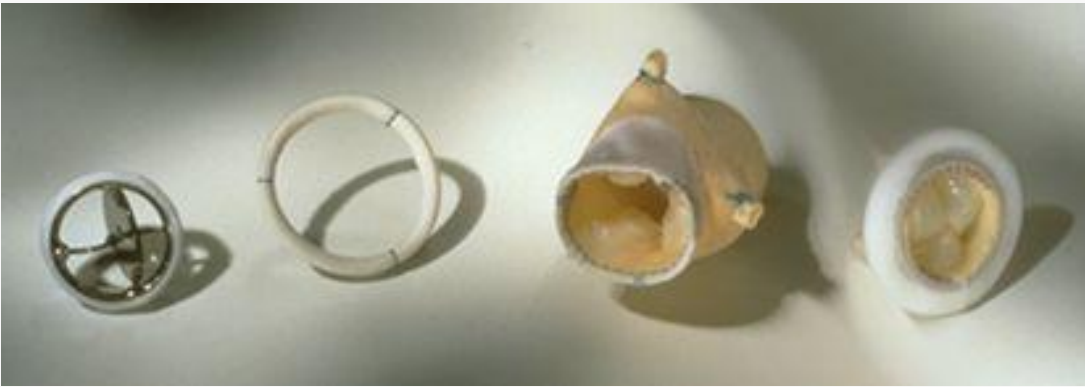


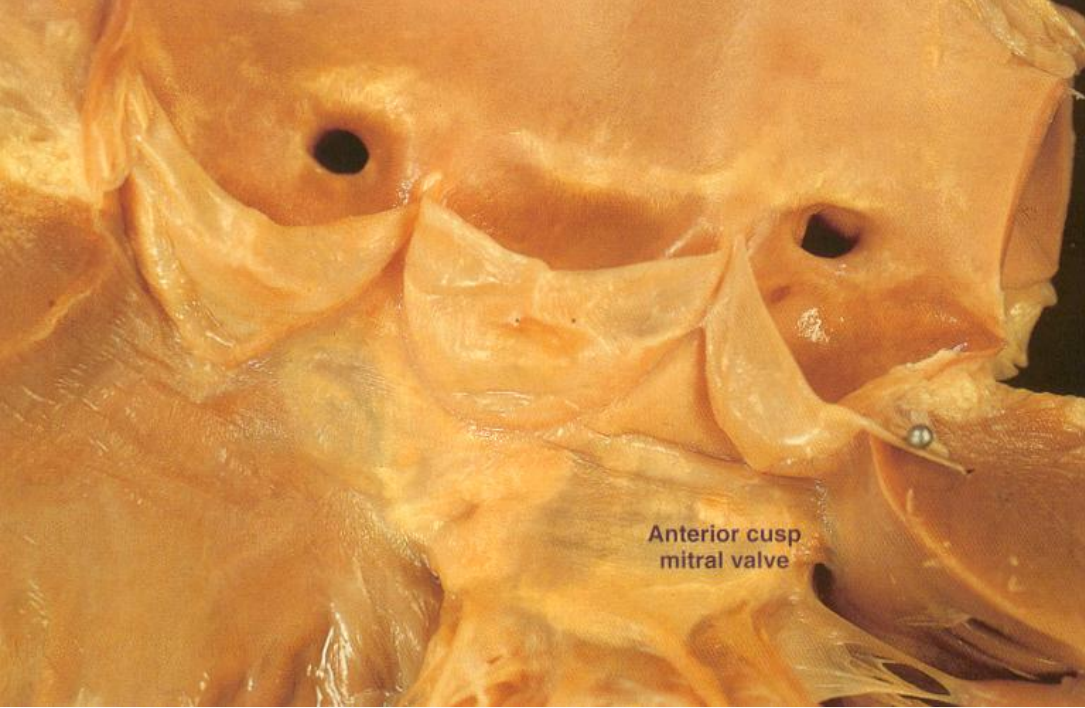
# KAPAK HASTALIKLARI ve İNFEKTİF ENDOKARDİTLERDE CERRAHİ TEDAVİ



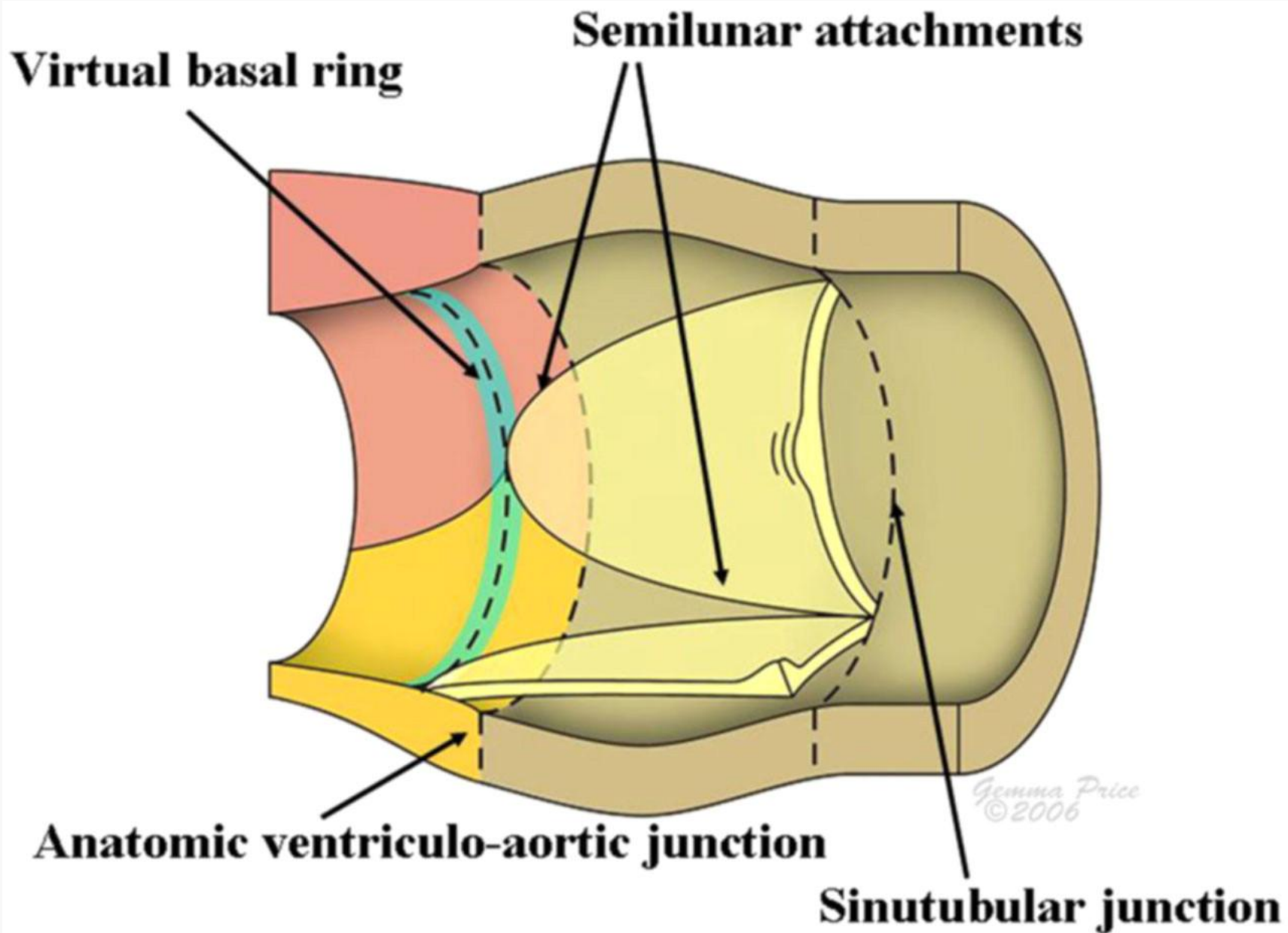
**Doç. Dr. Serkan DURDU**

**2015-2016 Eğitim Yılı  
Ankara Üniversitesi Tıp Fakültesi**

# AORT KAPAĀI



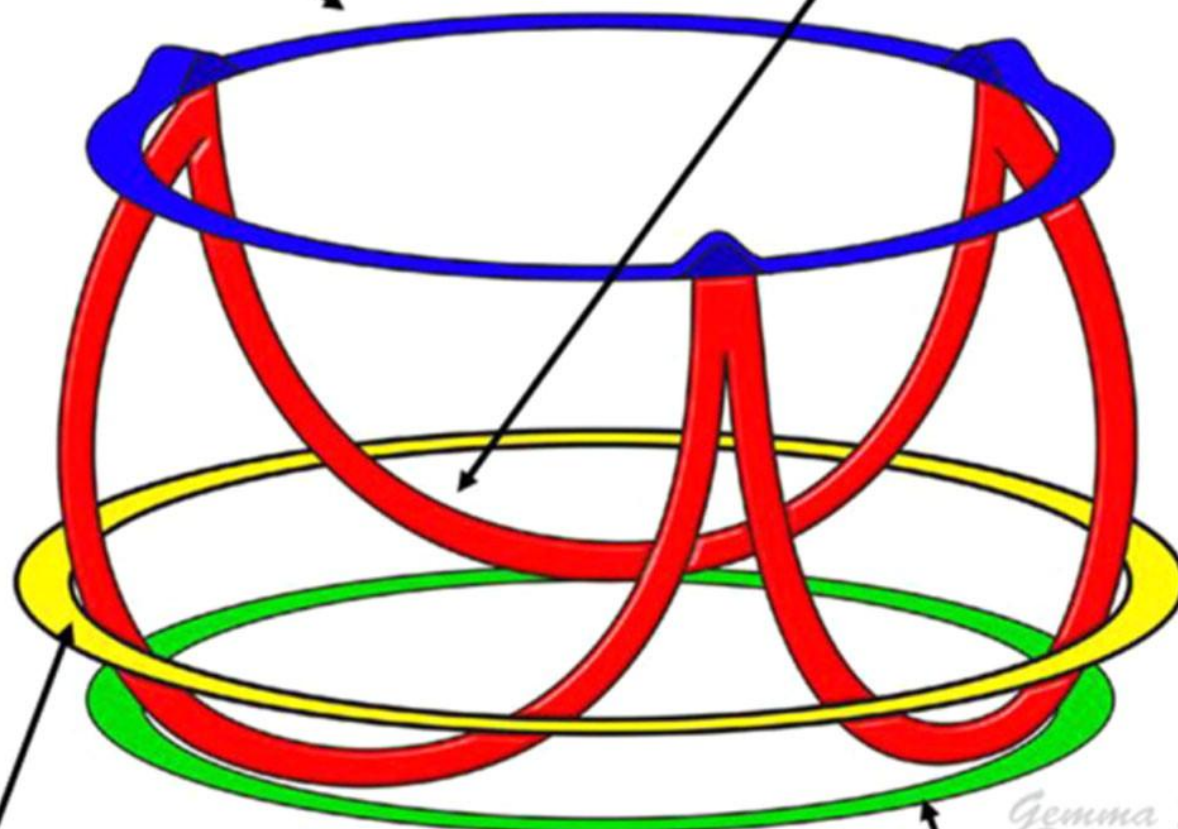
- 1) Leafletler
- 2) Anulüs
- 3) Valsalva Sinüsü
- 4) Sinotubuler bileşke
- 5) Kapakçık arası üçgenler





