

AF KONUSUNDA BİZİM İÇİN ZOR KONULAR

AF ABLASYONU ÖNCESİ GÖRÜNTÜLEME VE FIBROZIS TESPİT TEKNİKLERİ – TÜRKİYE'DE DURUM NE?

Dr. İlyas ATAR
Güven Hastanesi
Kardiyoloji
Ankara

AF ablasyonu görüntüleme

- *Ekokardiyografi*
 - Transtorasik ekokardiyografi
 - TEE
 - ICE
- *CT*
- *MRI*
- *3 boyutlu Rotasyonel anjiyografi*
- *Floroskopi*
- *Elektroanatomic mapping (CARTO, En Site NavX, vs..)*
- *Diğer (Rotor, vs)*
- *Fibrozis değerlendirilmesi (MRI, Elektroanatomic mapping, EKO, vs..)*

Transtorasiik Ekokardiyografi (3D TTE)

- Kullanım zamanlaması
 - *İşlem öncesi: Anatomi, altta yatan kalp hastalığı, hasta seçimi*
 - *İşlem sonrası: Komplikasyonların değerlendirilmesi*
 - *Takip*
- Avantajları:
 - *Kolay ulaşılır*
 - *Ucuz*
 - *Güvenli*
- Dezavantajları
 - *Operatör bağımlı*
 - *Görüntü kalitesi sorunları*
 - *Yetersiz anatomik değerlendirme*

TEE (3D TEE)

■ Kullanım zamanlaması

- *İşlem öncesi: Anatomi, LAA trombüsü, altta yatan kalp hastalığı, kapak hastalığı, hasta seçimi*
- *İşlem: Transseptal geçiş rehber, ablasyona rehber?*
- *İşlem sonrası: Komplikasyonların değerlendirilmesi*

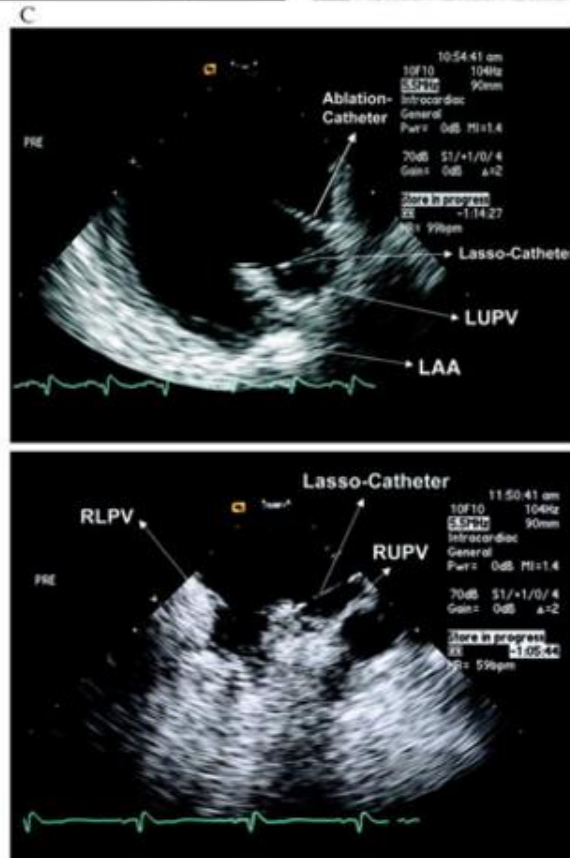
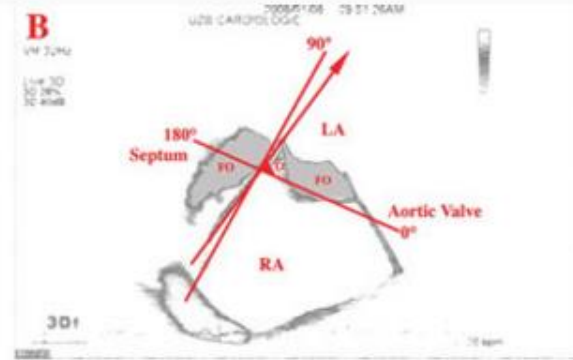
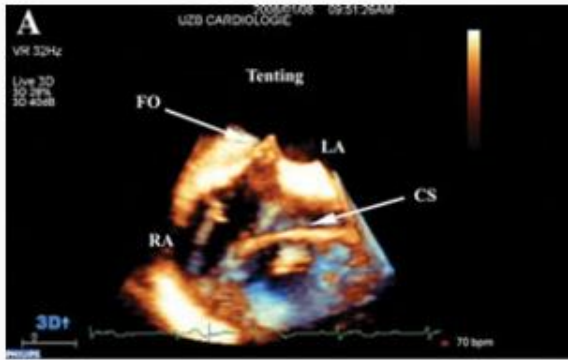
■ Avantajları:

- *Kolay ulaşılır*
- *Güvenli*
- *TTE göre daha iyi görüntü kalitesi ve değerlendirme*

■ Dezavantajları

- *Yarı invaziv, anestezi gereksinimi*
- *Operatör bağımlı*
- *Görüntü kalitesi sorunları*





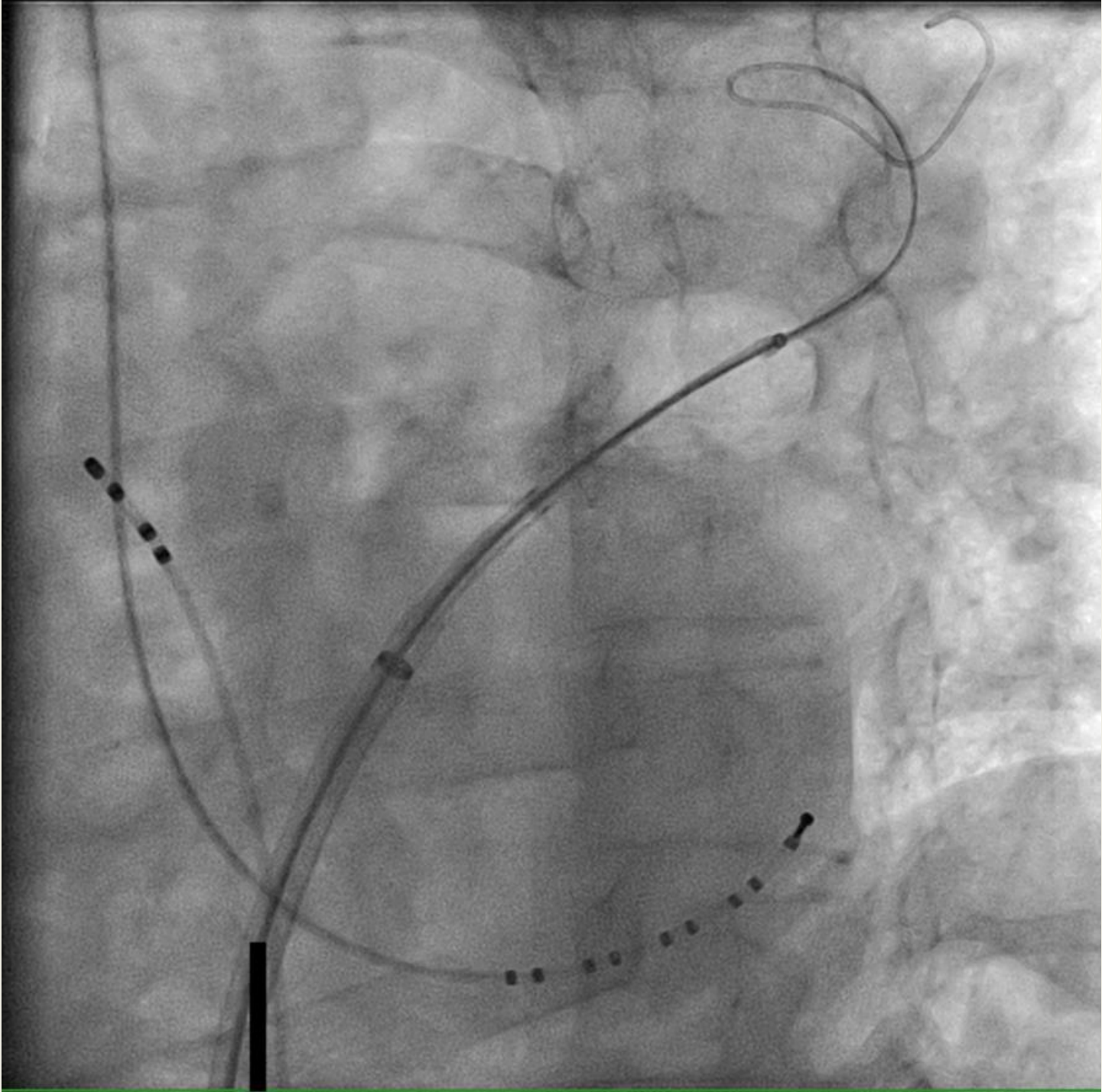
Chierchia GB, et al. *Europace* 2008; 10:1325–1328.
Marrouche NF, et al. *Circulation* 2003; 107:2710–2716

ICE (3D ICE)

- Kullanım zamanlaması
 - *İşlem: Tüm işleme rehber, komplikasyonların değerlendirilmesi*
- Avantajları:
 - *Floroskopi süresini azaltır*
 - *TEE kullanımına gereksinimi ortadan kaldırır*
- Dezavantajları
 - *Maliyet*

