

İmplantasyonda yeni yöntemler püf noktaları: CRT implantasyon teknîği

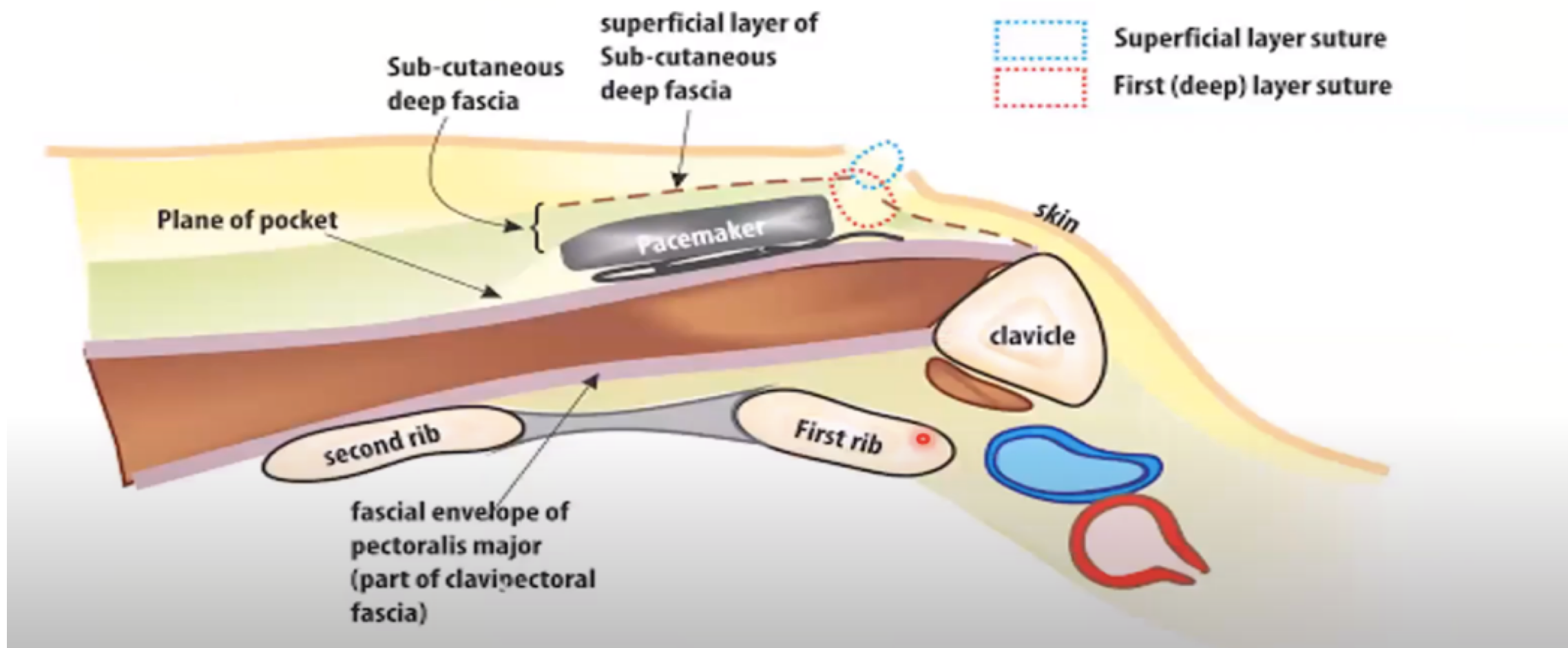
Dr. Ali Deniz

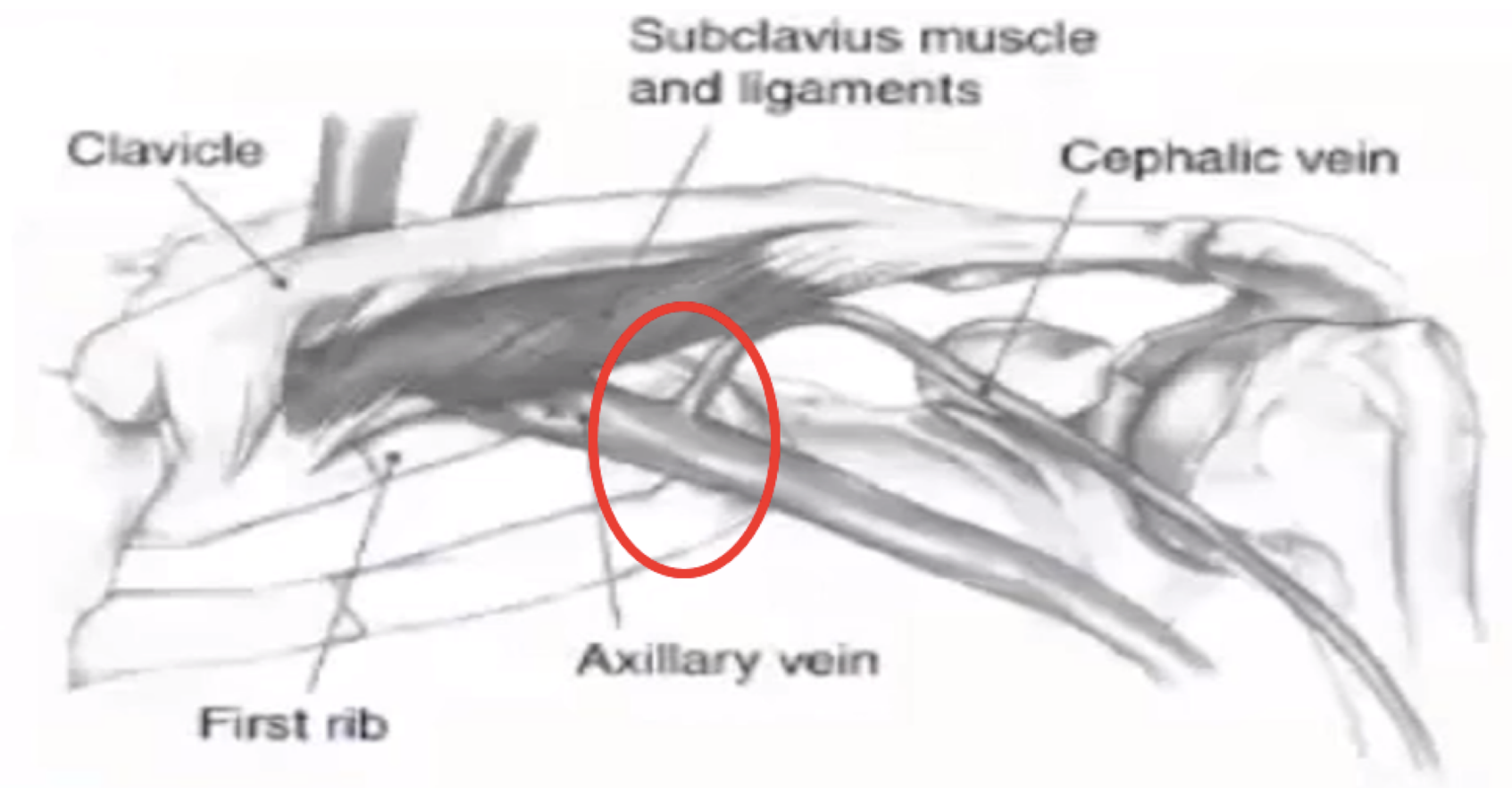
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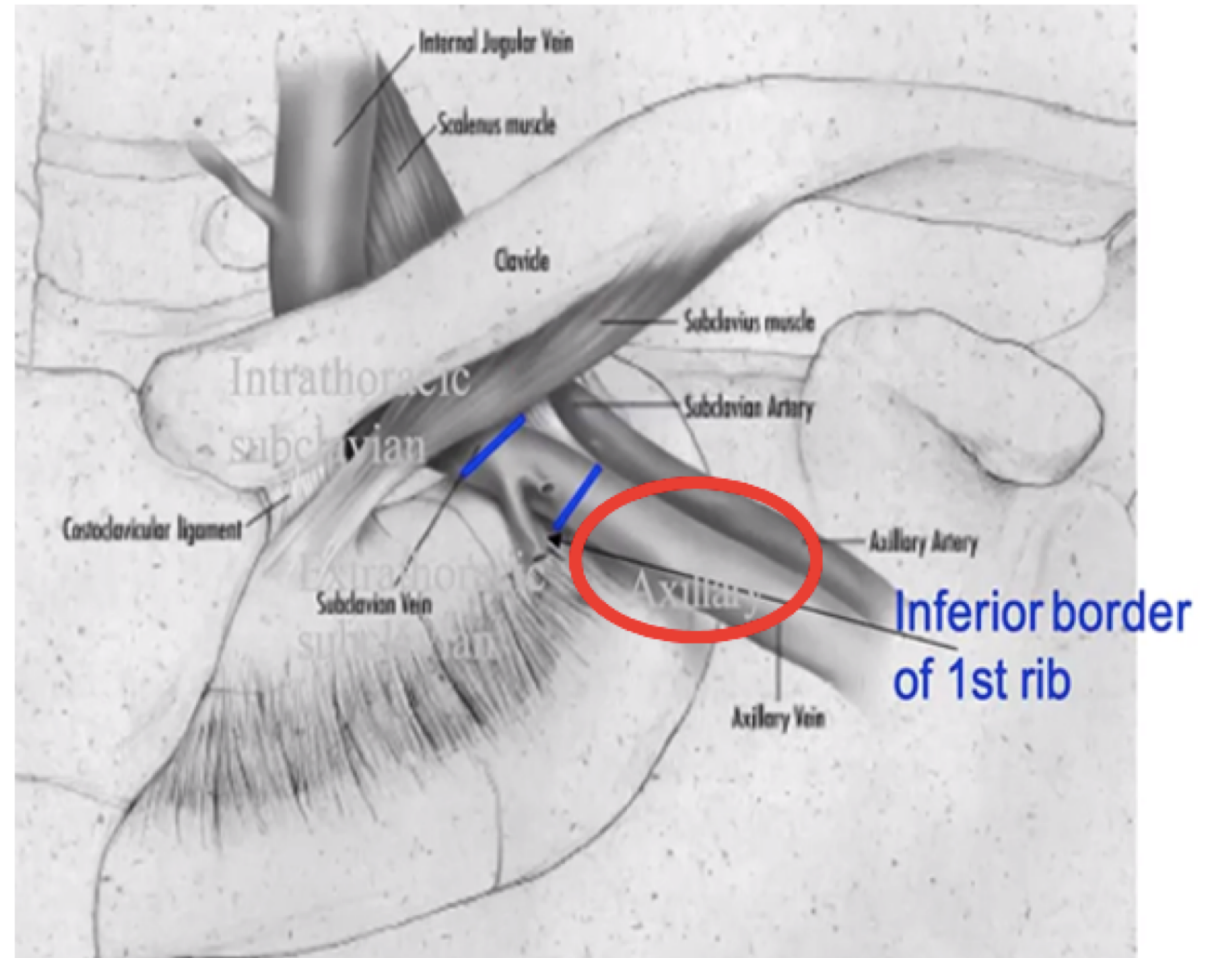
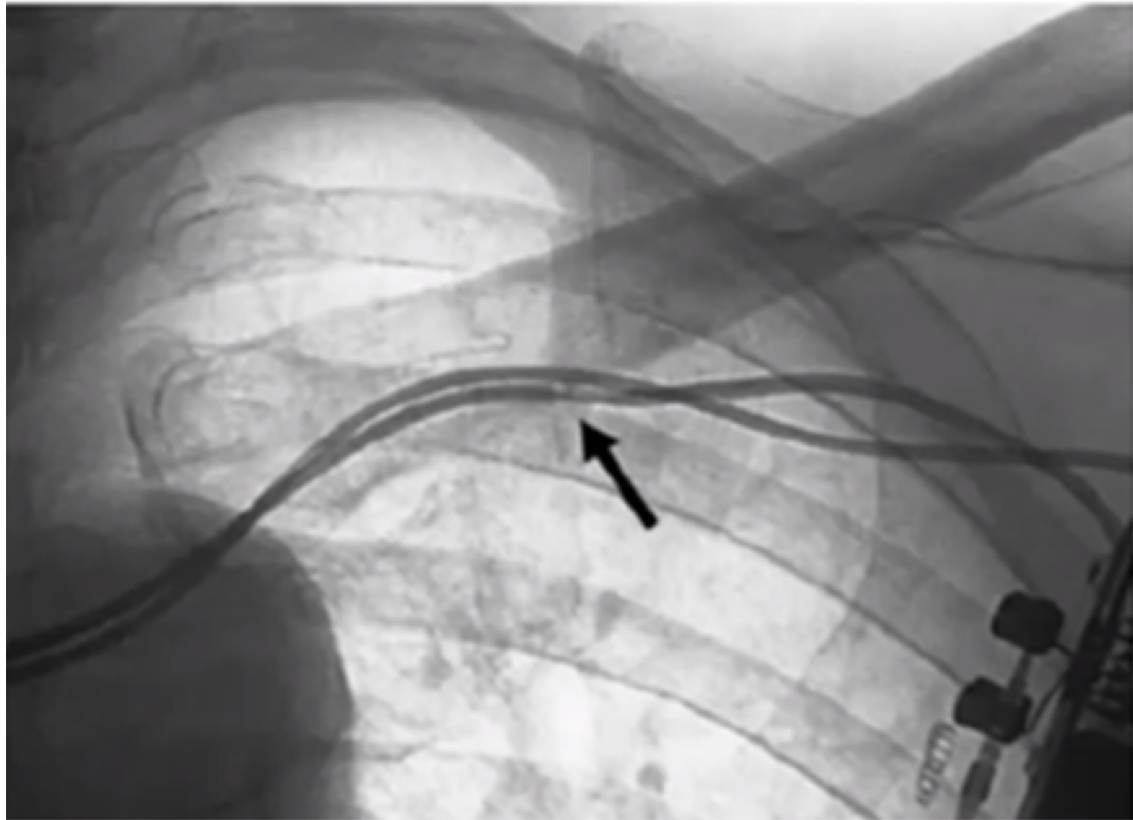
Kardiyoloji Anabilim Dalı

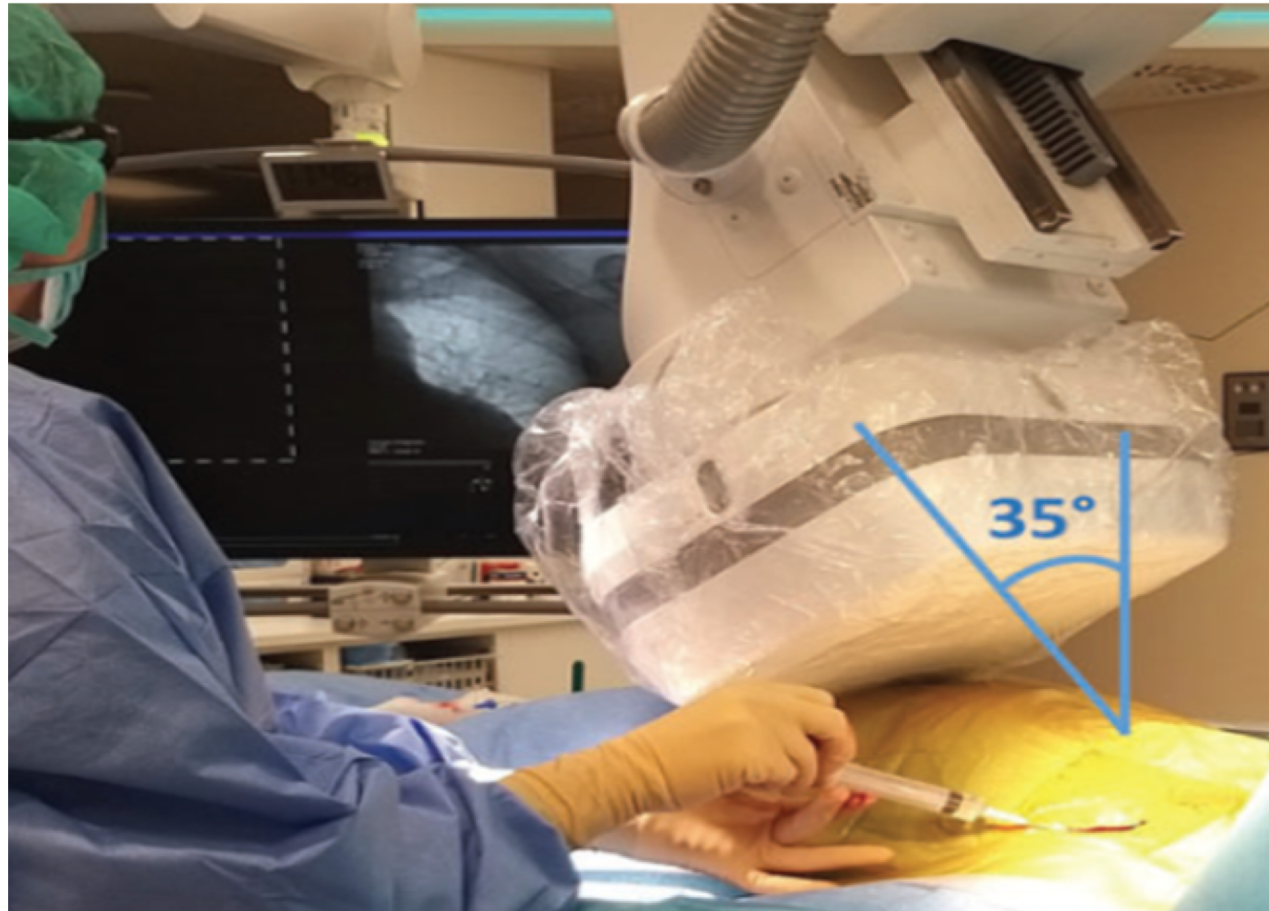
İşlem öncesi

- **Temel klinik veriler**
 - Optimal medikal tedavi
 - Temel laboratuvar değerlendirmeler
 - Fonksiyonel değerlendirme
 - Yaşam kalitesini değerlendirme
 - Kalp yetersizliği etiyolojisi
 - Komorbiditeler/ yaşam beklentisi
- **Görüntüleme**
 - Temel anatomik/fonksiyonel değerlendirme
 - Dissenkroni
 - Kardiyak CTA/MRI (koroner venöz anatomi dahil)
 - Ventrikül fonksiyonu/ doku karakterizasyonu
- **İstirahat EKG**
 - P dalgası/atriyal ritim
 - QRS morfolojisi ve süresi
 - Ventriküler erken vuru
- **İmplantasyon öncesi medikal tedavi**
 - Antikoagülan/ antiplatelet
 - Antibiyotik profilaksisi
 - CIN