**Sinutubular junction**

**Crown-like  
semilunar attachments**



**Anatomic ventriculo-aortic junction**

*Gemma Price  
©2006*

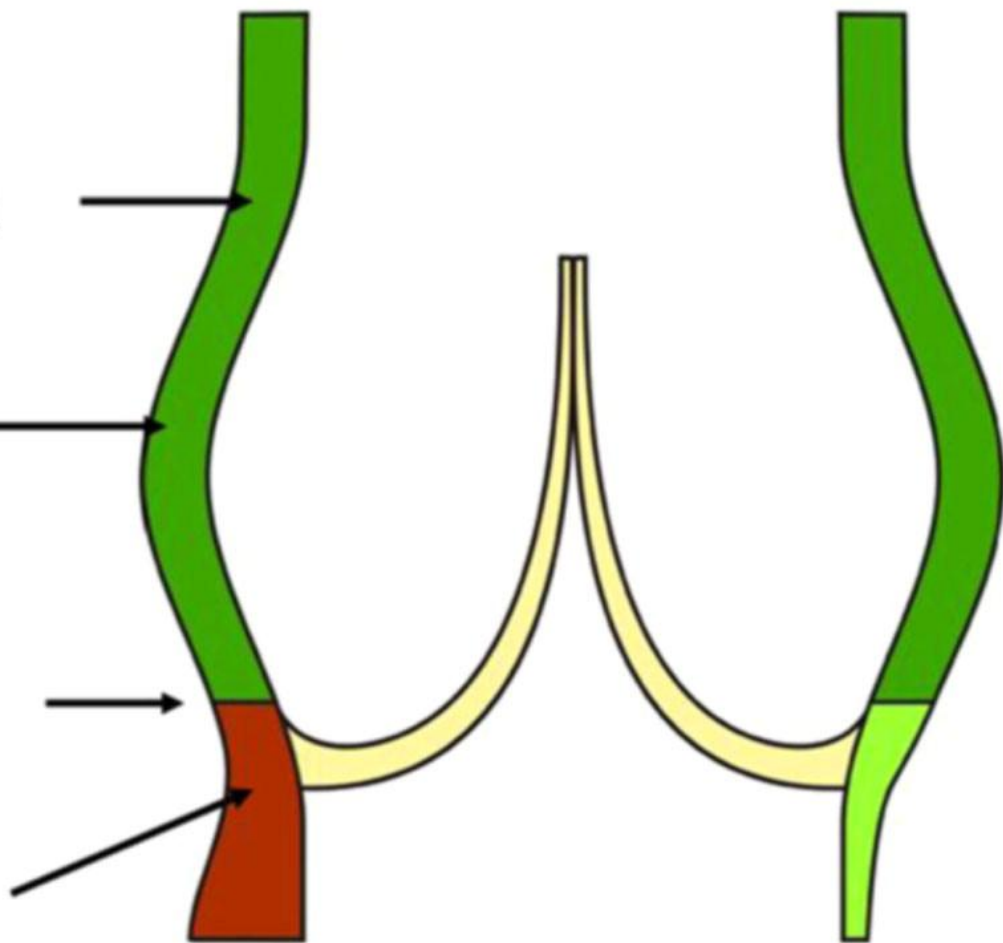
**Virtual basal ring**

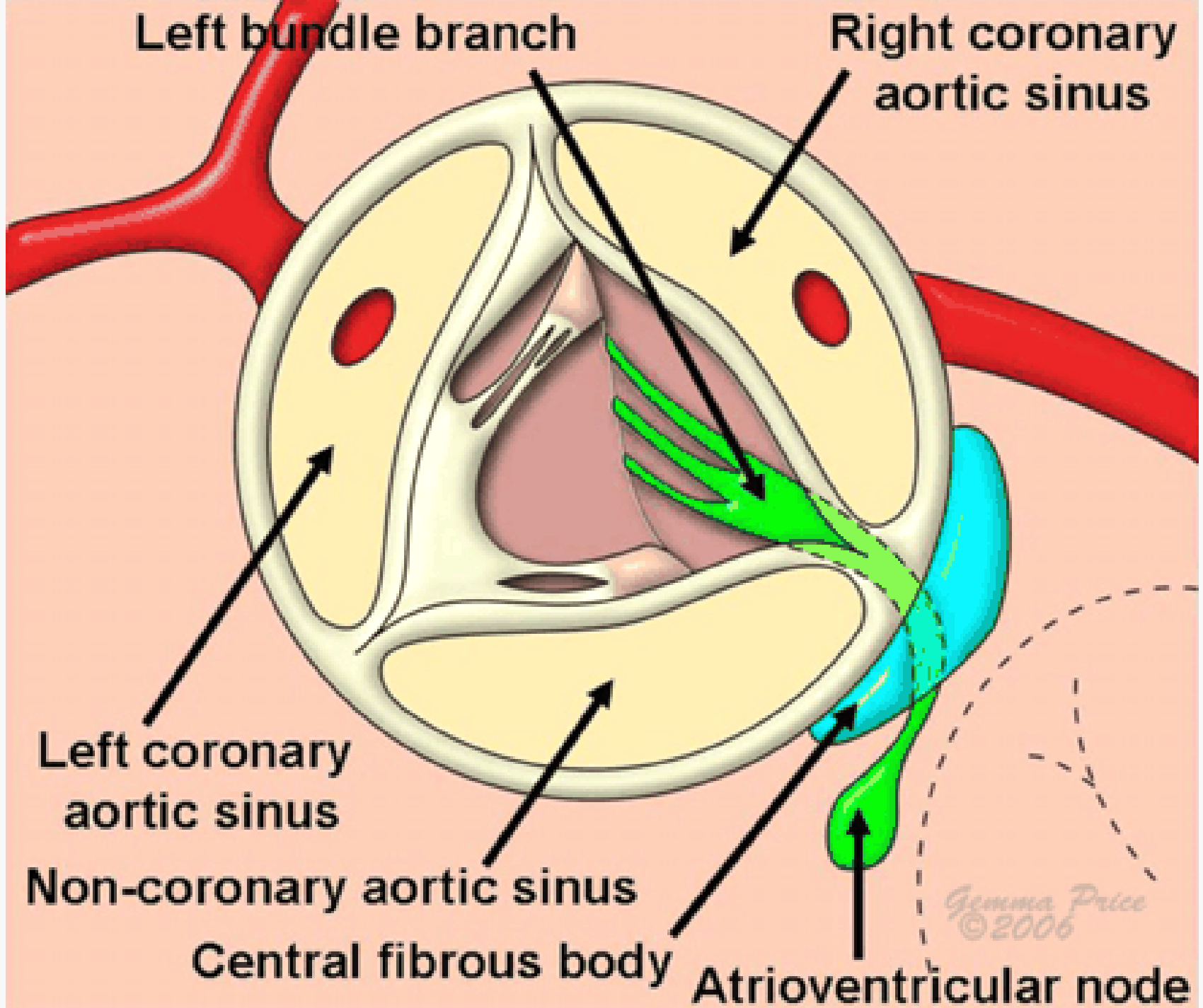
**Sinutubular junction**

**Mid-sinusal level**

**Anatomic  
ventriculo-arterial  
junction**

**Virtual basal ring**





Left bundle branch

Right coronary  
aortic sinus

Left coronary  