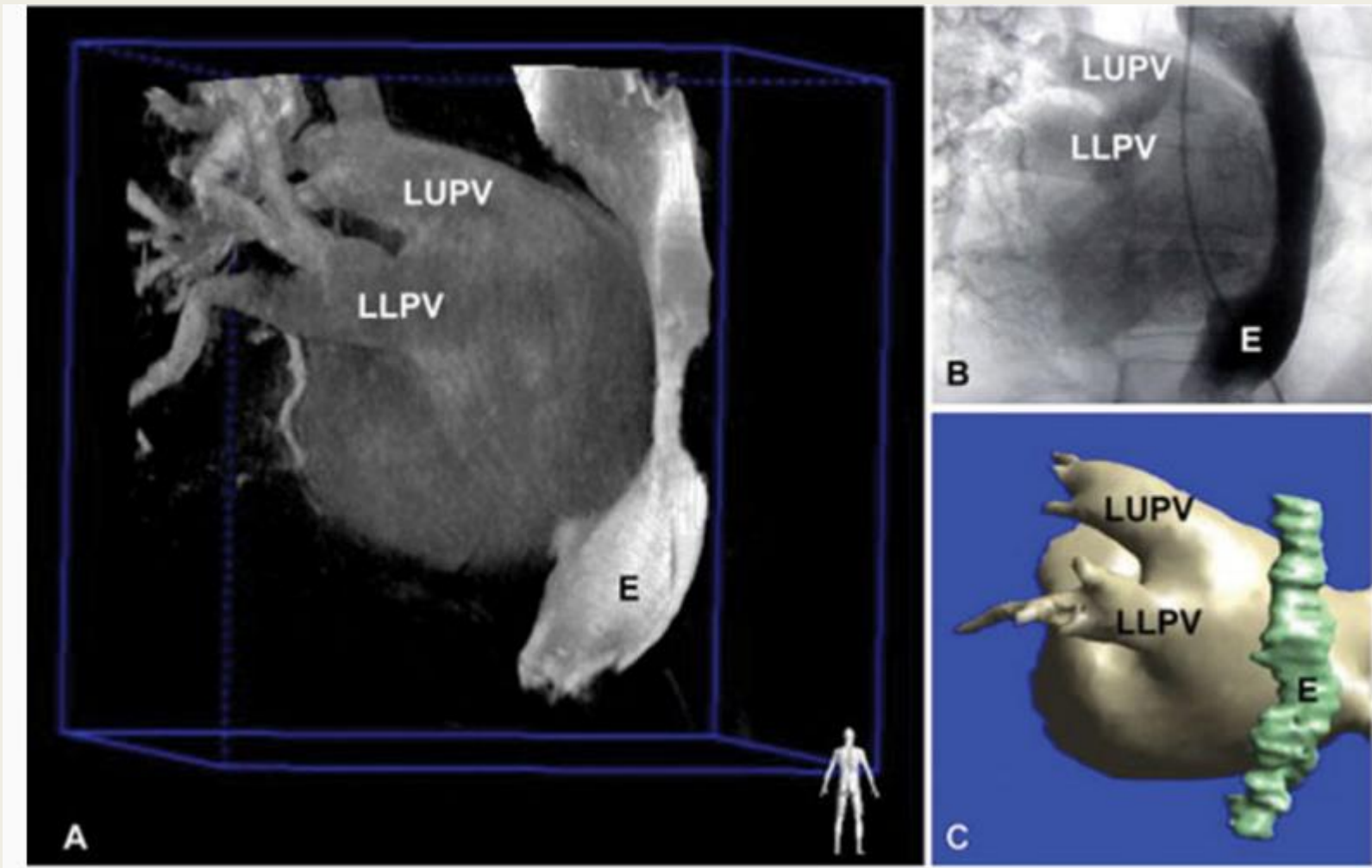
Floroskopi

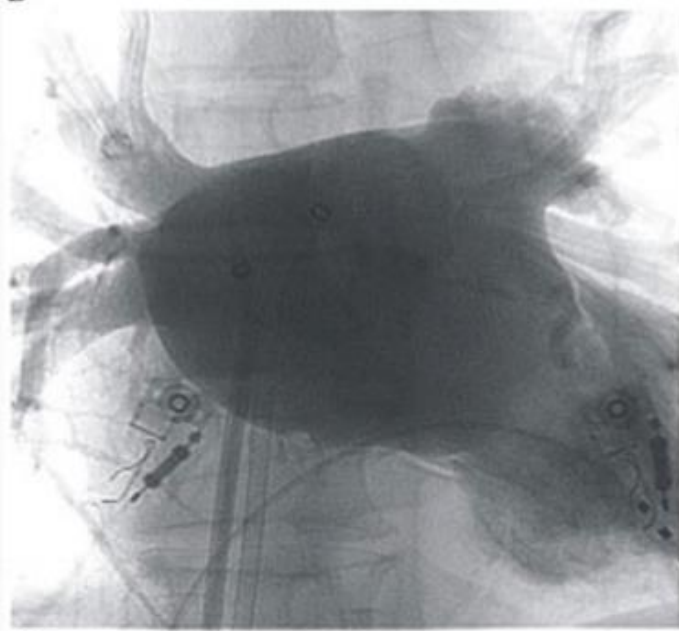
- Kullanım zamanlaması
 - *İşlem sırasında*
- Avantajları:
 - *Kateterlerin ve anatomik yapıların görülmesi*
 - *Ucuz*
 - *Her operatör için kolay*
- Dezavantajları
 - *Radyasyon maruziyeti*
 - *Kontrast maruziyeti*
 - *Yetersiz anatomik bilgi*



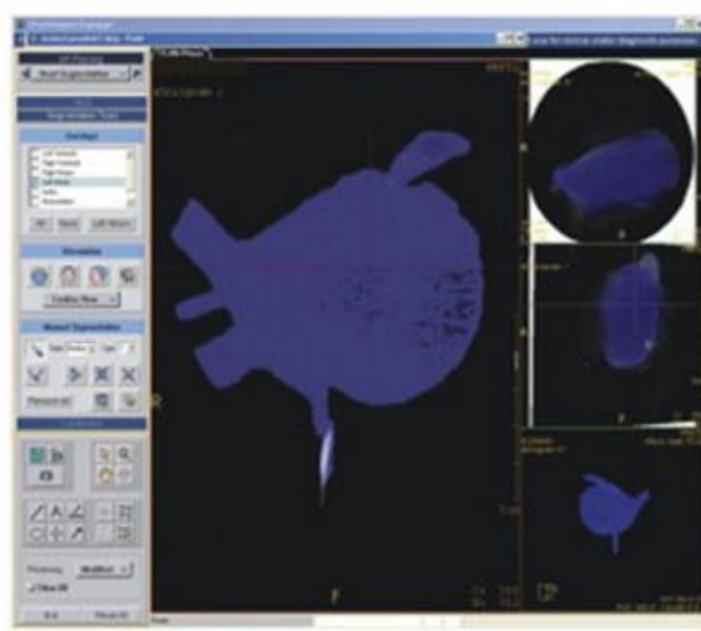
3D Rotasyonel anjiyografi

- Kullanım zamanlaması
 - *İşlem sırasında*
- Avantajları:
 - *Anatomi değerlendirilmesine yardımcı*
 - *İşlem öncesi CT, MRI ihtiyacını azaltır*
 - *Görüntüleme işlenmesi sırasındaki hatalar yoktur*
- Dezavantajları
 - *Radyasyon maruziyeti*
 - *Kontrast maruziyeti*
 - *Teknik destek yetersizliği?*

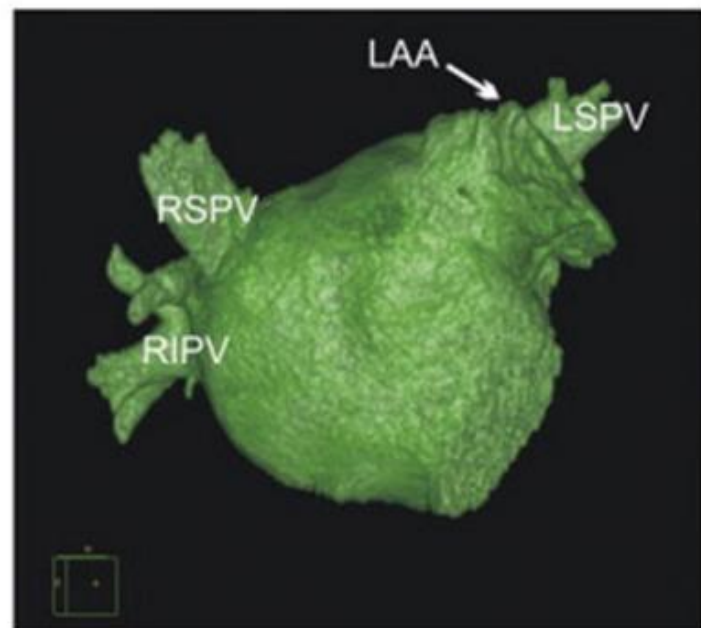
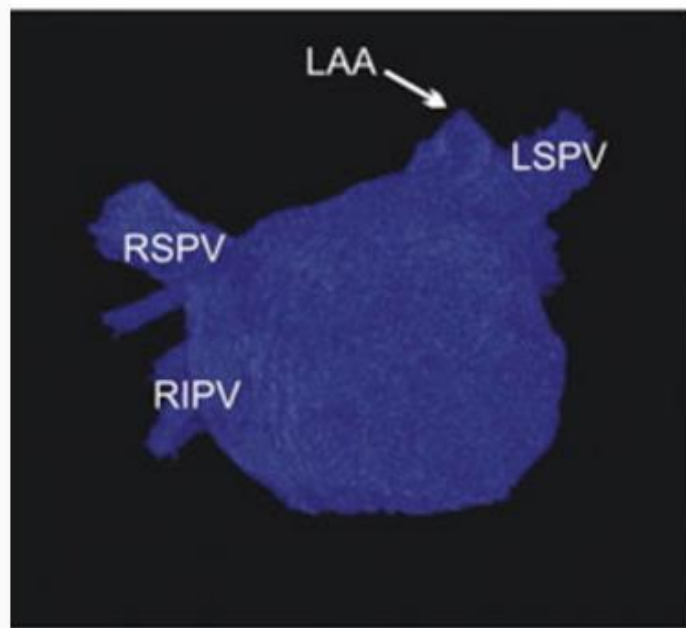




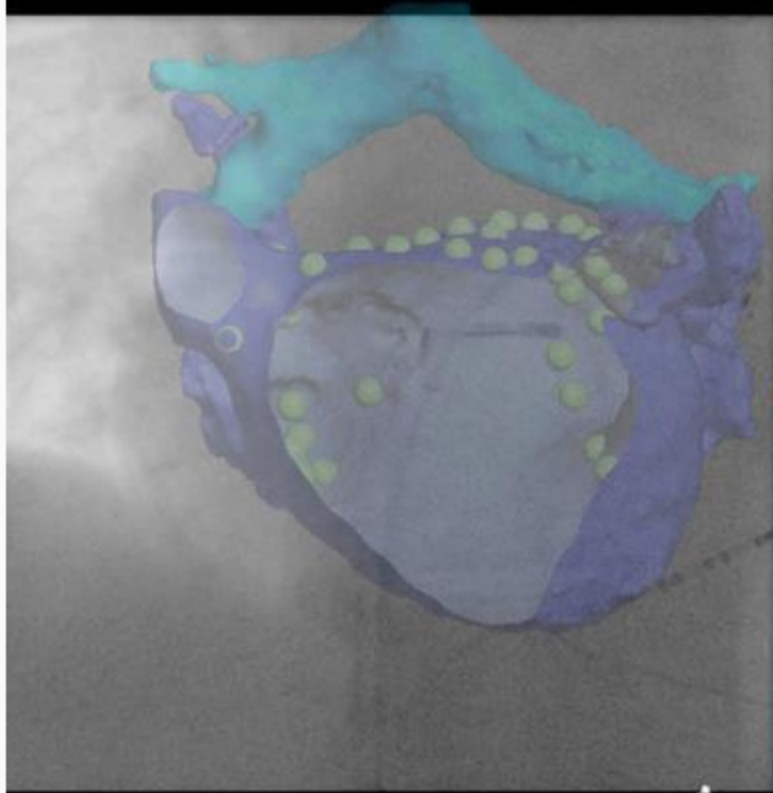
A



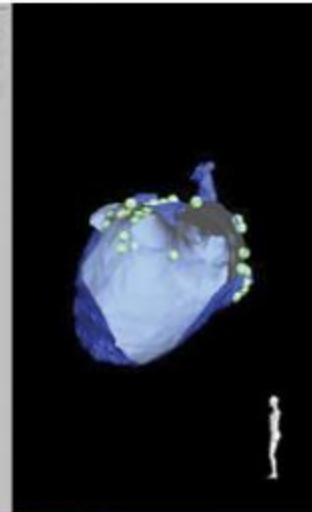
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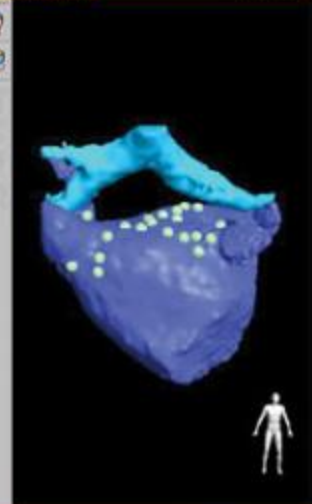
CRAN 0°
RAO 0°



Review

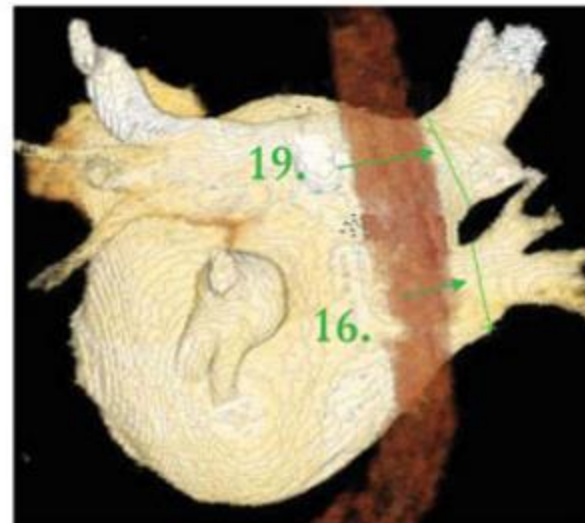
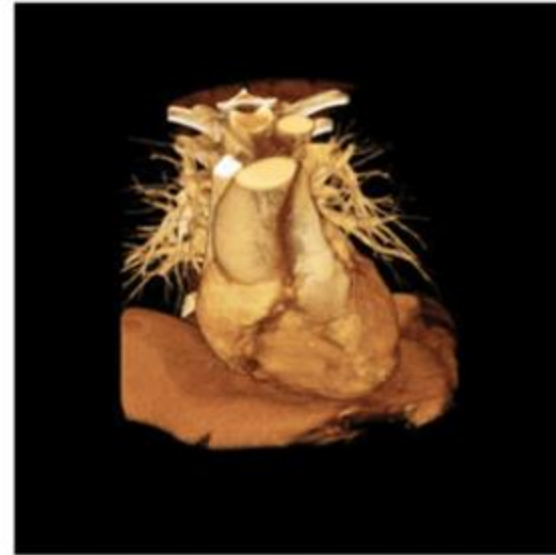