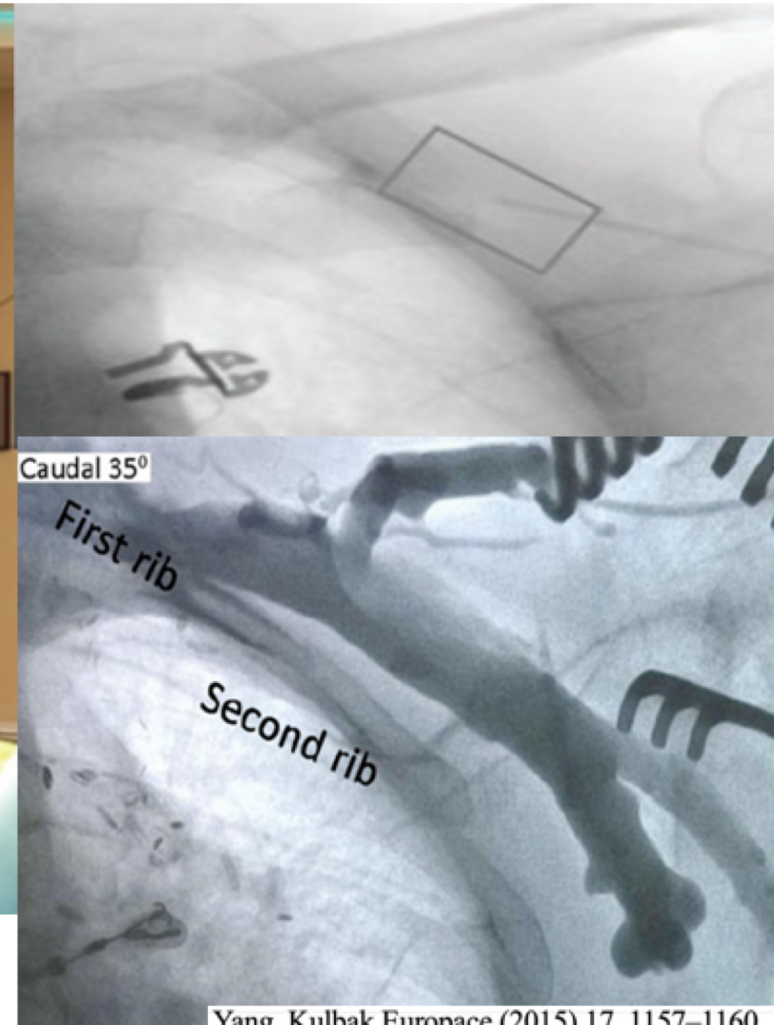








35 Caudal view → Texposes the outermargin of the lung
 Allowing safe puncture
 Minimizing pneumothorax risk



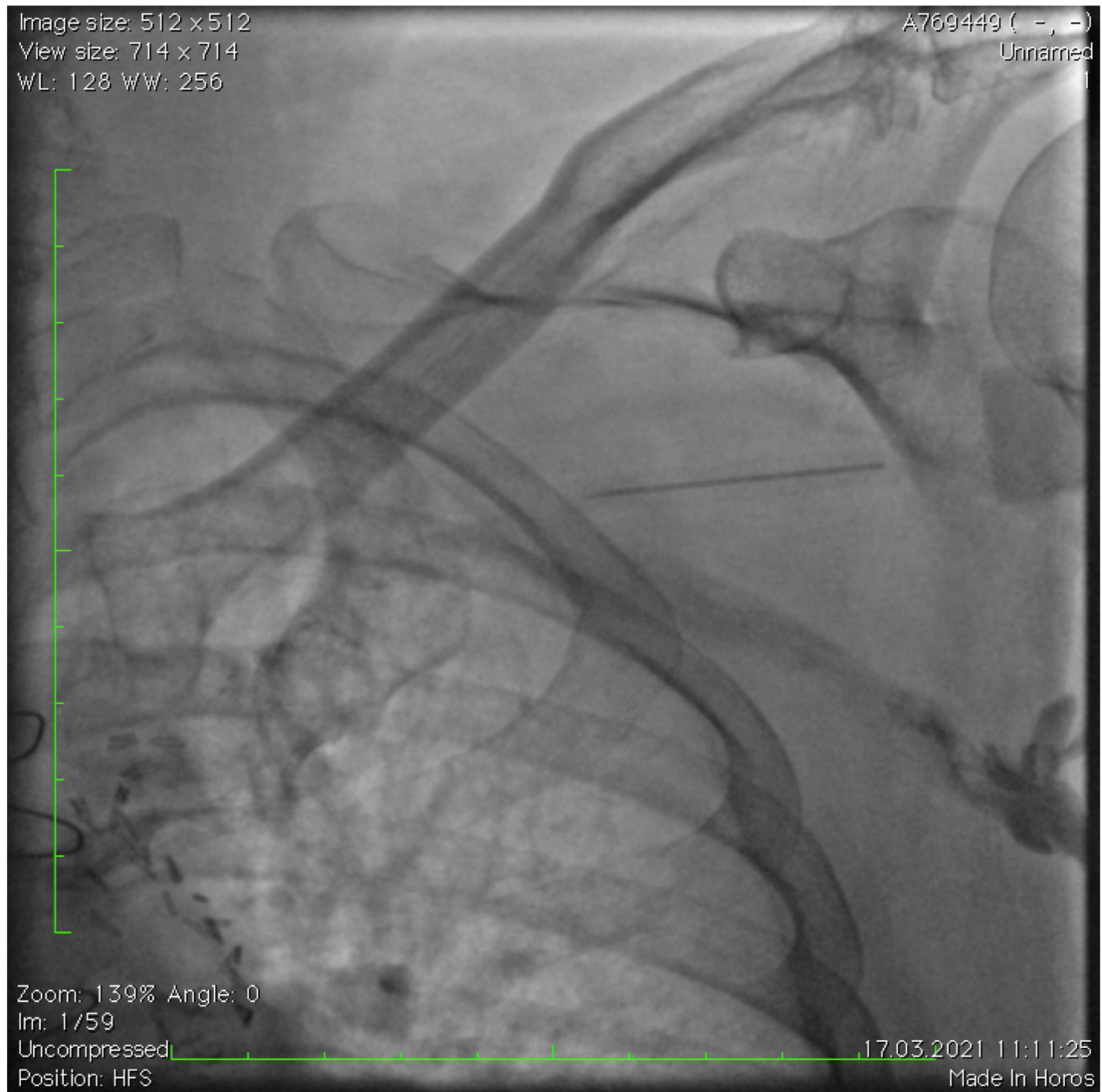
Yang, Kulbak Europace (2015) 17, 1157–1160

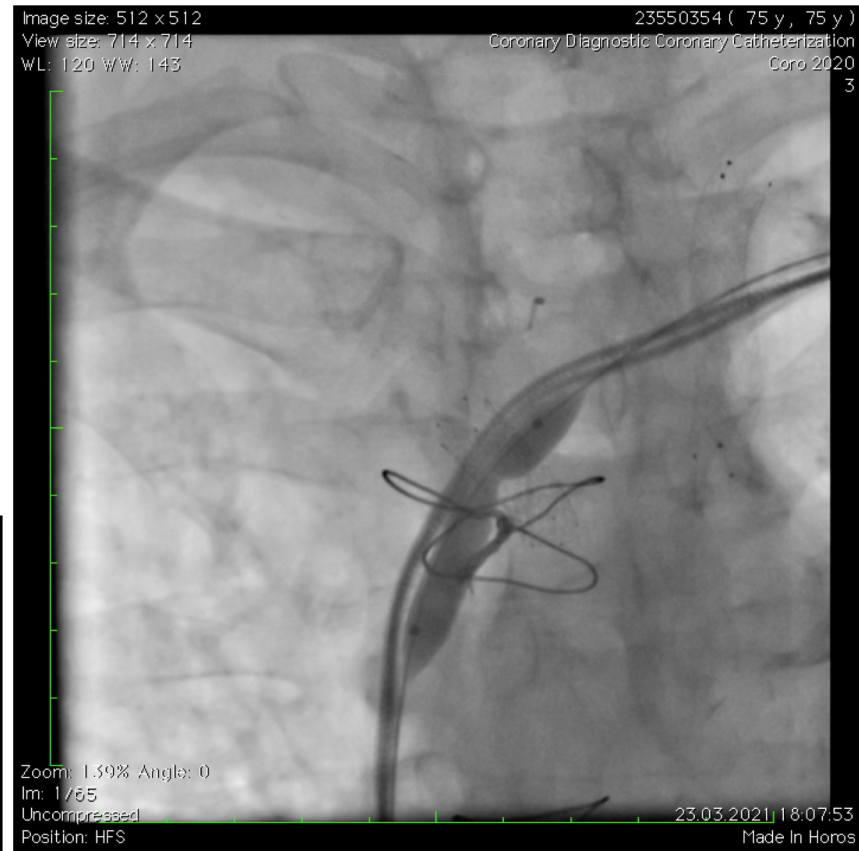
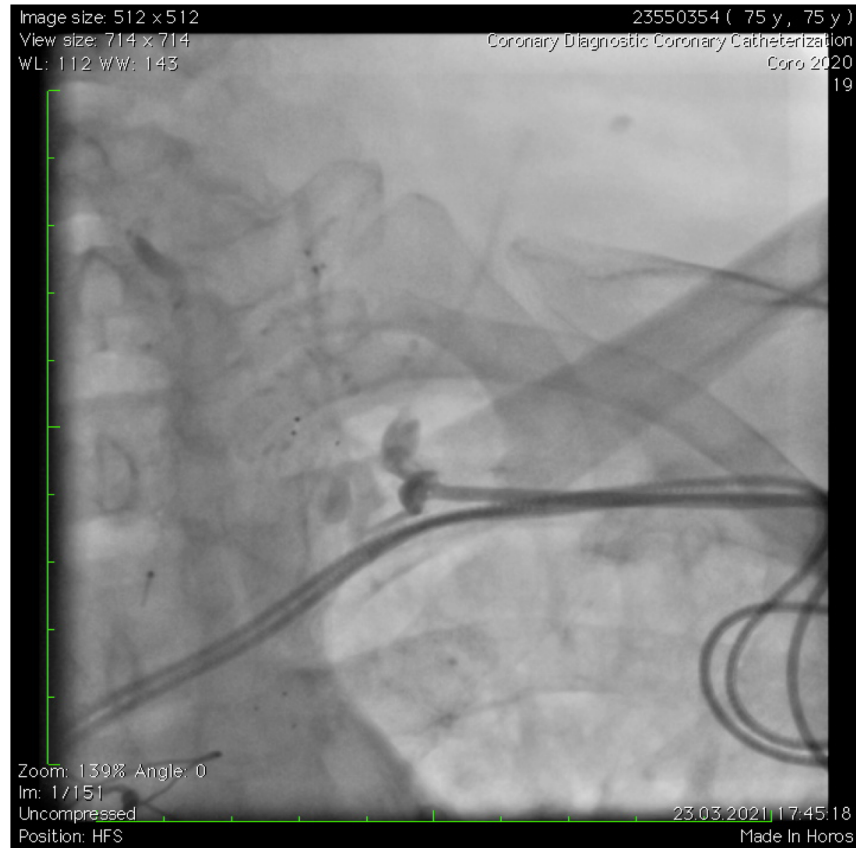
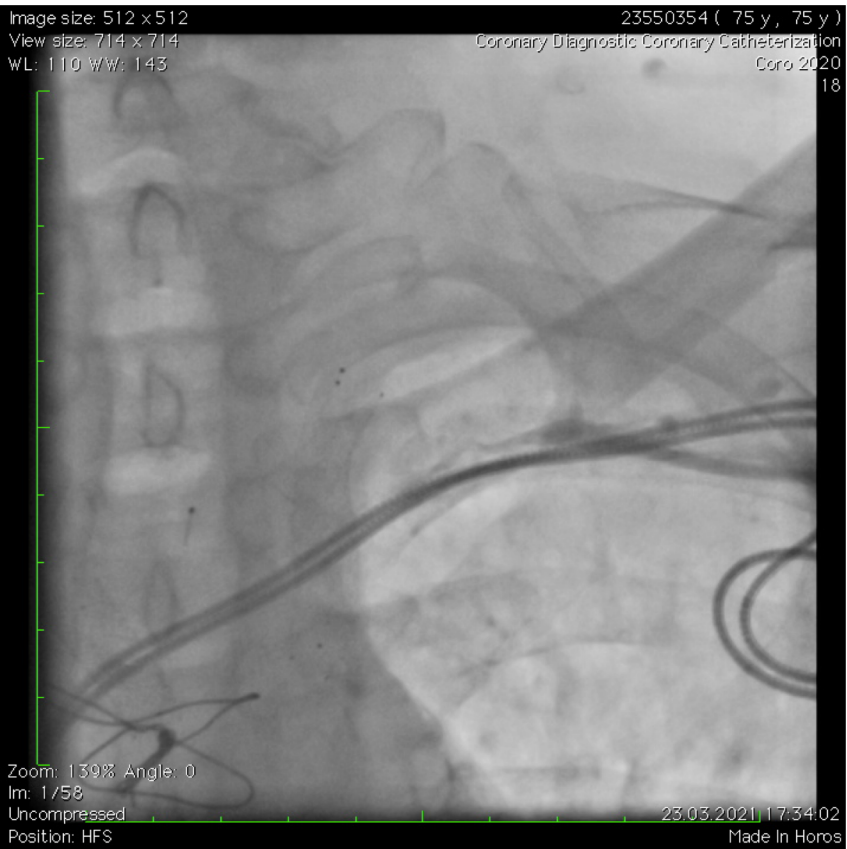
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LV lead implantasyonunun aşamaları

- 1. CS kanülasyonu
- 2. CS Venogramı
- 3. Hedef yan dal seçilmesi
- 4. LV leadinin yan dala yerleştirilmesi
- 5. LV Lead testlerinin yapılması
 - Eşik testi
 - Frenik sinir stimülasyon varlığı ?
 - Elektriksel gecikme süresi
- 6. Kılıfı kesme ve lead'i sabitleme

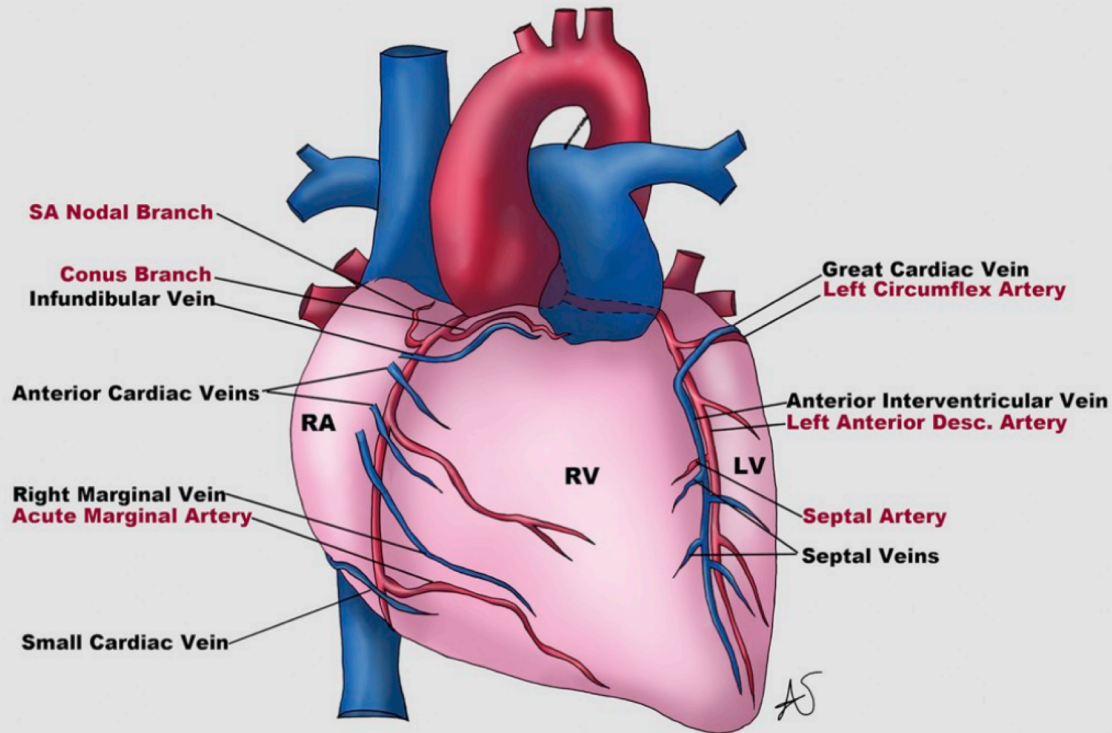
CS kanülasyonu

- CS os posteroseptal bölgededir ve Thebesian valv bulunabilir
- CS os sağ atriyum tabanından 1-2 cm yukarıdadır
- Sağ atriyum dilate olursa posteriyora ve yaklaşık 1 cm yukarı kayar