aortic sinus

Non-coronary aortic sinus

Central fibrous body

Atrioventricular node

*Gemma Price*  
© 2006

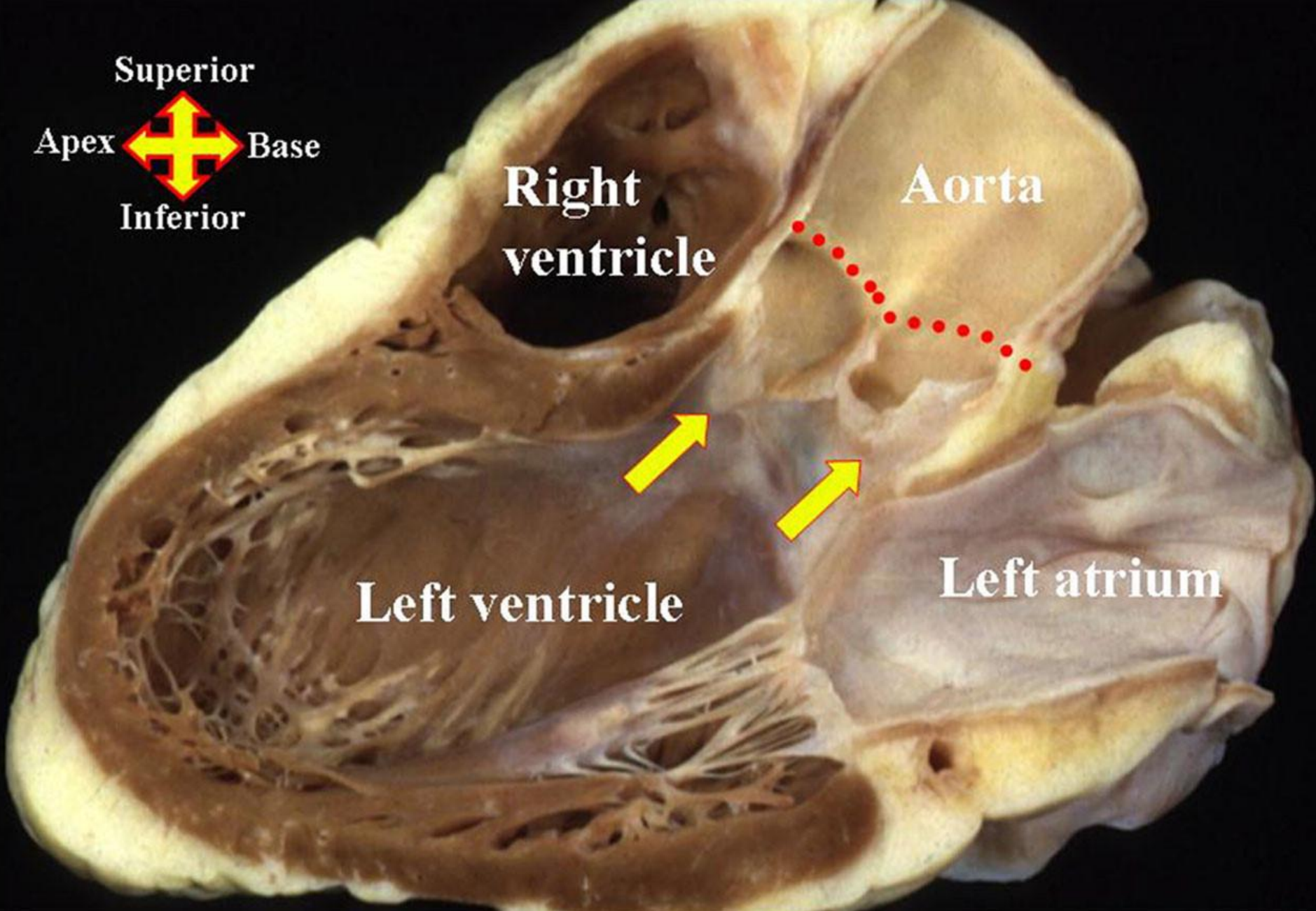
Superior  
Apex  Base  
Inferior

Right  
ventricle

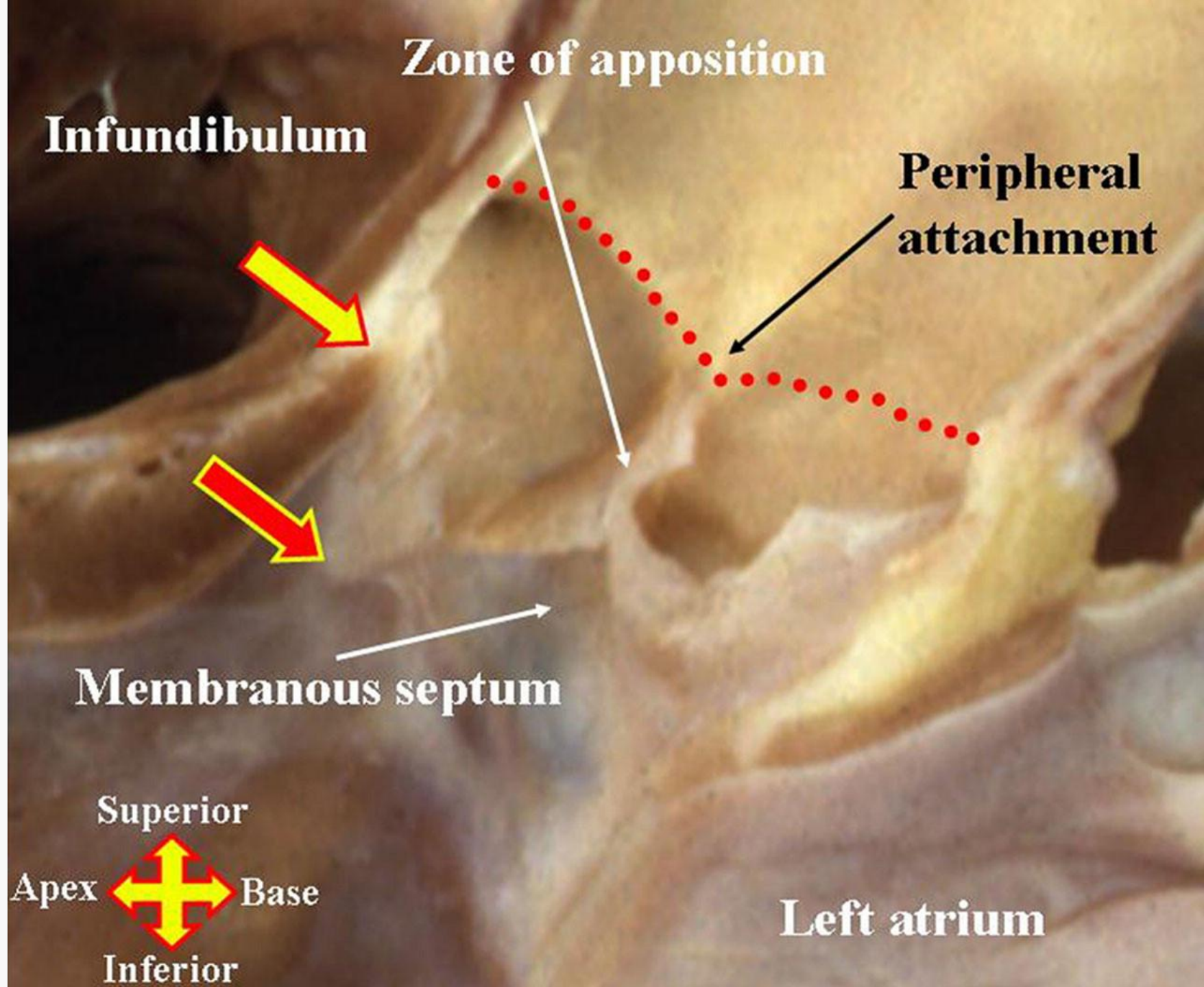
Aorta

Left ventricle

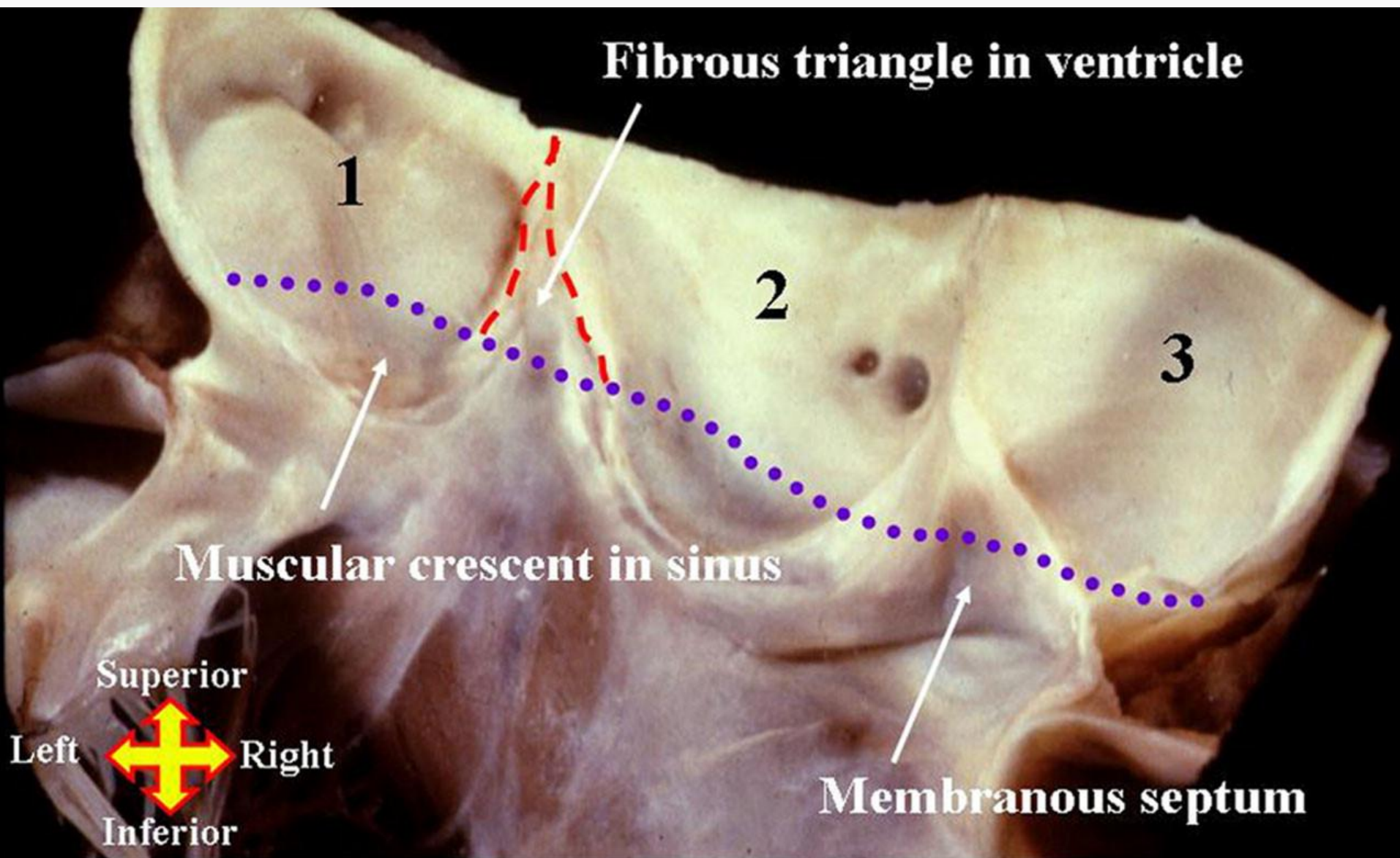
Left atrium











**Right coronary artery**

**Pulmonary valve**

**Tricuspid valve**

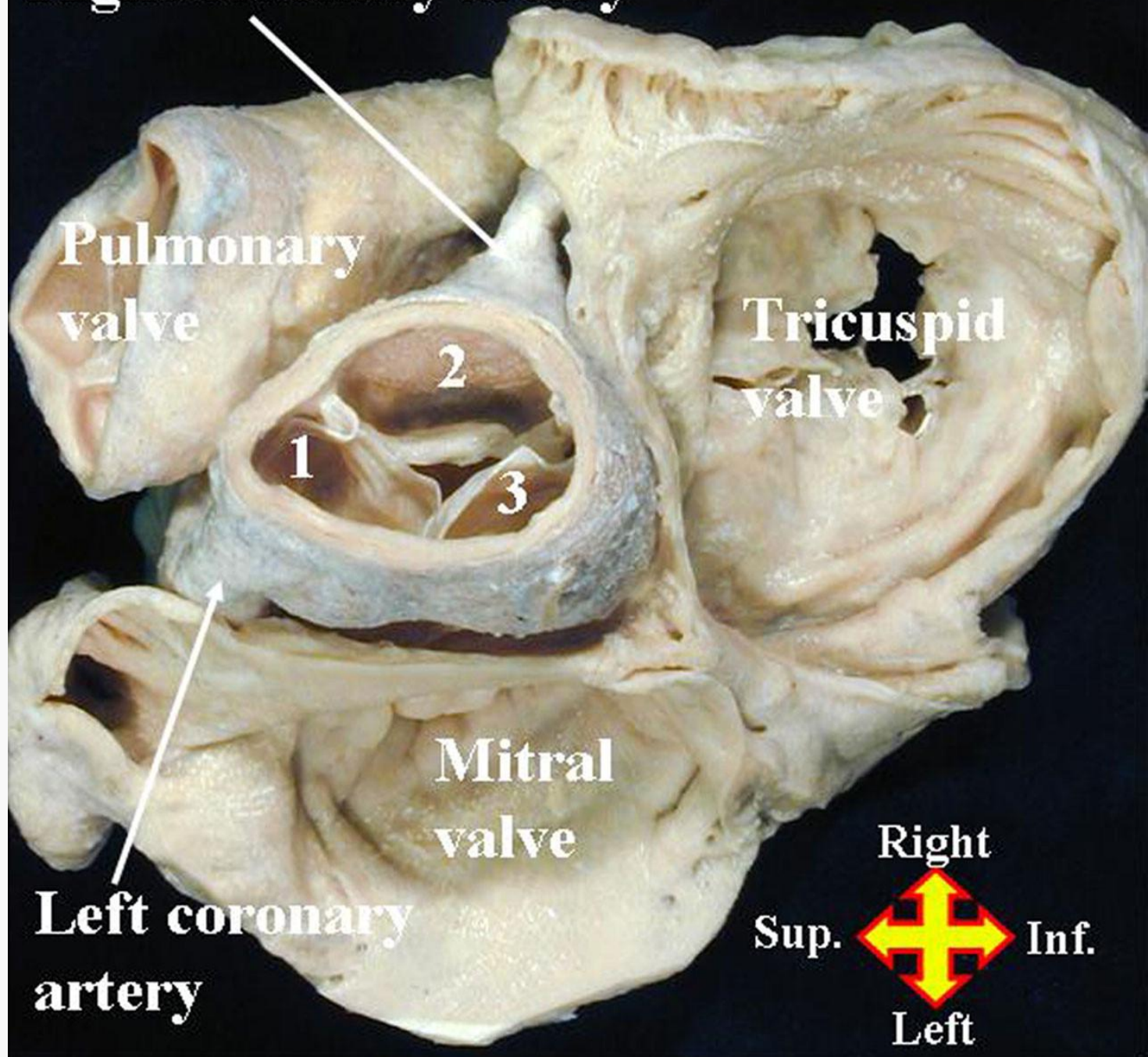