Review View



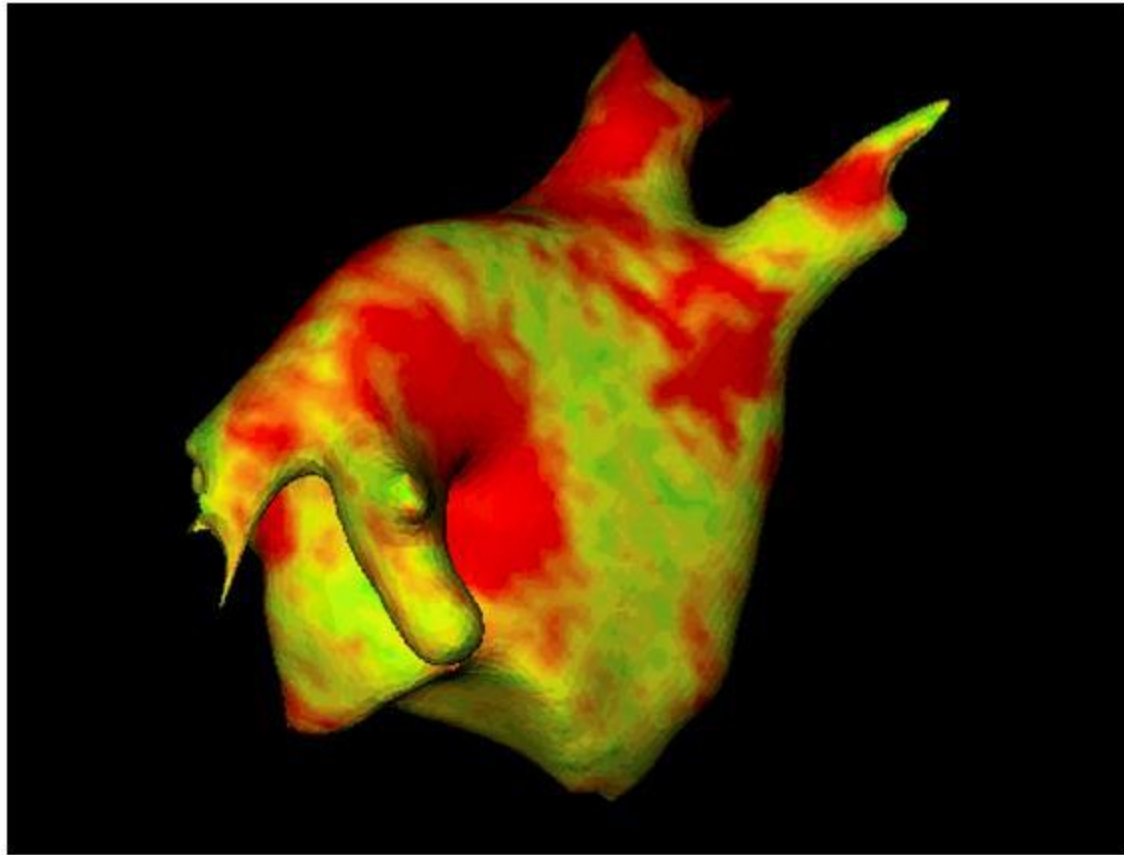
CT

- Kullanım zamanlaması
 - *İşlem öncesi: Anatomi, hasta seçimi*
 - *İşlem sonrası: Komplikasyonların değerlendirilmesi: PV darlığı, atriyo-özafagial fistül)*
- Avantajları:
 - *3 boyutlu anatomik değerlendirme*
 - *Kolay ulaşılabilirlik*
- Dezavantajları
 - *Radyasyon maruziyeti*
 - *Kontrast maruziyeti*



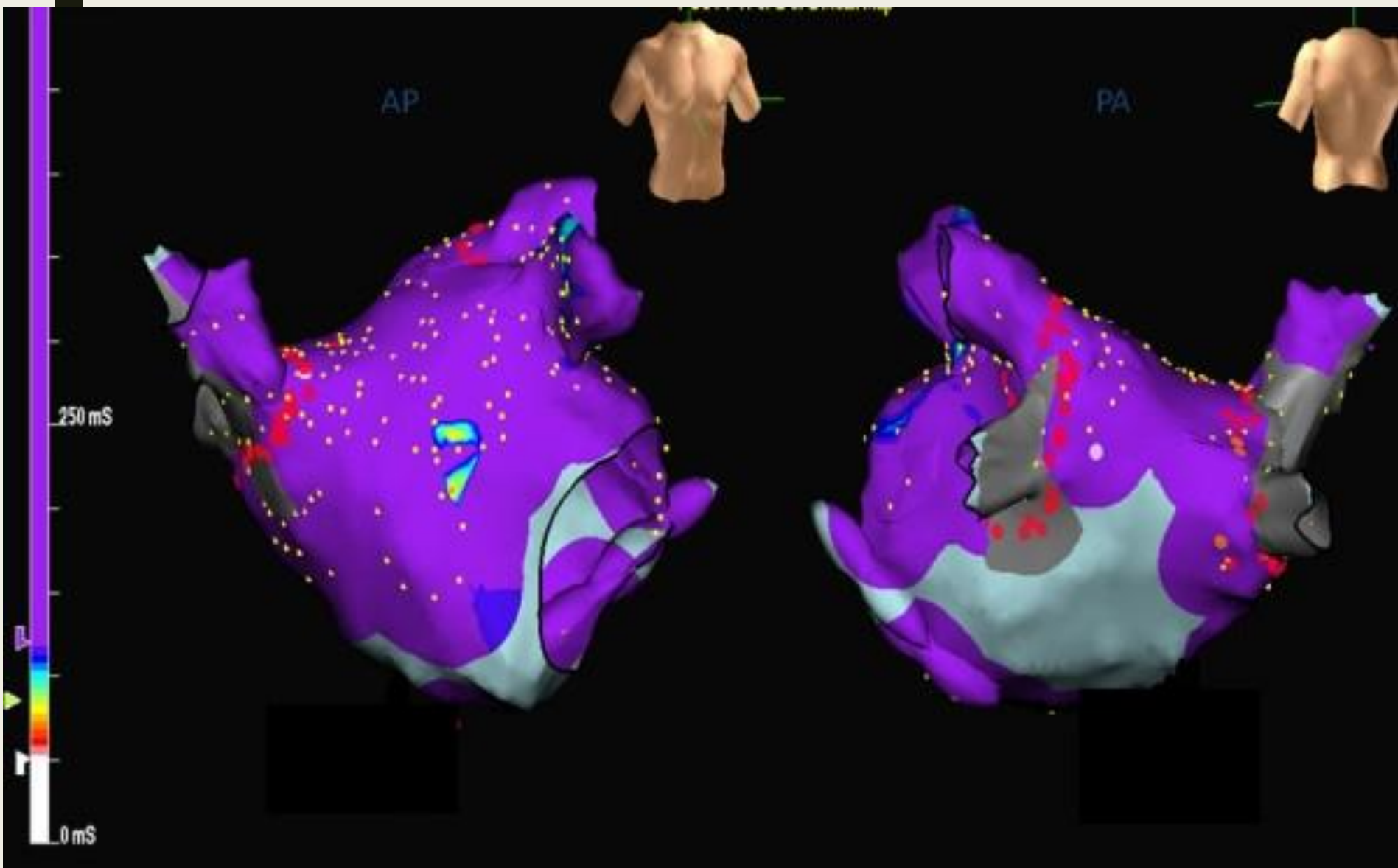
MRI

- Kullanım zamanlaması
 - *İşlem öncesi: Anatomi, substratın saptanması, altta yatan hastalık tanısı, hasta seçimi*
 - *İşlem sırasında: Uzaktan manyetik kateter kullanımı*
 - *İşlem sonrası: Komplikasyonların değerlendirilmesi: PV darlığı*
 - *Takip: Ablasyon lezyonlarının değerlendirilmesi*
- Avantajları:
 - *3 boyutlu anatomik değerlendirme*
 - *Radyasyon maruziyeti olmaması*
 - *Substratın saptanması*
- Dezavantajları
 - *Uzun işlem süresi*
 - *Daha zor ulaşılabilirlik*
 - *MRI kontrendikasyonları: PM, protez, vs ...*
 - *Regüler olmayan ritimlerde suboptimal görüntü kalitesi*



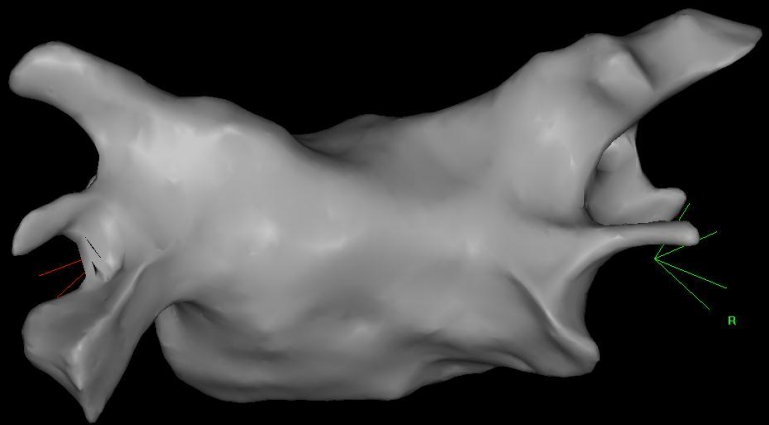
Elektroanatomic mapping

- Kullanım zamanlaması
 - *İşlem sırasında*
- Avantajları:
 - *3 boyutlu anatomik değerlendirme*
 - *Substratın saptanması*
 - *Floroskopi süresini azaltır*
 - *Kateter pozisyonunun daha iyi değerlendirilebilmesi*
- Dezavantajları
 - *Maliyet*
 - *Hazırlık süresi*
 - ***SGK kısıtlamaları (TÜRKİYEDE DURUM? İLE İLGİLİ SUNUM BÖLÜMÜ TAM DA BURASI)***



1-LA (0, 0)

LAT



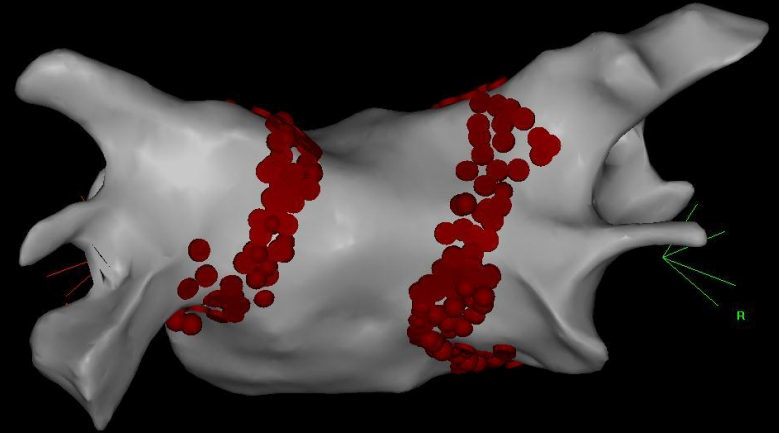
1.58



AP PA LAO RAO LL RL INF SUP

1-LA (334, 0)

