



# İSKEMİK FONKSİYONEL MİTRAL YETERSİZLİĞİ

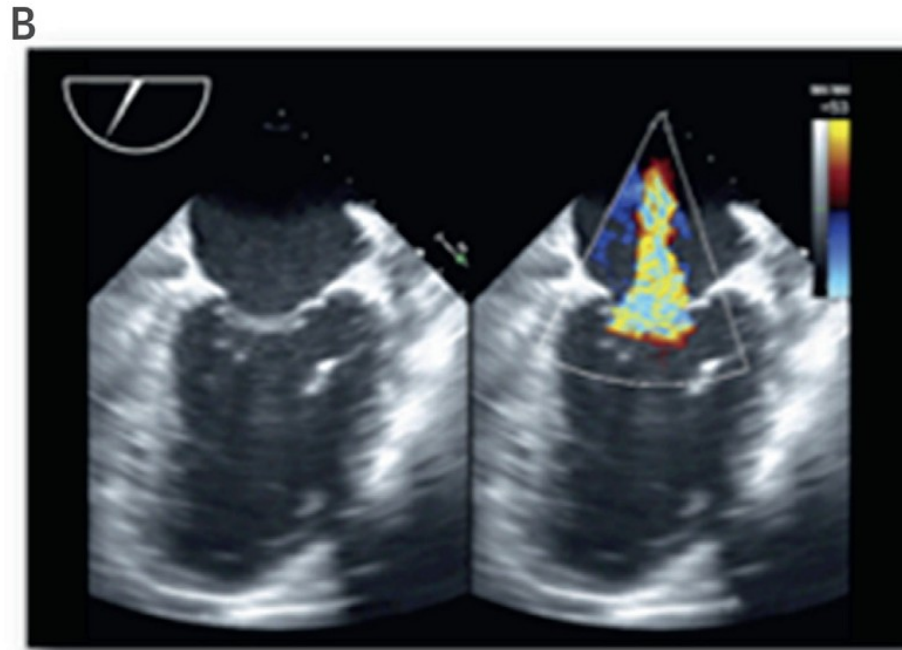
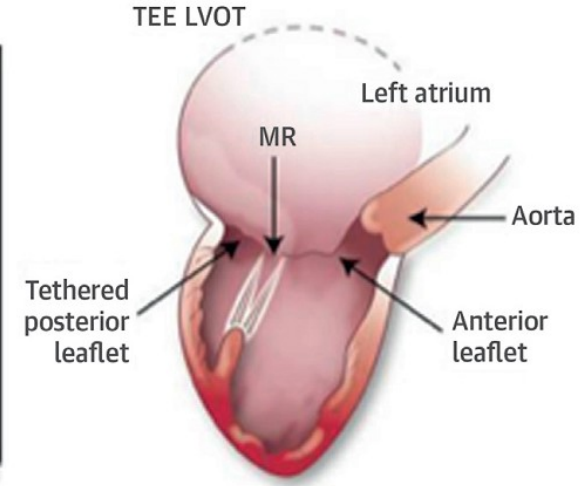
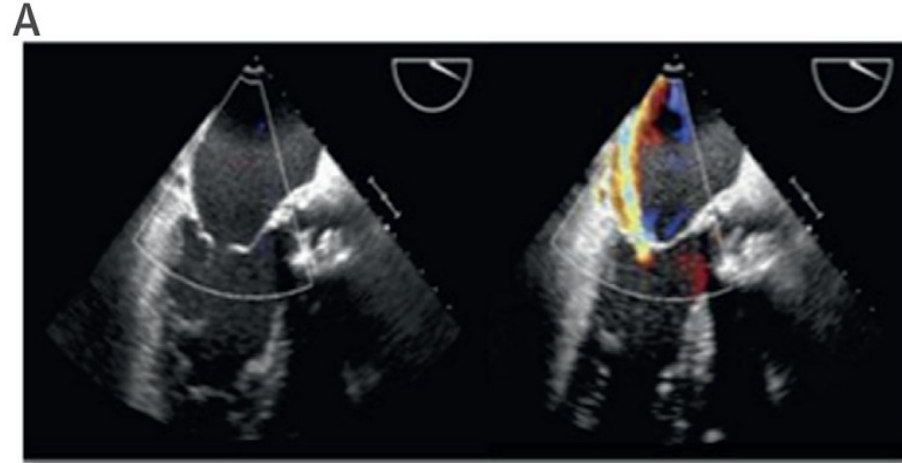
## Mitral kapağa girişim için sınırı nasıl çizelim?

Dr Alpay Sezer

18 Şubat 2017

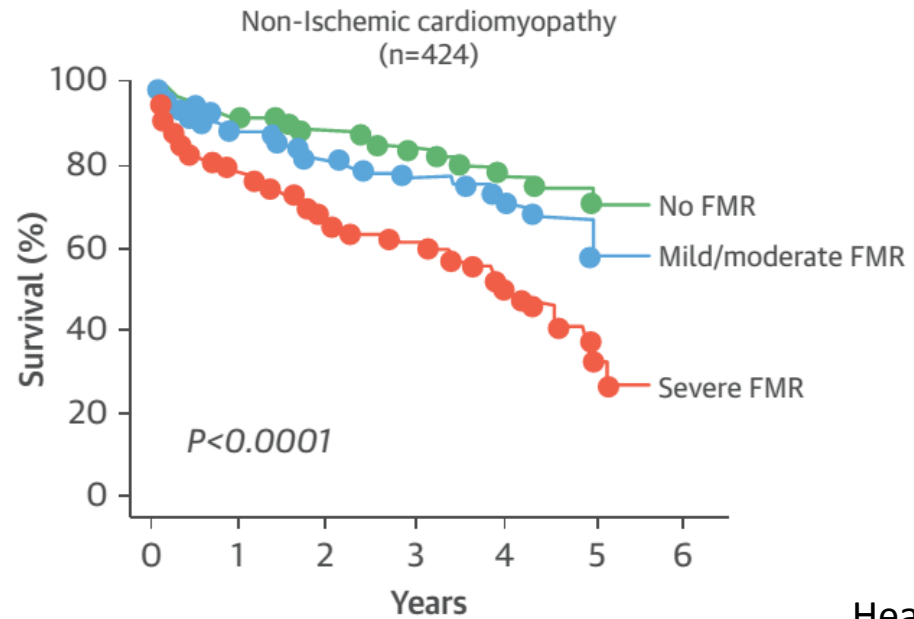
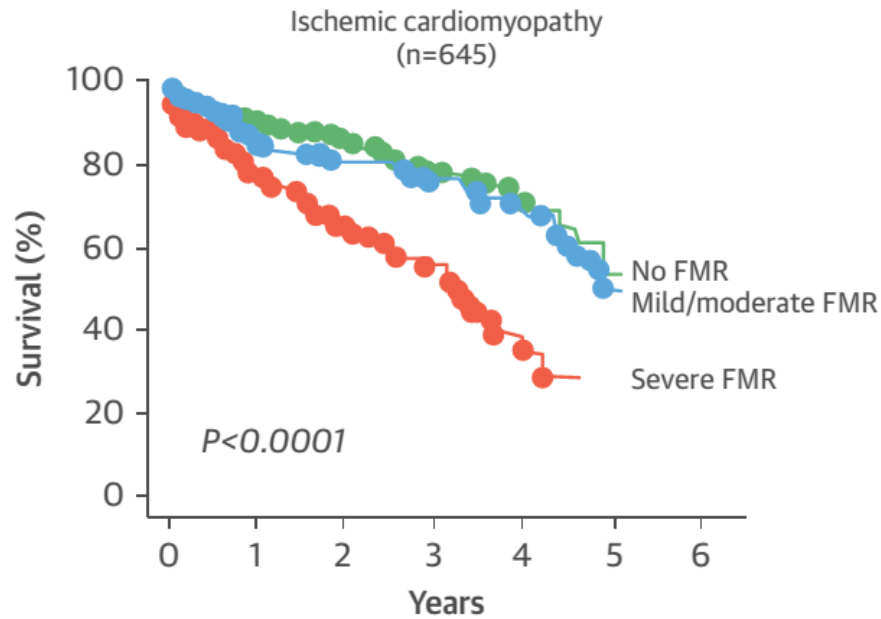
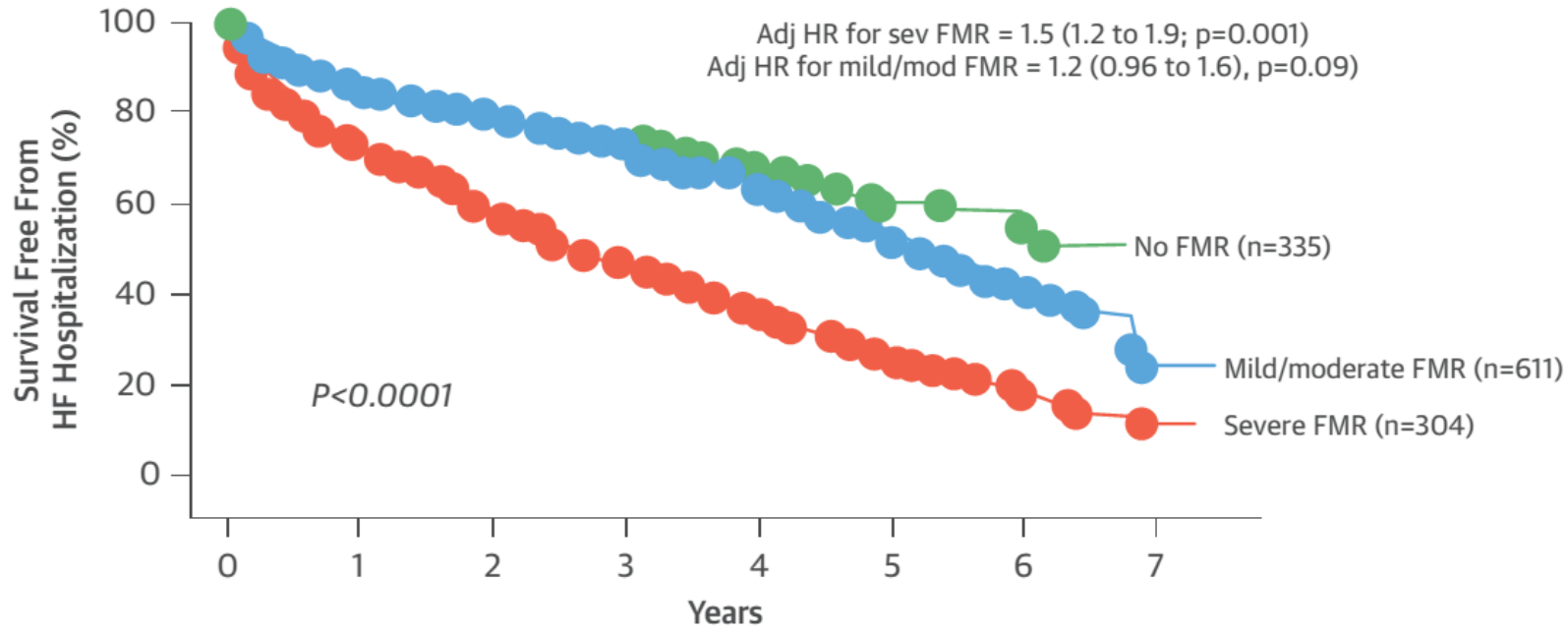
İstanbul Girişimsel Kardiyoloji Kursu

