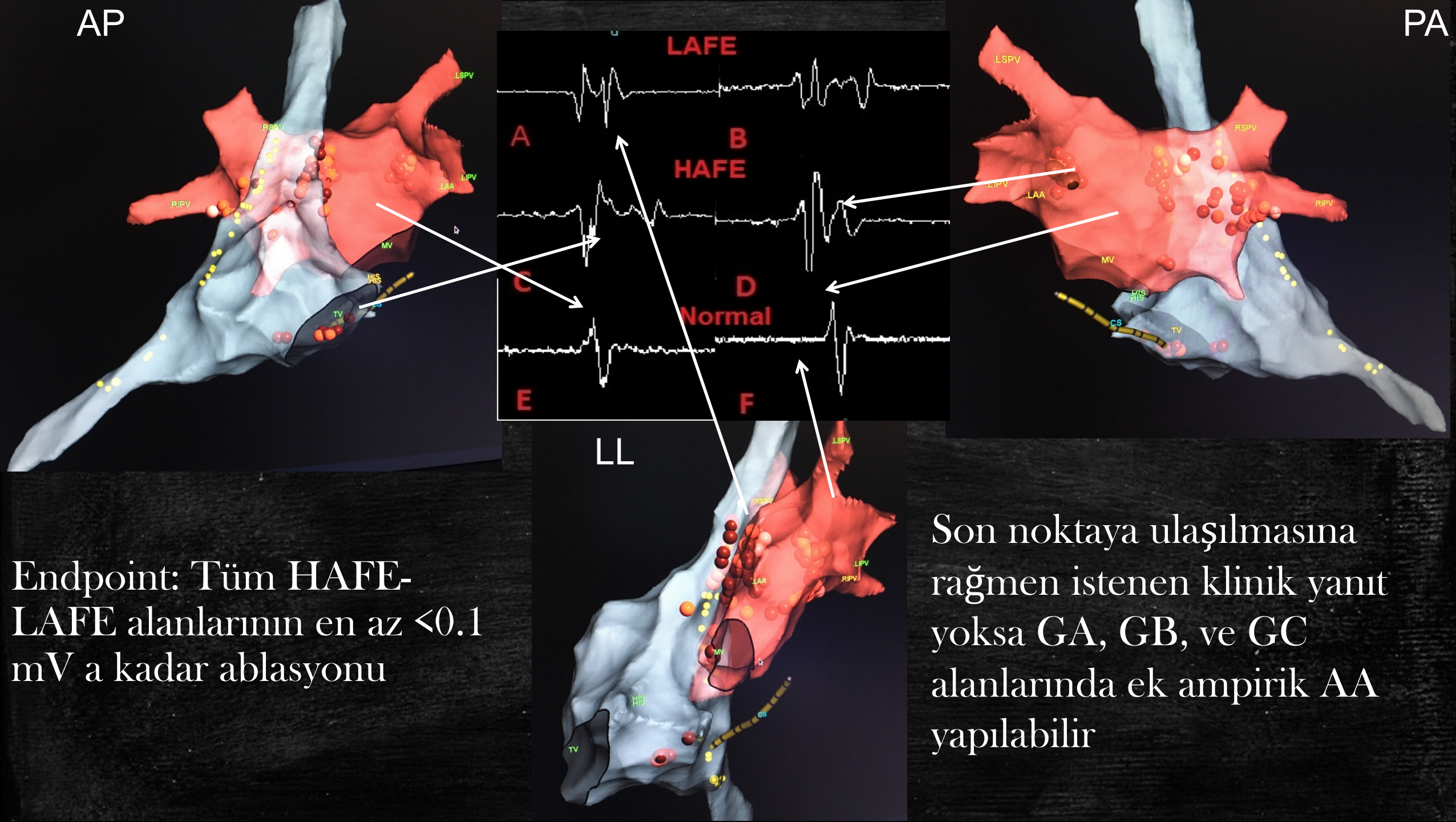
Time domain with high frequency filters is better to map GP



Her iki atriyum haritalandı
Filter settings 300-500 Hz ve
sweep speed of 200 mm/s
Bipolar EGM'ler 3 gruba
bölündü
Normal EGM,
LAFE
HAFE } Hedeflendi

AP

PA



Endpoint: Tüm HAFE-LAFE alanlarının en az <0.1 mV a kadar ablasyonu

Son noktaya ulaşılmasına rağmen istenen klinik yanıt yoksa GA, GB, ve GC alanlarında ek ampirik AA yapılabilir

Can We Predict Vagal Response to Cryoballoon Application Using Intracardiac Recordings?

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²Usak University Hospital, Department of Cardiology, Usak/Turkey.

³Koc University Hospital, Department of Cardiology, Istanbul/Turkey.