LAT



1.58

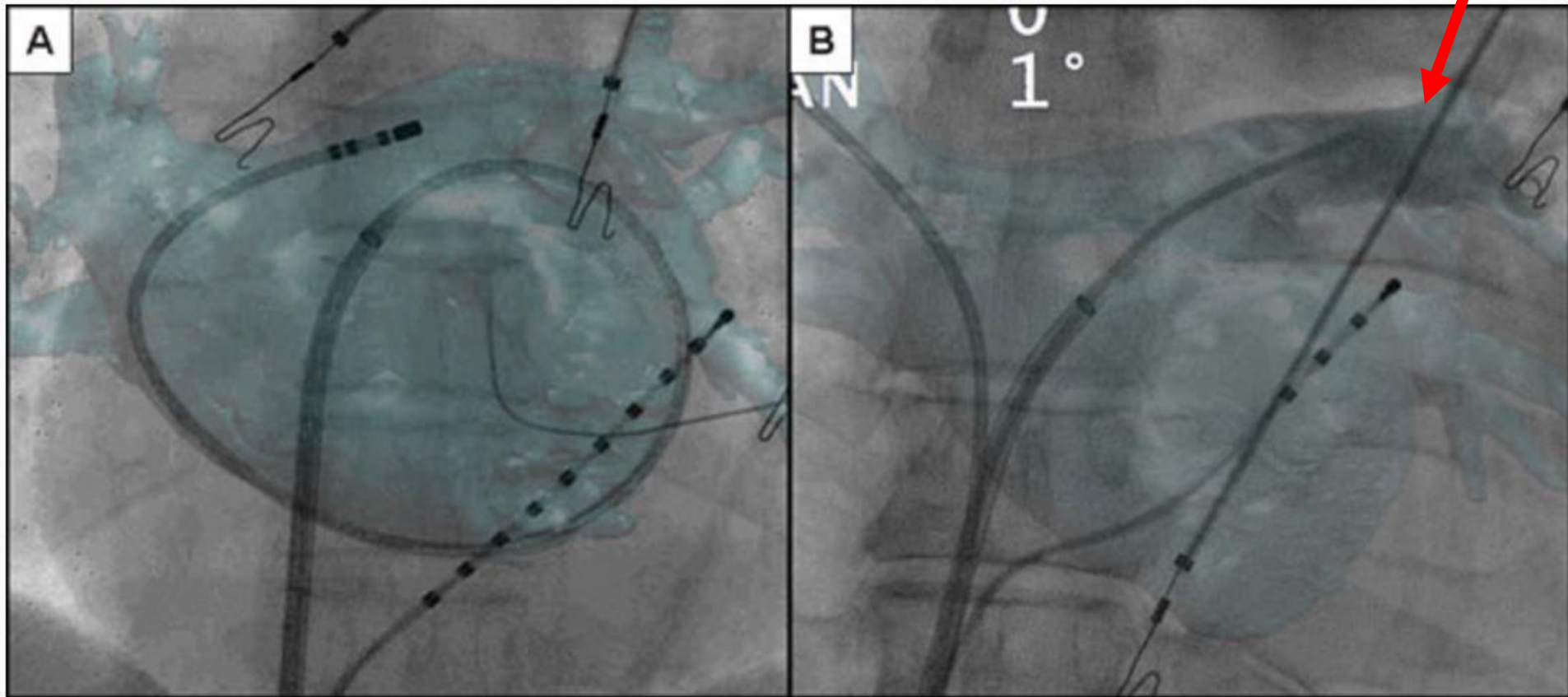


AP PA LAO RAO LL RL INF SUP

GÖRÜNTÜ BİRLEŐTİRME

Floroskopi + CT, 3D Rotasyonel anjiyografi veya MRI

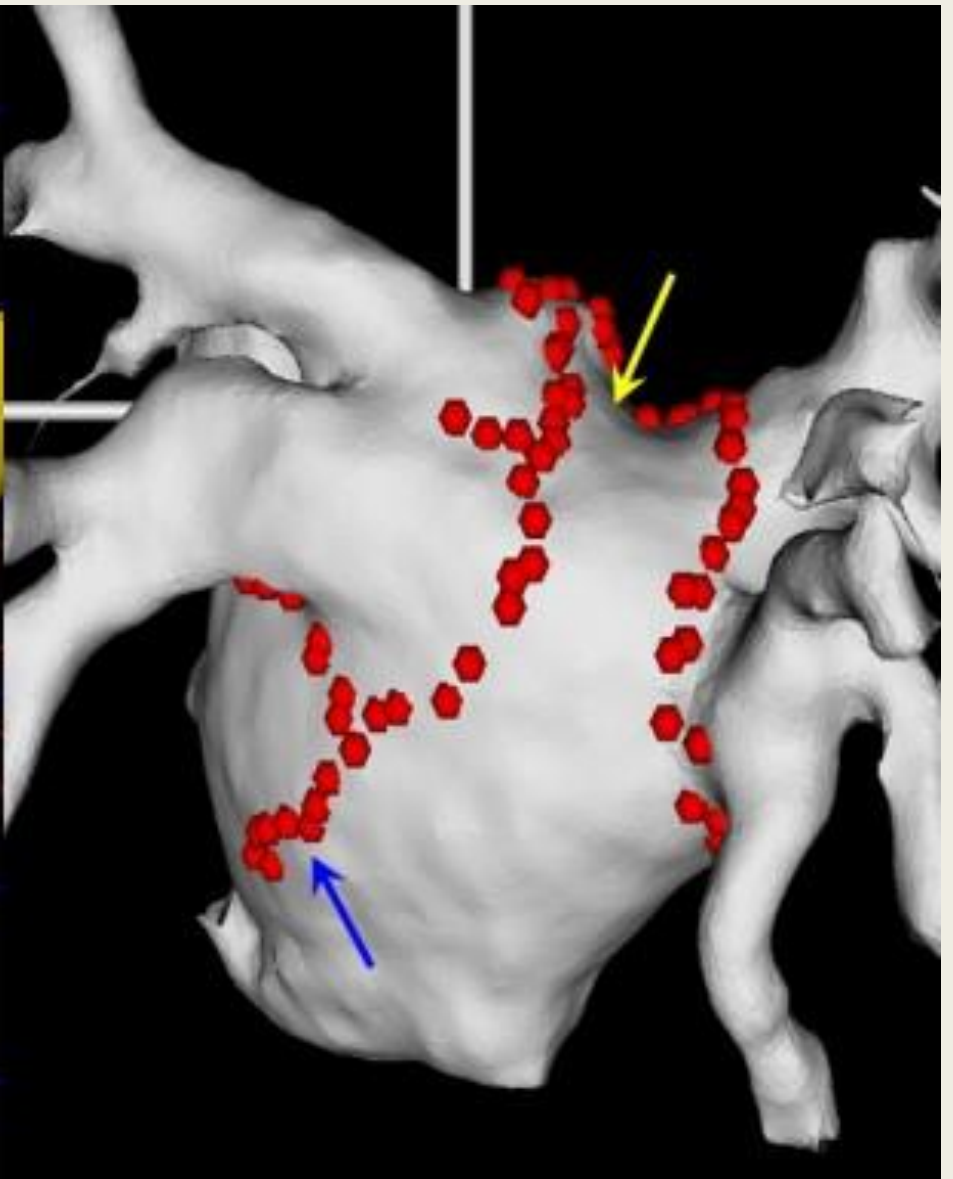
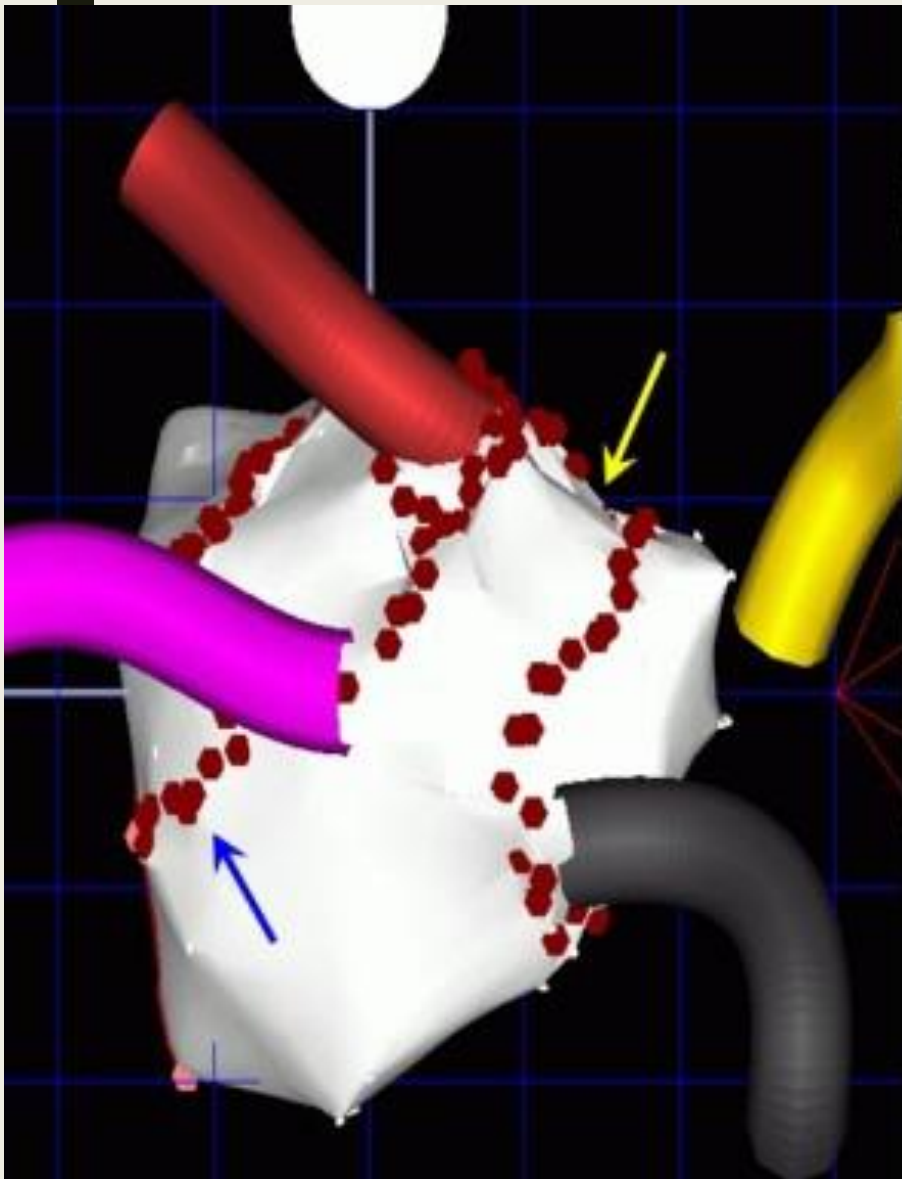
- Kullanım zamanlaması
 - *İşlem sırasında*
- Avantajları:
 - *Daha iyi 3 boyutlu anatomik değerlendirme*
 - *İşlem başarısında artış*
 - *Kateter pozisyonunun daha iyi değerlendirilebilmesi*
- Dezavantajları
 - *Yetersiz hatalı birleştirme*



GÖRÜNTÜ BİRLEŞTİRME

Elektroanatomic mapping + CT veya MRI

- Kullanım zamanlaması
 - *İşlem sırasında*
- Avantajları:
 - *Daha iyi 3 boyutlu anatomik değerlendirme*
 - *İşlem başarısında artış*
 - *Floroskopi süresini azalma*
 - *Kateter pozisyonunun daha iyi değerlendirilebilmesi*
- Dezavantajları
 - *Yetersiz hatalı birleştirme*