**1**

**2**

**3**

**Mitral valve**

**Left coronary artery**



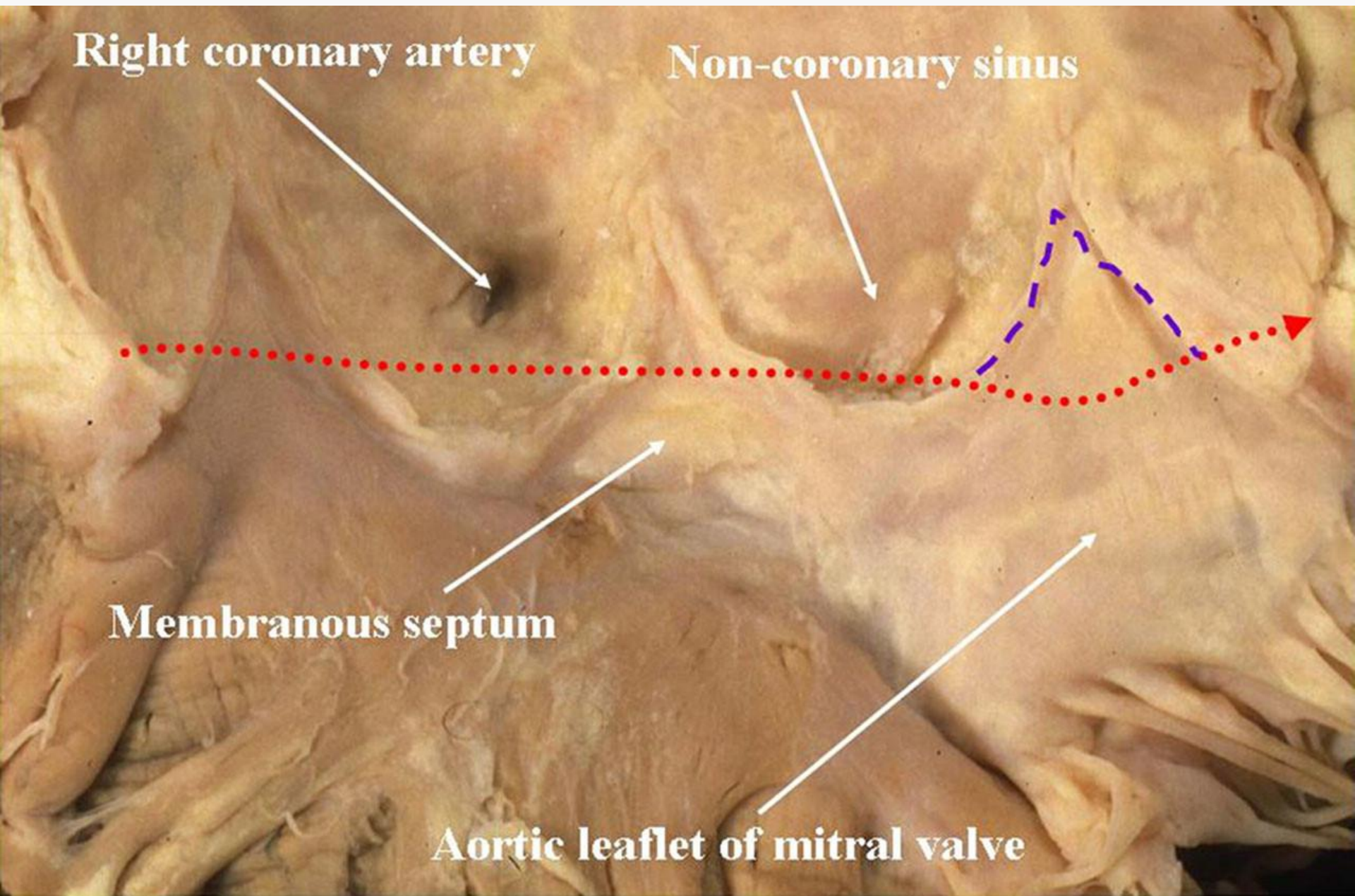


**Right coronary artery**

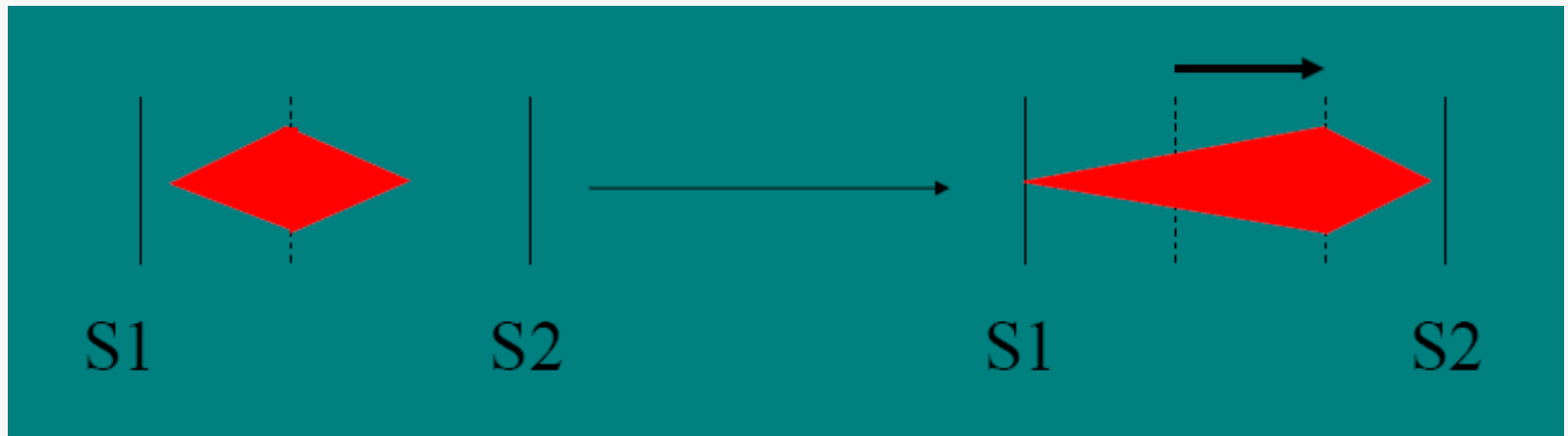
**Non-coronary sinus**

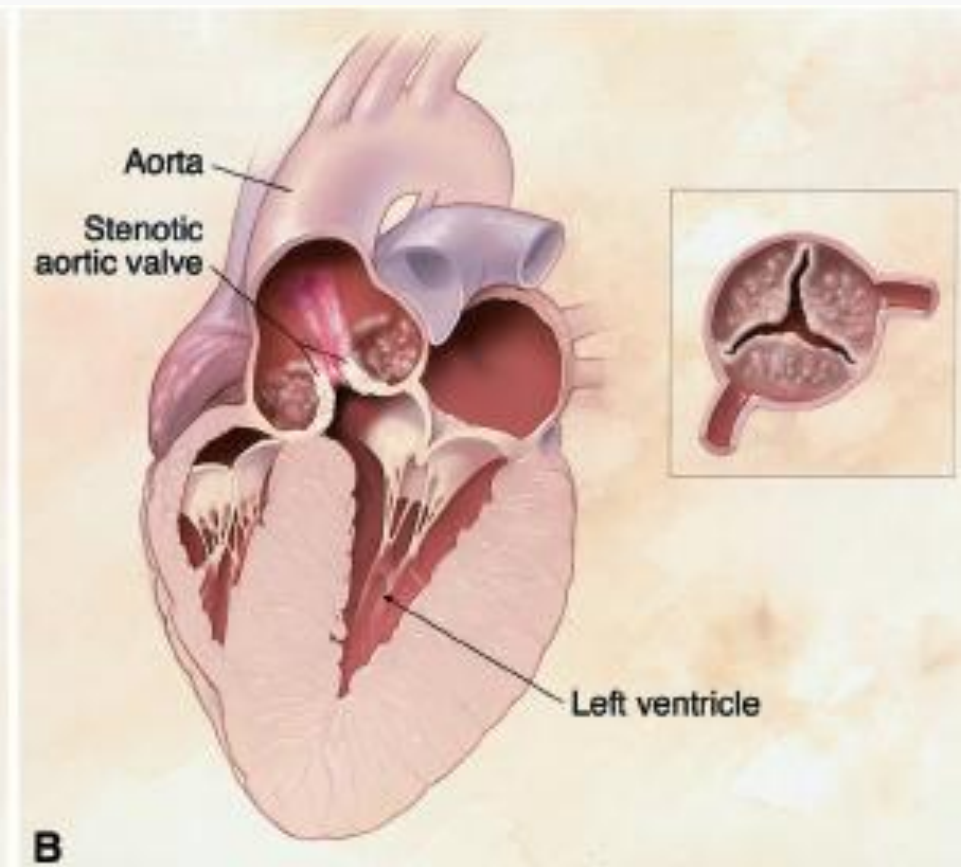
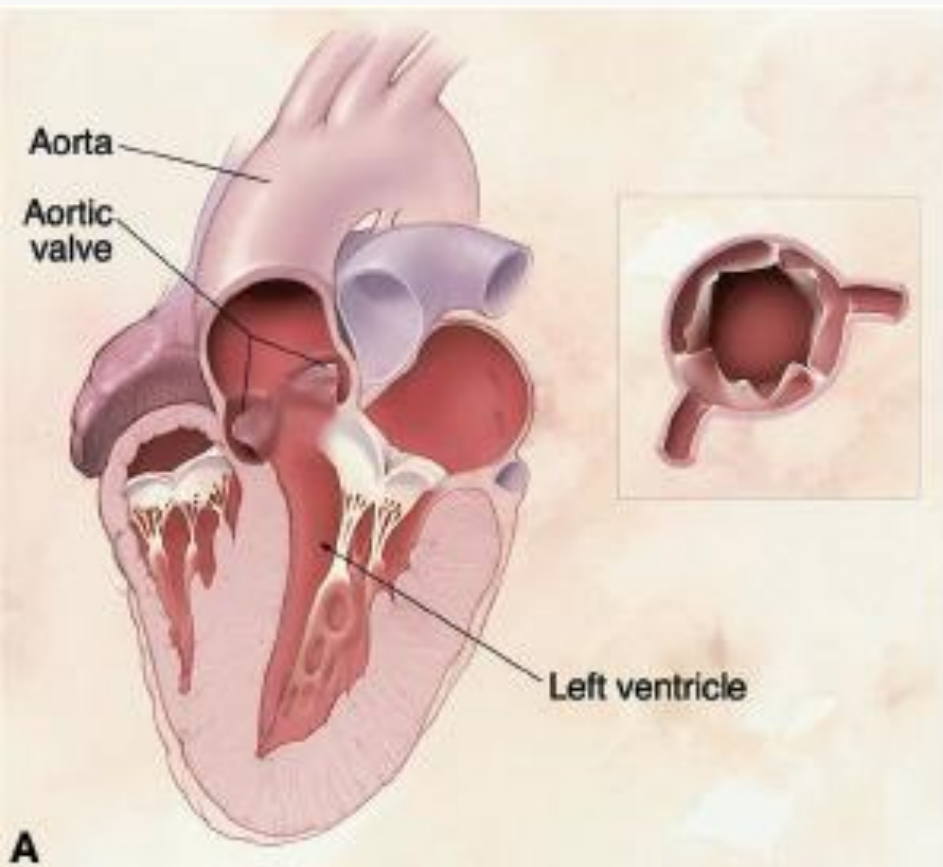
**Membranous septum**

**Aortic leaflet of mitral valve**



# AORT DARLIĞI





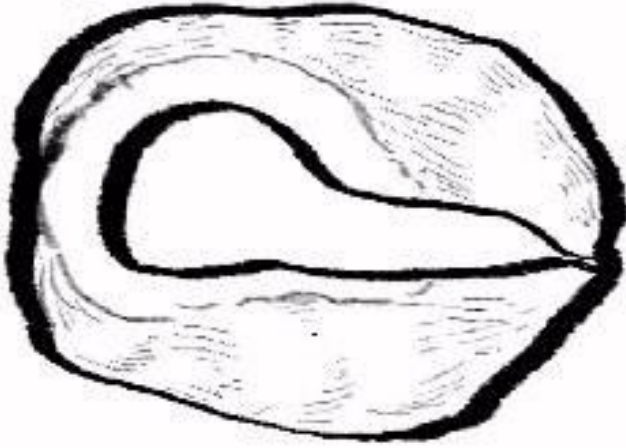


# Aort Darlığı

---