# İskemik Mitral Yetersizliği (İMY)

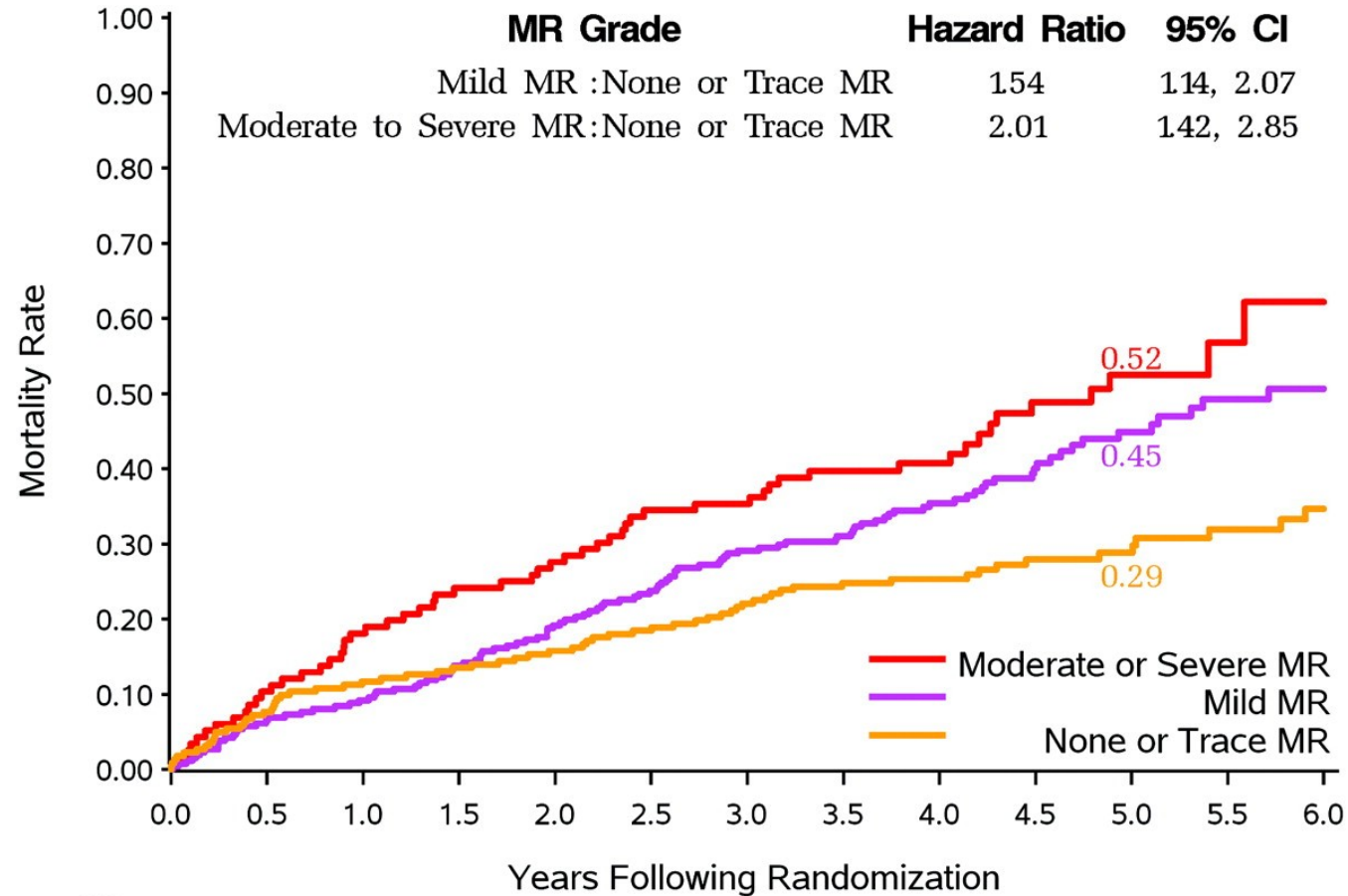


- Kordal gerilme
- Annuler dilatasyon

Mayo Clinic  
n=1256



# İskemik LV disfonksiyonunda medikal tedavi altında sağkalım-mitral yetersizliği ilişkisi



Patients at Risk:

	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Moderate/Severe	116	95	85	75	50	22	5						
Mild	261	238	212	185	131	57	30						
None/Trace	222	197	188	173	129	73	44						

# Girişimin Sınırını Nasıl Çizelim?

- Kılavuzlar ne diyor?
- Kalp takımı yaklaşımı
- Cerrahi için yüksek riskli hasta
- Girişime uygun kapak anatomisi
- Uygun girişim hangisi?
- Hangi durumlarda girişimden kaçınalım?

# Ciddi İMY tedavisi: Kılavuzlar ne diyor?

- ESC 2012, ACC/AHA 2014, AATS 2015-2016 güncelleme
- Optimal medikal tedavi, uygun hastalara CRT, revaskülarizasyon
- CABG/AVR yapılacak hastada mitral kapak cerrahisi öneriliyor (IIa/C).
- Tek başına mitral kapak cerrahisi ciddi İMY olan NYHA sınıf III/IV hastalarda düşünülebilir (IIb/B).
- Bu hastalarda cerrahi yüksek riskli ya da kontrendike ise kalp takımının kararı ile perkütan transkateter mitral kapak tamiri önerilebilir (IIb/C).
- Cerrahi/Girişim sağkalım faydası gösterilememiş!

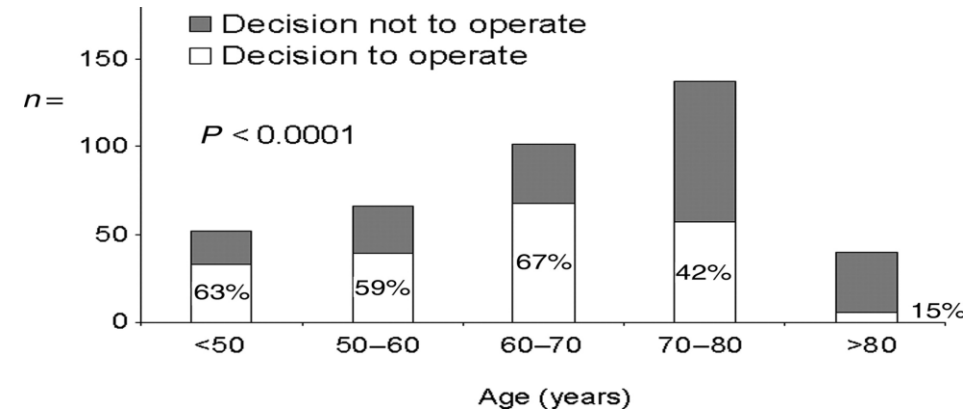
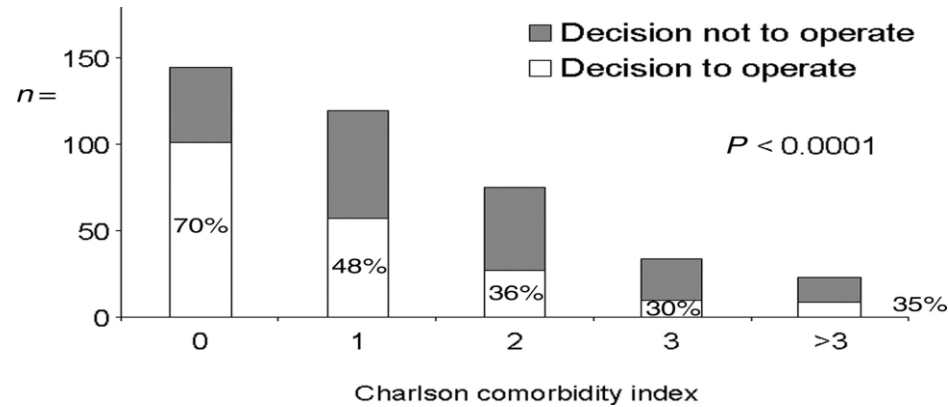
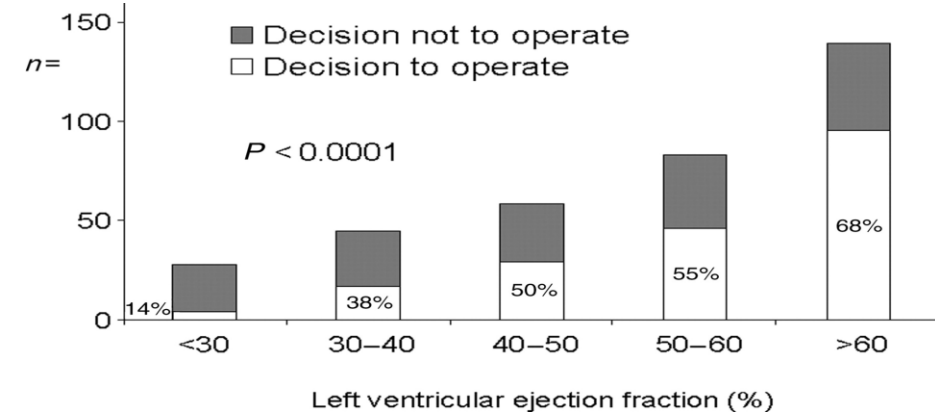
# Kalp Takımı Yaklaşımı