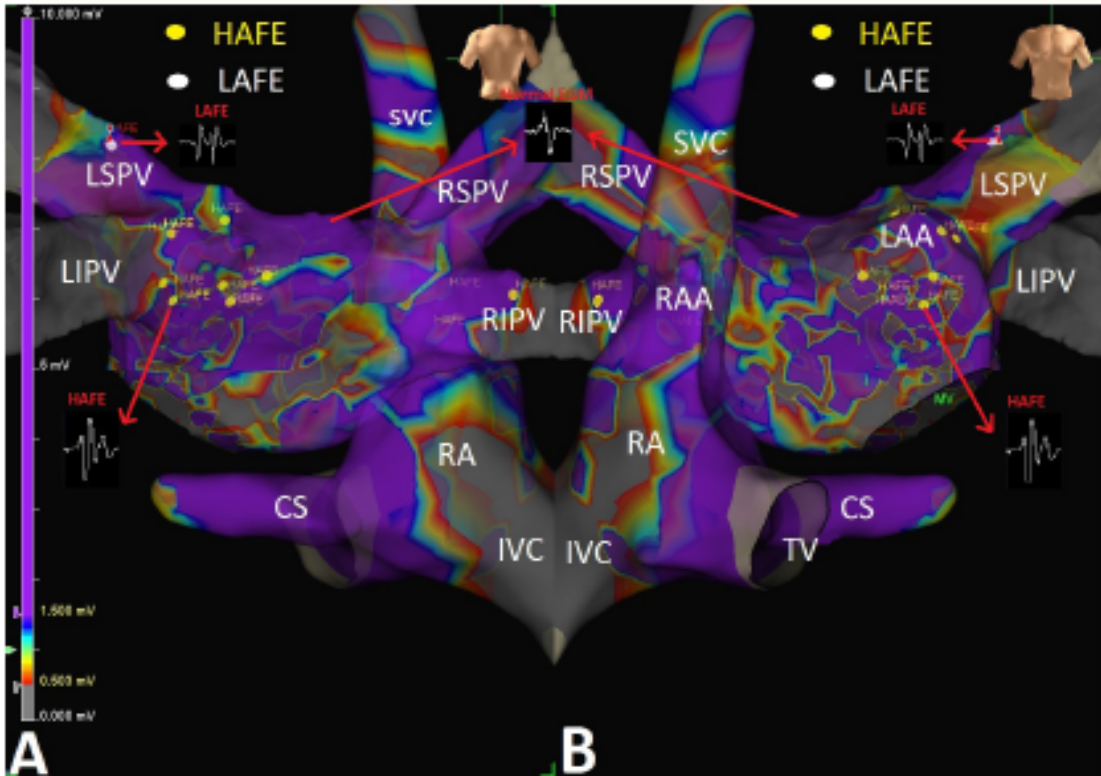
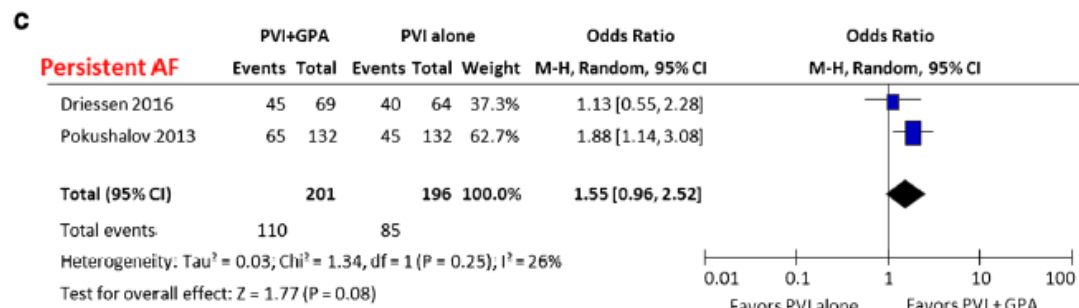
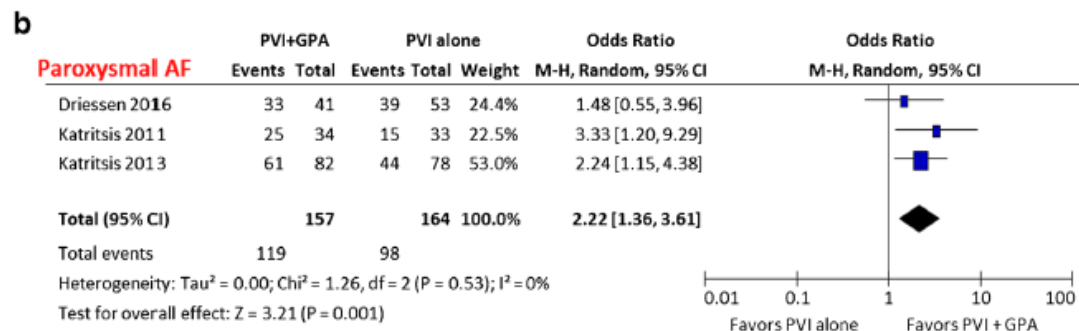
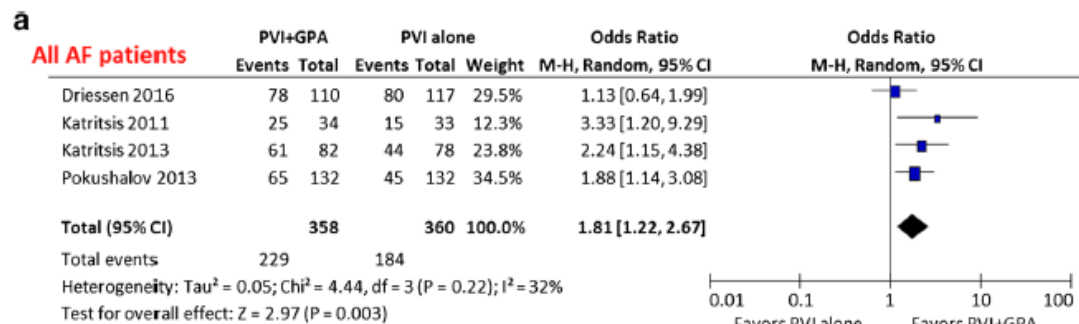


Figure 1: Electroanatomical endocardial bipolar voltage mapping of atria in posteroanterior (A) and anteroposterior (B) views

Uygun adaylar nasıl seçilmeli?