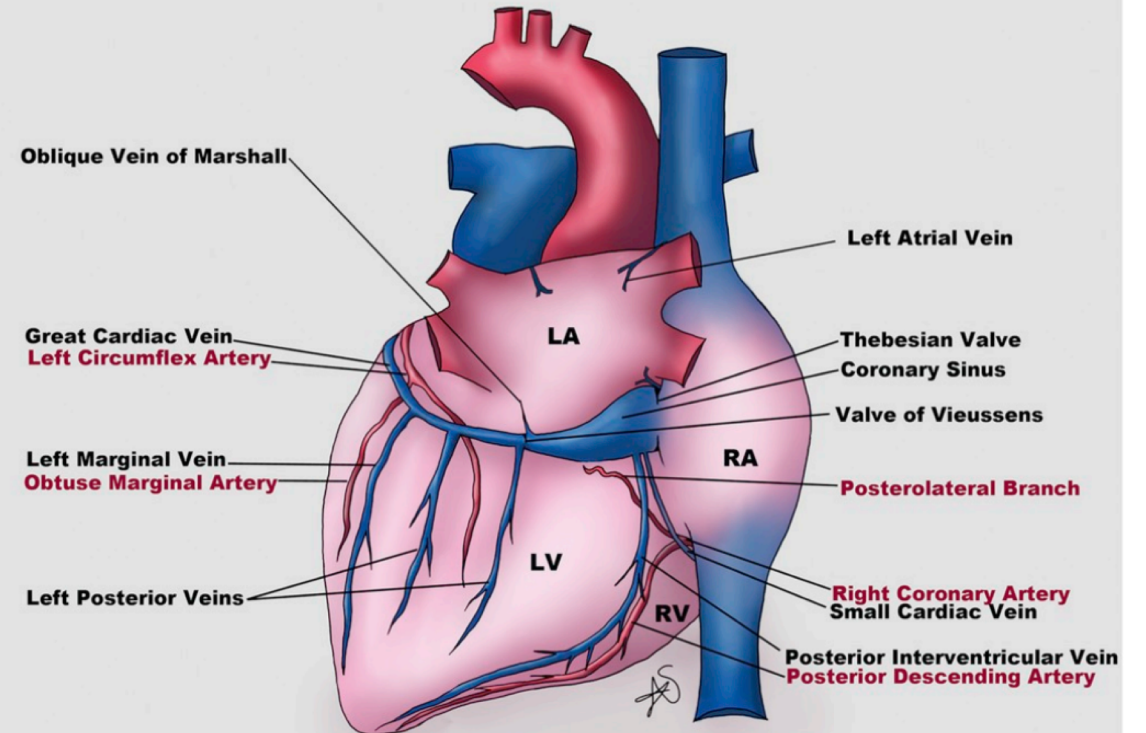
Koroner Sinüs Anatomisi

1. Middle cardiac ven
 2. sol posteriyor ven ve Marshal veni
 3. Sol lateral ven (PL, L ve AL)
 4. Anterior interventricular ven (AIV)
- } Great cardiac ven (GCV)

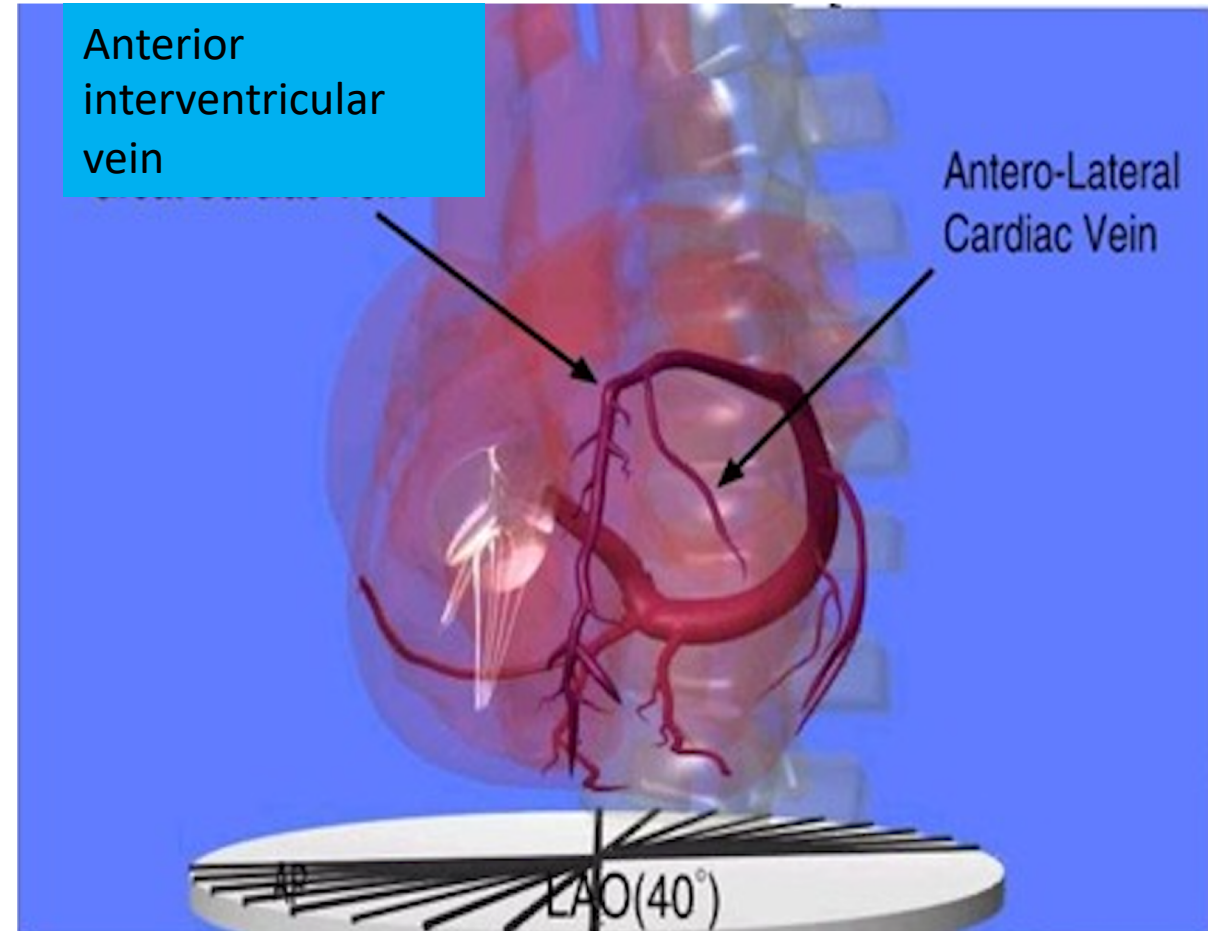
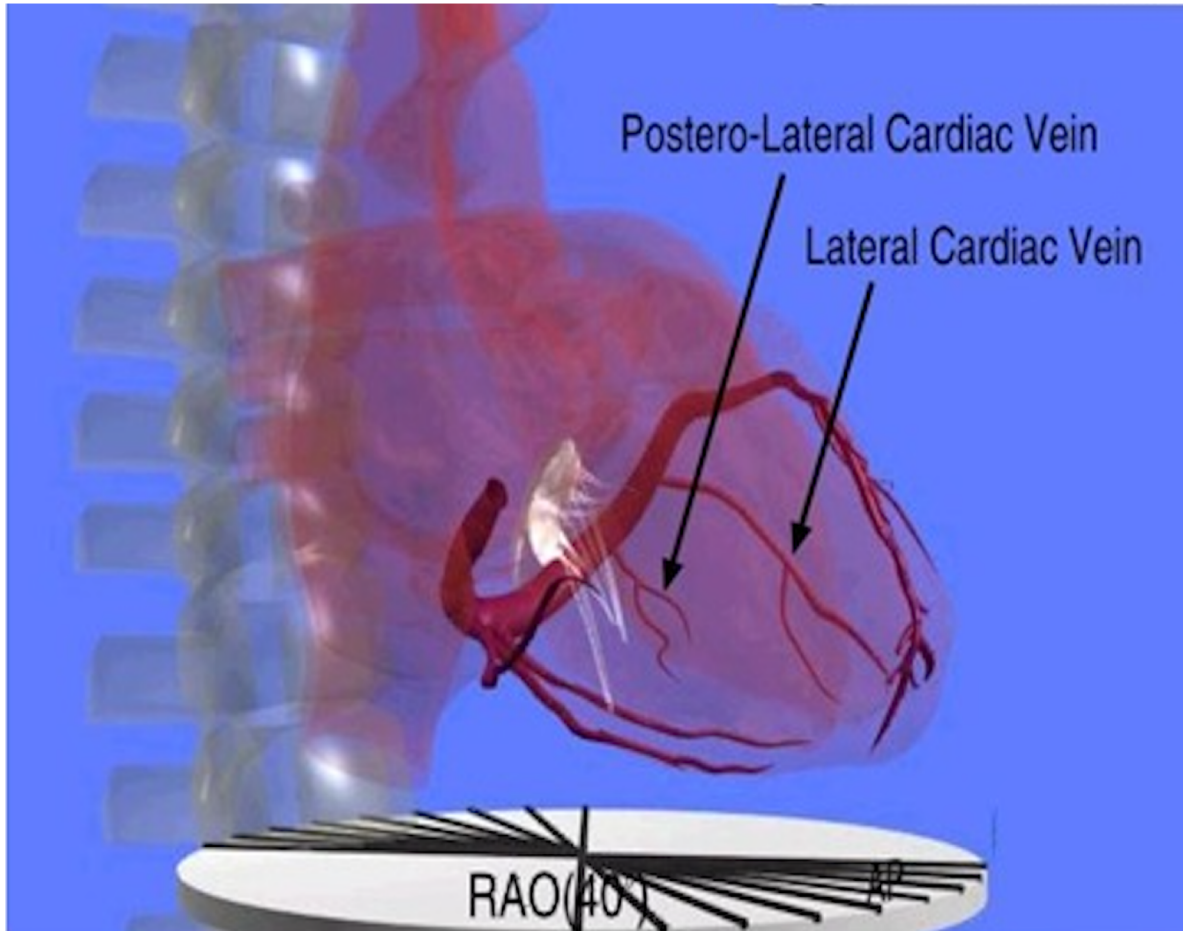
A



B

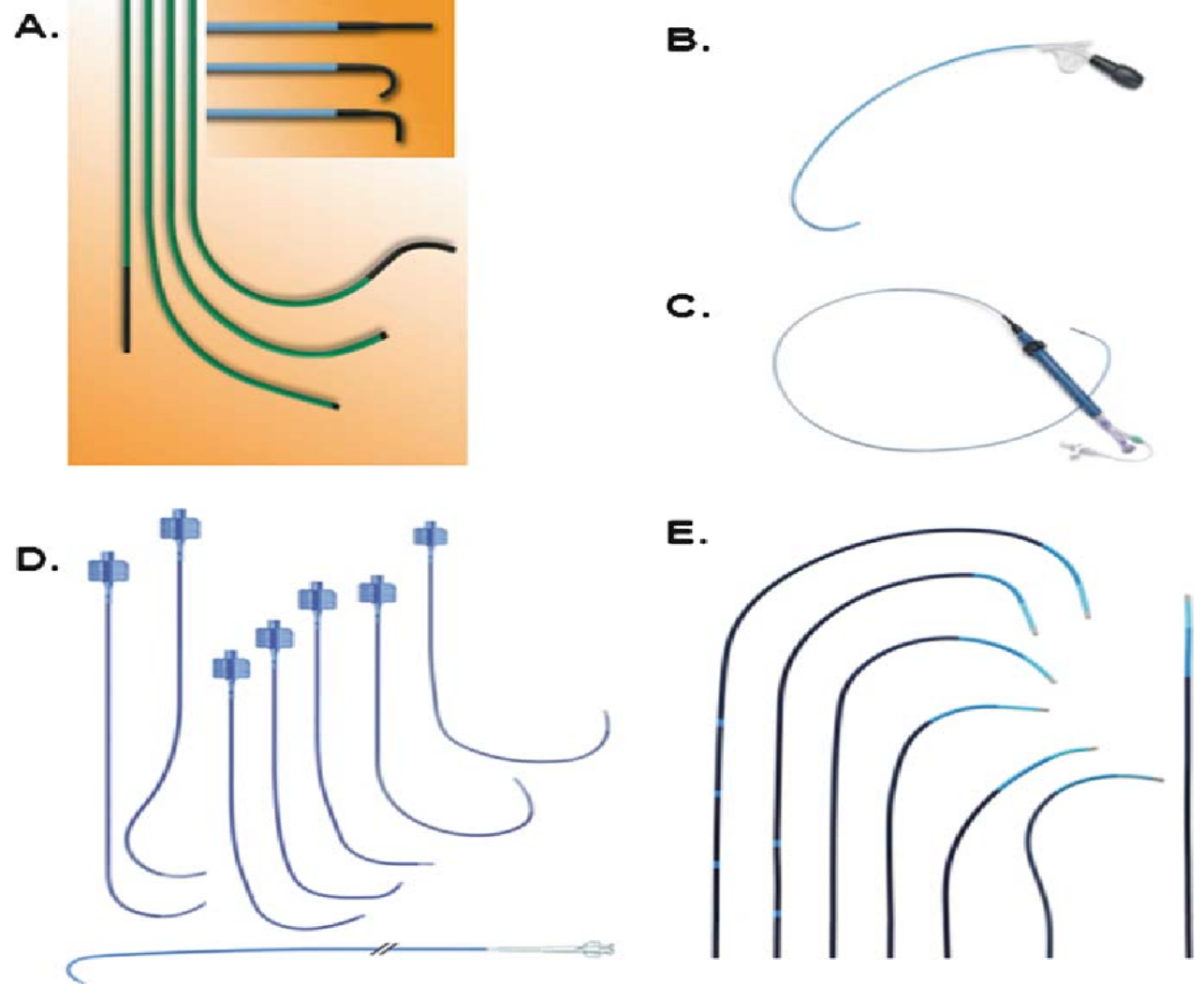
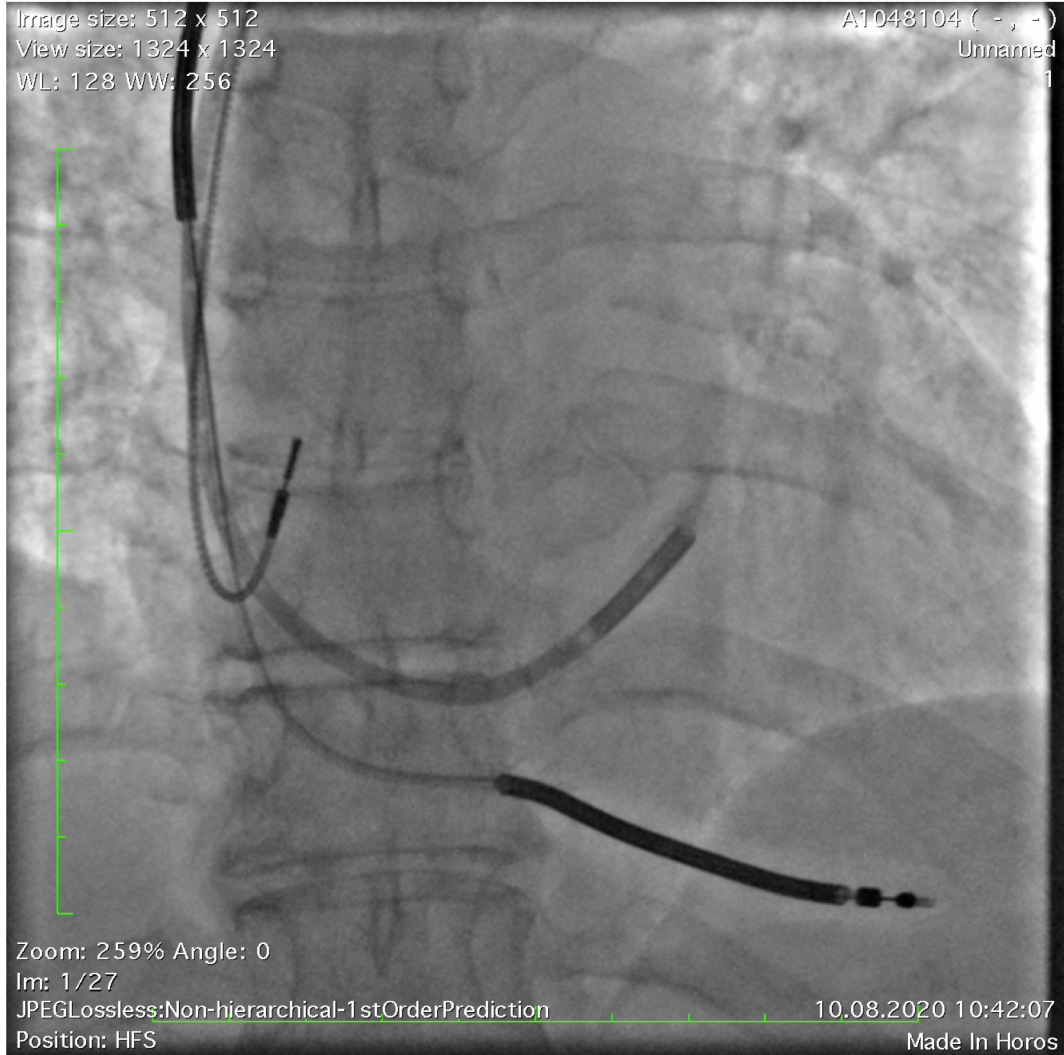