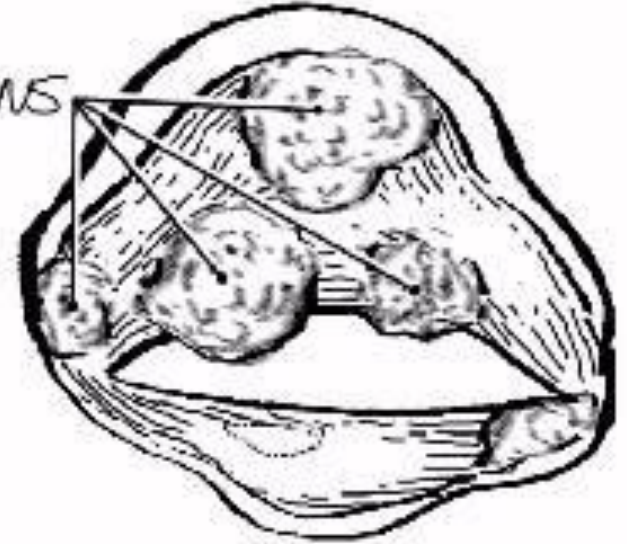
- ✓ **Dejeneratif**
- ✓ **Romatizmal**
- ✓ **Konjenital**
  - bikuspid kapak**
  - unikuspid kapak**
- ✓ **Endokardit (masif vejetasyonlu)**

UNICUSP VALVE



(TOILET SEAT VALVE)

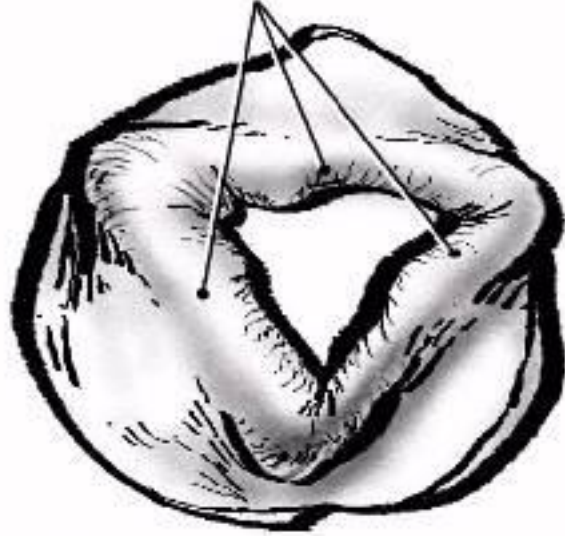
CALCIFICATIONS



BICUSPID VALVE

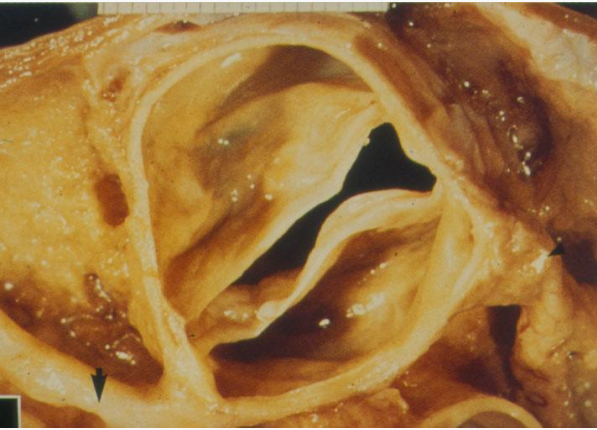
Konjenital bikuspid or unikuspid aort kapağı  
Komissur füzyonu  
50-70 yaşlarında kalsifikasyon