PAF veya non-PAF



Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Odds Ratio M-H, Fixed, 95% CI
1.2.1 GP+PVI VS PVI							
Katritsis-a 2013	61	82	44	78	22.1%	2.24 [1.15, 4.38]	
Pokushalov E 2013	65	132	45	132	43.7%	1.88 [1.14, 3.08]	
Subtotal (95% CI)		214		210	65.8%	2.00 [1.34, 2.98]	
Total events	126		89				
Heterogeneity: $\chi^2 = 0.18$, $df = 1$ ($P = 0.67$); $I^2 = 0\%$							
Test for overall effect: $Z = 3.41$ ($P = 0.0006$)							

Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Odds Ratio M-H, Fixed, 95% CI
1.7.3 GP+PVI							
Katritsis DG 2011	25	34	15	33	10.3%	3.33 [1.20, 9.29]	
Katritsis-a 2013	61	82	44	78	29.5%	2.24 [1.15, 4.38]	
Subtotal (95% CI)		116		111	39.9%	2.53 [1.45, 4.42]	
Total events	86		59				
Heterogeneity: $\chi^2 = 0.40$, $df = 1$ ($P = 0.53$); $I^2 = 0\%$							
Test for overall effect: $Z = 3.25$ ($P = 0.001$)							

Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Odds Ratio M-H, Fixed, 95% CI
1.6.2 GP+PVI							
Pokushalov E 2013	65	132	45	132	25.1%	1.88 [1.14, 3.08]	
Subtotal (95% CI)		132		132	25.1%	1.88 [1.14, 3.08]	
Total events	65		45				
Heterogeneity: Not applicable							
Test for overall effect: $Z = 2.49$ ($P = 0.01$)							