CS'nin LAO ve RAO flouroskopik anatomisi





CS kanülasyonu ve malzemeleri

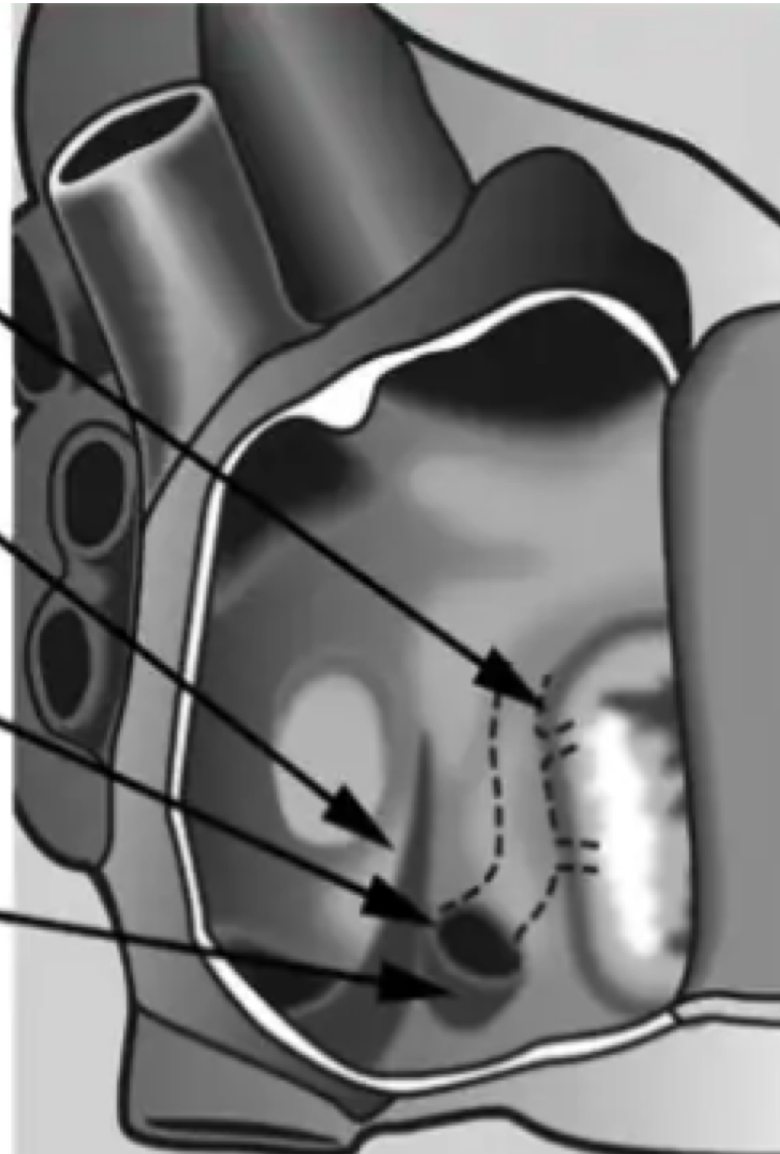


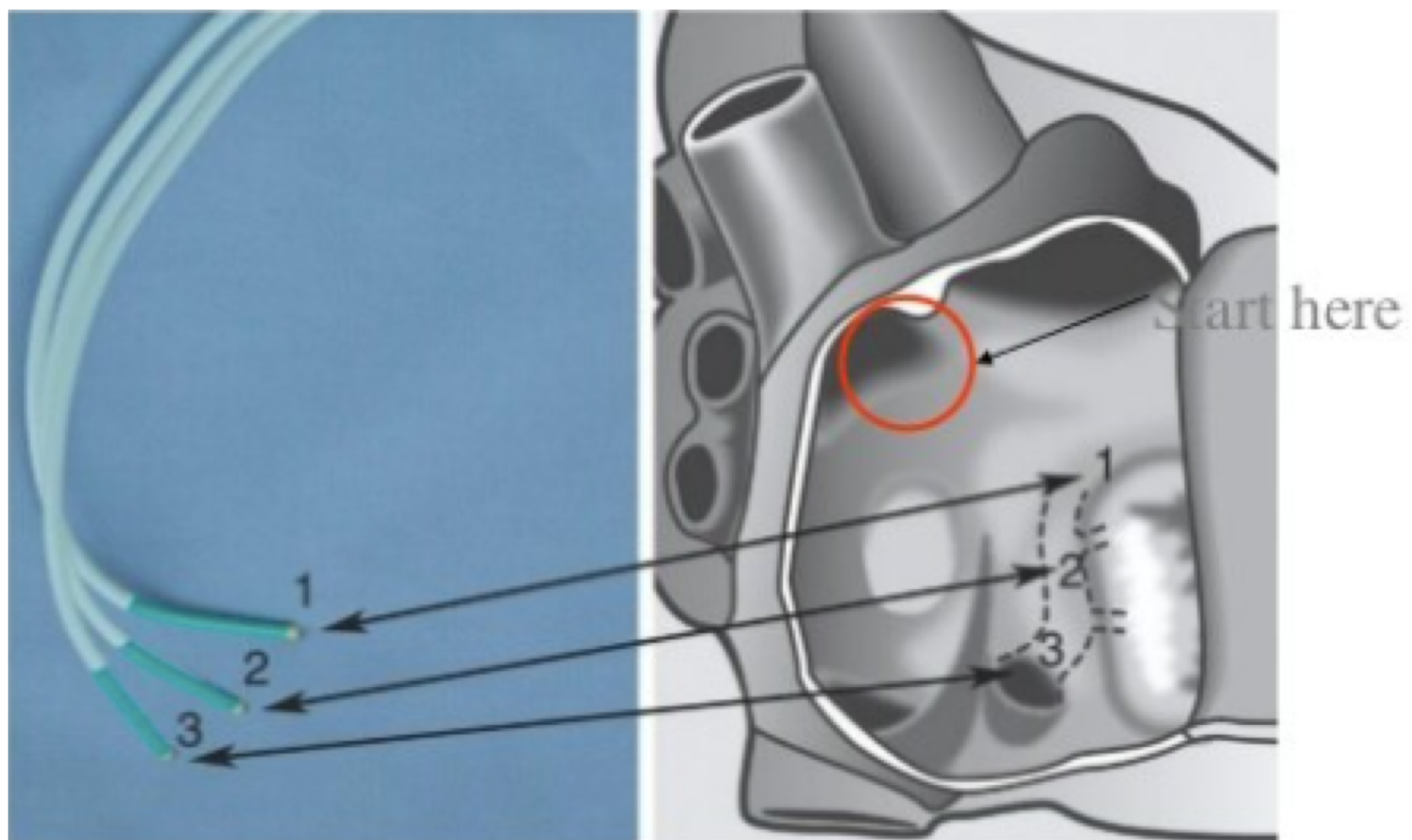
Tricuspid annulus

Eustachian ridge

OS coronary sinus

Thebesian valve





CS'ye girmede zorluklar (CS kapakçıkları)

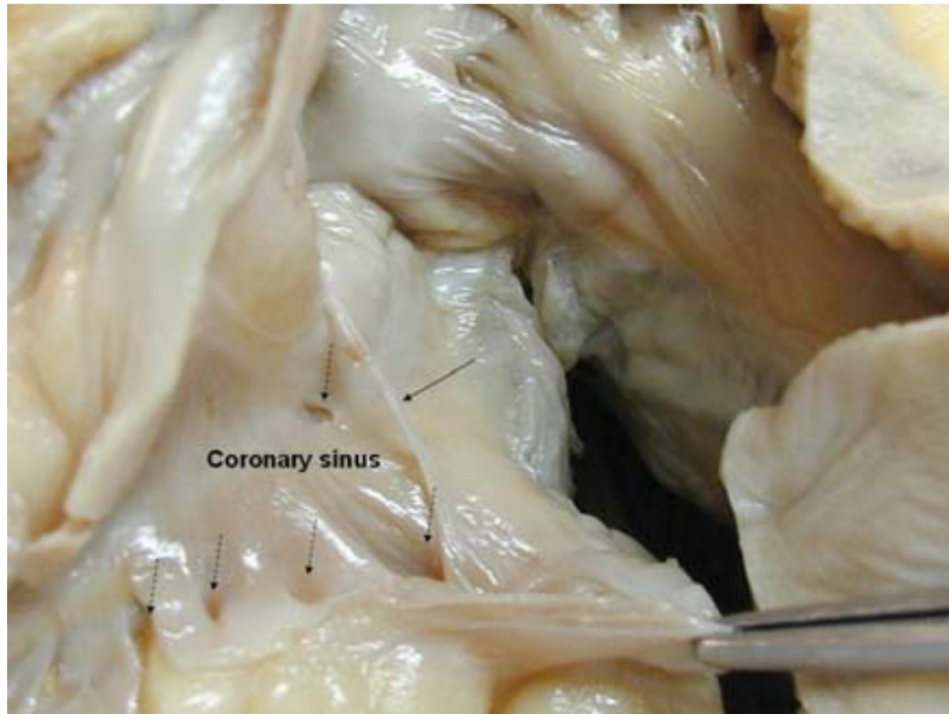


Figure 3 The CS has been dissected open along its long axis. Note the multiple ostia of various ventricular veins (hatched arrows). A remnant of the Thebesian valve that partly covers the ostium of the middle cardiac vein (MCV) is seen (arrow).