- Girişimci kardiyolog
- Kalp damar cerrahı
- Ekokardiyografi uzmanı kardiyolog
- Klinisyen kardiyolog
- Anestezi uzmanı
- Konsültanlar: Hastanın komorbiditelerine göre Pnömolog, Nefrolog, Nörolog, Hepatolog, Onkolog, Geriatri uzmanı, Radyolog

# Mitral Yetersizliğinde Cerrahi - Avrupa Verileri -

50%'ye varabilen cerrahi red oranları

- Yüksek risk skoru (STS-Euroscore II)
- Porselen aort
- Malignite
- KOAH, ciddi PAH, demans
- Renal-hepatik disfonksiyon





**TABLE 8 Risk Assessment in Valvular Heart Disease, Combining Society of Thoracic Surgery Risk Estimates, Frailty, Major Organ System Dysfunction, and Procedure-Specific Impediments for Intervention**

	<b>Low Risk (ALL Criteria in This Column Must Be Present)</b>	<b>Intermediate Risk (At Least 1 Criterion in This Column Must Be Present)</b>	<b>High Risk (At Least 1 Criterion in This Column Must Be Present)</b>	<b>Prohibitive Risk (Any 1 Criterion in This Column Must Be Present)</b>
STS PROM*	<4%	4%-8%	>8%	Predicted risk with surgery of death or major morbidity (all-cause)
Frailty†	None	1 index (mild)	≥2 indexes (moderate to severe)	>50% at 1 yr
Major organ system compromise not to be improved post-operatively‡	None	1 organ system	No more than 2 organ systems	≥3 organ systems
Procedure-specific impediment§	None	Possible procedure-specific impediment	Possible procedure-specific impediment	Severe procedure-specific impediment

\*Use of the STS predicted risk of mortality (PROM) to predict risk in a given institution with reasonable reliability is appropriate only if institutional outcomes are within 1 SD of STS average observed/expected ratio for the procedure in question. †Seven frailty indexes: Katz Activities of Daily Living (independence in feeding, bathing, dressing, transferring, toileting and urinary continence) and independence in ambulation (no walking aid or assist required for 5-m walk in <6 s). Other scoring systems can be applied to calculate no, mild, or moderate-to-severe frailty. ‡Examples of major organ system compromise: Cardiac: severe LV systolic or diastolic dysfunction or RV dysfunction, or fixed pulmonary hypertension; CKD stage 3 or worse; pulmonary dysfunction with FEV1 <50% or DLCO<sub>2</sub> <50% of predicted; CNS dysfunction: dementia, Alzheimer's disease, Parkinson's disease, or CVA with persistent physical limitation; GI dysfunction: Crohn's disease, ulcerative colitis, nutritional impairment, or serum albumin <3.0; cancer: active malignancy; and liver: any history of cirrhosis, variceal bleeding, or elevated INR in the absence of VKA therapy. §Examples: tracheostomy present, heavily calcified ascending aorta, chest malformation, arterial coronary graft adherent to posterior chest wall, or radiation damage. Adapted with permission from Nishimura et al. (1).

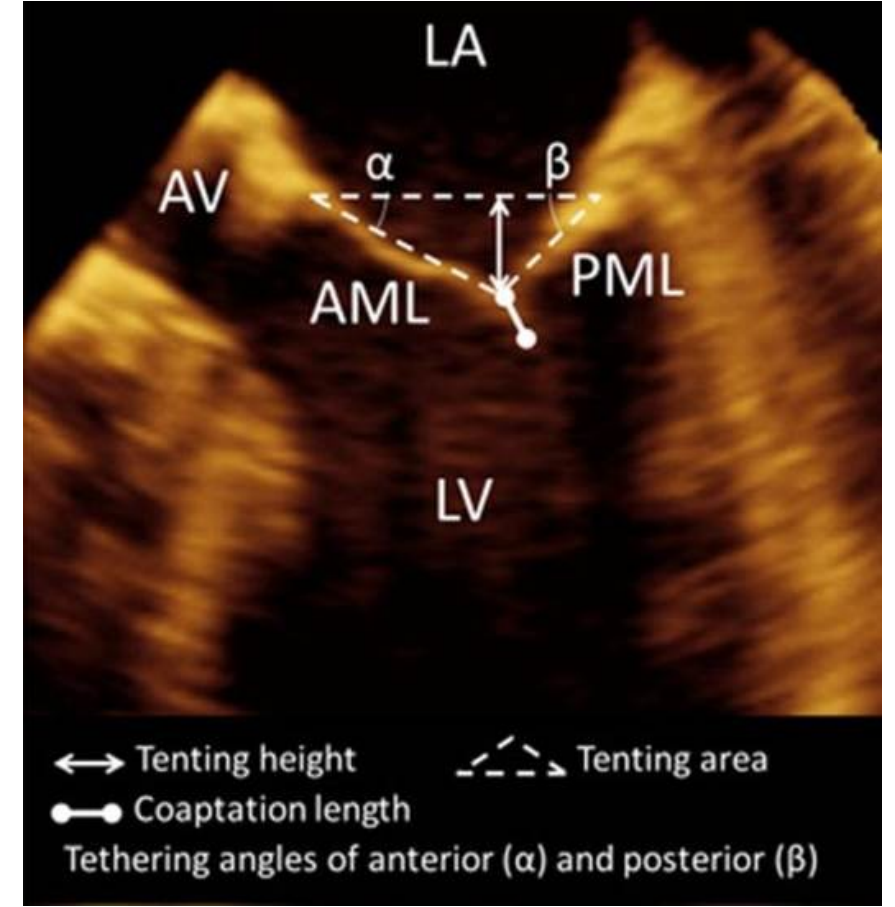
CKD = chronic kidney disease; CNS = central nervous system; CVA = cerebrovascular accident (stroke); DLCO<sub>2</sub> = diffusion capacity for carbon dioxide; FEV1 = forced expiratory volume in 1 s; GI = gastrointestinal; INR = international normalized ratio; LV = left ventricular; PROM = predicted risk of mortality; RV = right ventricular; STS = Society of Thoracic Surgeons; VKA = vitamin K antagonist.

# Transkateter girişimi öne çıkaran durumlar

- Revaskülarizasyon endikasyonu olmaması
- Reoperasyon, LIMA grefti, mediastinal radyoterapi, göğüs deformitesi
- İleri yaş (>80 yaş), düşkünlük-kırılganlık («frailty»)
- Ciddi sol ventrikül sistolik disfonksiyonu (EF <%30)
- Ciddi sol ventrikül dilatasyonu (LVDD >65 mm)
- Cerrahi riski arttıran çoğul komorbiditeler
- Cerrahi tamir sonrası MY nüks riskini arttıran durumlar
- Girişime uygun kapak anatomisi
- Girişimin düşük mortalite ve morbidite ile uygulanması

# Cerrahi tamir sonrası mitral yetersizliği nüks riskini arttıran ekokardiyografi parametreleri

- Kordal gerilme göstergeleri:
  - Anterior yaprakçık açısı  $>25^\circ$
  - Koaptasyon derinliği  $>10$  mm
  - Posterior yaprakçık açısı  $>45^\circ$
  - Sistolik çadırlaşma alanı  $>2.5$  cm<sup>2</sup>
- Sol ventrikül yeniden şekillenmesi:
  - İnferobazal anevrizma/diskinezi
  - LVEDD  $>65$  mm, LVESD  $>51$  mm
  - Sistol sonu sferisite endeksi  $>0.7$
  - Sistol sonu papiller kasların mesafesi  $>20$  mm



Circulation: Cardiovascular Imaging. 2014;7:344-351

European Heart Journal (2016) 37, 133–139

JACC 2015;65:1231-48

# Girişime Uygun Kapak Anatomisi

- Farklı girişimler ve farklı cihazlar (klip, annuloplasti, replasman) için farklı anatomik gereklilikler
- Transözofajeal ekokardiyografi (2B/3B) temel inceleme yöntemi.
- BT anjiografinin annuloplasti girişimlerinin planlanmasında yeri var.
- Mitral annulus kalsifikasyonu, Cx arterin annulus ve koroner sinus ile ilişkisi, koroner sinus anatomisi transkateter mitral annuloplasti için önemli.