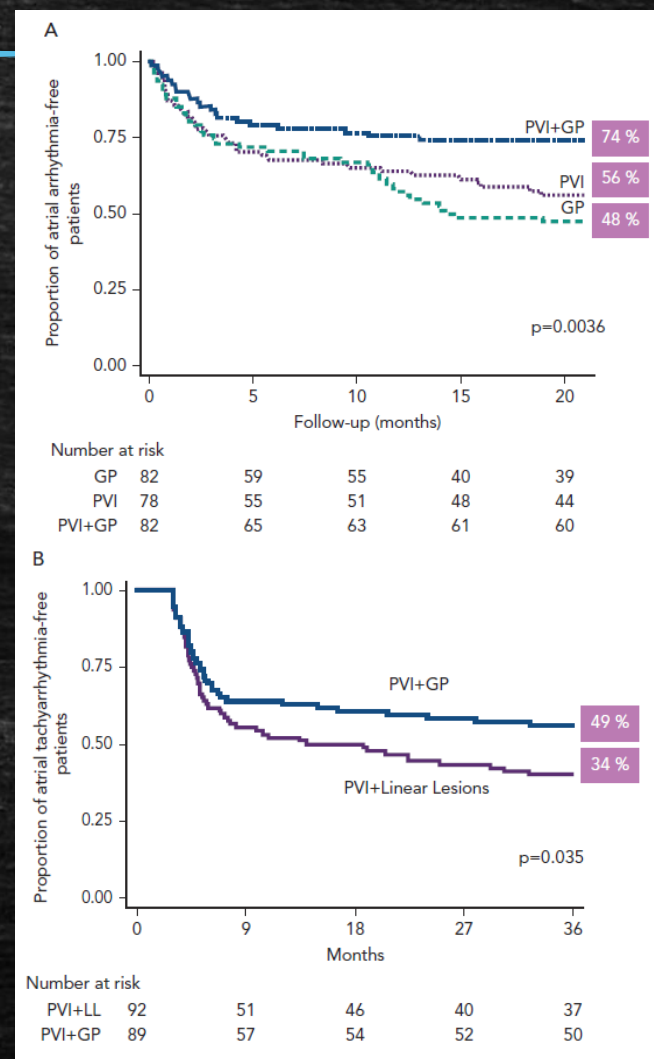
En iyi ablasyon yaklaşımı ne olmalı?-1

GPA vs PVI

GPA+PVI
vs PVI

GPA w/o
control group

Study	Year	Experiment vs. control group	Ablation sites	Study design	Atrial fibrillation type	No. of study patients	Outcomes
Katritsis DG ²⁸	2008	GP vs. PVI	Endocardial	CCS	Paroxysmal	38	AF recurrence: 74% (GP ablation group) vs. 37% (PVI isolation group) (log-rank test $P=0.017$)
Mikhailov E ²⁹	2011	GP vs. PVI	Endocardial	CCS	Paroxysmal	70	Freedom from any atrial tachyarrhythmia without antiarrhythmic drugs: 34.3% (GP ablation group) vs. 65.7% (PVI group) (log-rank test $P=0.008$)
Scherlag BJ ³³	2005	GP + PVI vs. PVI	Endocardial	Unknown	Paroxysmal or persistent	60	AF-free survival: 91% in GP + PVI group vs. 71% in PVI group (no statistic comparison)
Katritsis DG ³¹	2011	GP + PVI vs. PVI	Endocardial	RCT	Paroxysmal	67	Arrhythmia-free (AF or AT) survival: 85.3% in PVI + GP group vs. 60.6% in PVI group (log rank test, $P=0.019$)
Katritsis DG ³²	2013	GP + PVI vs. GP vs. PVI	Endocardial	RCT	Paroxysmal	242	AF-free survival: 74% (GP + PVI) vs. 48% (GP) vs. 56% (PVI) (log-rank test $P=0.004$)
Xu FQ ³⁴	2017	GP+re-PVI vs. re-PVI	Endocardial	RCT	Paroxysmal (recurred)	123	AF-free survival: 91% (GP + re-PVI) vs. 78% (re-PVI) ($P=0.046$)
Scanavacca M ³⁵	2006	GP ablation or PVI	Epicardial and/or endocardial	Observational study	Paroxysmal	10	Recurrence in 5/7 patients who underwent denervation
Po SS ⁹	2009	GP + PVI	Endocardial	Observational study	Paroxysmal or persistent	80	Free of symptomatic AF or AT after a single ablation procedure: 80% at 12 months and 86% at a mean follow-up of 22 months
Pokushalov E ²⁷	2009	Selective GP vs. anatomic GP ablation	Endocardial	RCT	Paroxysmal	80	Free of symptomatic paroxysmal AF: 42.5% in selective GP ablation
Pokushalov E ²⁷	2010	Anatomic GP ablation	Endocardial	Observational study	Paroxysmal	56	AF-free survival at 12 months: 71%
Pokushalov E ³⁶	2010	Anatomic GP ablation	Endocardial	Observational study	Long standing persistent	89	AF-free survival: 38.2%
Pokushalov E ³⁸	2012	GP ablation guided by HFS and CFAE	Endocardial	Observational study	Paroxysmal	62	AF-free survival at 12 months: 71%



En iyi ablasyon yaklaşımı ne olmalı?-2

LETTER TO THE EDITOR

doi:10.1093/europace/eux363

2017 expert consensus statement on catheter and surgical ablation of atrial fibrillation: letter to the Editor

We read with great interest the recent expert consensus statement on catheter and surgical ablation of atrial fibrillation (AF).¹ It is well known that pulmonary vein isolation (PVI) is the cornerstone of AF ablation, especially in patients with paroxysmal AF. Various energy sources and specially designed catheters have been introduced for effective PVI. With this aim, conventional point-by-point radiofrequency catheter ablation (RFCA) and cryoballoon ablation (CA) are the two most commonly used methods. Although PVI was shown as the primary goal in these studies, the work done was wide antral circumferential ablation (WACA) in fact. As shown in our recently published work, WACA causes not only PVI but also a significant reduction in the total complex fractionated atrial electrogram area in patients with long-standing persistent AF.² If we consider that ganglionated plexi (GPs) are also located around the pulmonary veins, it would be a realistic idea to consider that WACA significantly reduces these GPs during PVI. Again, it was shown in our study that antral ablation effect is wider in CA than in RFCA. Therefore, the

recommendation of WACA rather than PVI during RFCA may demonstrate positive effect on the outcome. This emphasis is important because large antral ablation requires more technical skill and experience than ostial or near-ostial ablation.

Secondly, there is a misunderstanding in the article that GP is mainly located around the left atrium. However, in a human autopsy study, Armour *et al.*³ demonstrated that the largest number of GP—an average of 194 of the 458 per heart—is located in the posterior surface of the right atrium adjacent to the interatrial groove, and these GPs contain much more neurons compared with the others. Furthermore, in our research article, we demonstrated that vagal denervation may be achieved by the right atrial ablation only in patients with a functional atrioventricular block.⁴ So, we conclude that the left atrial-only approach may not be enough for complete vagal denervation and the addition of the right atrial ablation into the procedure may improve the results.

Finally, gastric hypomotility or gastroparesis is considered as a complication that is seen only after RFCA. However, our study of 104 patients who underwent either CA or RFCA demonstrated the prevalence of post-procedural gastroparesis to be 10% and 2%, respectively.⁵ Surprisingly, gastroparesis had resolved in all patients who received CA, but one patient who received RFCA had persistent gastroparesis at the follow-up visit of 6 months. We

speculated that the energy source may influence the severity of collateral tissue damage.