500 mS

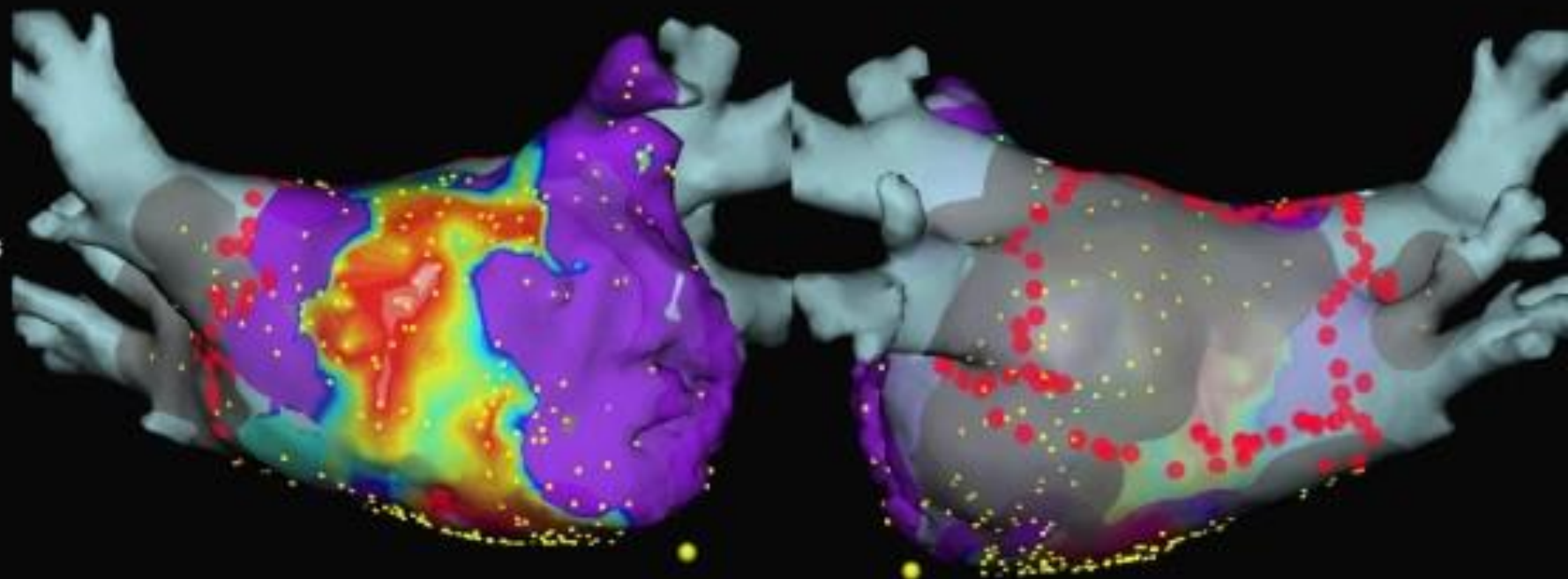
CFE POST/PYI/BOX CFE Mean Map



AP

PA

250 mS



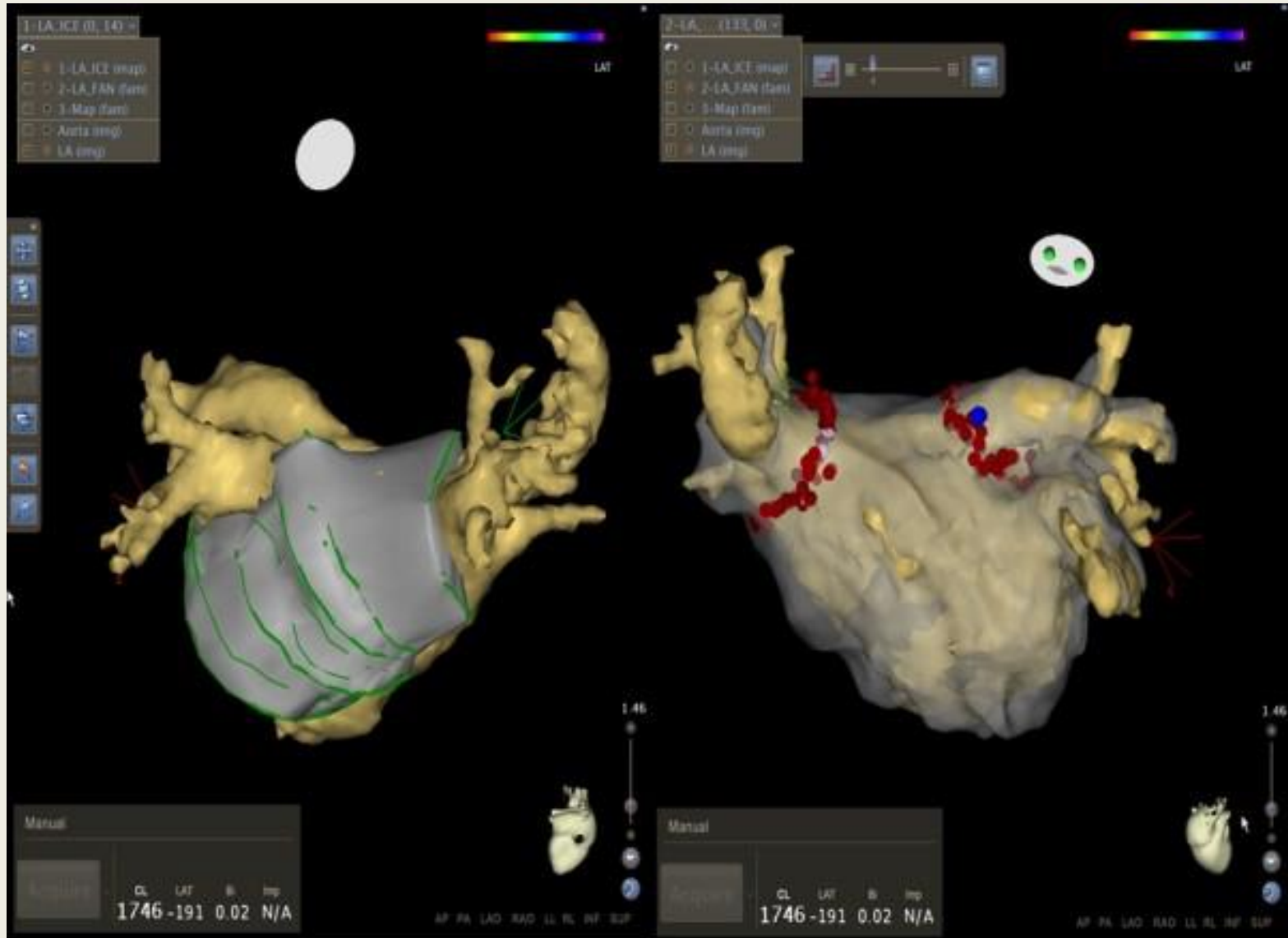
GÖRÜNTÜ BİRLEŞTİRME

Elektroanatomic mapping + 3D TEE veya ICE

- Kullanım zamanlaması
 - *İşlem sırasında*
- Avantajları:
 - *Daha iyi 3 boyutlu anatomik değerlendirme*
 - *İşlem başarısında artış*
 - *Floroskopi süresini azalma*
 - *Kateter pozisyonunun daha iyi değerlendirilebilmesi*
- Dezavantajları
 - *Yetersiz hatalı birleştirme*

CARTO + ICE

CARTO + MRI

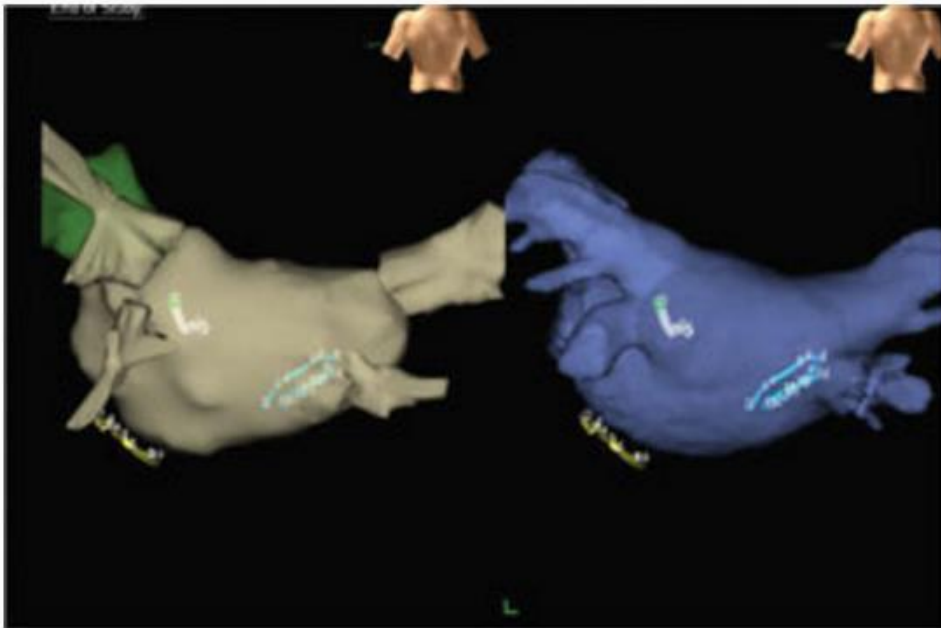


GÖRÜNTÜ BİRLEŞTİRME

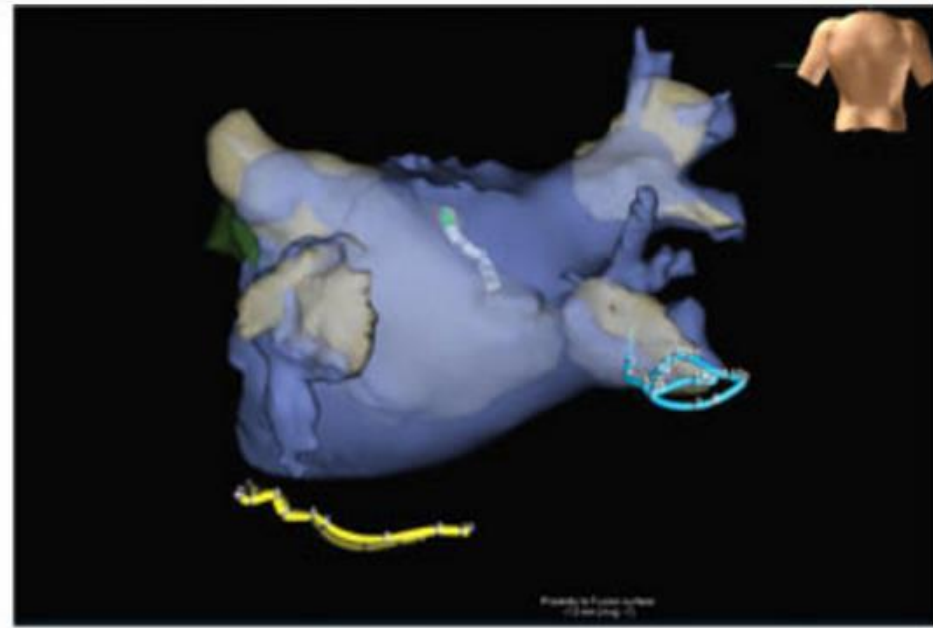
Elektroanatomic mapping + 3D Rotasyonel anjiyografi

- Kullanım zamanlaması
 - *İşlem sırasında*
- Avantajları:
 - *Daha iyi 3 boyutlu anatomik değerlendirme*
 - *İşlem başarısında artış*
 - *Floroskopi süresini azalma*
 - *Kateter pozisyonunun daha iyi değerlendirilebilmesi*
- Dezavantajları
 - *Yetersiz hatalı birleştirme*
 - *Radyasyon maruziyeti*
 - *Kontrast maruziyeti*