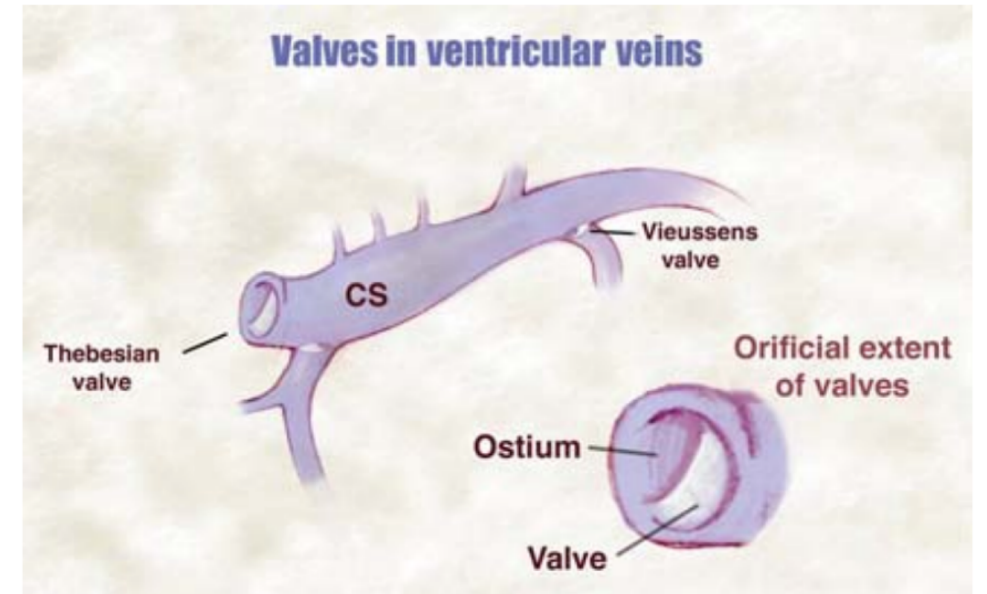
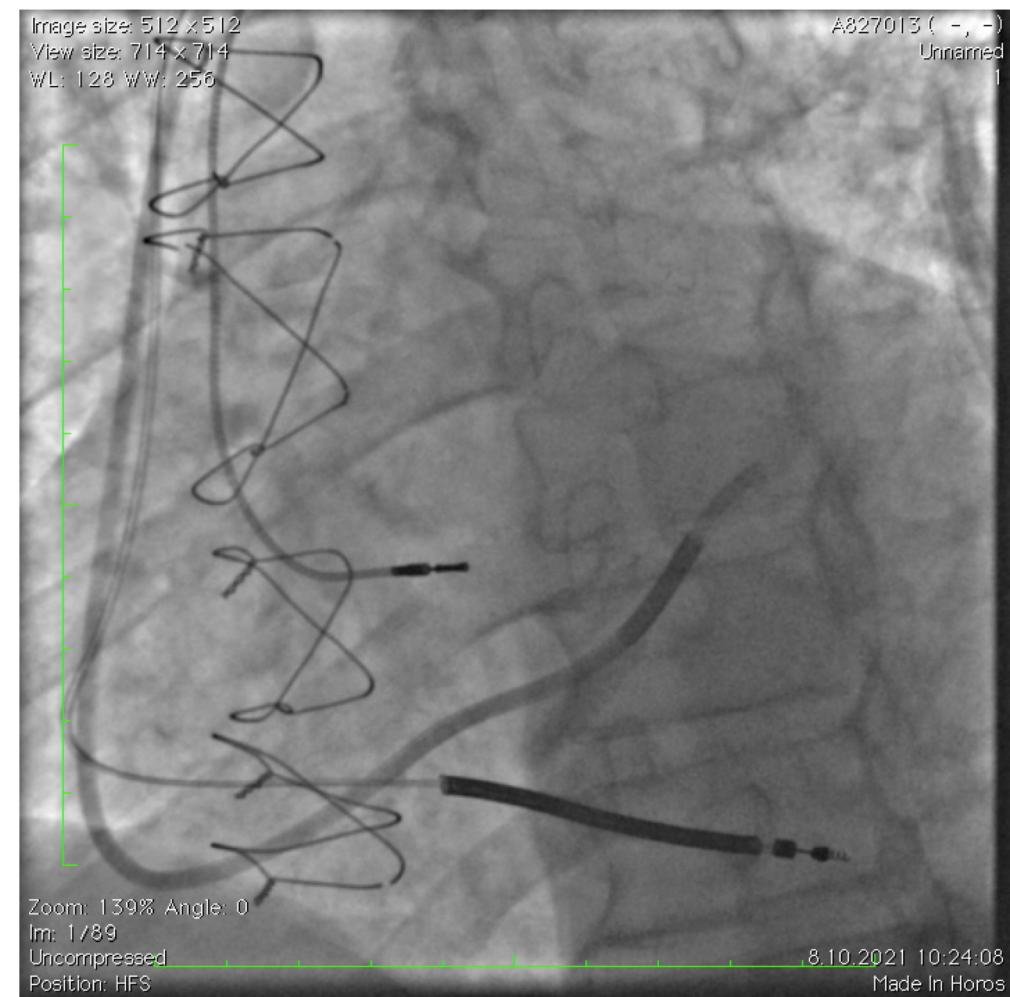
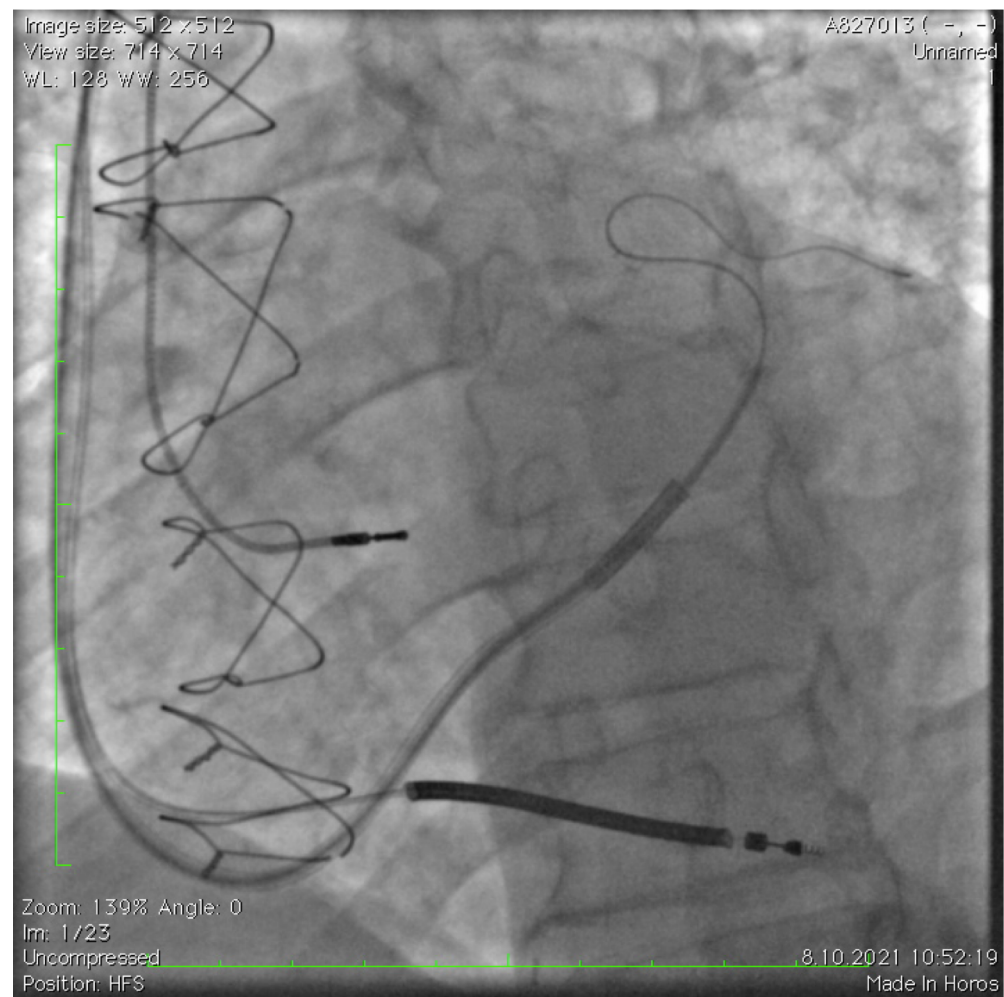
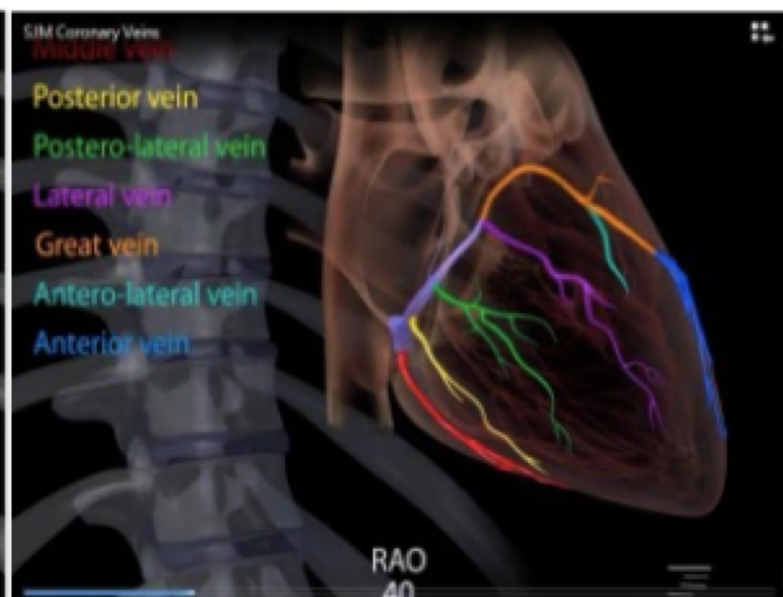
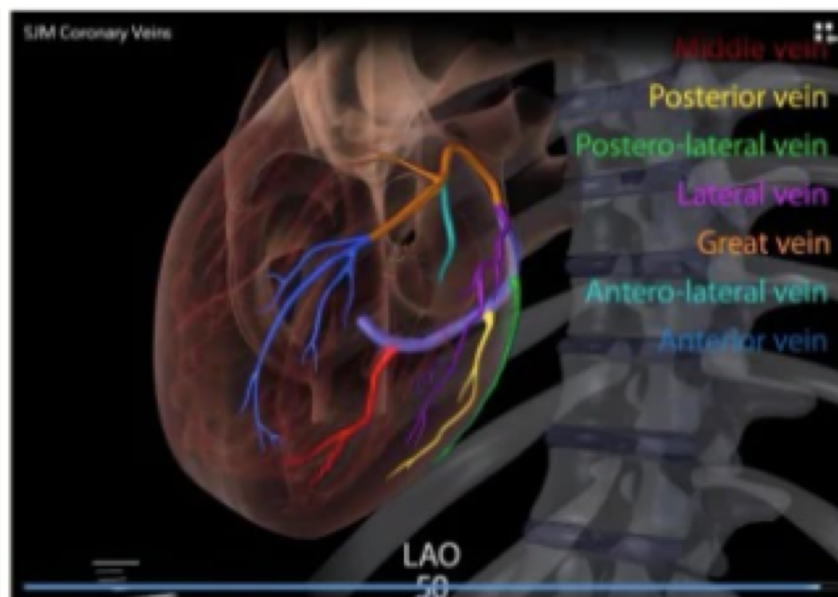
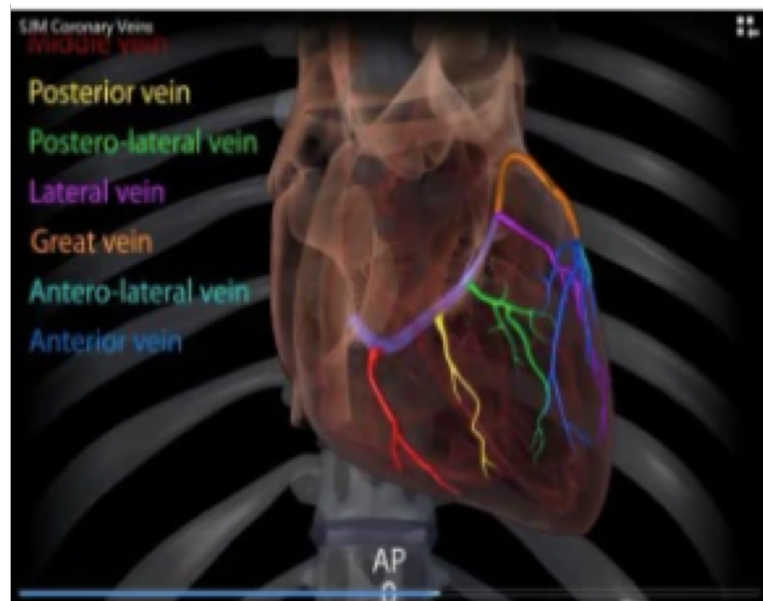
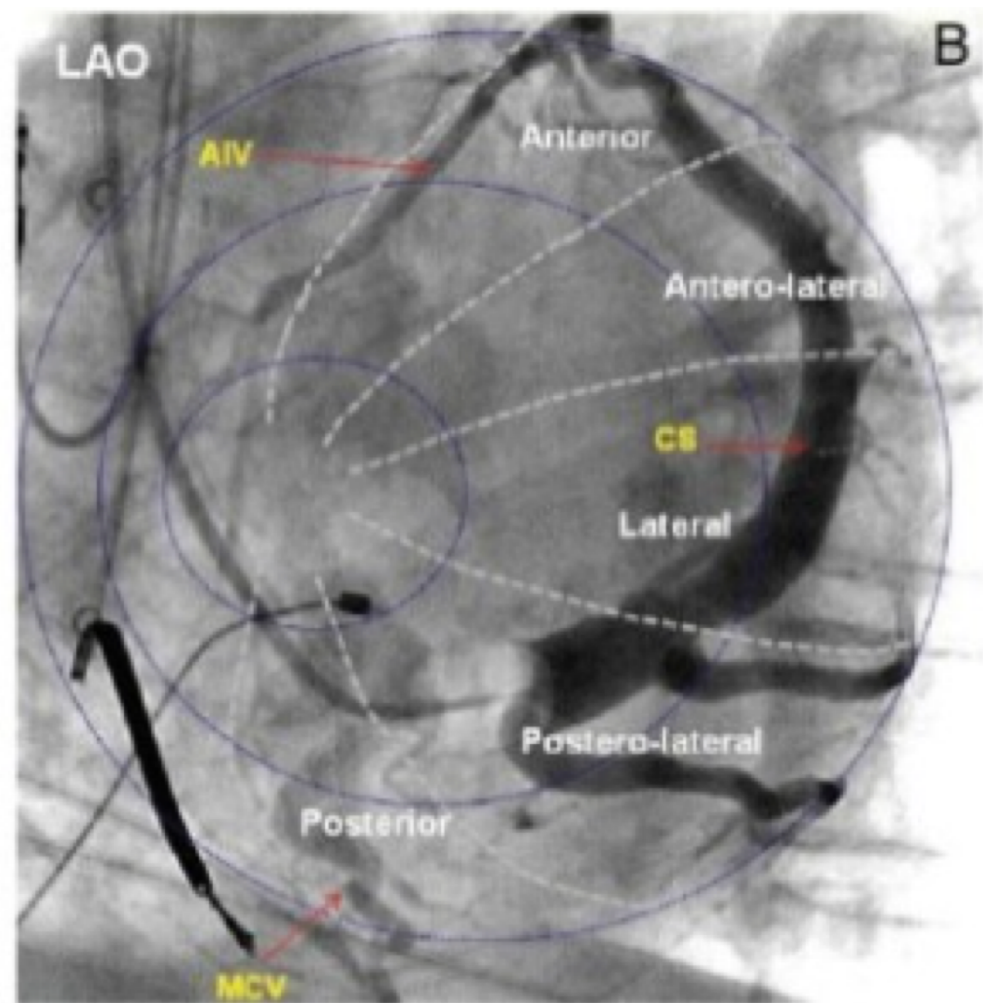
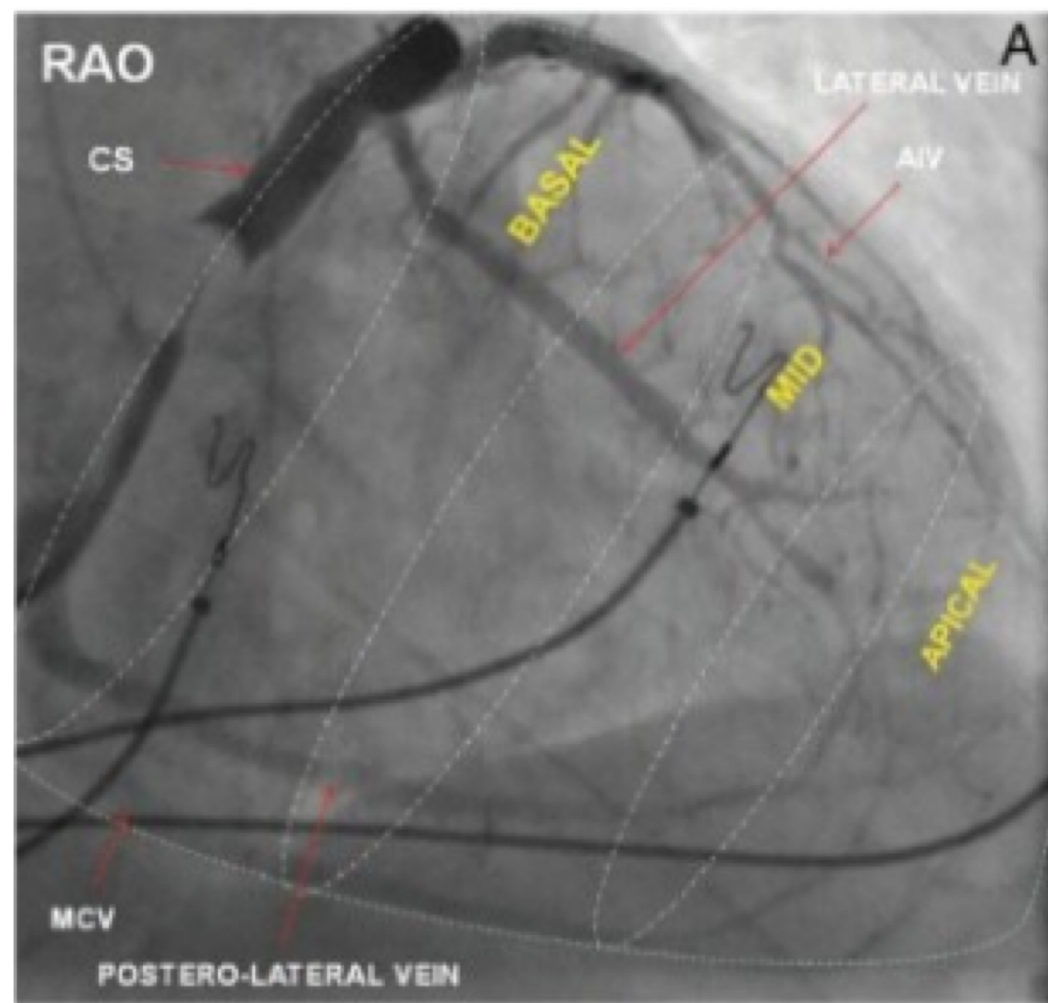


Figure 4 Valves can be found in the CS at various locations. Most common are at the ostium of the CS (Thebesian valve) and at the ostium of the postural lateral vein at the junction of the Great Cardiac vein and CS (Vieussen's valve). These valves cover various extents of the area of the orifice.