References

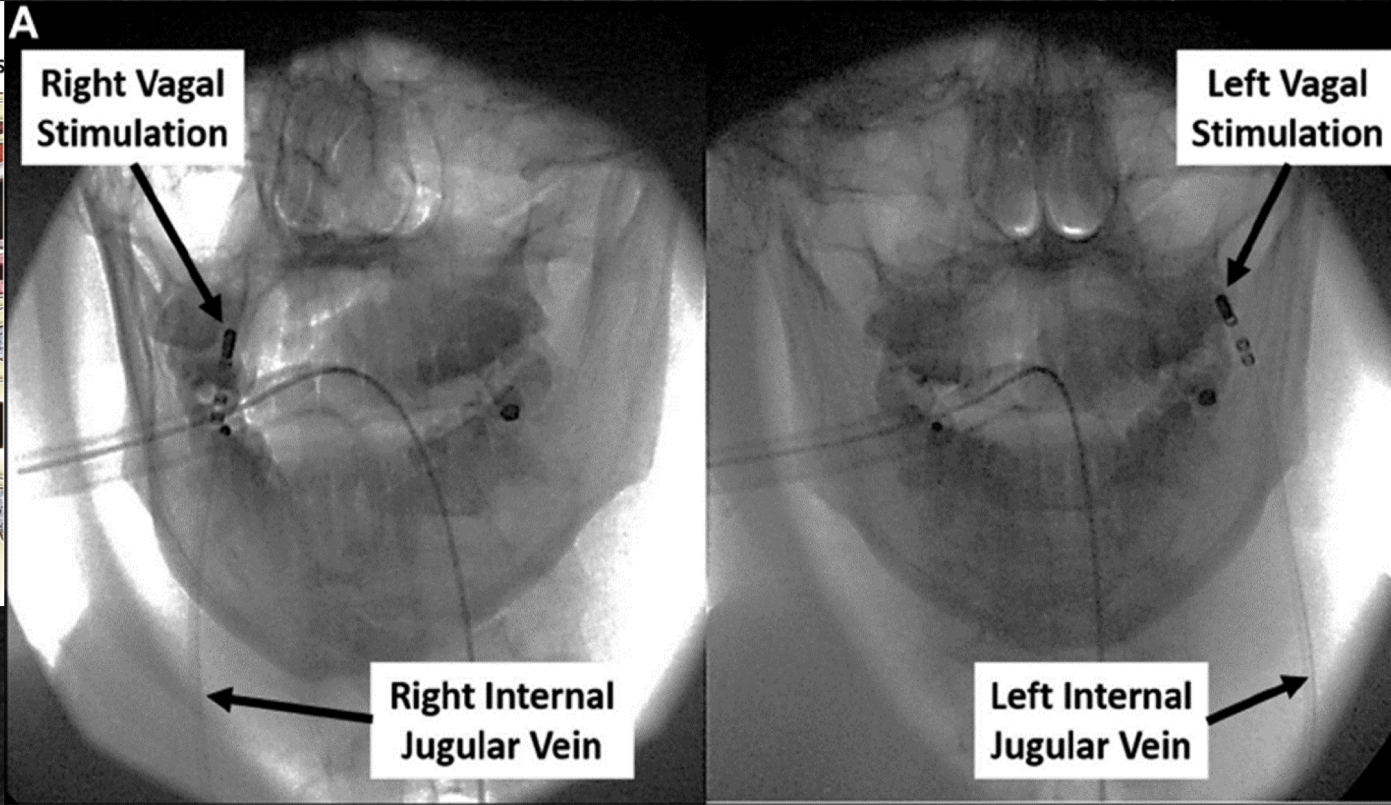
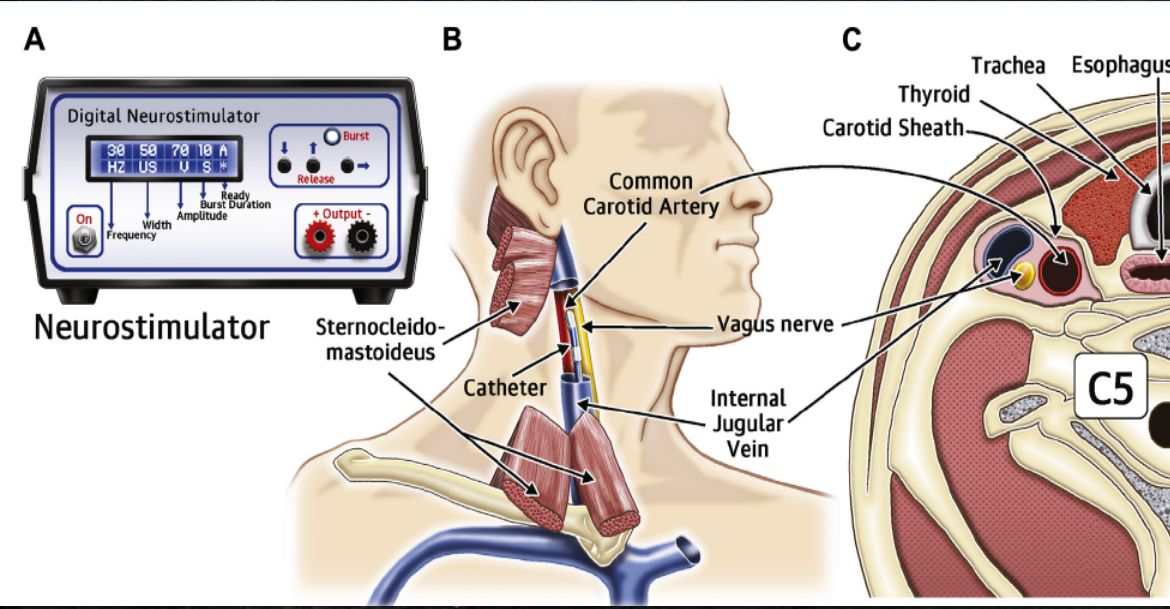
1. Calkins H, Hindricks G, Cappato R, Kim YH, Saad EB, Aguinaga L *et al.* 2017 HRS/EHRA/ECAS/APHRS/SOLAECE expert consensus statement on catheter and surgical ablation of atrial fibrillation. *Europace* 2017; doi:10.1093/europace/eux274.
2. Güler TE, Aksu T, Yalın K, Gökçuk SE, Mutluer FO, Bozyel S. Combined cryoballoon and radiofrequency ablation versus radiofrequency ablation alone for long-standing persistent atrial fibrillation. *Am J Med Sci* 2017; 354:1500–06.
3. Armour JA, Murphy DA, Yuan BX, Macdonald S, Hopkins DA. Gross and microscopic anatomy of the human intrinsic cardiac nervous system. *Anat Rec* 1997; 247:289–98.
4. Aksu T, Gökçuk E, Yalın K, Güler TE, Erden I. Simplified cardioneuroablation in the treatment of reflex syncope, functional AV block, and sinus node dysfunction. *Pacing Clin Electrophysiol* 2016;39:42–53.
5. Aksu T, Gökçuk S, Güler TE, Yalın K, Erden I. Gastroparesis as a complication of atrial fibrillation ablation. *Am J Cardiol* 2015;116:92–7.