FIBROUS ROLLED  
EDGES



RHEUMATIC VALVE

Fibröz kalınlaşma,  
3-kusplisli kapak,  
Hafif kalsifikasyon,  
Hastaların %50 sinde AER hikayesi



**bikuspid aort kapağı**



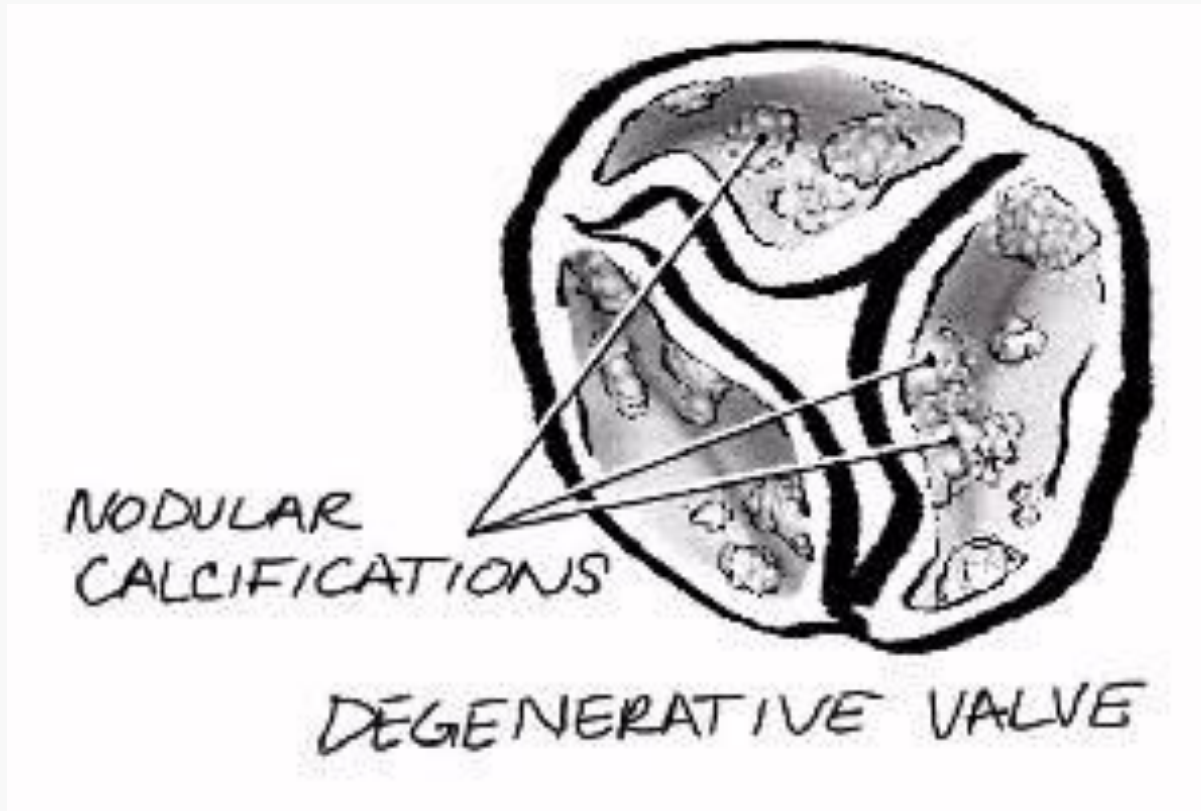
**Kalsifik bikuspid aort kapağı**



**Kalsifik trikuspid aort kapağı**



**psödobikuspid**



Diffüz nodüler kalsifikasyon,  
3-kuspisli kapak  
komissural füzyon yok



# Eksplantasyon sonrası kalsifik aort kapađı



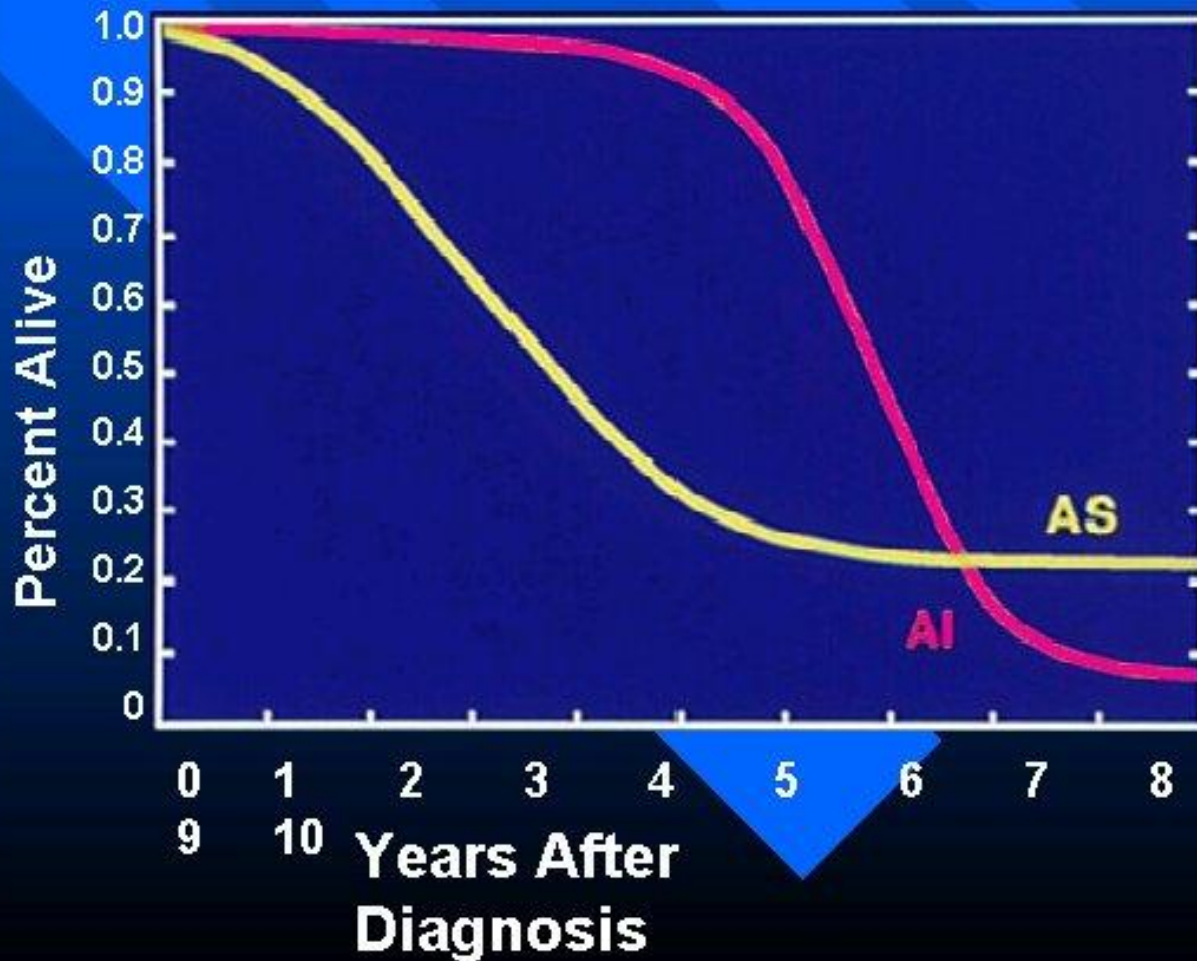
# **Aort Darlığı**

## ***Doğal Süreç***

---

- ✓ **Uzayan latent periyot**
- ✓ **Azalan kapak alanı 0.1-0.3 cm<sup>2</sup> /yıl**
- ✓ **Artan gradiyent basıncı 6-8 mmHg/yıl**
- ✓ **Semptomlar:**
  - anjina, senkop, kalp yetmezliği**
  - (1/3 hastada)**
- ✓ **Ortalama yaşam süresi semptomlardan sonra 2-3 yıl**

# Survival Curves For AS or AI



# Aort Stenozu

## *Stenoz derecesini evreleme*

---

**Normal erişkin aort kapagı açıklığı(EOA)=3-4 cm<sup>2</sup>**

- ✓ Hafif AD                      EOA > 1.5 cm<sup>2</sup>
- ✓ Orta AD                        EOA = 1.0 -1.5 cm<sup>2</sup>
- ✓ Ağır AD                        EOA < 1.0 cm<sup>2</sup>