# MitraClip

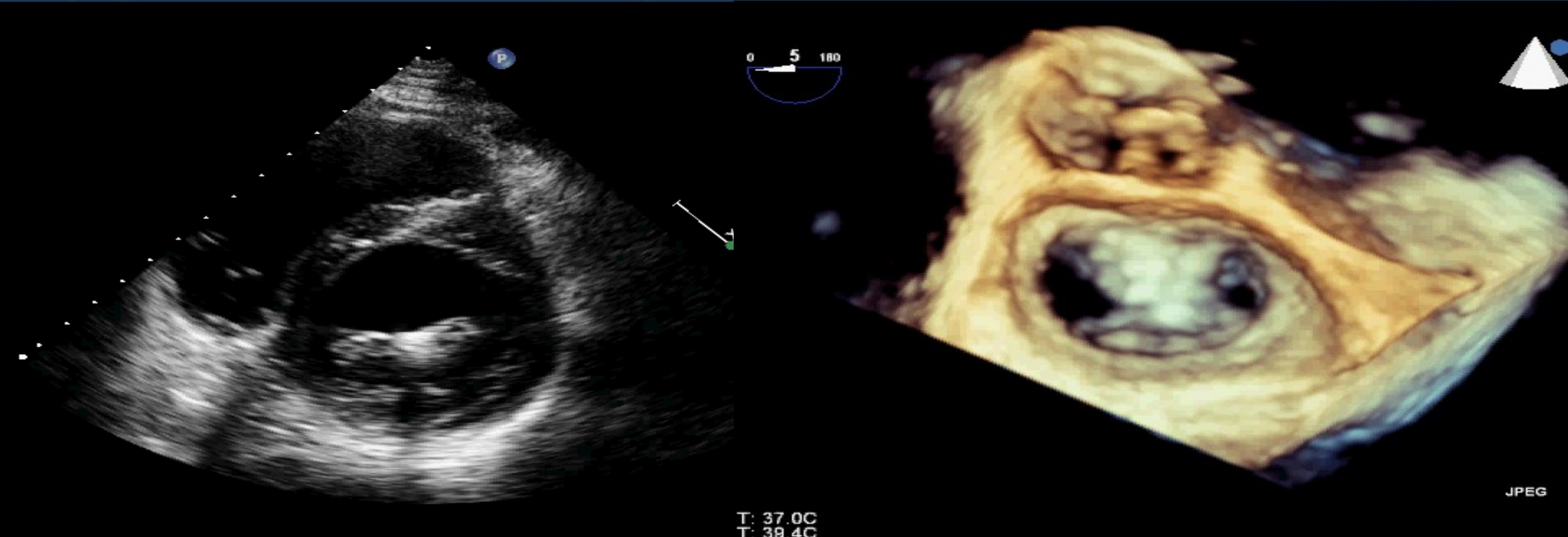


# Çift Orifisli Mitral Kapak

13051120101221

S5-1/Adult

X7-2t/Adult



JPEG



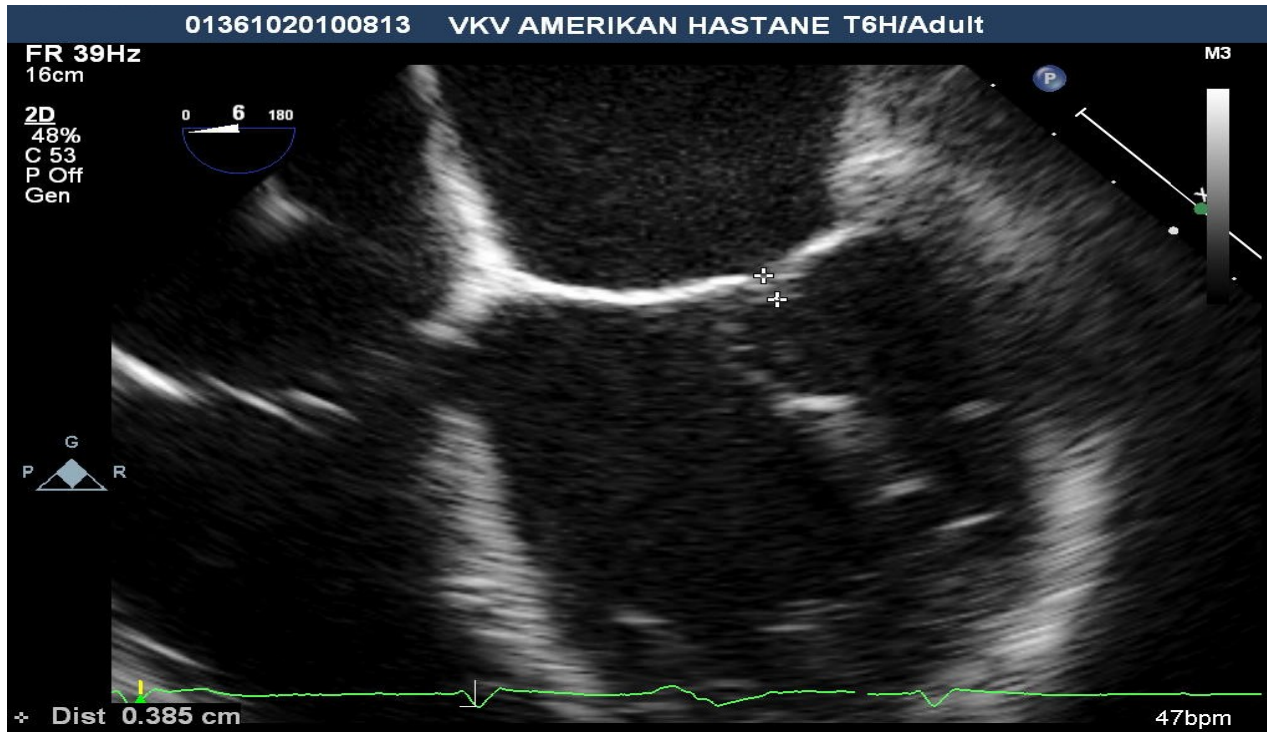
# İMY'de MitraClip Girişimine Uygun Kapak

## Uygun

- Ciddi iskemik mitral yetersizliği (EROA  $\geq$ 20 mm<sup>2</sup>, RV  $\geq$ 30 ml, RF  $\geq$ %50)
- Mitral kapak alanı >4 cm<sup>2</sup>
- Koaptasyon uzunluğu  $\geq$ 2 mm
- Koaptasyon derinliği <11 mm (şart değil)
- Yeterli arka yaprakçık uzunluğu (asgari >7 mm, ideal  $\geq$ 10 mm)
- Santral orijinli jet ideal, ancak lateral/medial orijinli jetler de yapılabilir.

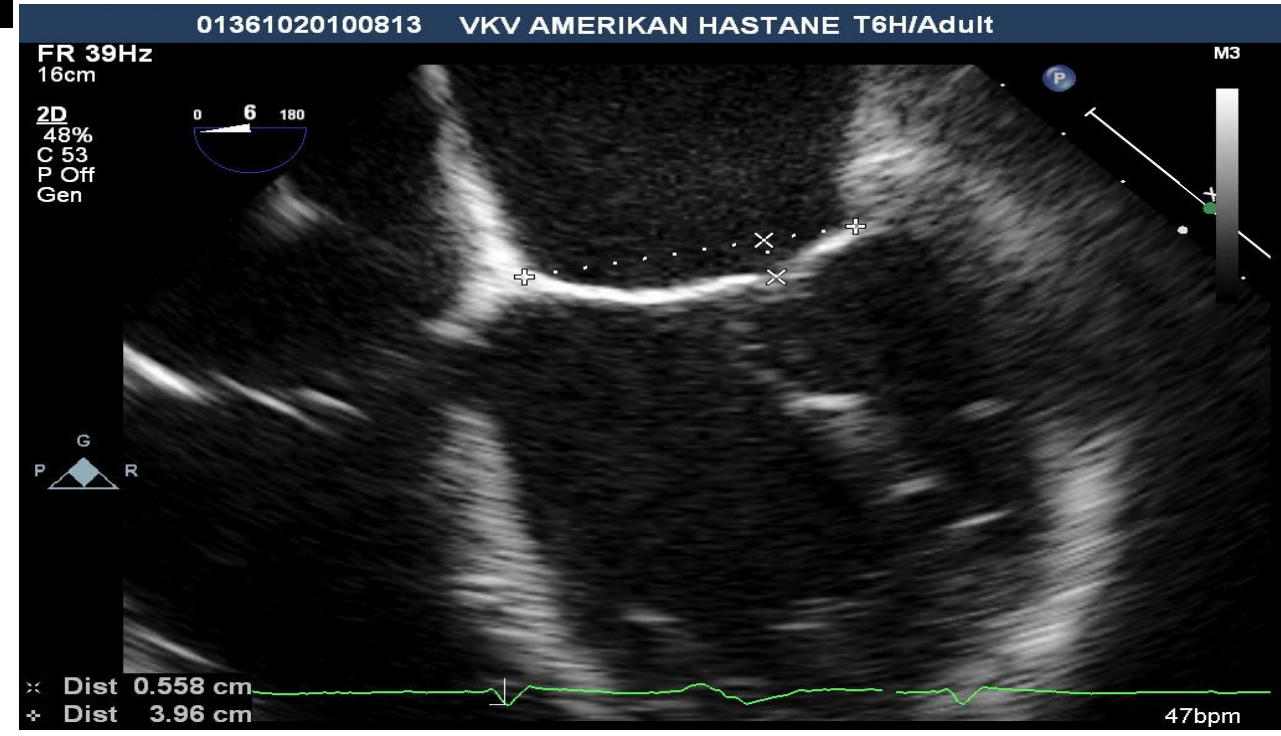
## Uygun değil

- 3D TEE ile >2 mm koaptasyon aralığı
- Ciddi asimetric kordal kordal çekilme
- Kordal çekilmeye bağlı aşırı kısıtlanmış yaprakçık hareketi
- Ciddi annulus dilatasyonu
- Ciddi annulus kalsifikasyonu
- Klip yerleşme bölgesinde kalsifikasyon
- Klip yerleşme bölgesinde kleft
- Koaptasyon hattında çok geniş jet (>%50)