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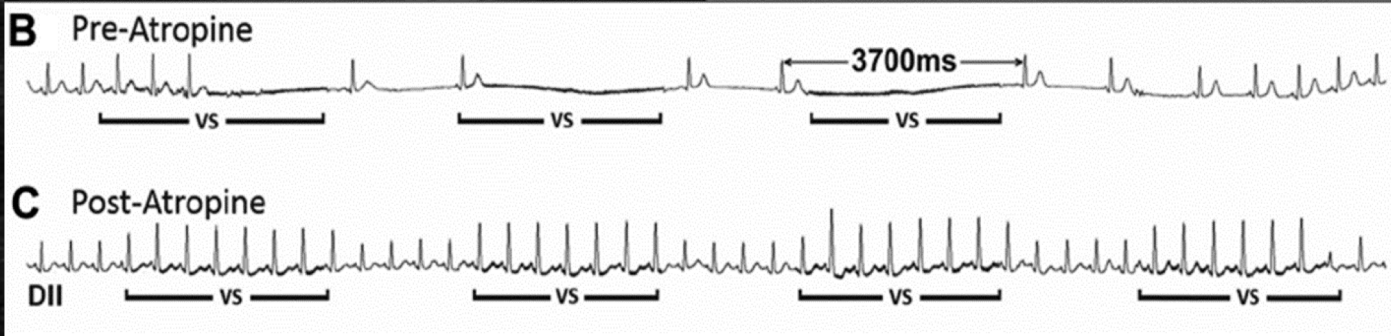
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Secondly, there is a misunderstanding in the article that GP is mainly located around the left atrium. However, in a human autopsy study, Armour *et al.*³ demonstrated that the largest number of GP—an average of 194 of the 458 per heart—is located in the posterior surface of the right atrium adjacent to the interatrial groove, and these GPs contain much more neurons compared with the others. Furthermore, in our research article, we demonstrated that vagal denervation may be achieved by the right atrial ablation only in patients with a functional atrioventricular block.⁴ So, we conclude that the left atrial-only approach may not be enough for complete vagal denervation and the addition of the right atrial ablation into the procedure may improve the results.

Son nokta ne olmalı?

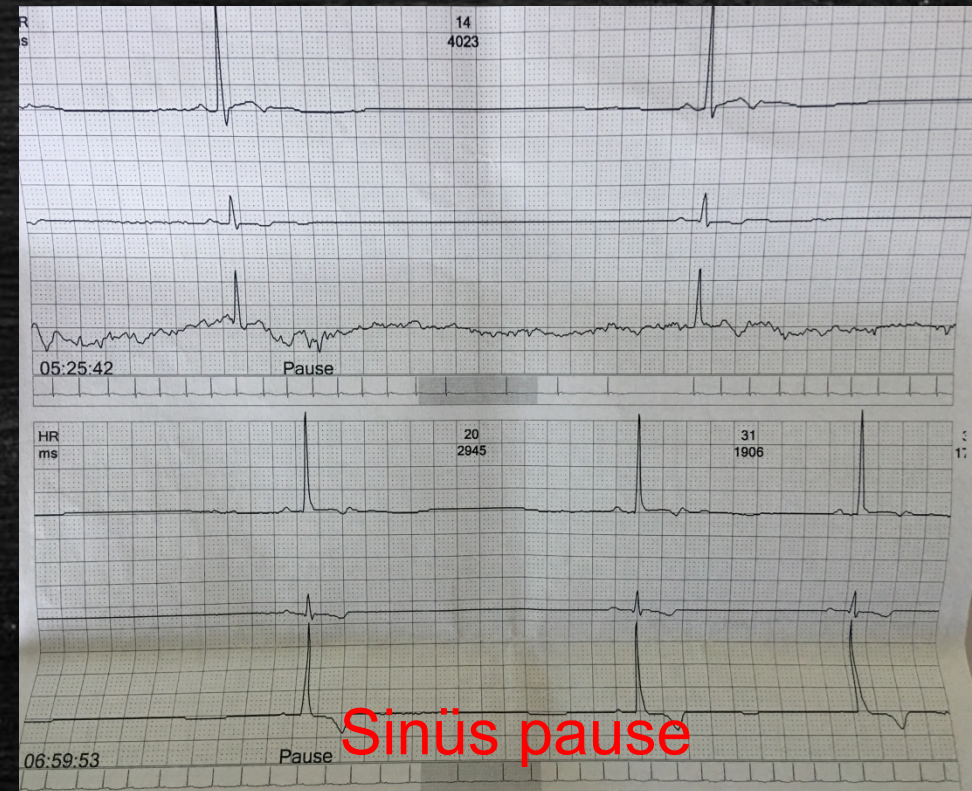
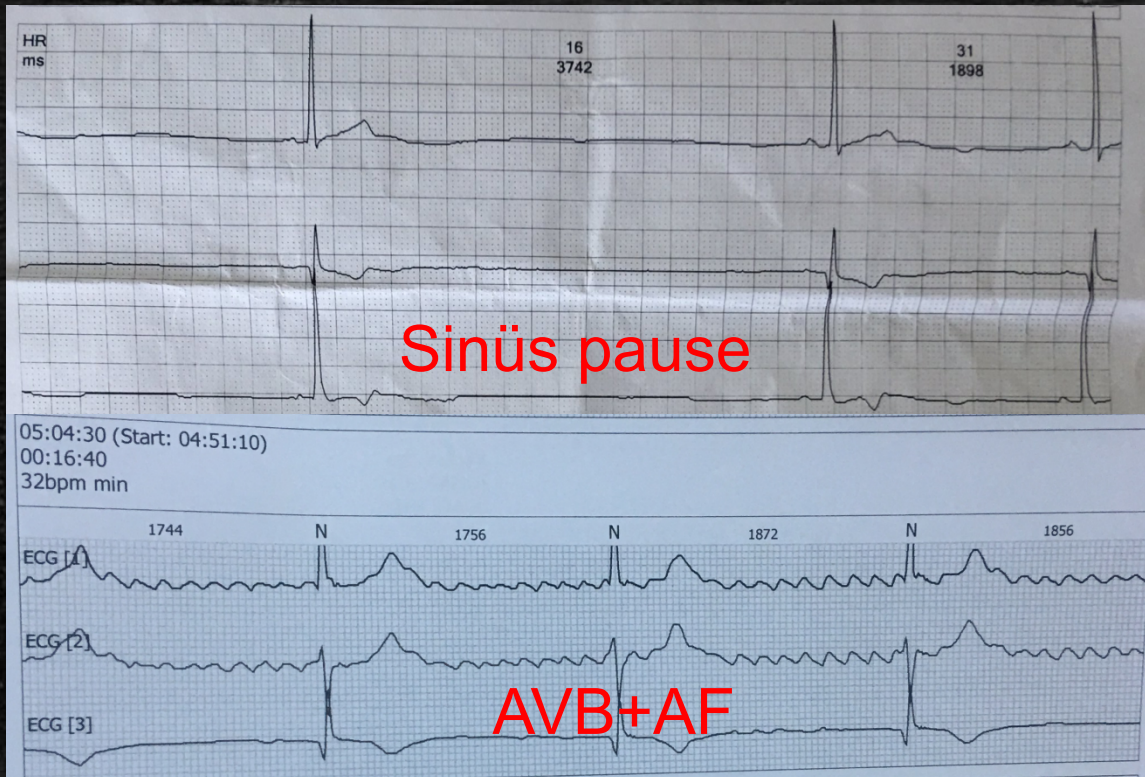