**veya ortalama transvalvuler basınç gradiyenti > 40 mmHg**

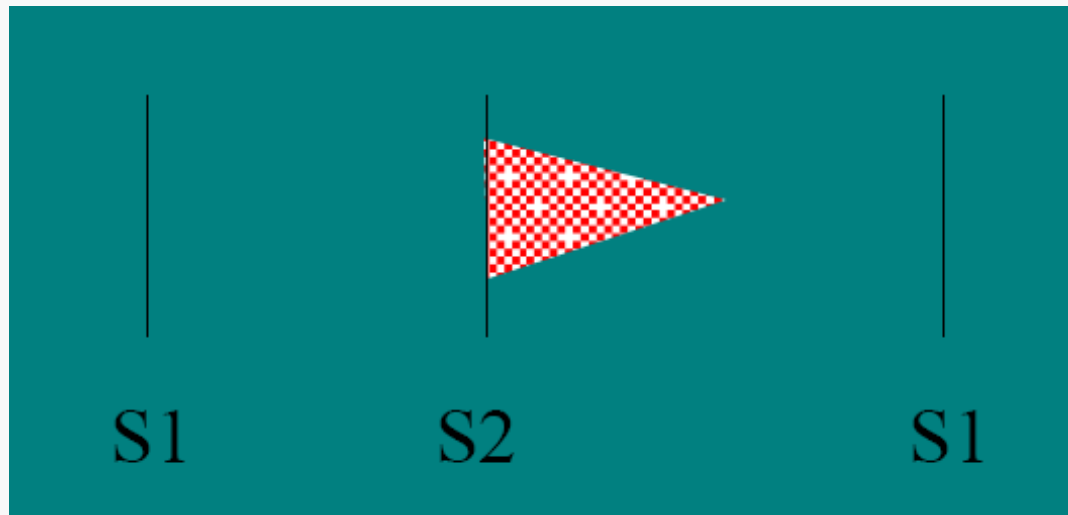
# Aort Darlığı

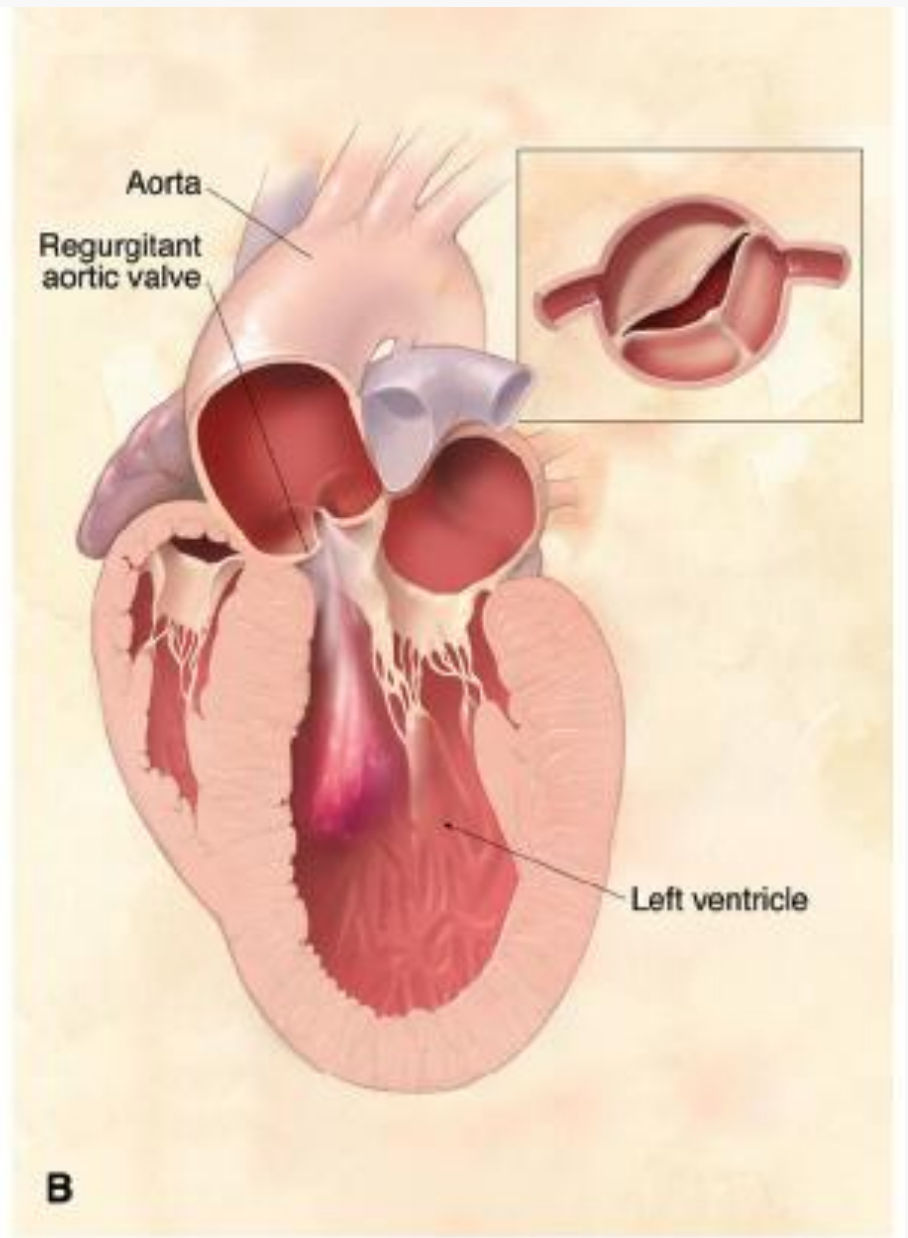
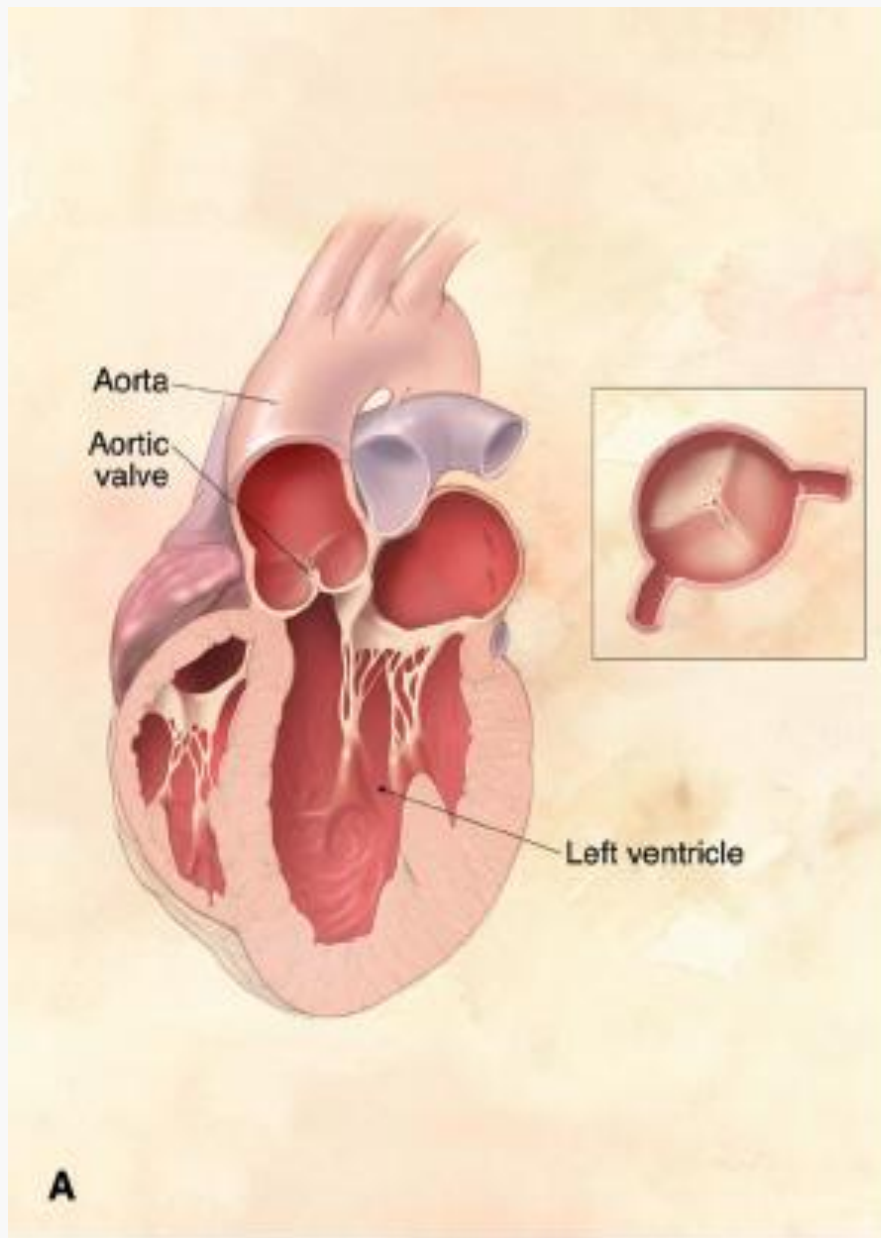
## AVR endikasyonları

- ✓ **Semptomatik hastalar (Klas I)**
  - semptomatik ilerleme & yaşam süresi kazancı
- ✓ **Asemptomatik hastalar**
  - Ciddi aort stenozu kanıtı (Klas I)**
  - LV sistolik disfonksiyonu (Klas IIa)
  - Egzersize hipotansif yanıt (Klas IIa)
  - VT ve ciddi LVH (Klas IIb)
- ✓ **CABG veya MVR operasyonu geçirecek hastalarda orta/ağır aort stenozu (Klas I)**