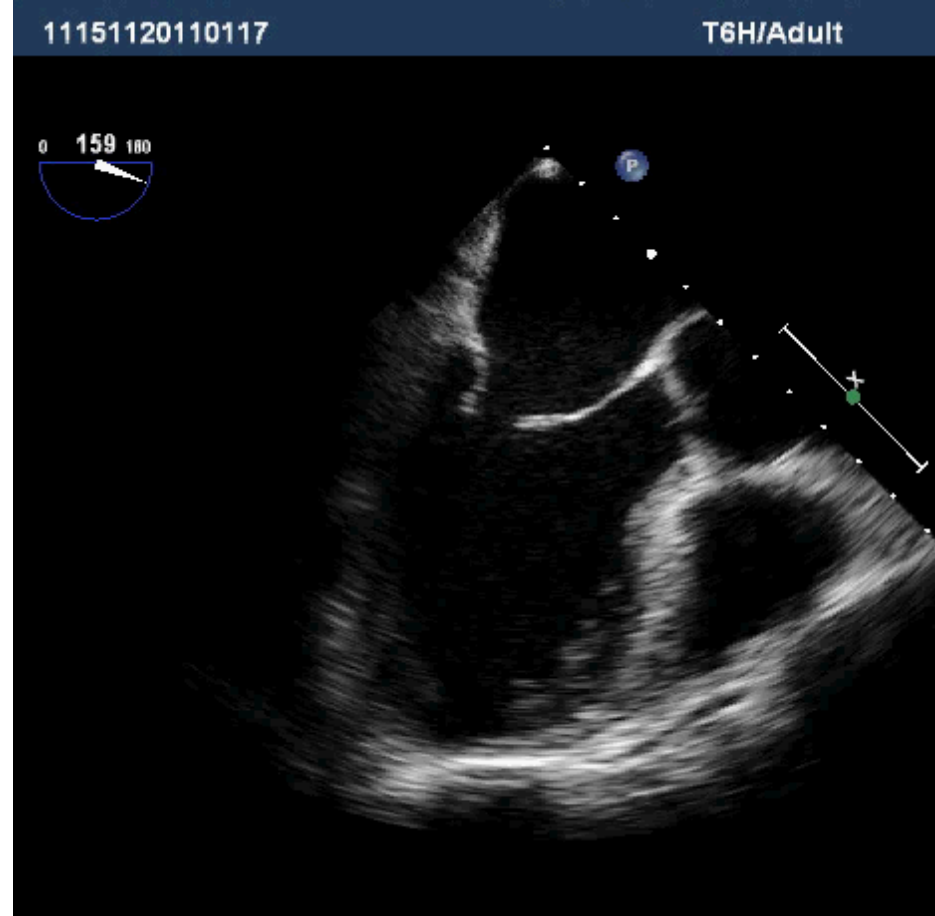
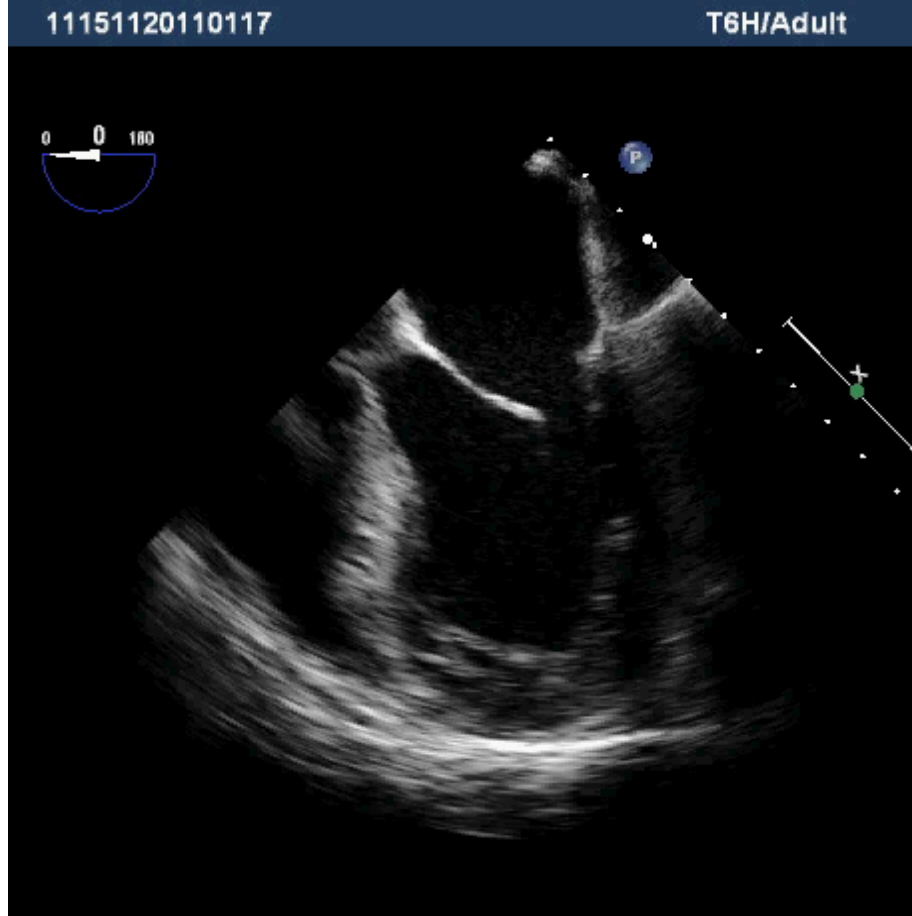
→ Koaptasyon uzunluđu