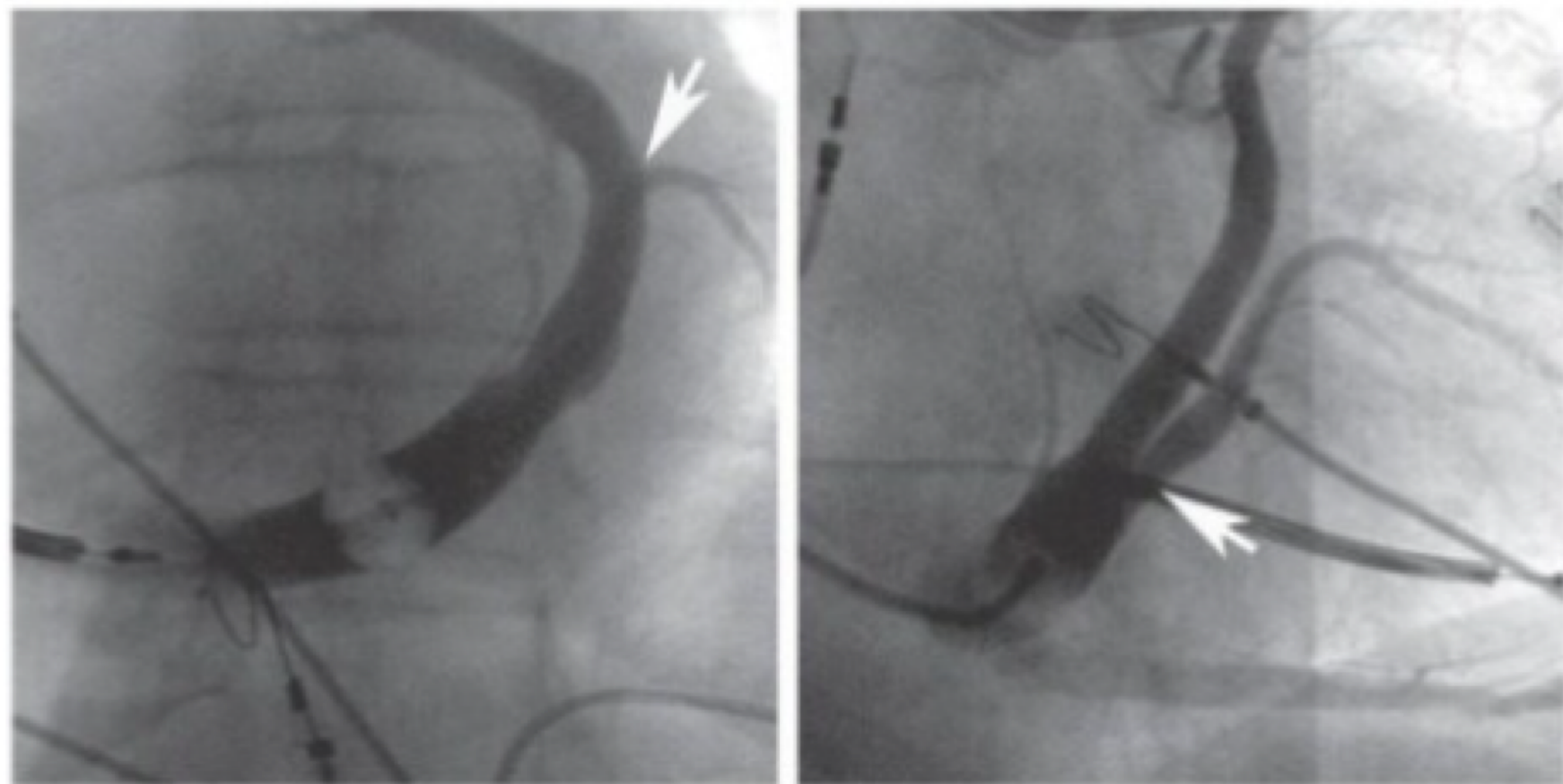


CS venogram





□ Always 3 views: AP-LAO-RAO



A

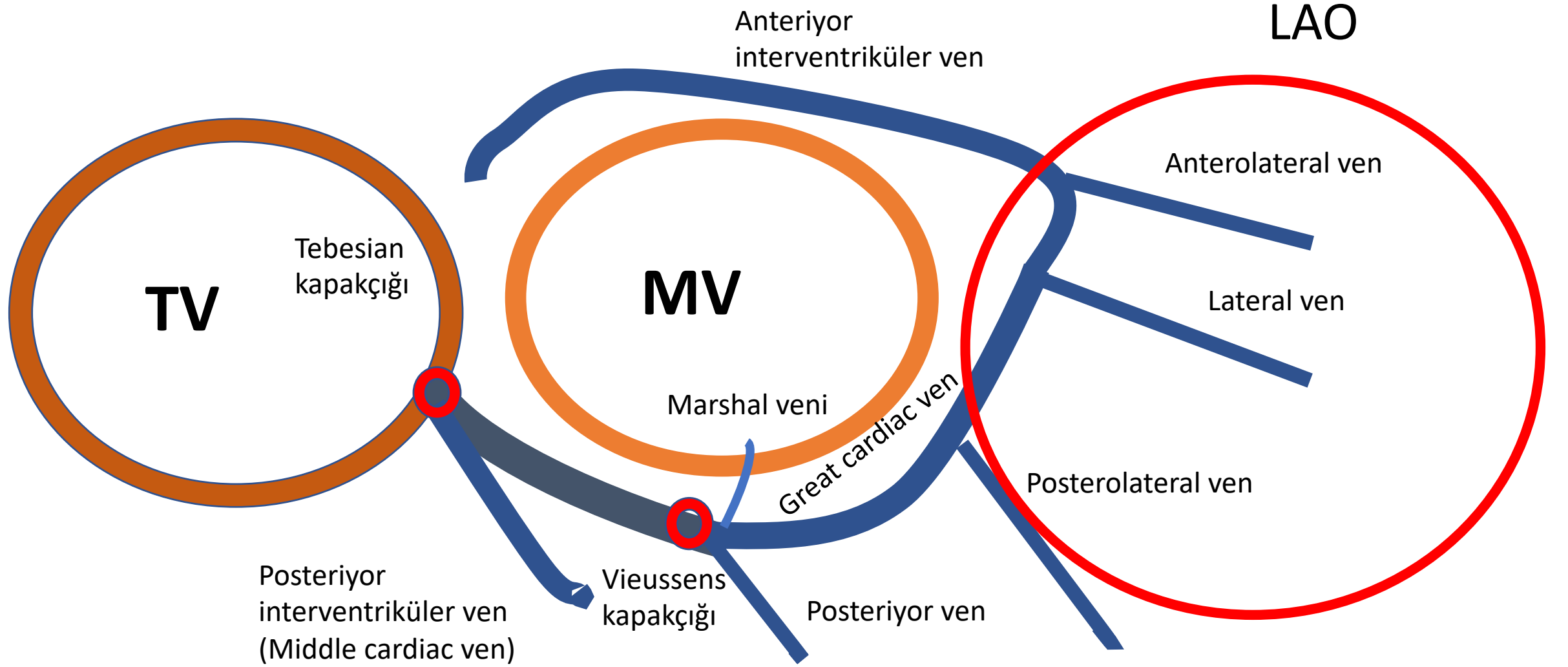
LAO

B

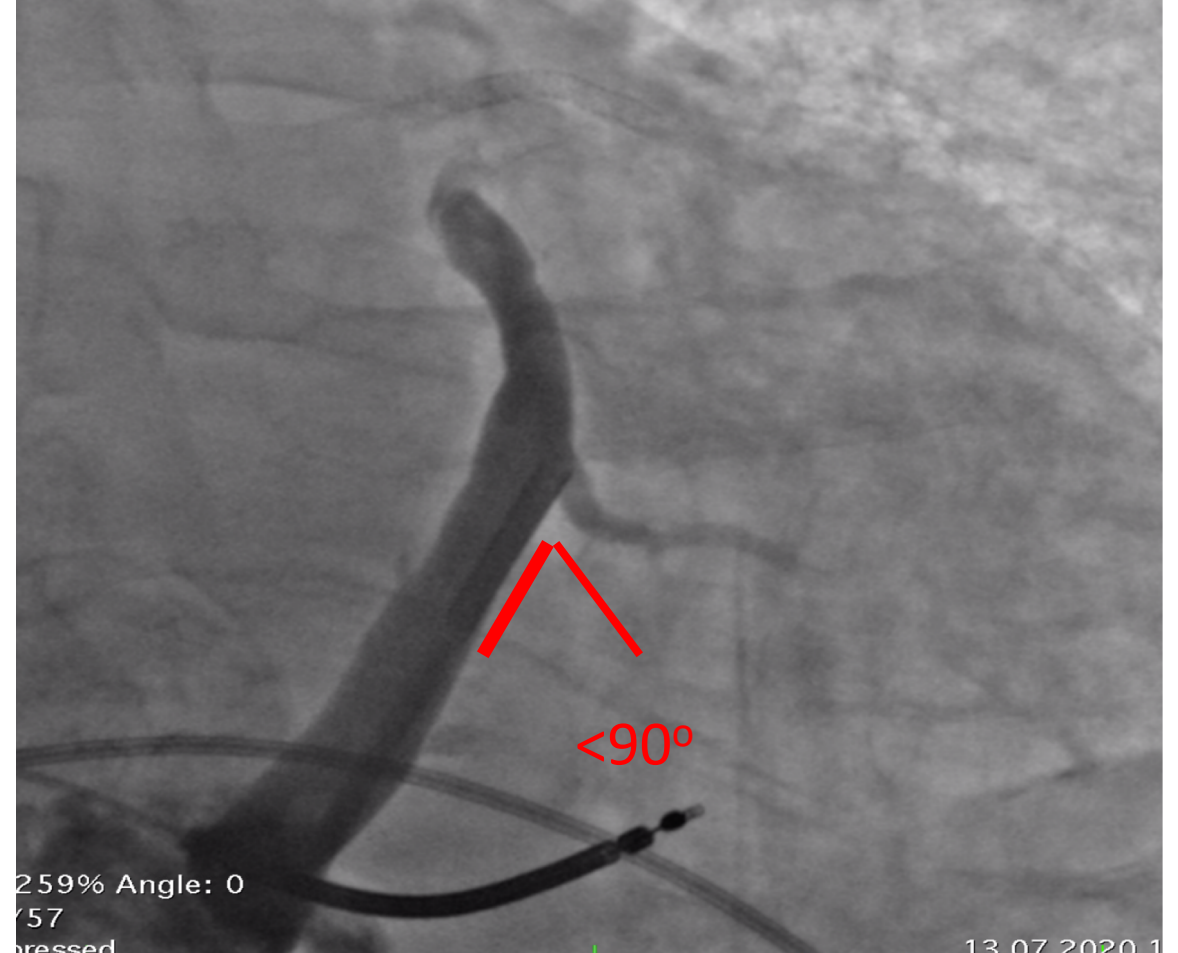
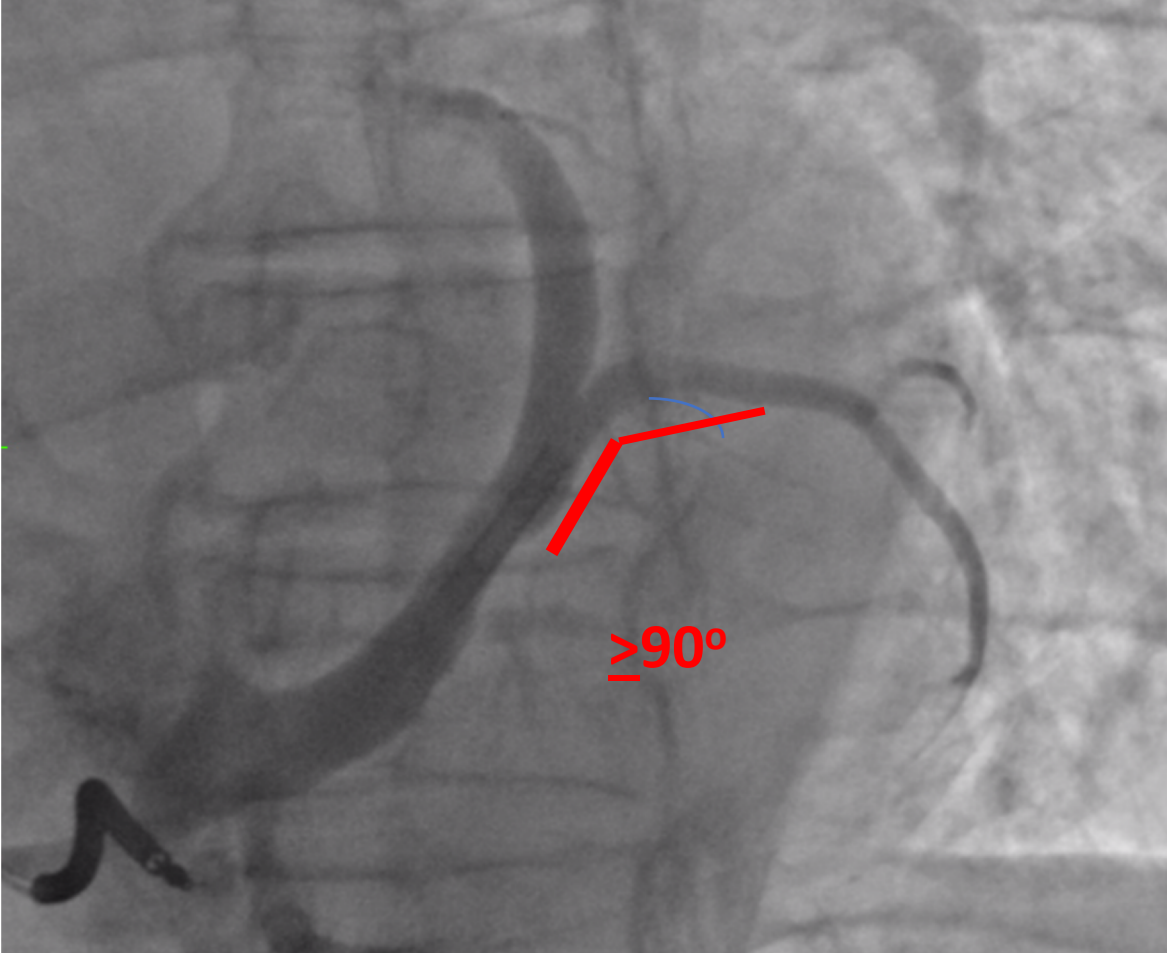
RAO



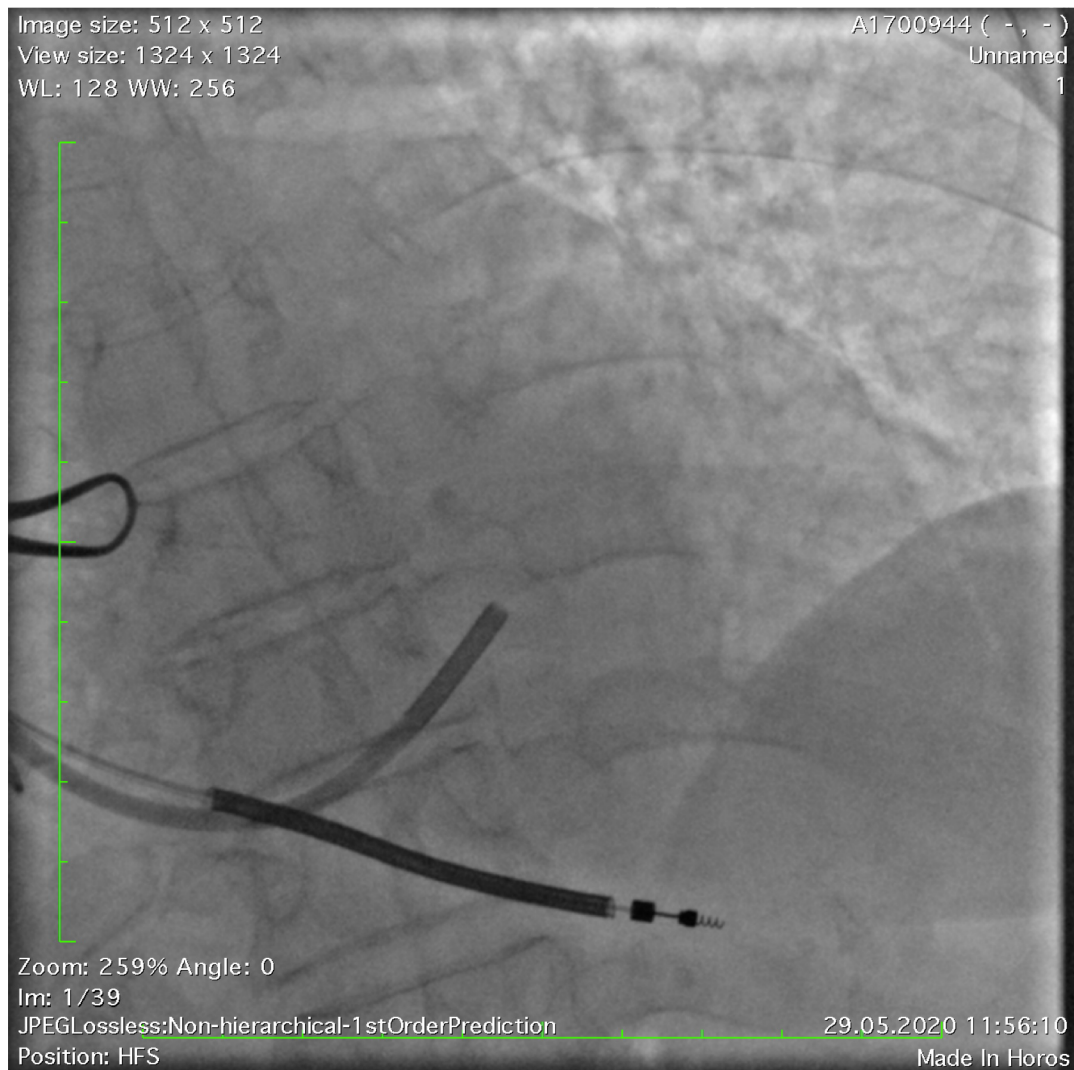
Hedef yan dal seçimi



Geniş ve dar açılı hedef yan dallar



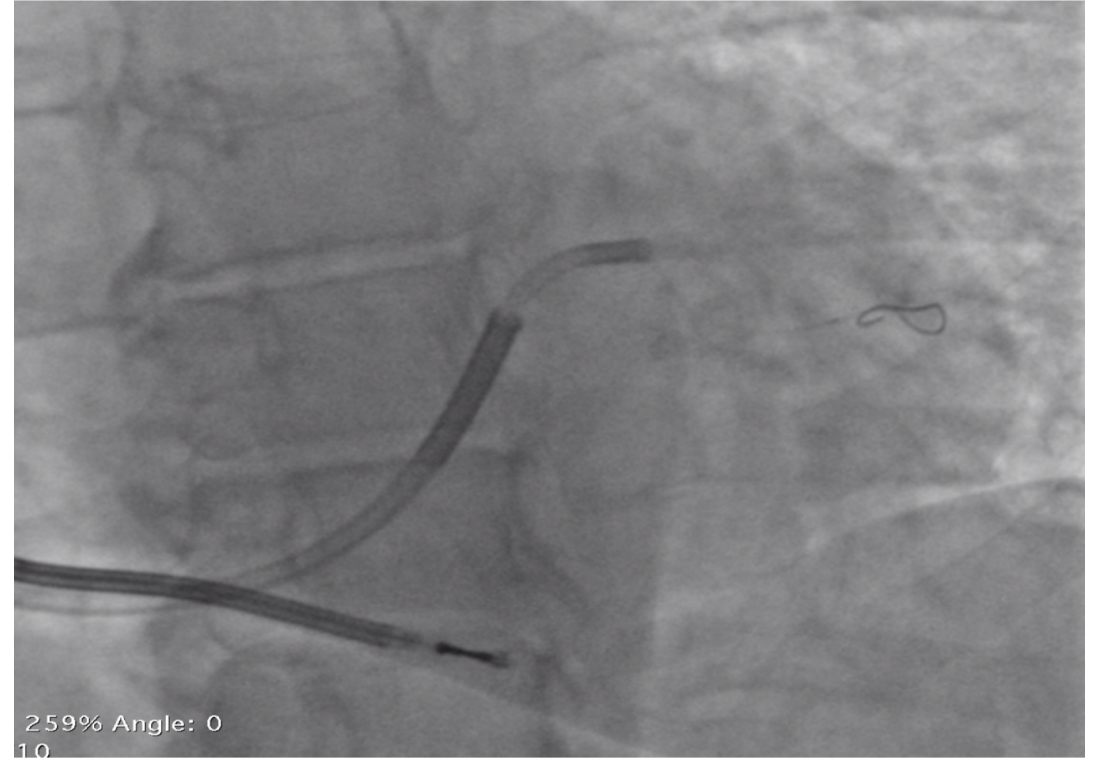
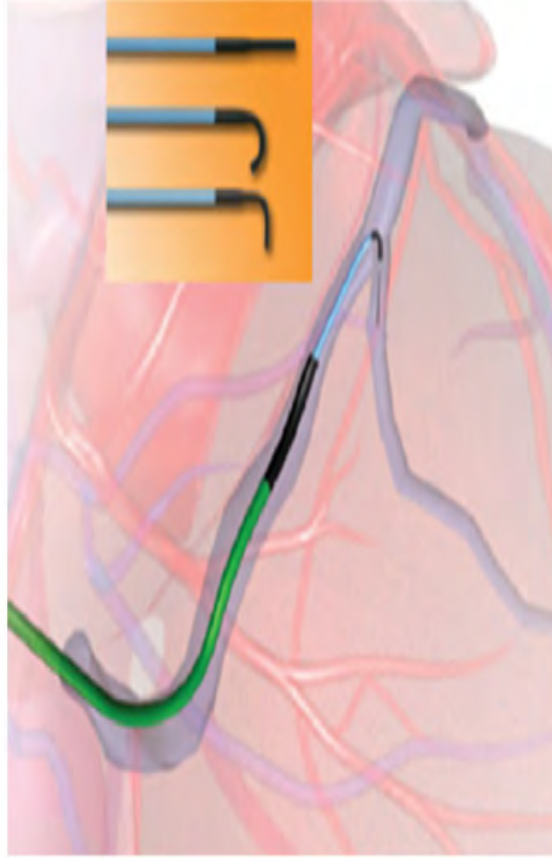
Kolay hedef