NavX + 3D Rotasyonel anjiyografi

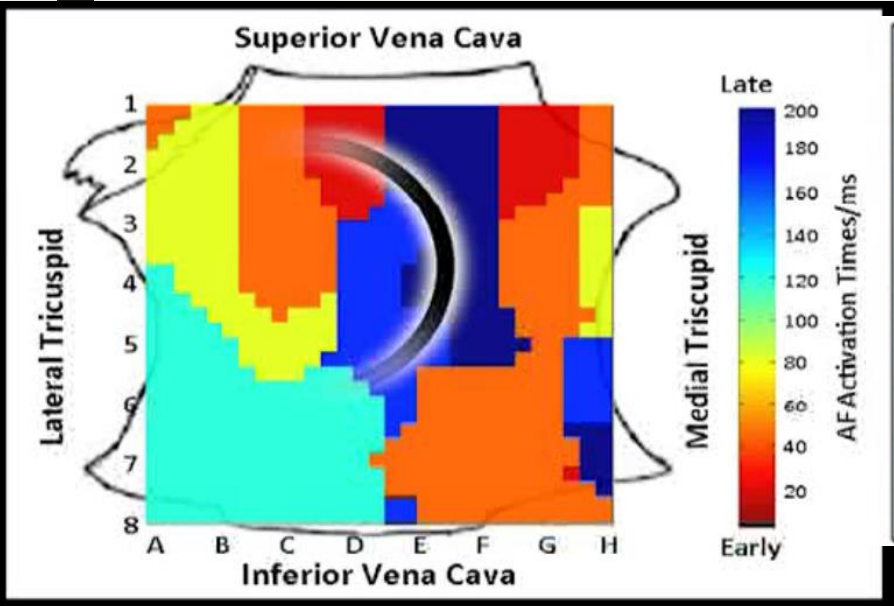


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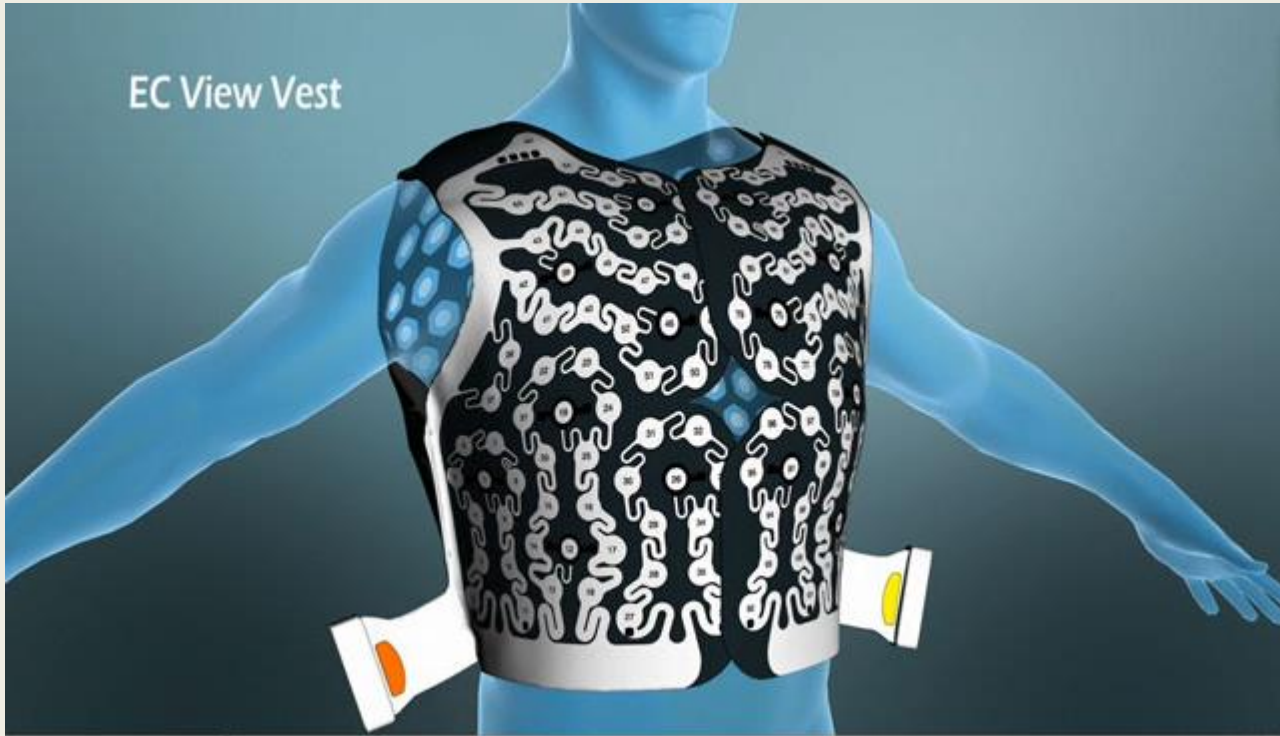


B

FIRM: Topera's RhythmView™



EC View Vest



The image features two large, thick black L-shaped brackets. One is positioned in the upper-left corner, and the other is in the lower-right corner. They are oriented towards each other, framing the central text.

ATRIYAL FIBROZIS

Left atrium and the imaging of atrial fibrosis: catch it if you can!

Timothy C. Tan^{*}, Ilias D. Koutsogeorgis[†], Julia Grapsa[‡], Costas Papadopoulos[†], Apostolos Katsivas[†] and Petros Nihoyannopoulos[‡]

^{*}Department of Cardiology, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA, [†]Department of Cardiology, Red Cross Hospital, Athens, Greece, [‡]Department of Cardiology, Hammersmith Hospital, Imperial College of London, London, UK

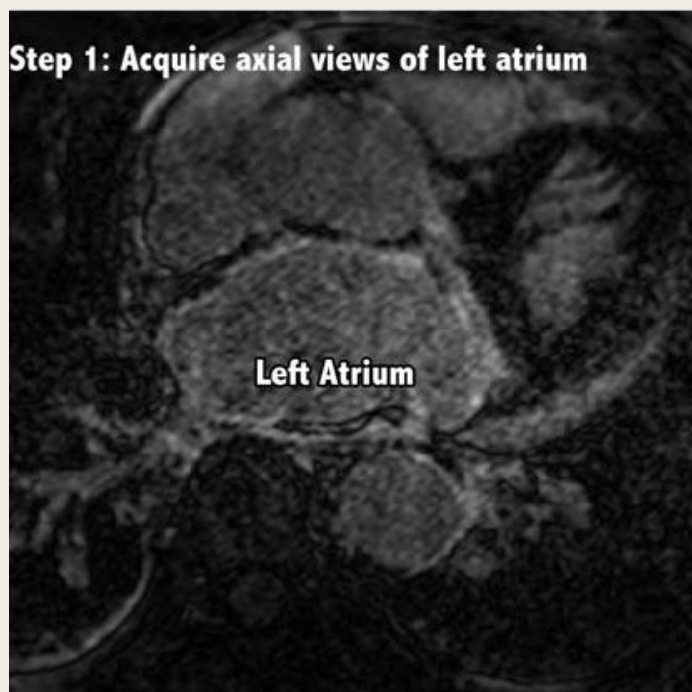
ABSTRACT

Atrial fibrillation is a sustained arrhythmia commonly encountered in clinical practice. It has a high prevalence among the elderly and contributes significantly to the global socio-economic burden. Among many risk factors predisposing to atrial fibrillation is left atrial remodelling and wall fibrosis. Frequently, pathological left atrial wall remodelling and fibrosis results in low atrial compliance and elastance significantly increase the risk of developing

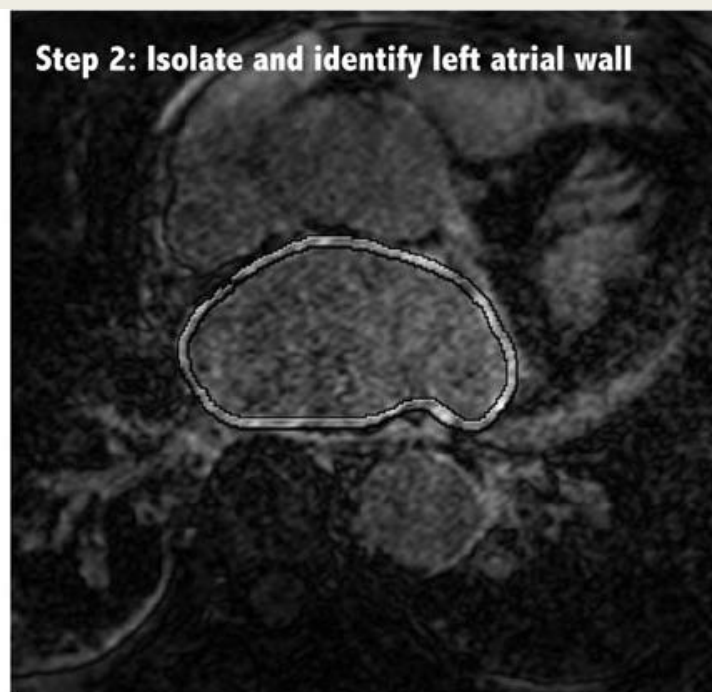
Atrial fibrosis görüntülenmesi

- Delayed enhancement (DE)-MRI
- Elektroanatomic mapping
- Ekokardiyografi ??
 - Strain, strain rate
 - speckle tracking echocardiography
 - Transthoracic echocardiographic integrated backscatter-based görüntüleme
- CT ???

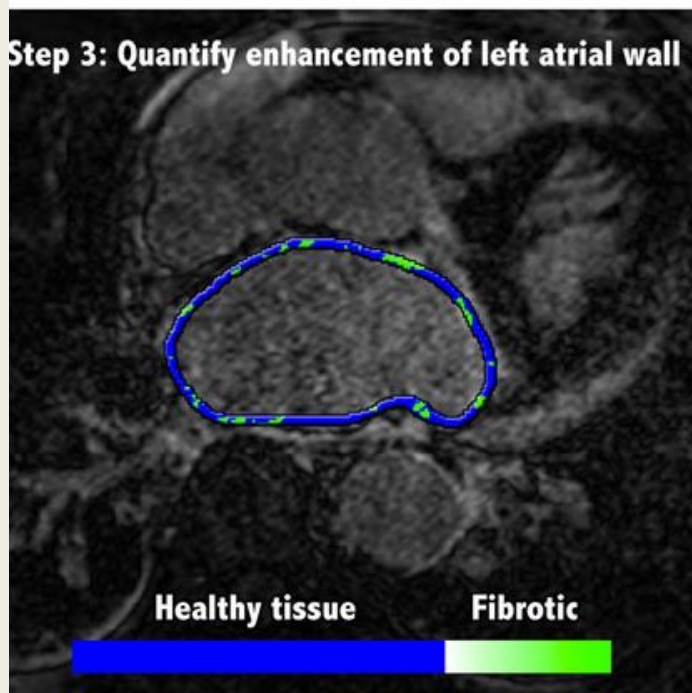
Step 1: Acquire axial views of left atrium



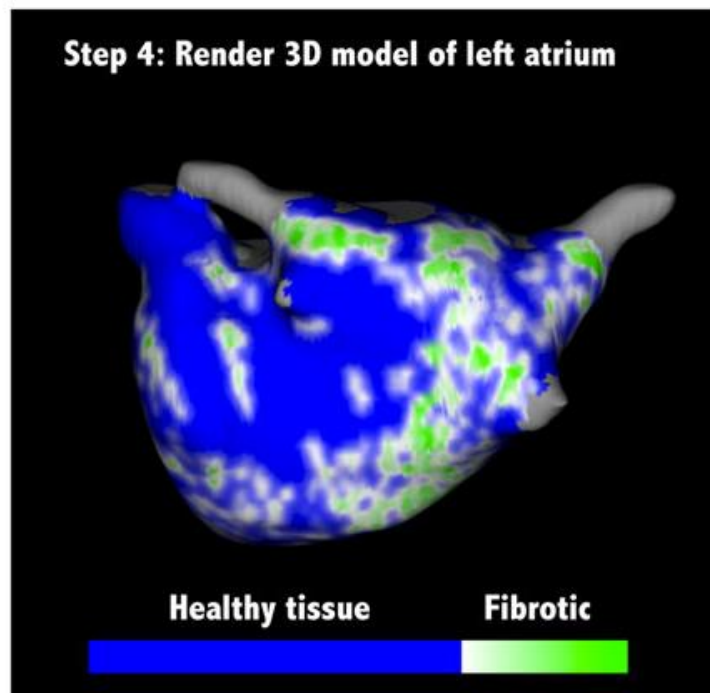
Step 2: Isolate and identify left atrial wall