Koaptasyon derinliđi ←

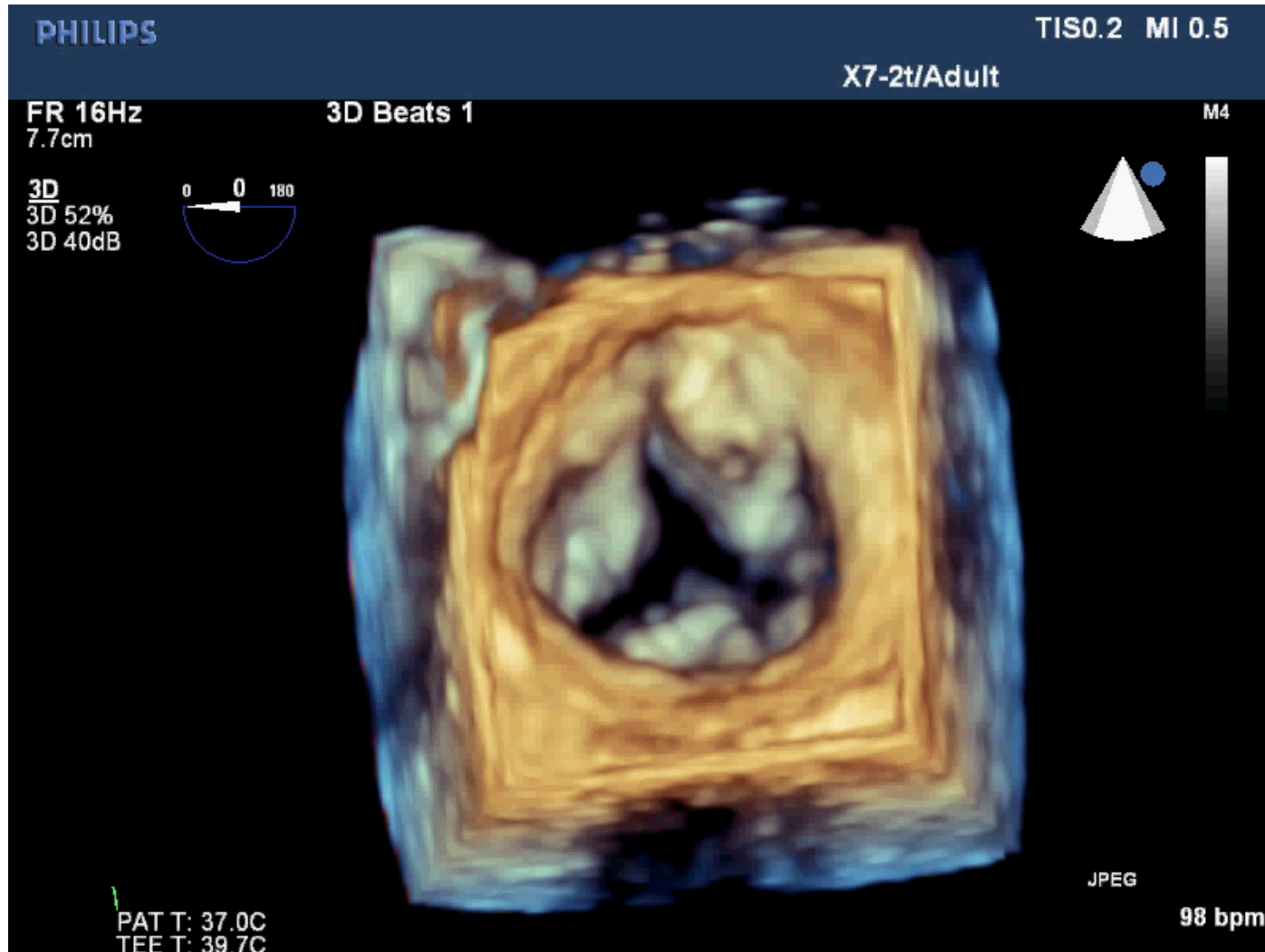




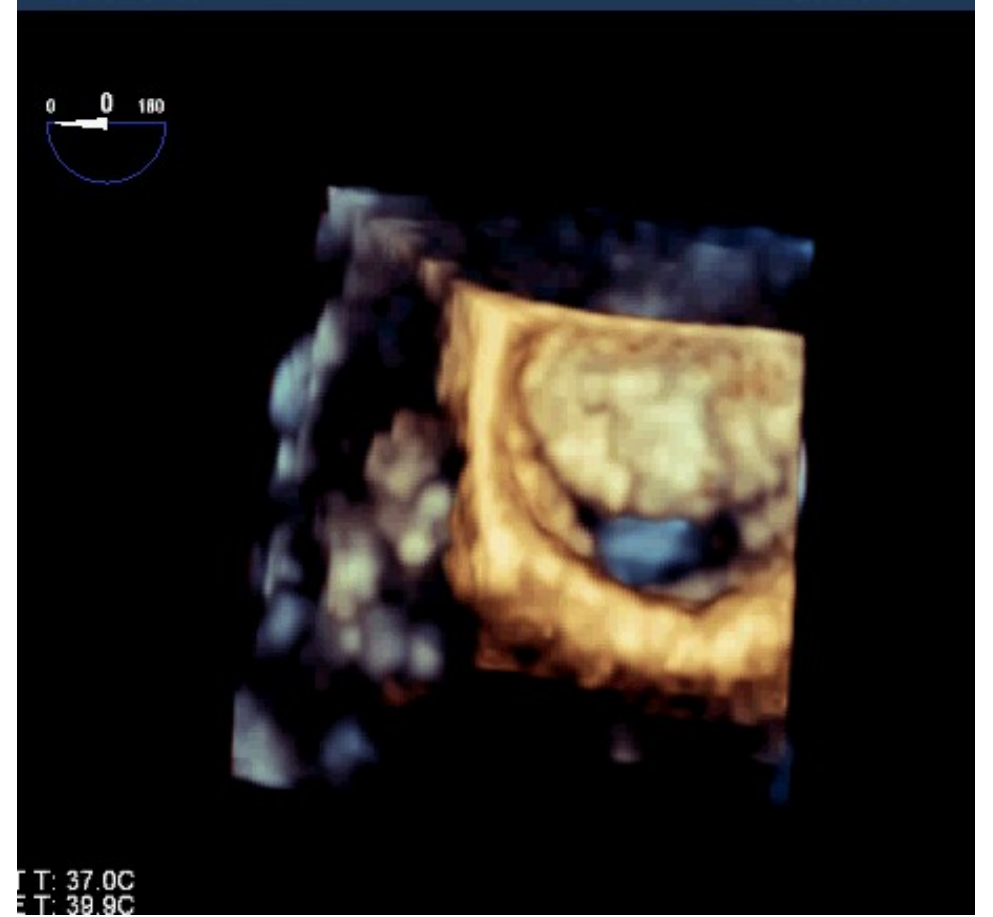
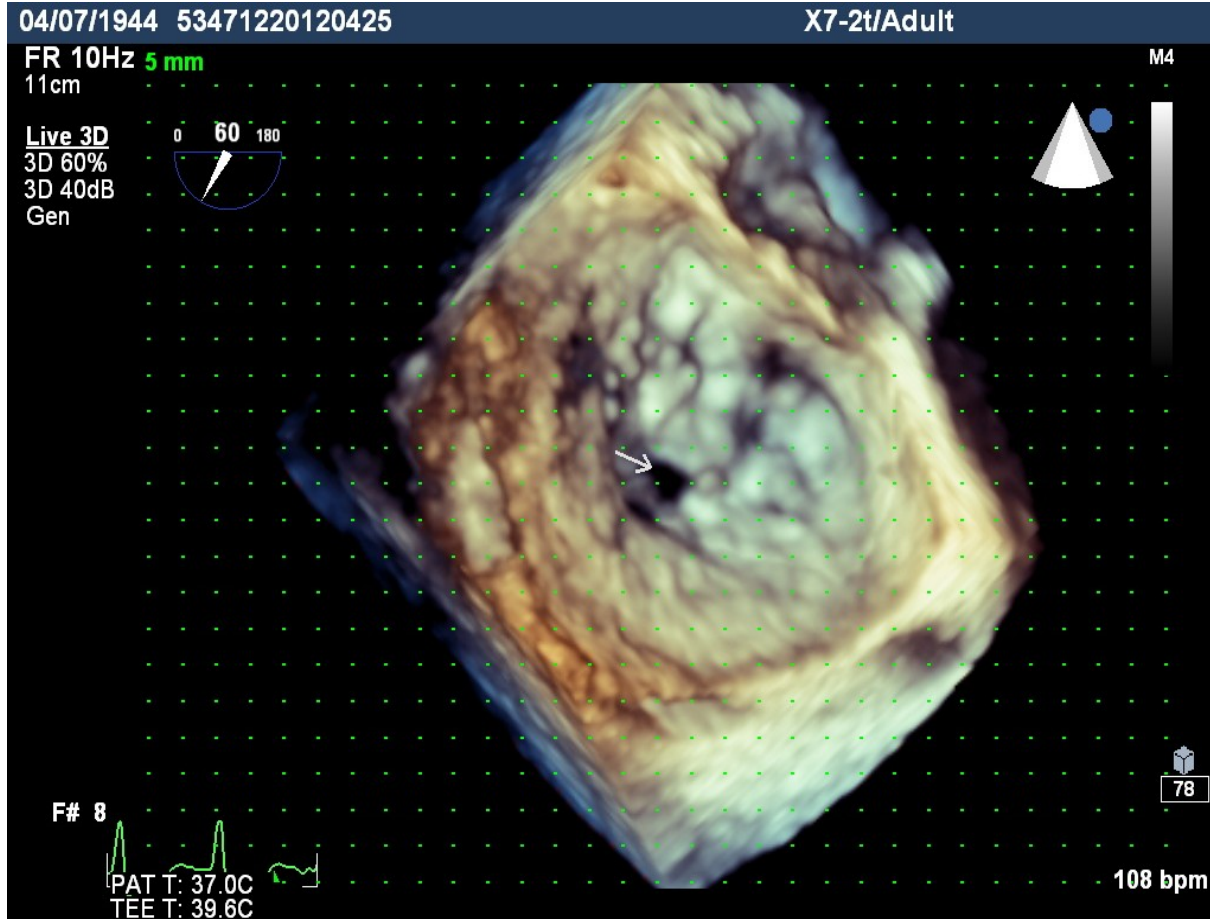
# Kısa Arka Yaprakçık



# Mitral Kleft



# 3D TEE ile koaptasyon aralığı



# İkinci MitraClip

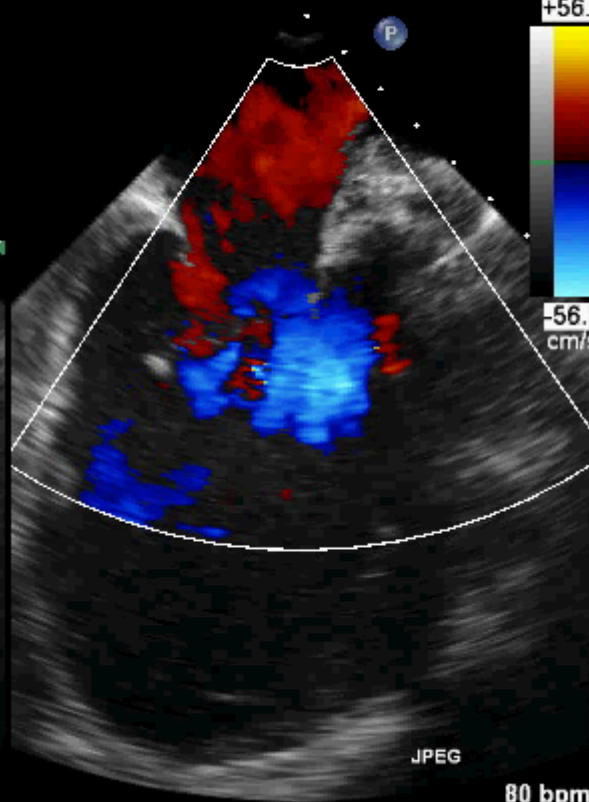
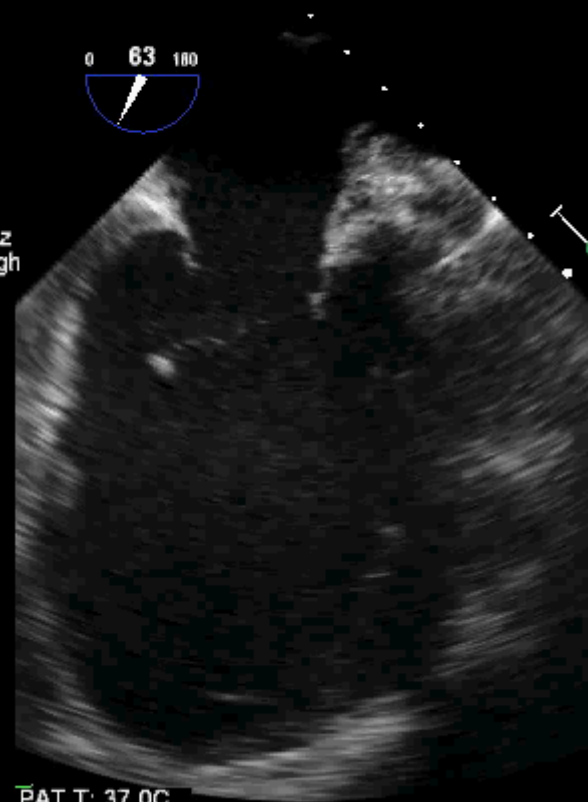
- İlk klip ile mitral yetersizliđi azaldı, ancak >2+.
- Rezidü mitral yetersizliđinin büyük kısmı ilk klipin hemen medial ya da lateral tarafında.
- Yeterli mitral kapak alanı mevcut.
- İlk klip sonrası mitral darlık yok (MMG<5 mmHg).
- Hastaların yaklaşık %40'ında gerekiyor.