Zor hedef



Dar açılı yan dallarda yardımcı kateterler



Inner kateteri
Sağ judkins kateteri
LIMA kateteri

Vieussen kapakçığı

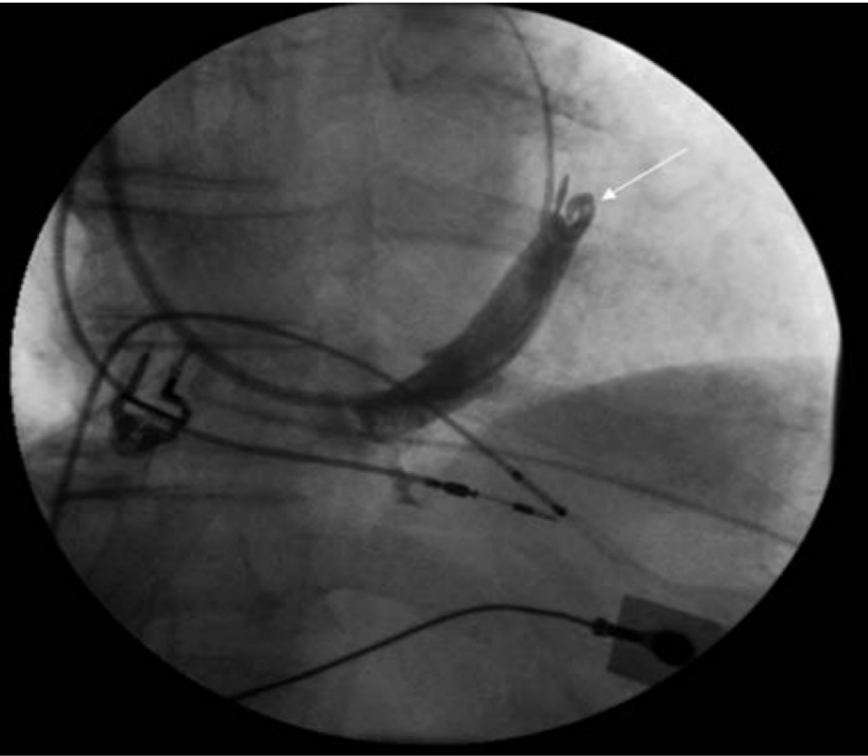
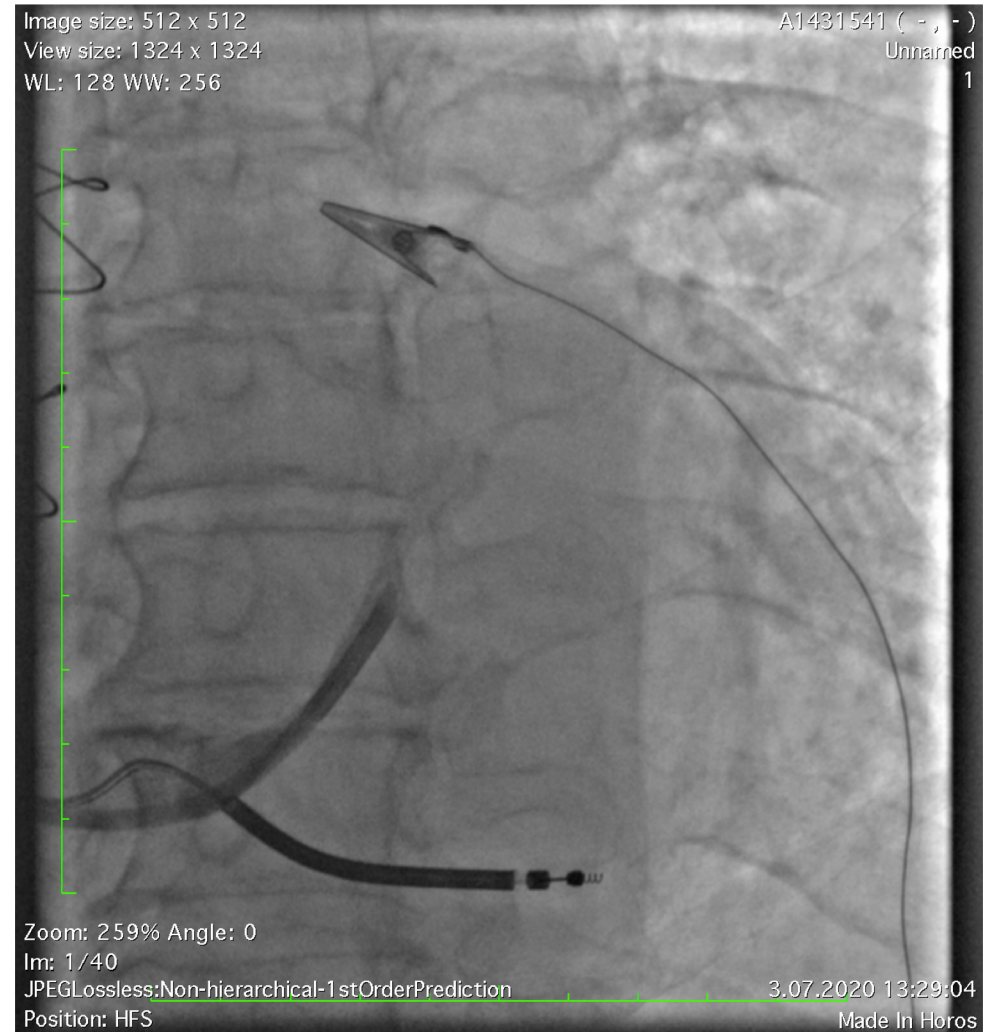


Figure 5 Coronary venous angiogram in the left anterior oblique (LAO) projection showing a near occlusive valve (arrow) in the region of the posterolateral vein (Vieussen's valve).



CRT Çalışmalarından öğrendiklerimiz

- LV bazal veya mid bölgeden pacing, apikal pacinge göre daha yararlıdır (MADIT CRT)
- LV apikalden pacing ile KY (1.7X) ve ve ölüm (2.9X) daha fazla artmaktadır (MADIT CRT)
- Hiç yapma: LV anterior (AIV)
- Mümkünse yapma: LV posterior (Middle cardiac ven)
- **Yapabilirsin: LV lateral, PL, AL**

LV leadi yan dalın (LV) neresinde bırakılmalıdır ?

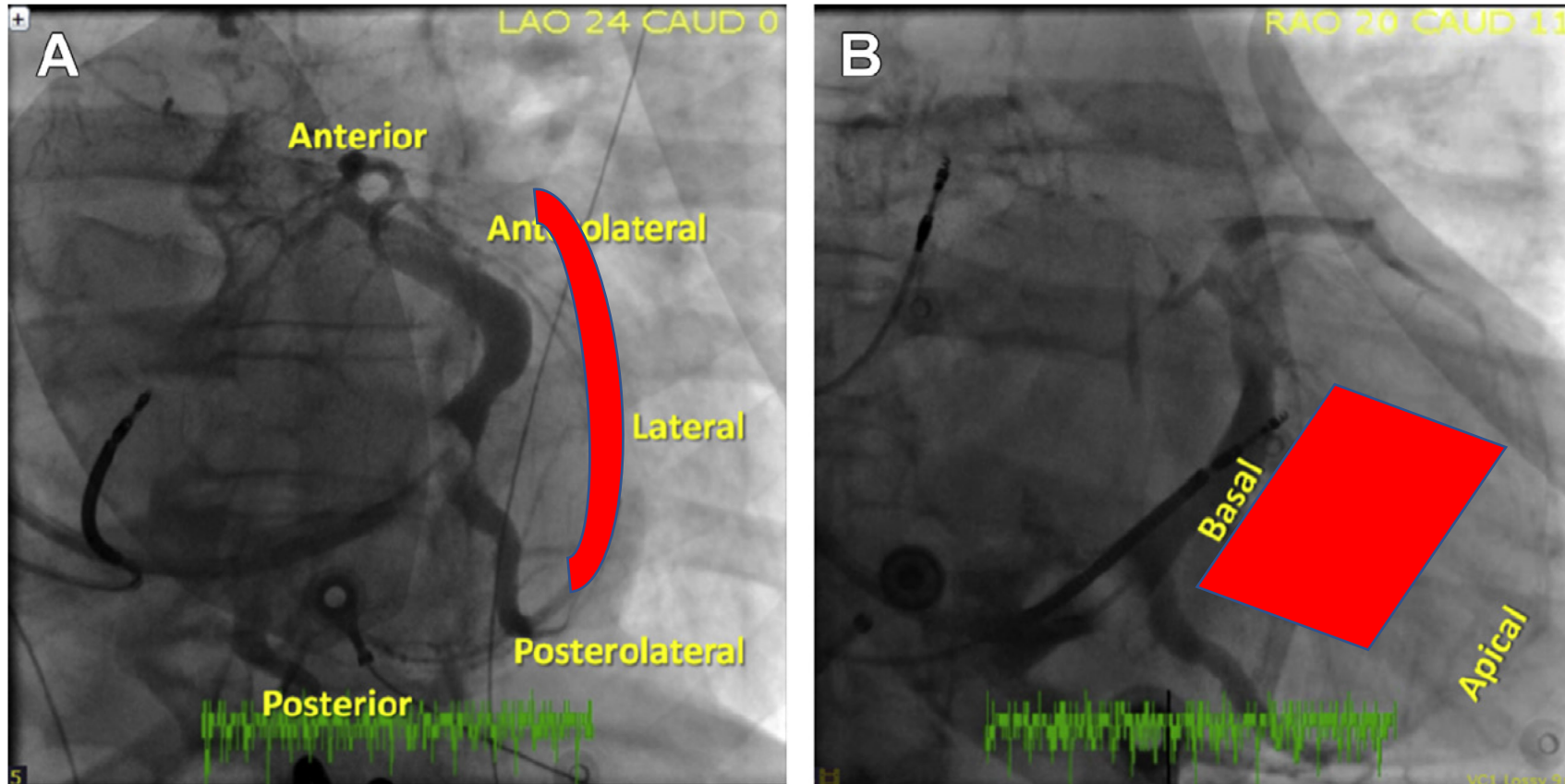
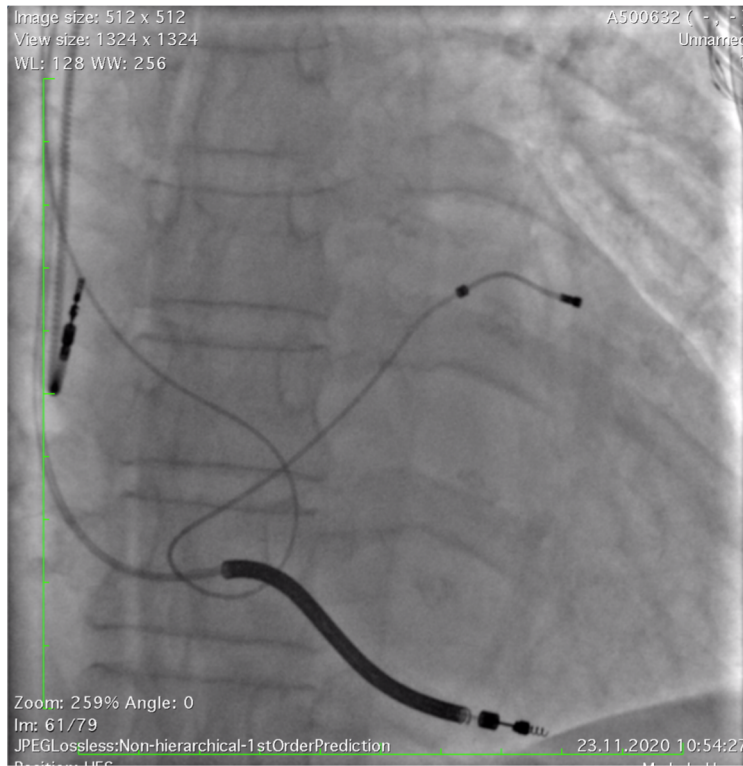


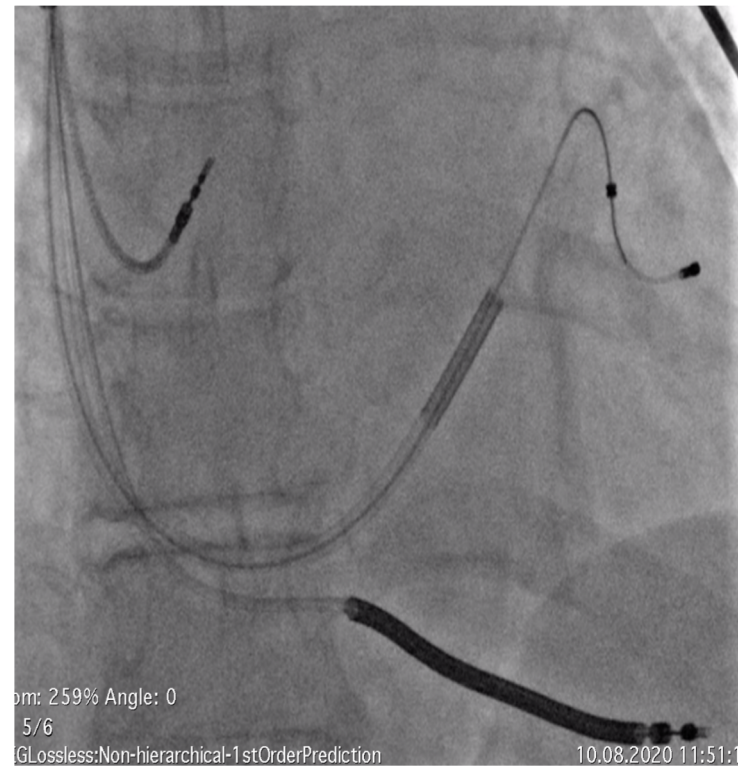
Fig. 1. Angiographic classification of CS anatomy. (A) The left anterior oblique (LAO) projection enables segmentation of the LV along the short axis, defining anterior, anterolateral, lateral, posterior, and posterior segments of the CS and its veins. (B) The right anterior oblique (RAO) projection shows the LV along the long axis, defining basal, mid, and apical segments.

LV bazal mid ve apikal pacing

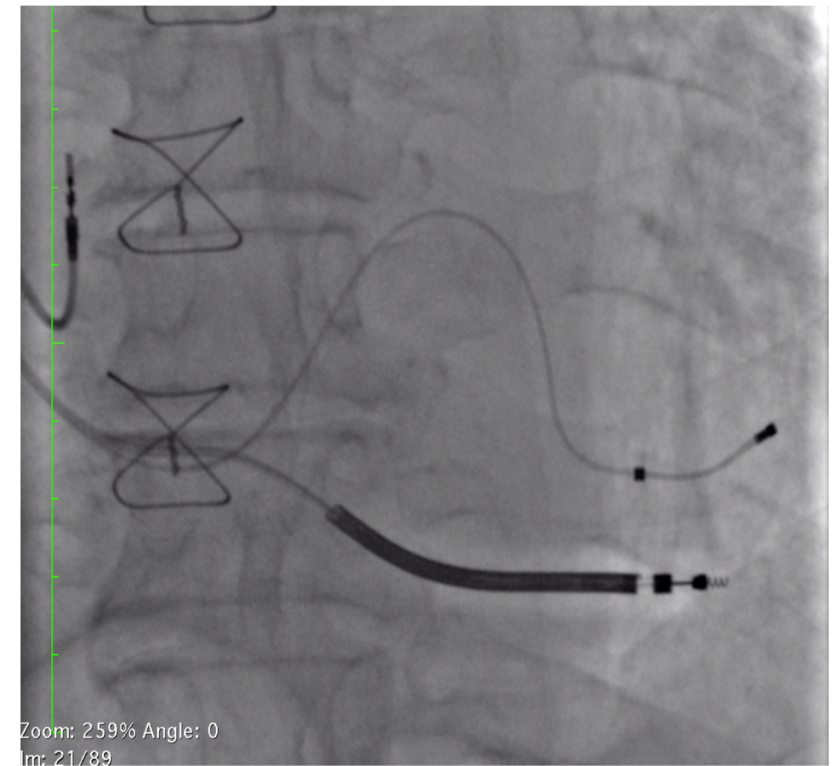
LV bazal



LV mid



LV apikal



Coronary venous angioplasty to a ring-like stricture preventing left ventricular lead insertion

Sol ventrikül lead implantasyonunu önleyen striktüre uygulanan koroner venöz anjiyoplasti

Introduction

Cardiac resynchronization therapy (CRT) is an alternative therapy in patients with severe systolic heart failure with dyssynchronous ventricular contraction and severe symptoms (NYHA III-IV) despite optimal medical therapy (1). The operators sometimes confront limitations to

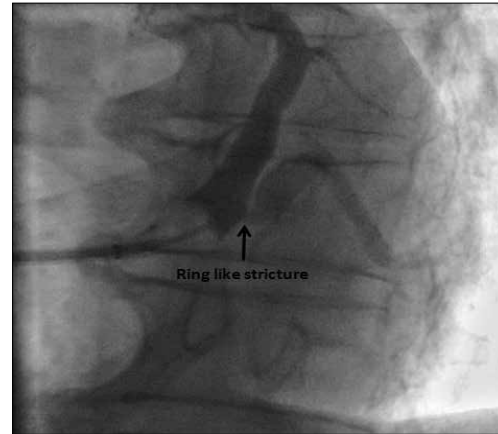


Figure 1. A ring-like stricture at the ostium of target coronary vein preventing left ventricular lead insertion

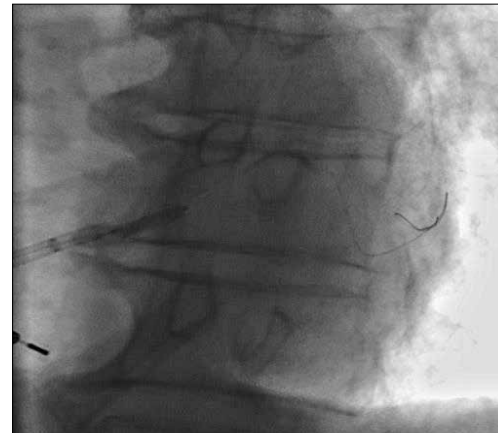


Figure 2. Application of balloon angioplasty to dilate stricture

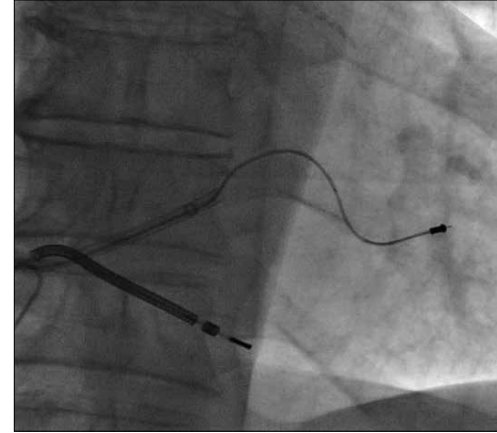


Figure 3. Successful implantation of left ventricular lead after dilatation of the stricture

implant left ventricular lead in coronary veins. These include unsuitable branching angle of coronary veins and tortuosity of coronary sinus anatomy, postoperative deformation, presence of venous valves, absence of vessel in target location, and coronary venous stenosis (2, 3).

We here describe coronary venous angioplasty before left ventricular lead insertion in a patient with coronary venous stenosis.

Case Report

A 57-year-old male patient with drug refractory heart failure underwent biventricular pacemaker implantation. During the procedure, guiding catheter was engaged into the coronary sinus ostium, and coronary venography was undertaken to choose target coronary vein for left ventricular lead insertion. A posterior coronary vein was found to be appropriate for lead implantation. The lead could not be introduced into the distal posterior coronary vein due to a stenosis caused by ring like stricture in the proximal portion of the vein (Fig. 1, Video 1. See corresponding video/movie images at www.anakarder.com). A coronary wire was advanced through the narrowing. The stenotic portion of the coronary vein was dilated with 2.5x10 mm angioplasty balloon with 9 atm pressure (Fig. 2, Video 2. See corresponding video/movie images at www.anakarder.com). Following dilatation, left ventricular lead was easily introduced into the posterior coronary vein without any complication (Fig. 3). Duration of the procedure was 50 minutes. Length of hospitalization was 3 days. Postoperative echocardiography did not reveal any pericardial effusion. Pacemaker follow-up showed effective biventricular stimulation.