Ablasyon son noktası: Hedef EGM'lerin yok edilmesi
Klinik son nokta: Atropine yanıtı
İşlem son noktası IJV HFS ile Vagal yanıtın yok edilmesi



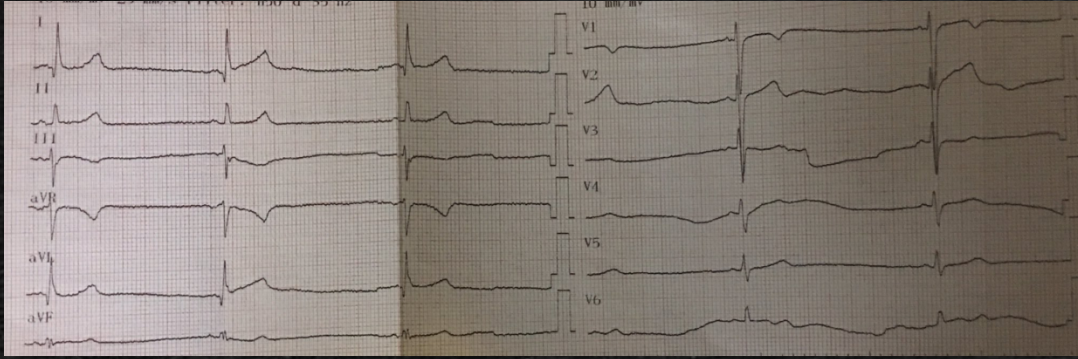
VAKA

31 Y, E, Tekrarlayan syncope ve çarpıntı atakları

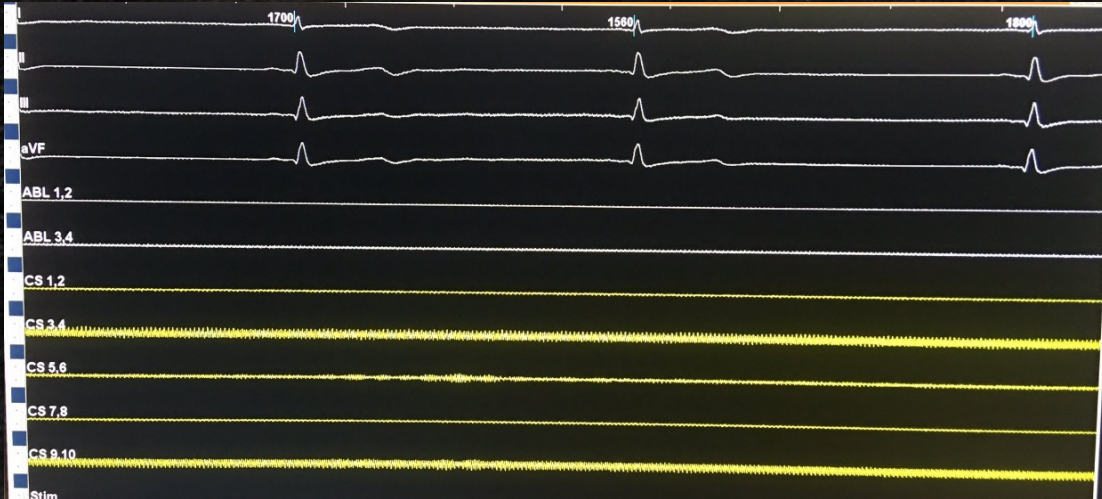


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İstirahat EKG



BCL sheat öncesi

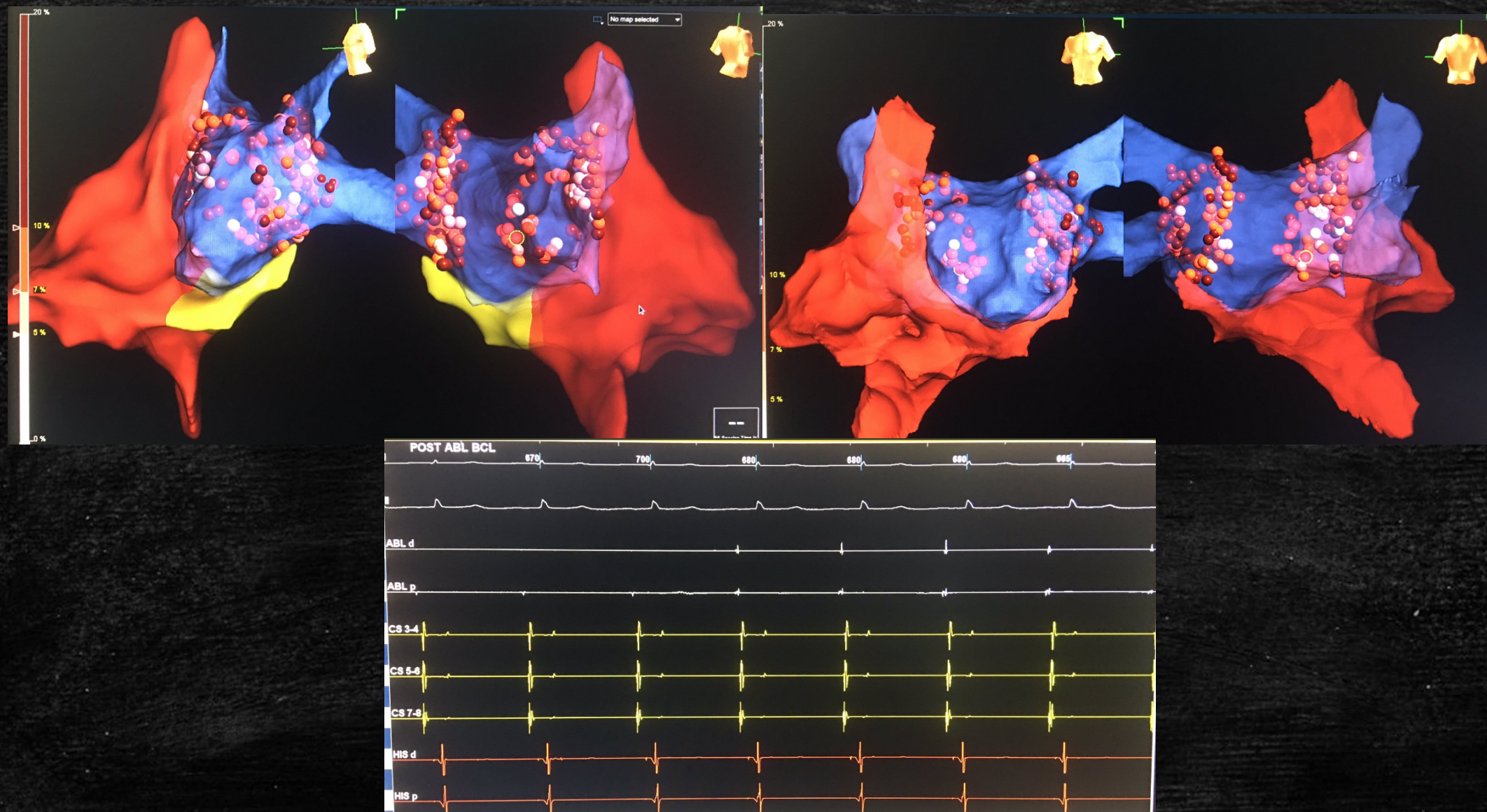


Optima ile mapping sırasında AF uyarılması





VAKA



Vagal denervation in atrial fibrillation ablation: A comprehensive review

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ABSTRACT

Although pulmonary vein isolation is accepted as an established interventional treatment in paroxysmal atrial fibrillation (AF), alternative modalities are being investigated because of the high recurrence rates of nonparoxysmal forms. One of the alternative ablation approaches is ablation or modification of vagal ganglionated plexi (VGP). The technique has not only been used in vagally mediated AF but also investigated in paroxysmal and nonparoxysmal AF. Clinical studies demonstrate significant discrepancy related with detection of VGP sites or ablation targets and definition of procedural end-points, so far. In this review, we aimed to discuss the current data on the role of VGP in the pathogenesis of AF and potential therapeutic implications of ablation of these ganglia. (*Anatol J Cardiol* 2017; 18: 142-8)

Keywords: parasympathetic, vagal ganglia, cardioneuroablation, tachycardia, autonomic

TEŞEKKÜRLER