14/06/1940 52291520130110

X7-2t/Adult

FR 11Hz  
15cm

2D  
71%  
C 50  
P Off  
Gen  
CF  
59%  
4.4MHz  
WF High  
Med



PAT T: 37.0C  
TEE T: 39.5C

JPEG

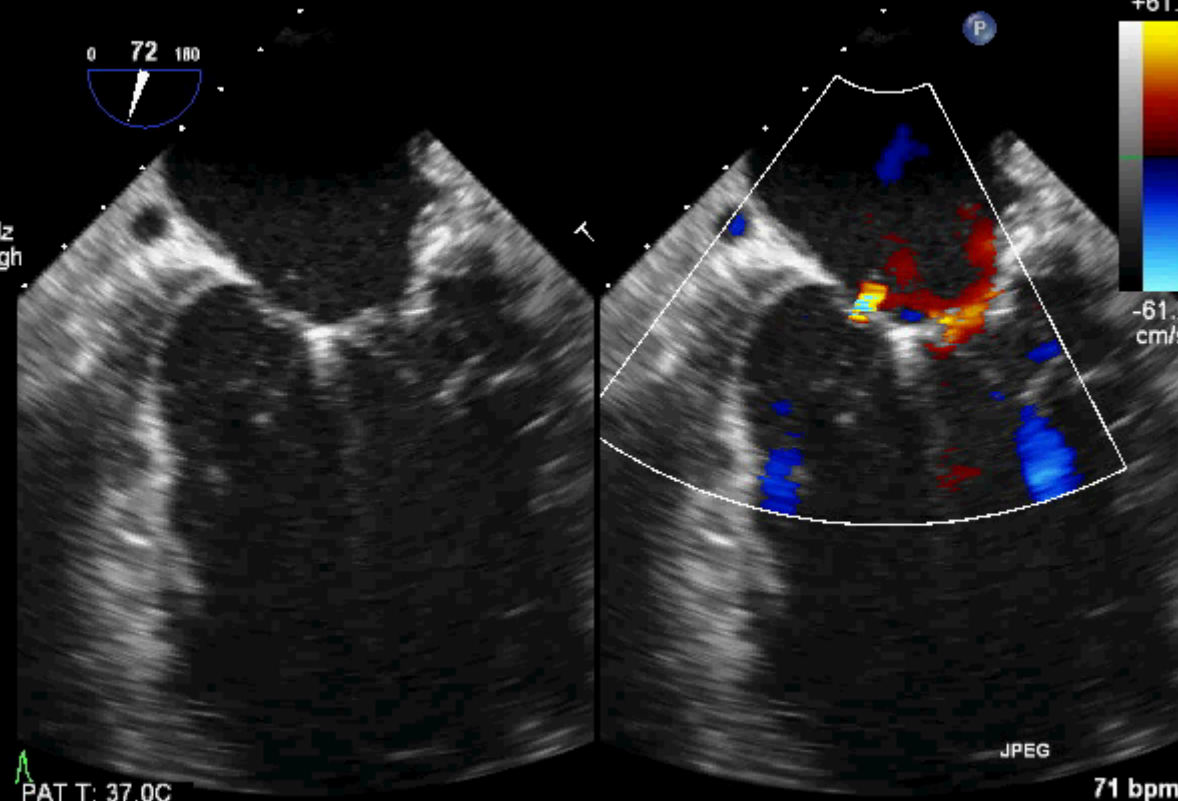
80 bpm

52331120130116

X7-2t/Adult

FR 12Hz  
14cm

2D  
71%  
C 50  
P Off  
Gen  
CF  
59%  
4.4MHz  
WF High  
Med



PAT T: 37.0C  
TEE T: 38.4C

JPEG

71 bpm

52331120130116

X7-2t/Adult

FR 12Hz  
13cm

2D  
70%  
C 50  
P Off  
Gen  
CF  
59%  
4.4MHz  
WF High  
Med

0 58 180



M4 M4  
+61.6



-61.6  
cm/s

PAT T: 37.0C  
TEE T: 37.8C

JPEG

70 bpm



**TABLE 5 Comparison of Ongoing Randomized Trials of the MitraClip in Patients With Heart Failure and Secondary Mitral Regurgitation**

	<b>COAPT</b>	<b>RESHAPE-HF</b>	<b>MITRA-FR</b>
Number of patients and sites	430 patients at 75 U.S. and Canadian sites	800 patients at 50 E.U. sites	288 patients at 18 French sites
Secondary MR grade (core laboratory verified)	≥3+ (EROA ≥30 mm <sup>2</sup> and/or Rvol >45 ml)	≥3+ (EROA ≥30 mm <sup>2</sup> and/or Rvol >45 ml)	Severe (EROA >20 mm <sup>2</sup> + Rvol >30 ml)
NYHA functional class	II, III, or ambulatory IV	III or ambulatory IV	II-IV
LVEF	≥20% to ≤50%	≥15% to ≤40%	≥15% to ≤40%
Surgical criteria	Not appropriate for mitral valve surgery (heart team)	None	None
Left ventricular volume entry criterion	LV end-systolic dimension ≤70 mm	LV end-diastolic dimension ≥55 mm	None
Control arm	Guideline-directed medical therapy (+CRT, if indicated)	Guideline-directed medical therapy (+CRT, if indicated)	Guideline-directed medical therapy (+CRT, if indicated)
Primary efficacy endpoint (superiority)	Heart failure rehospitalizations at 1 yr	Death or heart failure hospitalization at 1 yr	Death or recurrent heart failure hospitalization at 1 yr
Primary safety endpoint (noninferiority)	The composite of: SLDA; device embolization; endocarditis requiring surgery; echocardiography core laboratory-confirmed mitral stenosis requiring surgery; LVAD implant; heart transplant; or any device-related complications requiring nonelective cardiovascular surgery at 12 months	None	None
Health economics	Assessed	Assessed	None
Follow-up, yrs	5	2	2

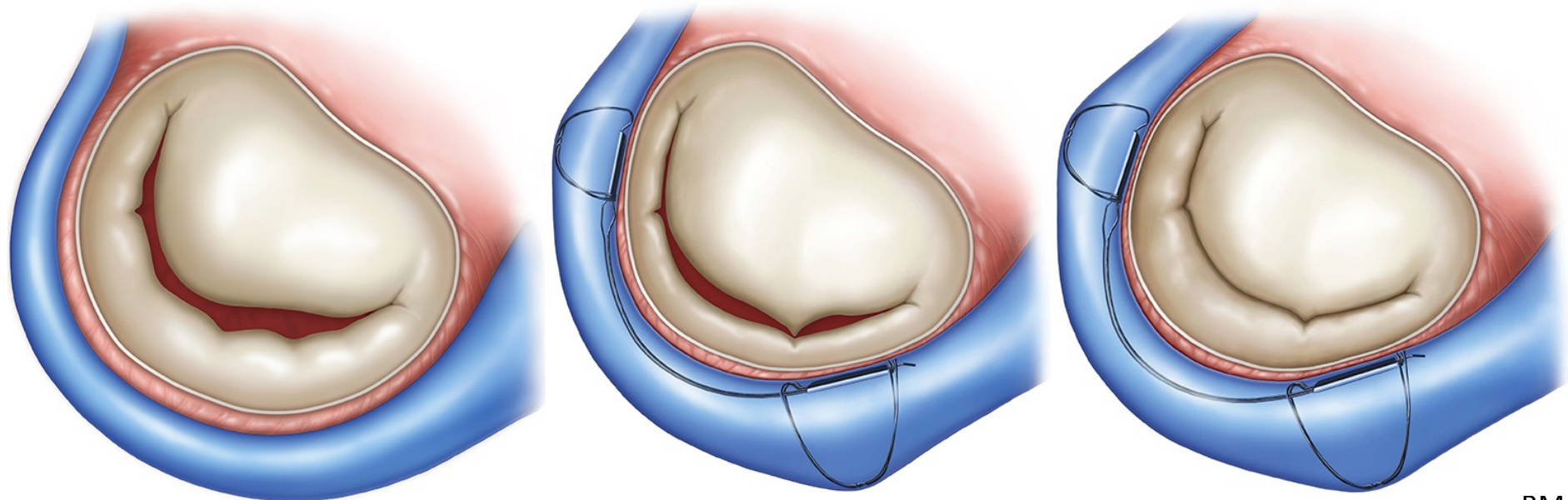
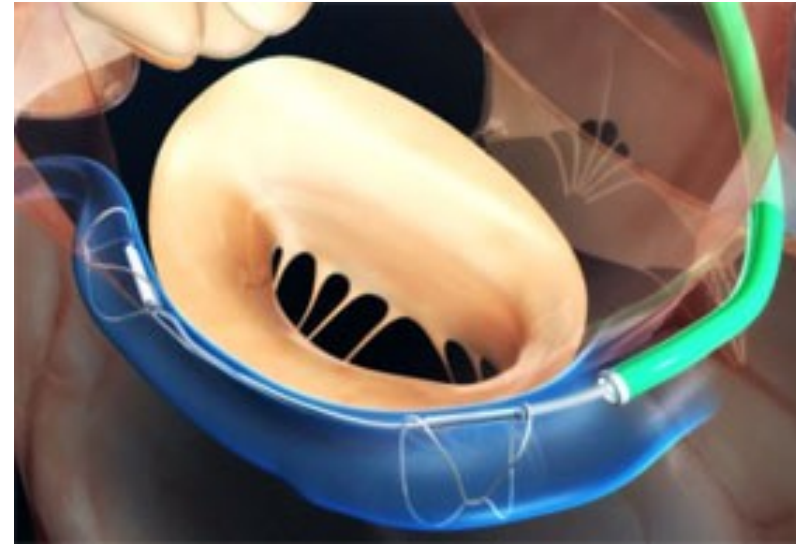
COAPT = Cardiovascular Outcomes Assessment of the MitraClip Percutaneous Therapy for Heart Failure Patients with Functional Mitral Regurgitation; EROA = effective regurgitant orifice area; LV = left ventricular; LVAD = left ventricular assist device; MITRA-FR = Multicentre Study of Percutaneous Mitral Valve Repair MitraClip Device in Patients With Severe Secondary Mitral Regurgitation; Rvol = regurgitant volume; RESHAPE-HF = Randomized Study of the MitraClip Device in Heart Failure Patients With Clinically Significant Functional Mitral Regurgitation; SLDA = single leaflet device attachment; other abbreviations as in [Table 4](#).