Discussion

The target coronary vein should be carefully selected for optimal left ventricular stimulation during CRT (4). However, there are some limitations preventing optimal lead implantation to target vein such as branching and tortuosity of coronary veins, postoperative deformation, presence of venous valves, and venous stenosis (2, 3).

The incidence of venous stenosis has been reported to be approximately 2-3.5% (3, 5-7). Venous stenosis may be due to scarring from myocardial infarction, coronary artery bypass graft surgery, previous implantation of venous leads, or ring like strictures (5, 6). Although venous angioplasty is considered to be safe and effective method to overcome venous stenosis, serious complications may ensue such as

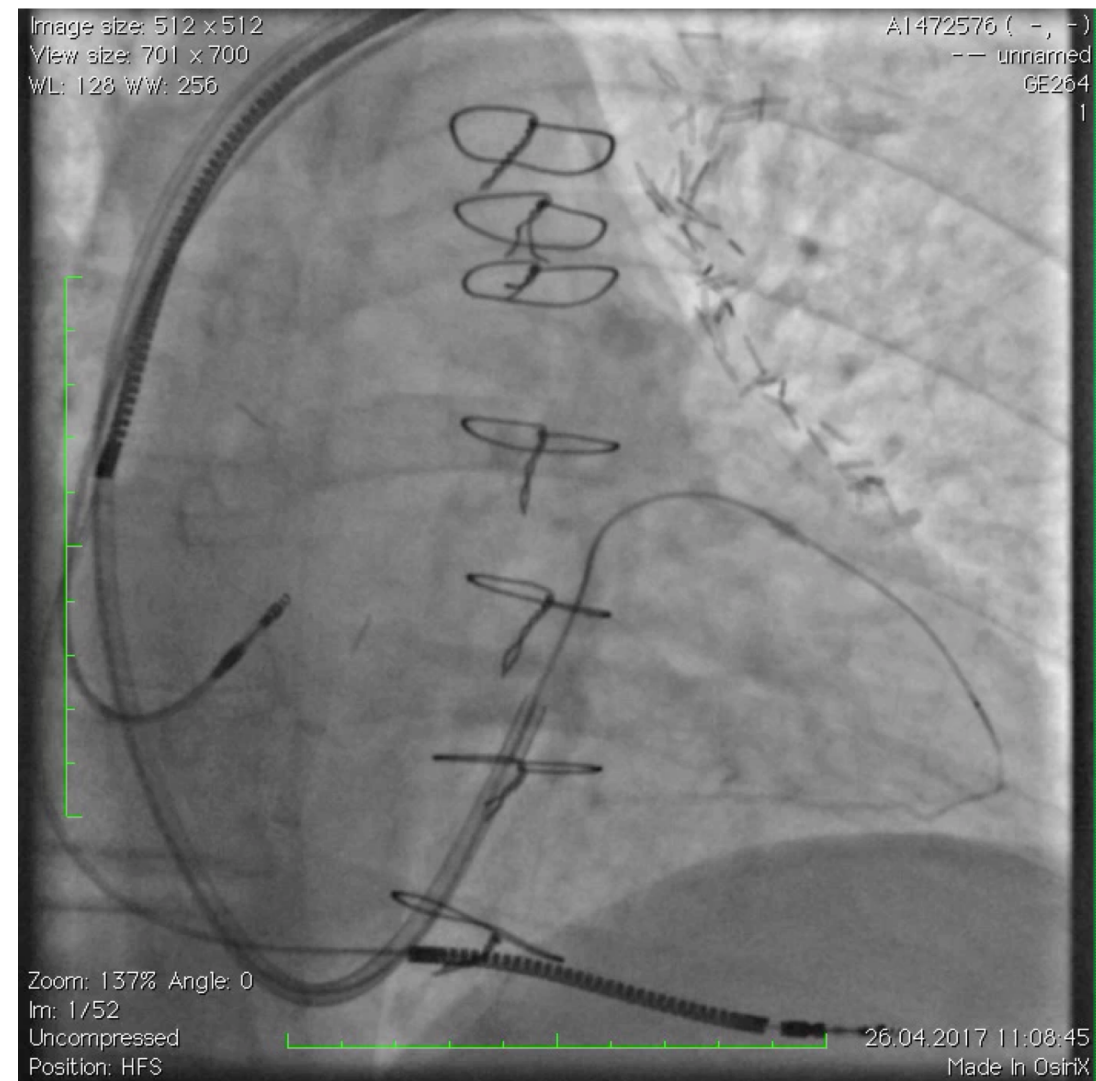
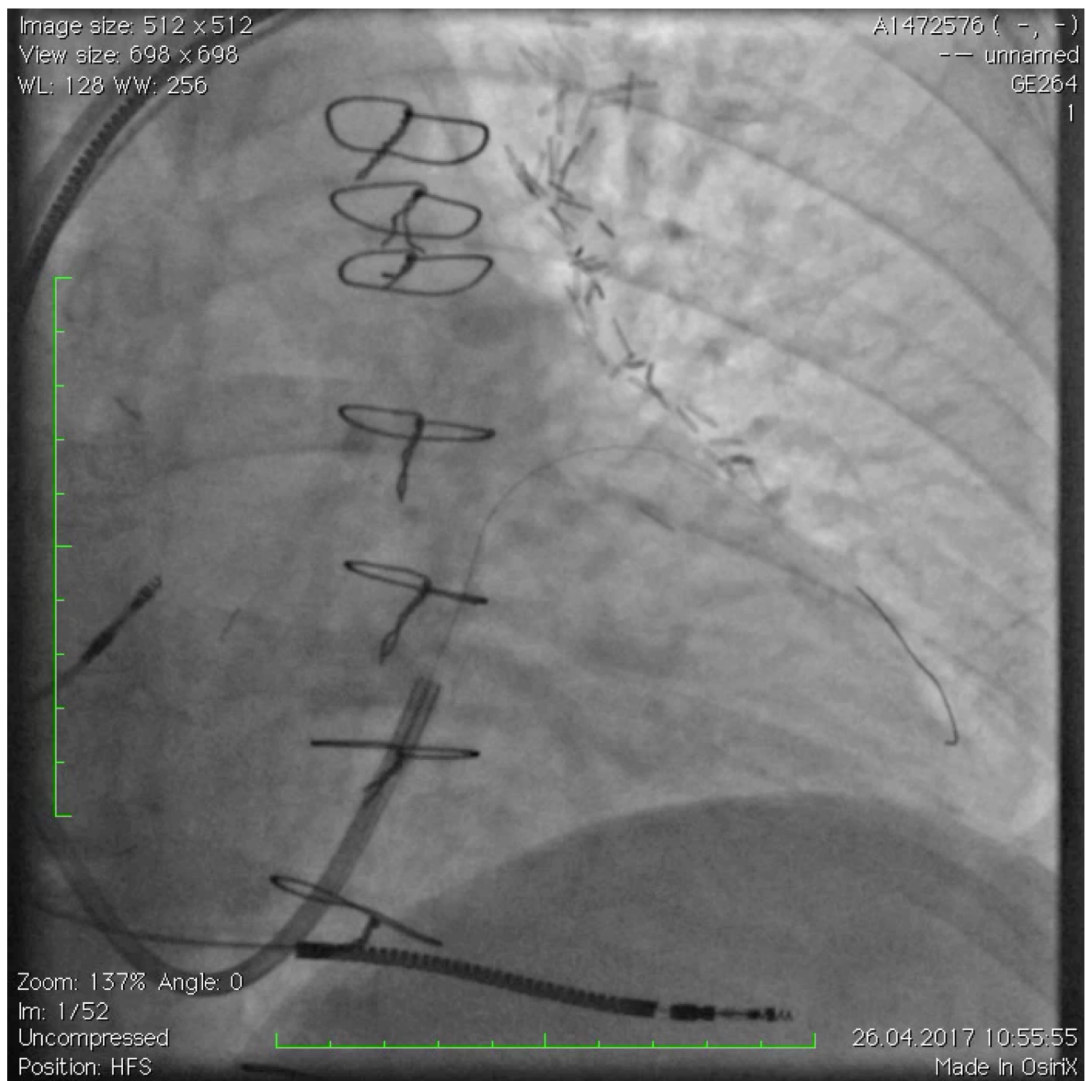


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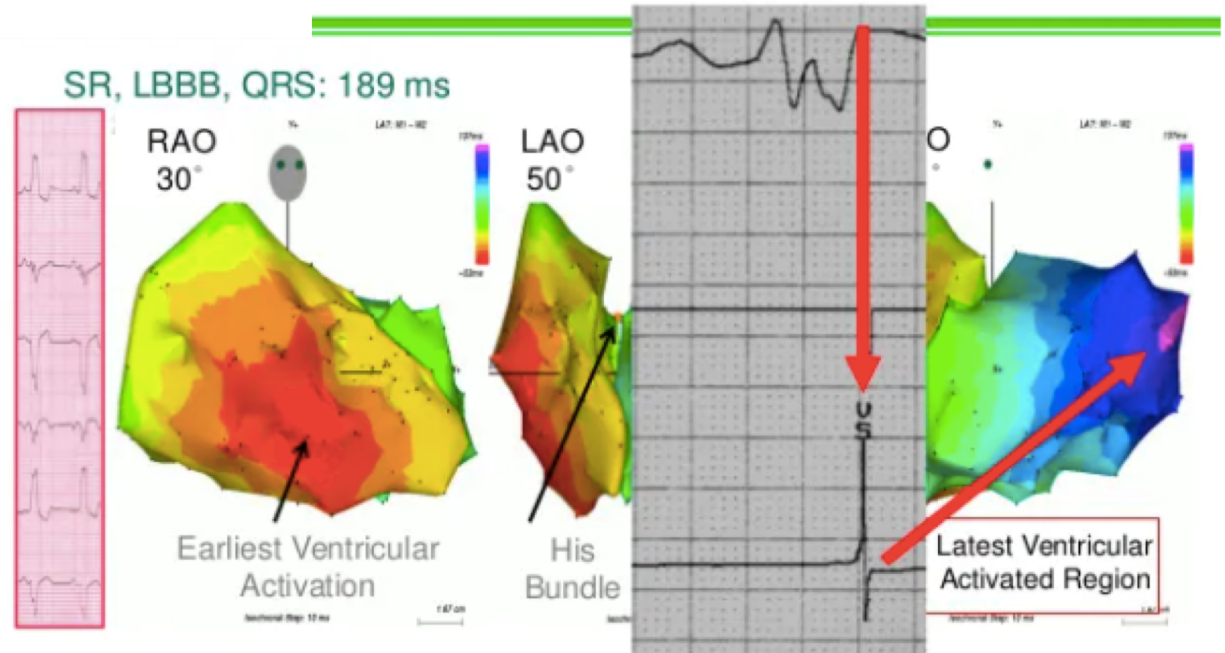
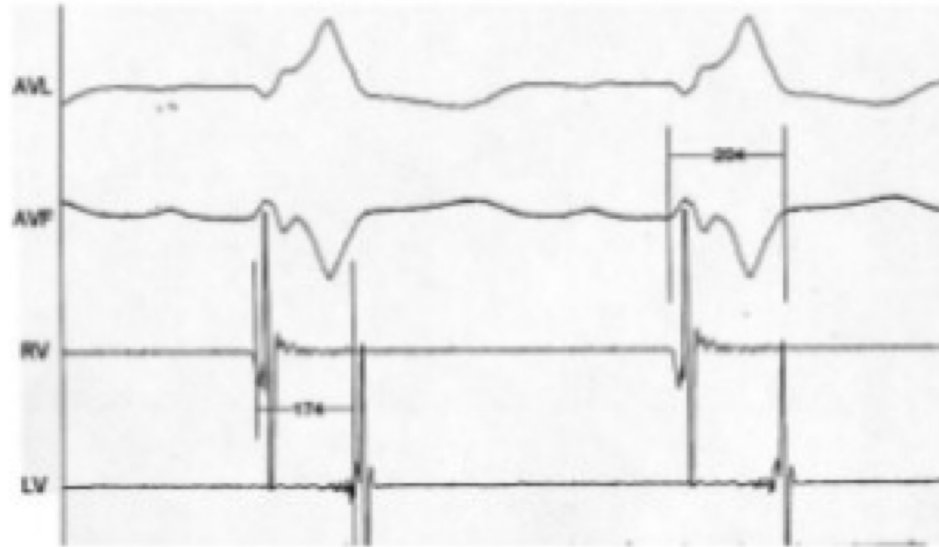
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LV pace için en uygun yer

- Anatomik: Lateral ven
- Floroskopi: RV ve LV lead uçları arasındaki mesafe
- Elektrogram: LV EGM mümkün olduğunca QRS sonunda, RV ve LV EGM'ler mümkün olduğunca açık
- Hemodinamik: En iyi dP/dt , nabız basıncı
- EKG: Pace sırasında QRS daralması
- Görüntüleme ile en geç mekanik aktivasyon olan bölge (EKO, MRI)

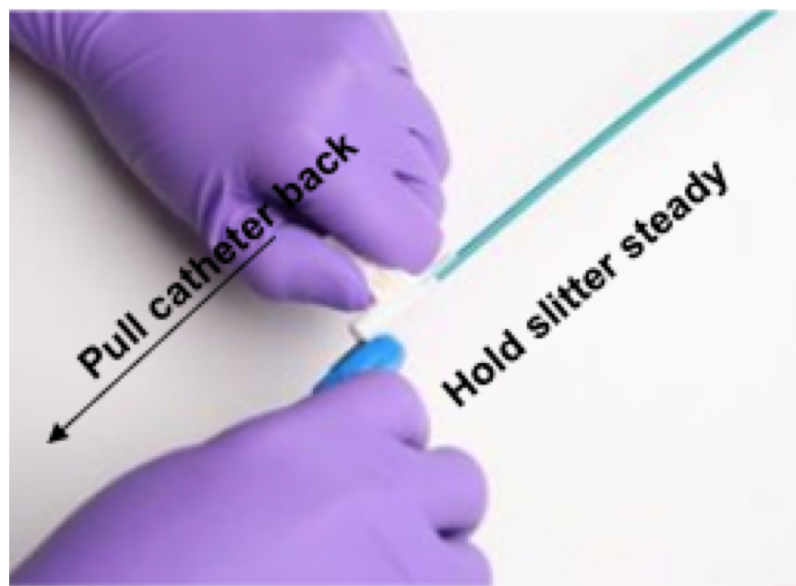
- Goal of at least 100 msec between RV and LV senses.



LV pace için uygun olmayan yerler

- Anterior (GCV) pacing
- Apikal LV lead yerleşimi
- Phrenic sinir stimülasyonu
- Skar alanları
- Ölçümler
 - Eşik <3 V
 - Sensing amplitüdü
 - İmpedans
 - Phrenic sinir stimülasyonu (10 V)

Kılıfı kesme

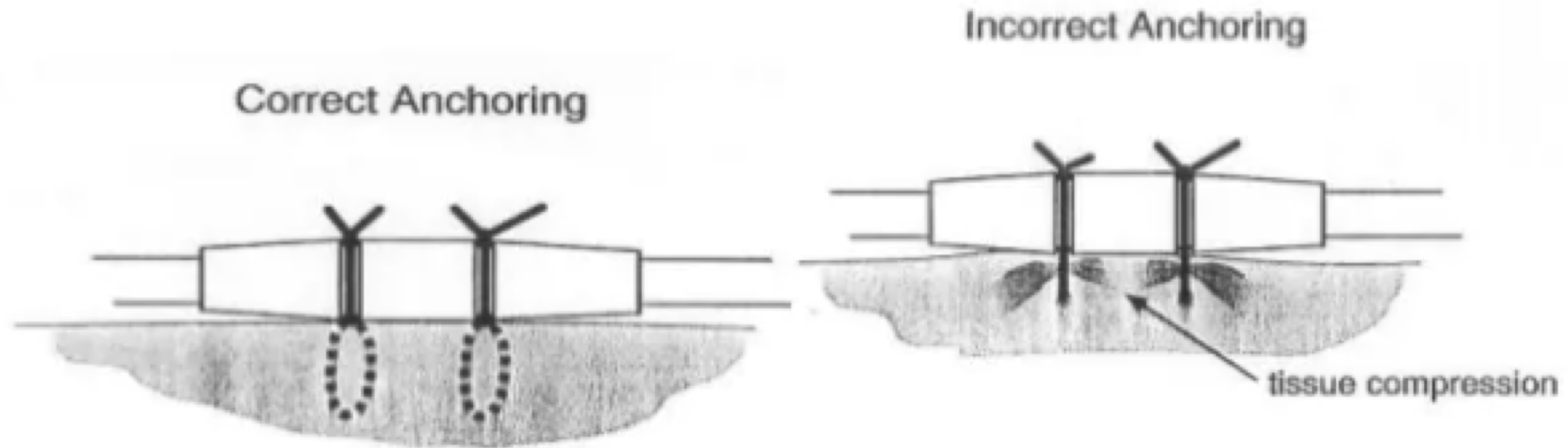


Universal II Slitter



Adjustable Slitter

Fiksasyon



Sonuç olarak

- CS anatomisi bilinmeli ve 1/3 hastada bu anatominin değişkenlik göstereceği akılda tutulmalıdır
- CS anatomisindeki farklılıklar ve zorluklar nedeniyle laboratuvarda buna uygun malzemeler bulundurulmalıdır
 - Hidrofilik tel, backup telleri, inner sheat, LIMA kateteri...
- LV lead'i elektriksel gecikmenin en fazla olduğu bölgenin (LV lateral) bazal-mid kısmına (mümkünse) RV lead'inden uzakta bir bölgeye yerleştirilmelidir
- CS anatomisinin izin vermediği hastalarda yeni teknikler olarak His bundle pacing veya LB pacing düşünülebilir

Teşekkürler