Step 3: Quantify enhancement of left atrial wall



Step 4: Render 3D model of left atrium

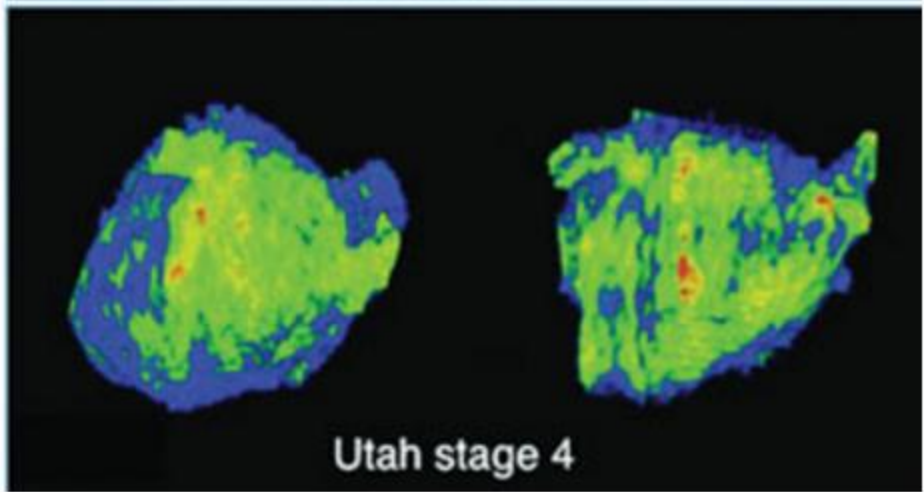
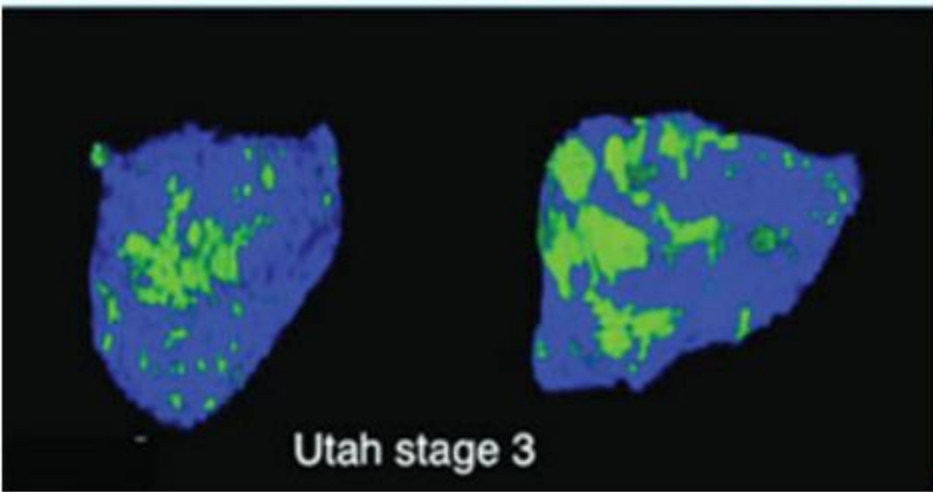
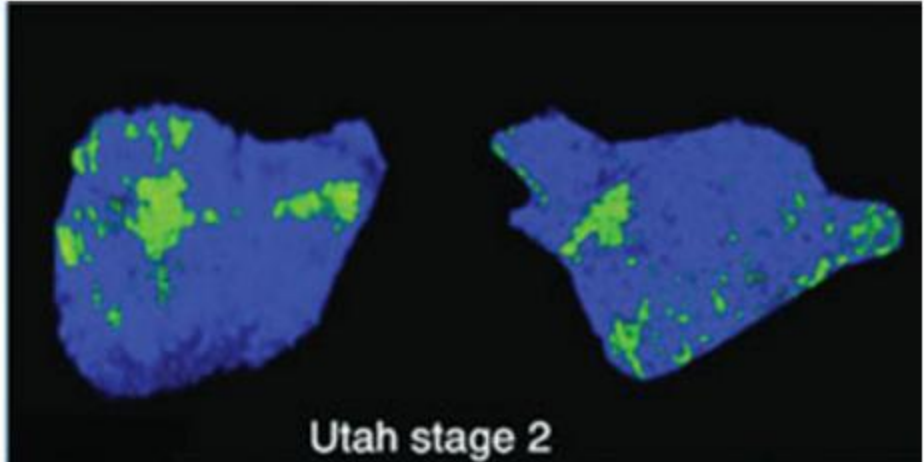
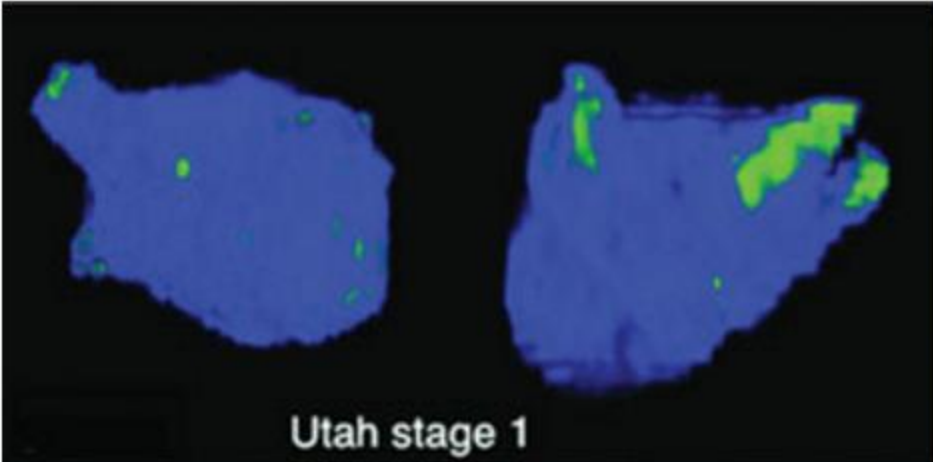


Utah sınıflaması

- Utah Evre 1: < % 5 fibrozis
- Utah Evre 2: % 5 - 20 fibrozis
- Utah Evre 3: % 20 -35 fibrozis
- Utah Evre 2: > % 35 fibrozis
- Utah Evre 1: < % 10 fibrozis
- Utah Evre 2: % 10 - 20 fibrozis
- Utah Evre 3: % 20 -30 fibrozis
- Utah Evre 2: > % 30 fibrozis

Pim Gal and Nassir F. Marrouche. Magnetic resonance imaging of atrial fibrosis: redefining atrial fibrillation to a syndrome. *European Heart Journal* (2017) 38, 14–19

Akoum N et al. *J Cardiovasc Electrophysiol* 2011; 22:16–22.



Delayed enhancement (DE)-MRI

- Ablasyon öncesiz DE-MRI ile Atriyal fibrozis saptanması
 - *AF rekürrensının bağımsız belirleyicisi*
 - *Ablasyon kararı veya ablasyon stratejisinde yeri var*
 - Fibrozis miktarı
 - Tipi (Diffüz, lokalize,..)
- DE-MRI ile ablasyon sonrası
 - *toplam skar miktarını*
 - *pulmoner venlerin etrafının çevresel yakılmasının tam olup olmadığı – gap varlığı*
 - *residü fibrozisi değerlendirilebiliriz*

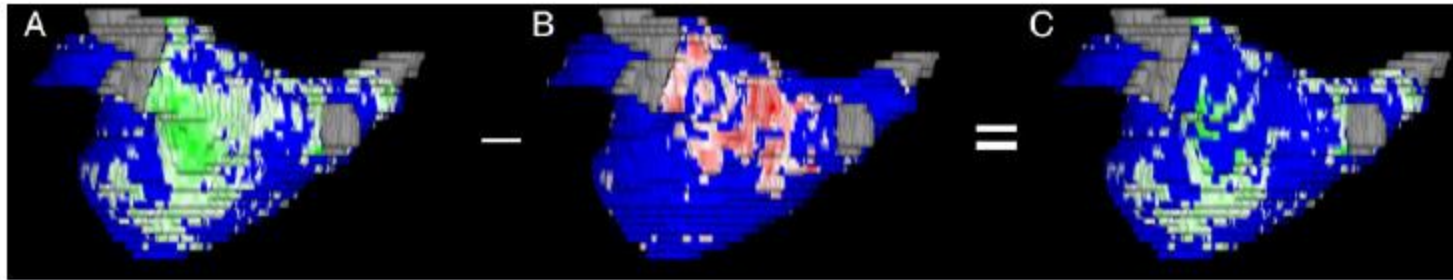


Figure 3 Calculation process of residual fibrosis. The pre-ablation delayed enhancement-magnetic resonance imaging scan (A) is reduced by the post-ablation delayed enhancement-magnetic resonance imaging scan (B), resulting in the residual fibrosis shell (C).

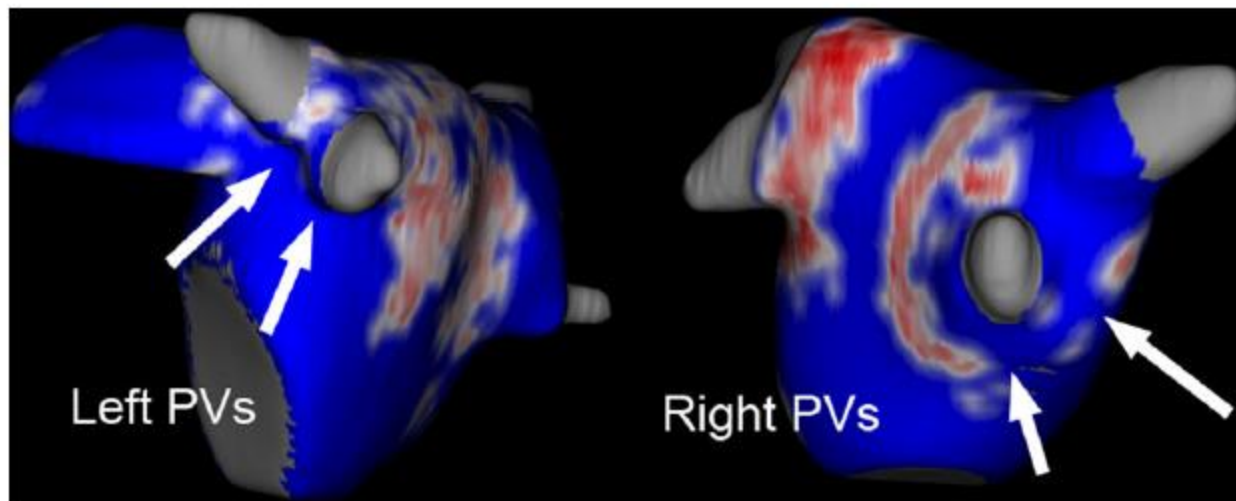


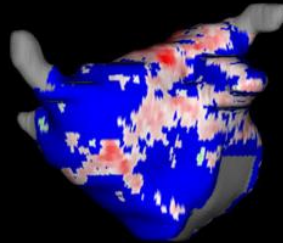
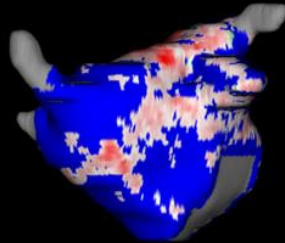
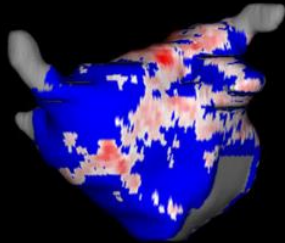
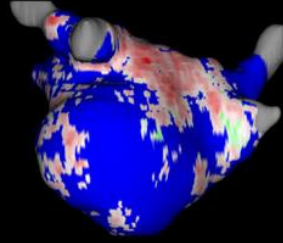
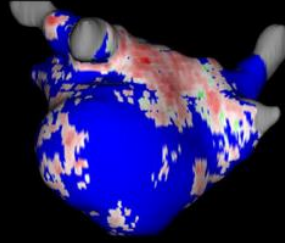
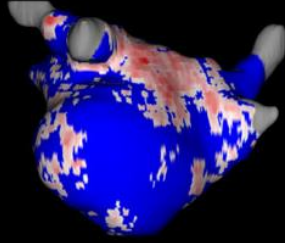
Figure 4 Assessment of pulmonary vein encirclement. Identification of gap lesions in left- and right-sided pulmonary veins. Note how the scar tissue (orange) does not completely cover the pulmonary vein. The white arrows indicate the location of the gaps.

A

Baseline

1 year

3 years



13.62%

+2.1% new

+1.6% new

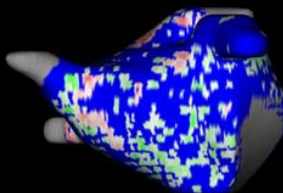
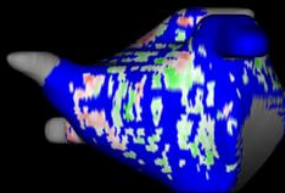
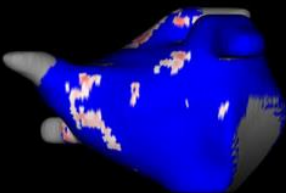
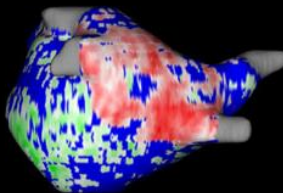
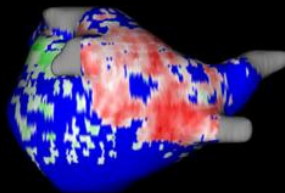
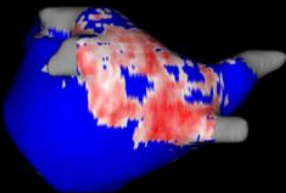
AF nüks
yok