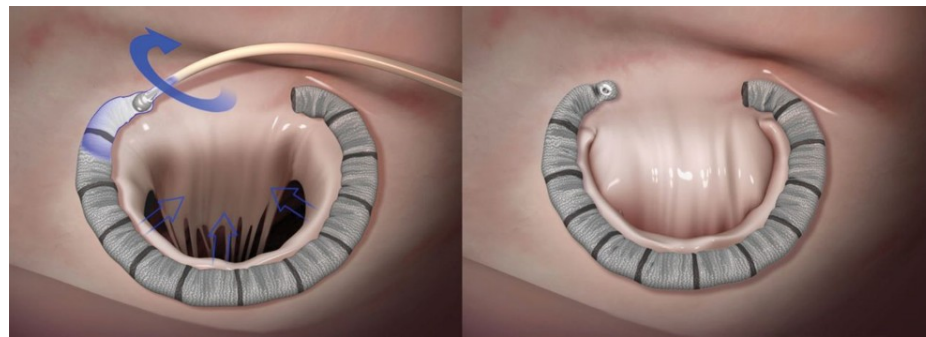
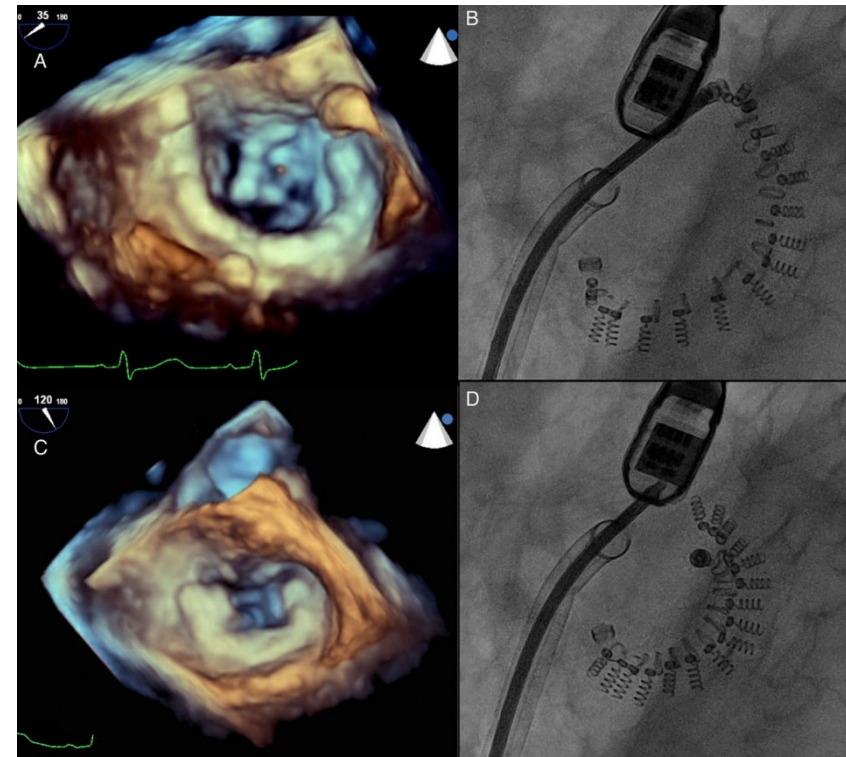
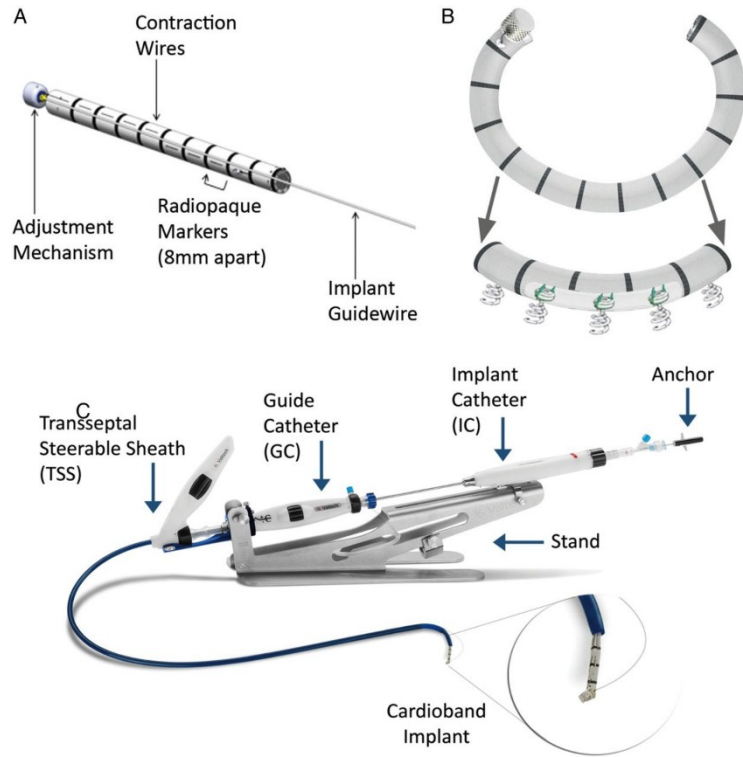
# Diğer Transkateter Yöntemler

- Mitral annuloplasti: MitraClip ile kombinasyon mümkün!
  - Koroner sinus annuloplasti teknikleri (**Carillon**- REDUCE FMR)
  - Direkt annuloplasti (**Cardioband**- REPAIR EU)
- Ring/Bioprotez içi kapak yerleştirilmesi: Cerrahi sonrası MY nüks için
- Transkateter mitral kapak implantasyonu (**CardiAQ, Tiara, Tendyne...>30**)
- Girişimin sınırları değişime-gelişime açık!

# Carillon Cihazı

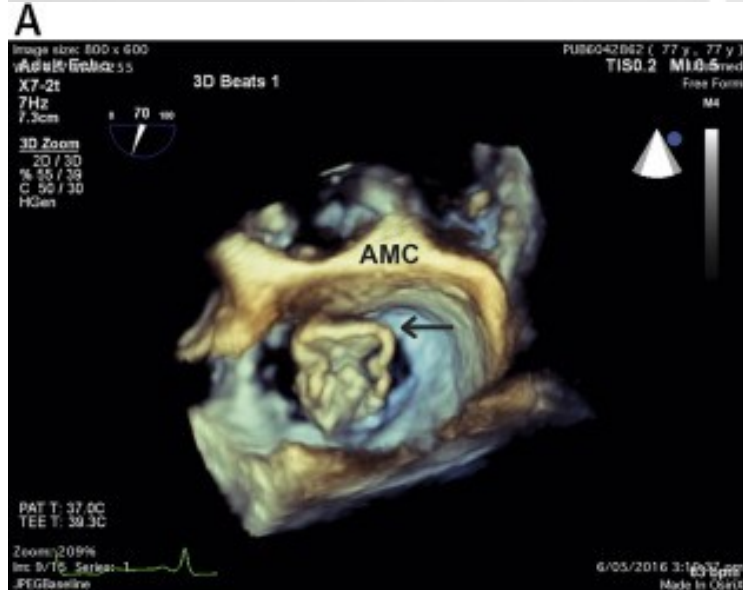
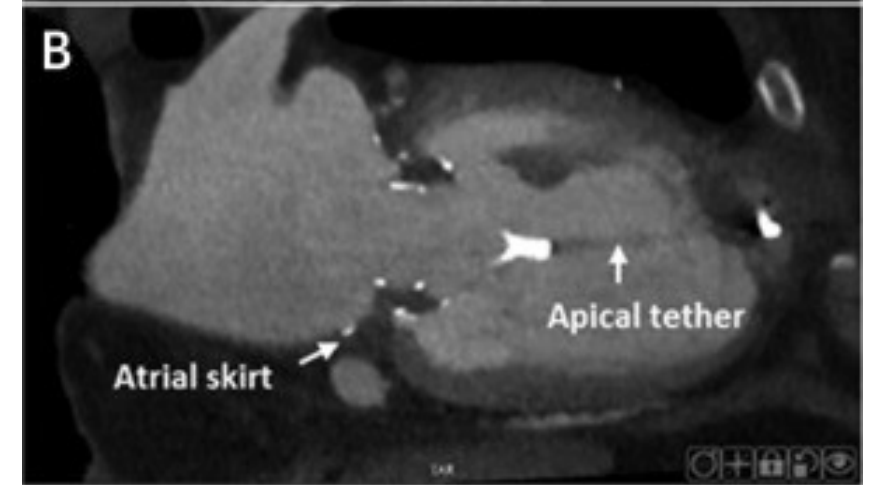
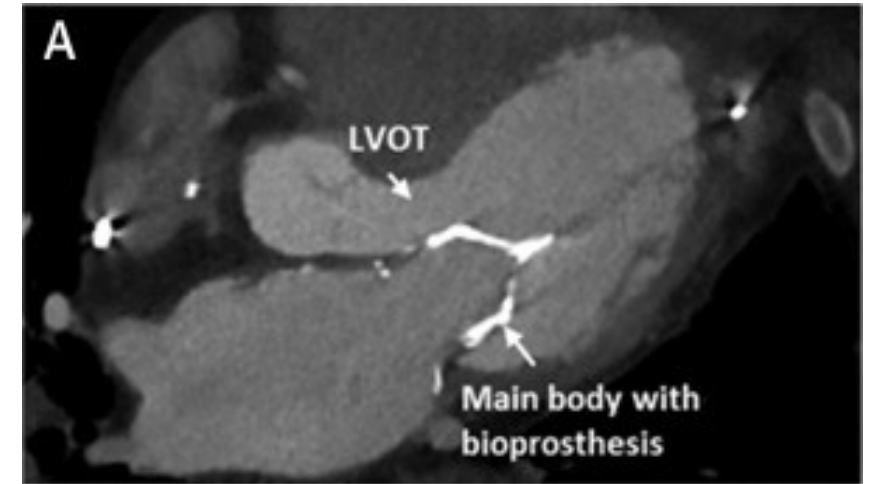
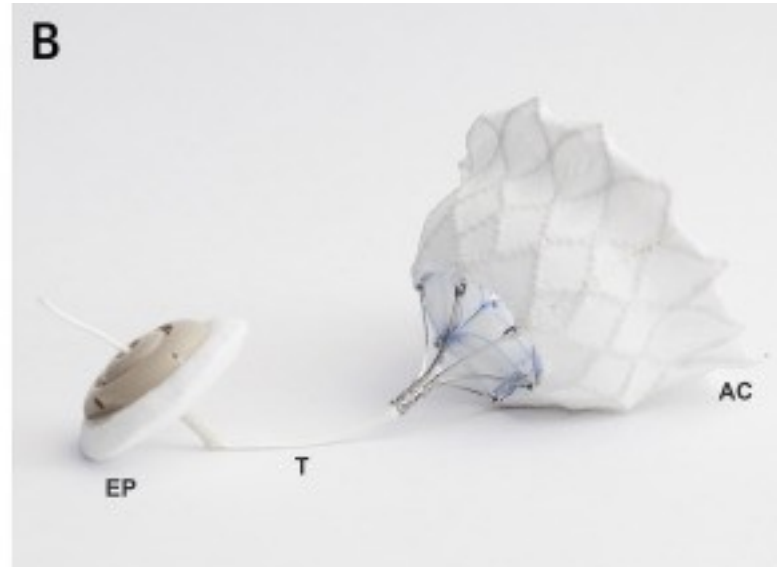


# Cardioband





# Tendyne Mitral Bioprotezi



# Hangi durumlarda girişimden kaçınalım?

- Kesin belirlenmiş net sınırlar yok (girişime uygun olmayan anatomik özellikler haricinde).
- Kanıt oluşturan randomize çalışmalardan dışlanan hastalar kimler?
- Sol ventrikül EF çok düşük (<%15-20)
- Sol ventrikül çok geniş (LVEDD >70 mm, LVESD >70 mm)
- Pulmoner arter sistolik basıncı >70 mmHg
- Ciddi sağ ventrikül disfonksiyonu
- Transplantasyon adayı olan hasta
- Yaşam beklentisi <1 yıl