B

Baseline

1 year

3 years



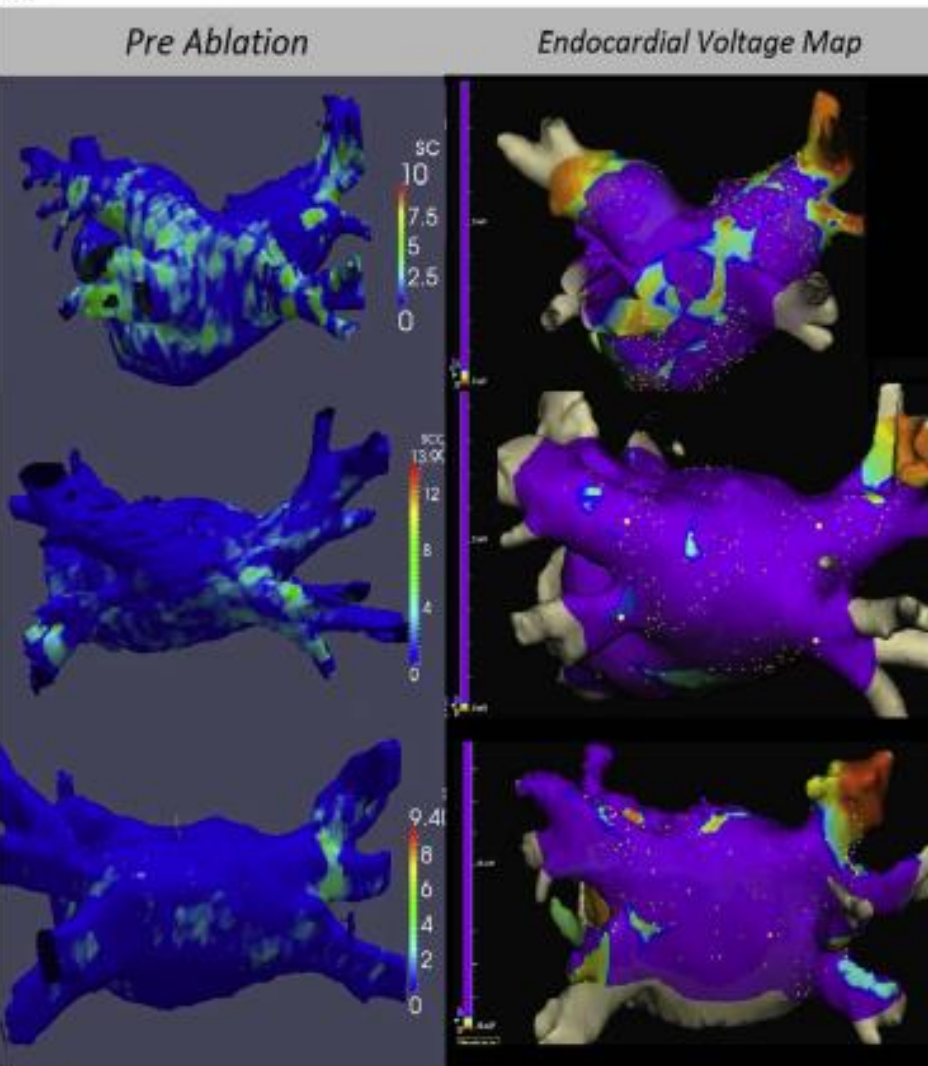
17.68%

+12.2% new

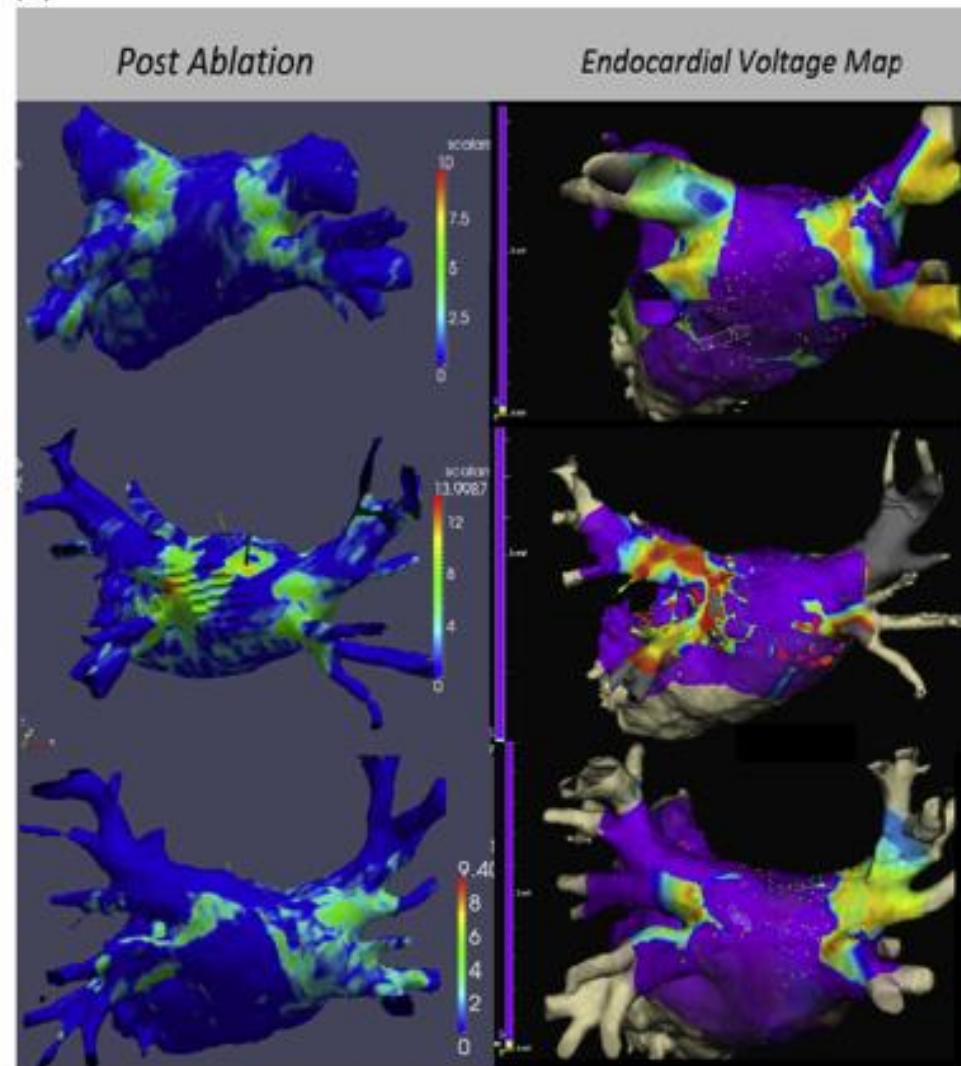
+16.6% new

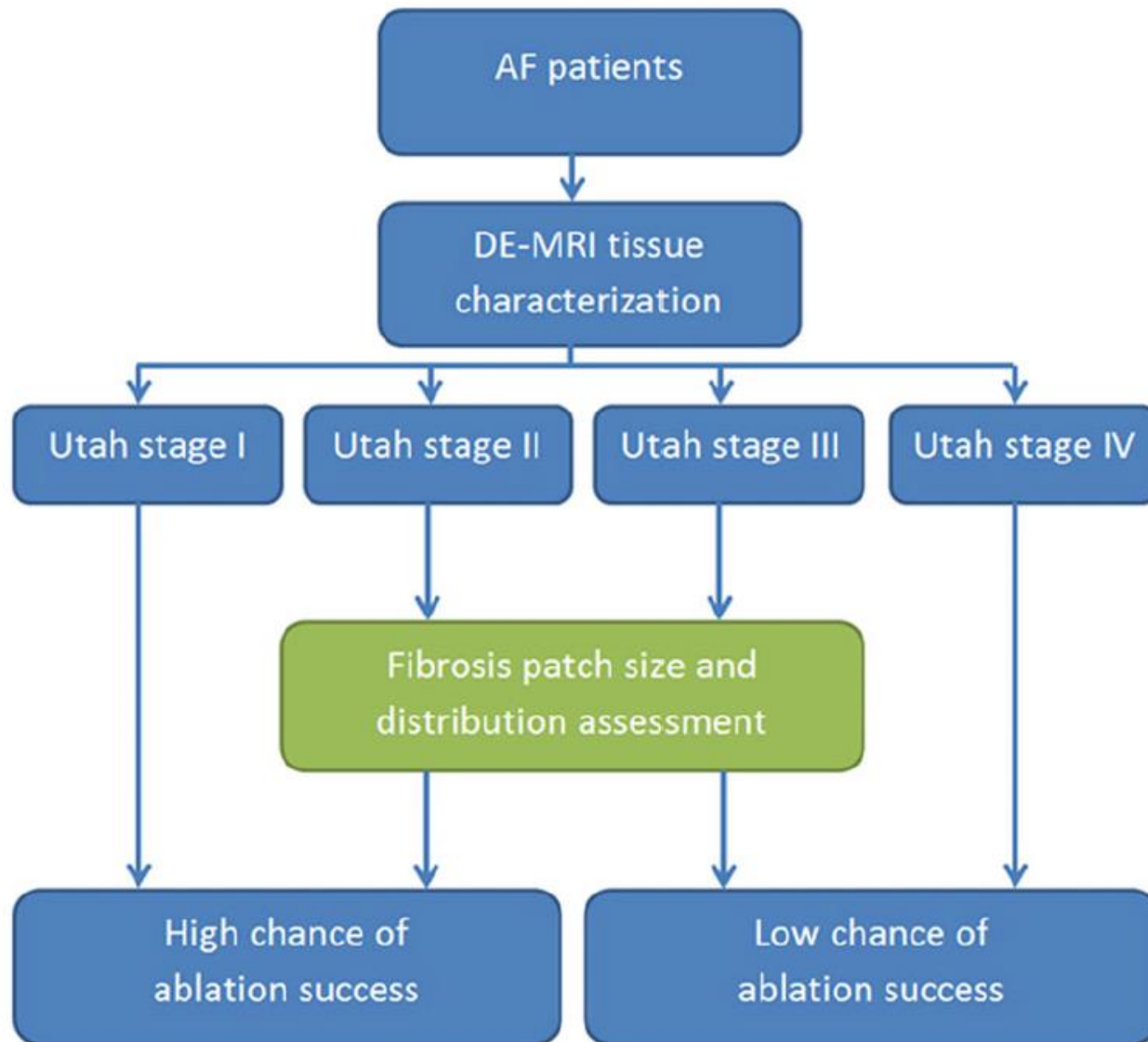
AF nüks var

(A)



(B)





The Association of Serum Galectin-3 Levels with Atrial Electrical and Structural Remodeling

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Galectin-3 and Left Atrial Remodeling in AF. *Introduction:* Left atrial (LA) interstitial fibrosis is known to have a role in the initiation and maintenance of atrial fibrillation (AF). The role of galectin-3 in the pathogenesis of cardiac fibrosis has been demonstrated in previous studies. We aimed to determine whether serum galectin-3 level is associated with markers of atrial remodeling, including the extent of LA fibrosis detected by delayed enhancement magnetic resonance imaging (DE-MRI) and atrial electromechanical delay (AEMD) in paroxysmal AF patients with preserved left ventricular (LV) functions.

Methods and Results: Thirty-three patients (58 [28–74] years, 51.5% male) with paroxysmal AF who underwent DE-MRI prior to cryoballoon-based AF ablation were included in the study. Serum galectin-3 levels were measured with ELISA. LA volume index ($B \pm SE$: 0.424 ± 0.504 , 95% CI: 0.560–2.627, $P = 0.004$) and serum galectin-3 levels ($B \pm SE$: 0.549 ± 7.745 , 95% CI: 16.874–47.550, $P < 0.001$) were found to be independently correlated with extent of LA fibrosis detected with DE-MRI in paroxysmal AF patients with preserved LV function. Correlation analysis between AEMD parameters and baseline characteristics showed that galectin-3 was significantly correlated with intra-left ($\rho = 0.432$, $P = 0.012$) and inter-AEMD ($\rho = 0.395$, $P = 0.023$). Duration of AF, LAD, and extent of LA fibrosis were also found to be significantly correlated with AEMD parameters.

Conclusion: This is a hypothesis-generating study pointing out that serum galectin-3 level is significantly associated with atrial remodeling in paroxysmal AF patients with preserved LV function. Further studies are necessary to provide exact pathophysiological mechanisms. (*J Cardiovasc Electrophysiol*, Vol. 26, pp. 635-640, June 2015)

Sonuç

- Gelecek teknolojide
- Türkiyede durum ne?
- *Ekokardiyografi*
 - Transtorasik ekokardiyografi
 - TEE
 - ICE
- *CT*
- *MRI*
- *3 boyutlu Rotasyonel anjiyografi*
- *Floroskopi*
- *Elektroanatomic mapping (CARTO, En Site NavX, vs..)*
- *Diğer (Rotor, vs)*
- *Fibrozis değerlendirilmesi (MRI, Elektroanatomic mapping, EKO, vs..)*