# AORT YETMEZLİĞİ





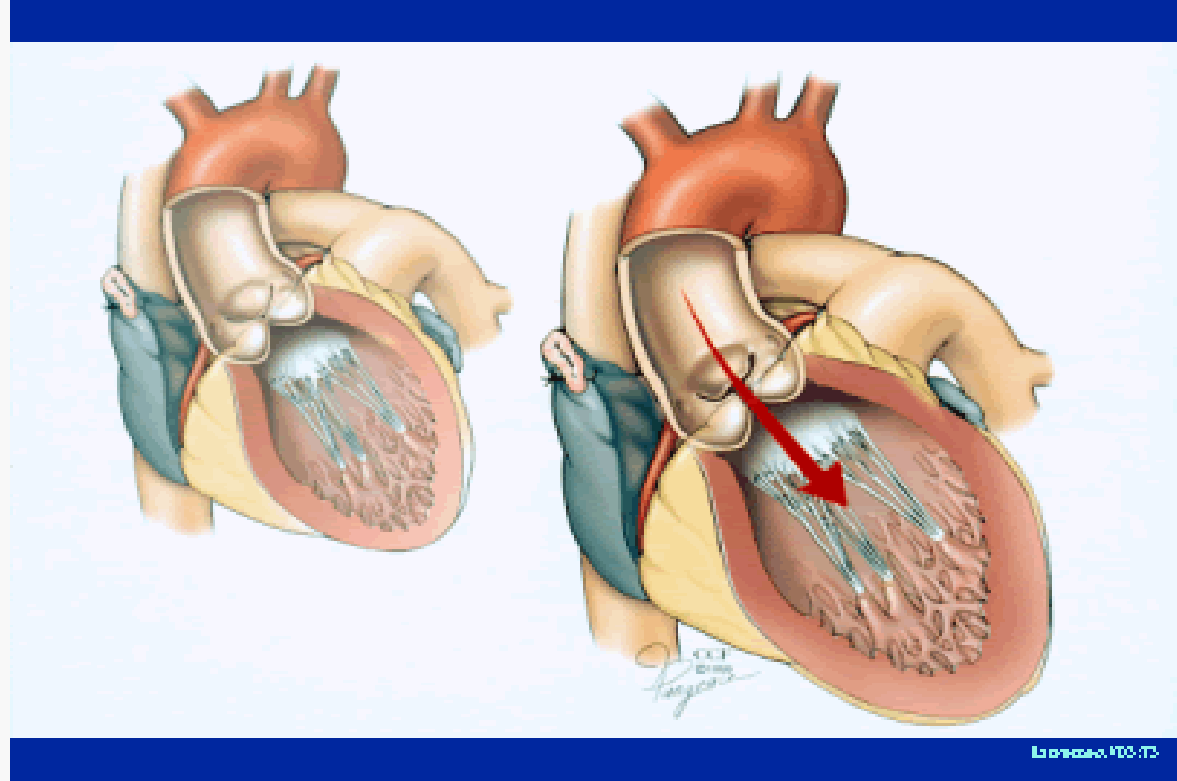
# Aort Kökü Hastalıkları

---

- ✓ Aort dilatasyonu (dejeneratif)
- ✓ Kistik mediyal nekroz (izole veya klasik Marfan ile birlikte)
- ✓ Aort diseksiyonu
- ✓ Sistemik hipertansiyon
- ✓ Osteogenesis imperfecta
- ✓ Ankilozan spondilit
- ✓ Behçet sendromu
- ✓ Psöriyatik artrit
- ✓ Ülseratif kolitle birlikte artrit
- ✓ Polikondrit relapsı
- ✓ Reiter sendromu
- ✓ Dev hücreli arterit
- ✓ Sifilitik aortit

# Aort Kapak Yetmezliđi

- ✓ Primer kapak hastalıđı anormal kapakçıklar
- ✓ Aort kökü hastalıđı A.B.D.' deki en sık nedeni
- ✓ İkisinin kombinasyonu





# Aort Kapak Yetmezliđi

---

## PRİMER KAPAK HASTALIđI

- ✓ Romatizmal
- ✓ Endokardit
- ✓ Konjenital  
(bikuspid)

## AORT KÖKÜ HASTALIđI

- ✓ Annuloaortik ektazi
- ✓ Çıkan aort  
anevrizması
- ✓ Aort Disseksiyonu
- ✓ Aortit

# Aort Kapak Yetmezliđi

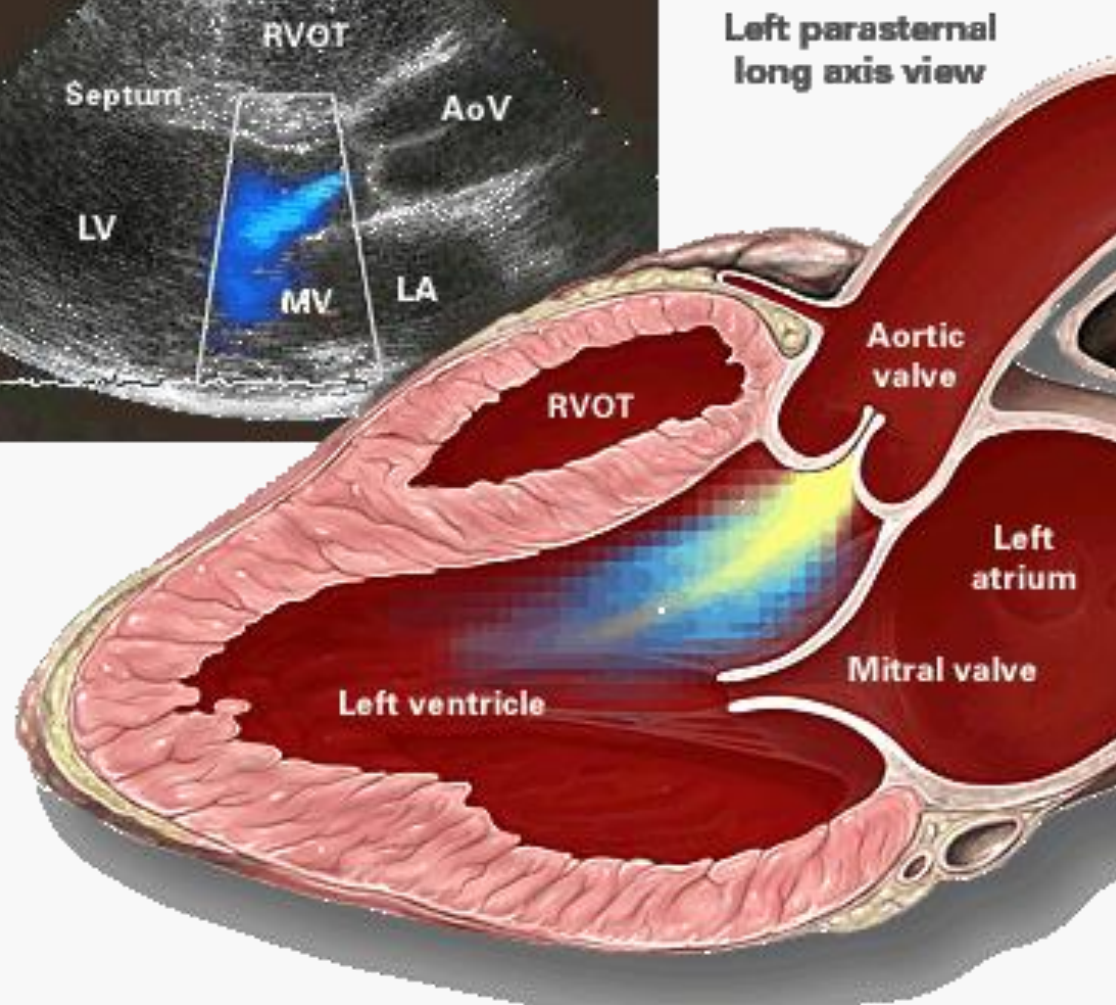
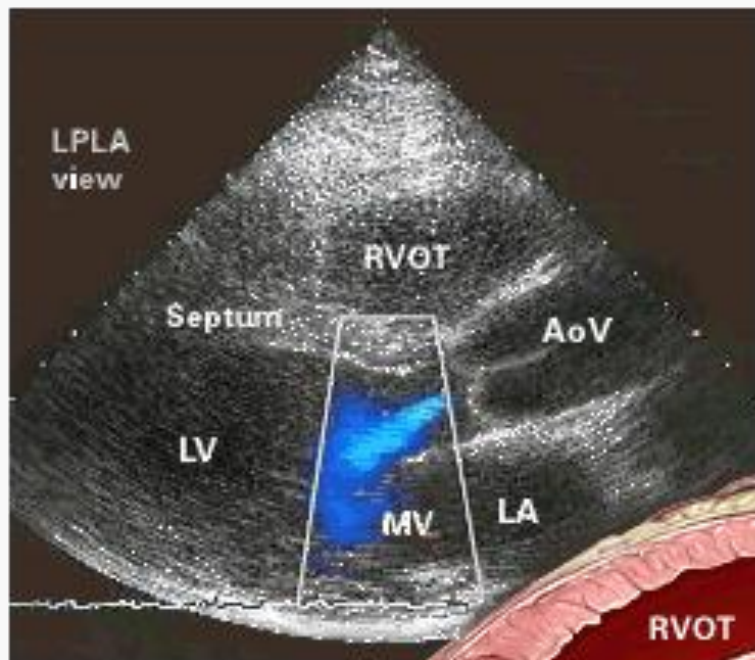
---

## AKUT

- ✓ **Aort Diseksiyonu**
- ✓ **Endokardit**

## KRONİK

- ✓ **Annuloaortik ektazi**
- ✓ **Çıkan aort anevrizması**
- ✓ **Aortit**
- ✓ **Romatizmal**



# **Kronik AY**

## **Sağ Kalımın Belirteçleri**

---

- ✓ **Sol ventrikül sistolik fonksiyonları (EF)**
- ✓ **Sol ventrikül sistol sonu çapı**
- ✓ **Semptomların ağırlığı**
- ✓ **Preoperatif sistolik disfonksiyonun süresi**



# Aort Yetmezliđi

## AVR ENDİKASYONLARI

- ✓ **Semptomatik hastalar (NYHA III-IV) (Klas I)**
- ✓ **Aseptomatik hastalar**

**NYHA II ve sol ventrikül sistolik disfonksiyonu (EF < 50%) dinlenme sırasında (Klas I)**

**Ciddi sol ventrikül dilatasyonu (Klas I)**

**SVEDÇ > 7.5 cm**

**SVESÇ > 5.5 cm**

**CCS klas II angina pectoris (Klas I)**

- ✓ **Aort kökü hastalığı ile birliktelikle**  
**Aort kökü > 5.0cm**

ACC/AHA Practice Guidelines, November 1, 1998

**Tedavi → Medikal**  
**Cerrahi LV disfonksiyonu gelişmeden önce**

# Dilate aort kökü ile birlikte AY “Konvansiyonel Tedavi”

- ✓ Çıkan aorta değişimi
- ✓ AVR
- ✓ Koroner arterlerin reimplantasyonu



## Komposit greft Bental Prosedürü

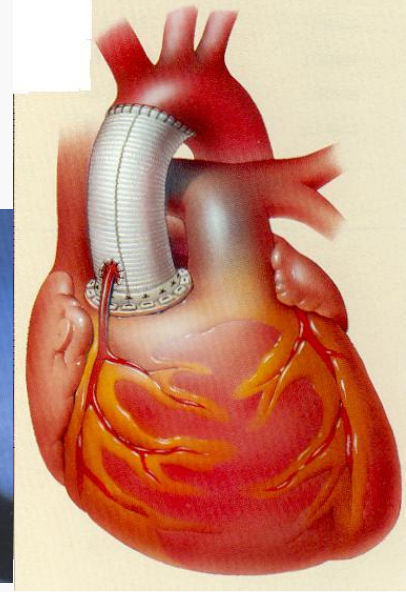
Kapağa bağlı komplikasyonlar

yetersiz hemodinamik  
performans

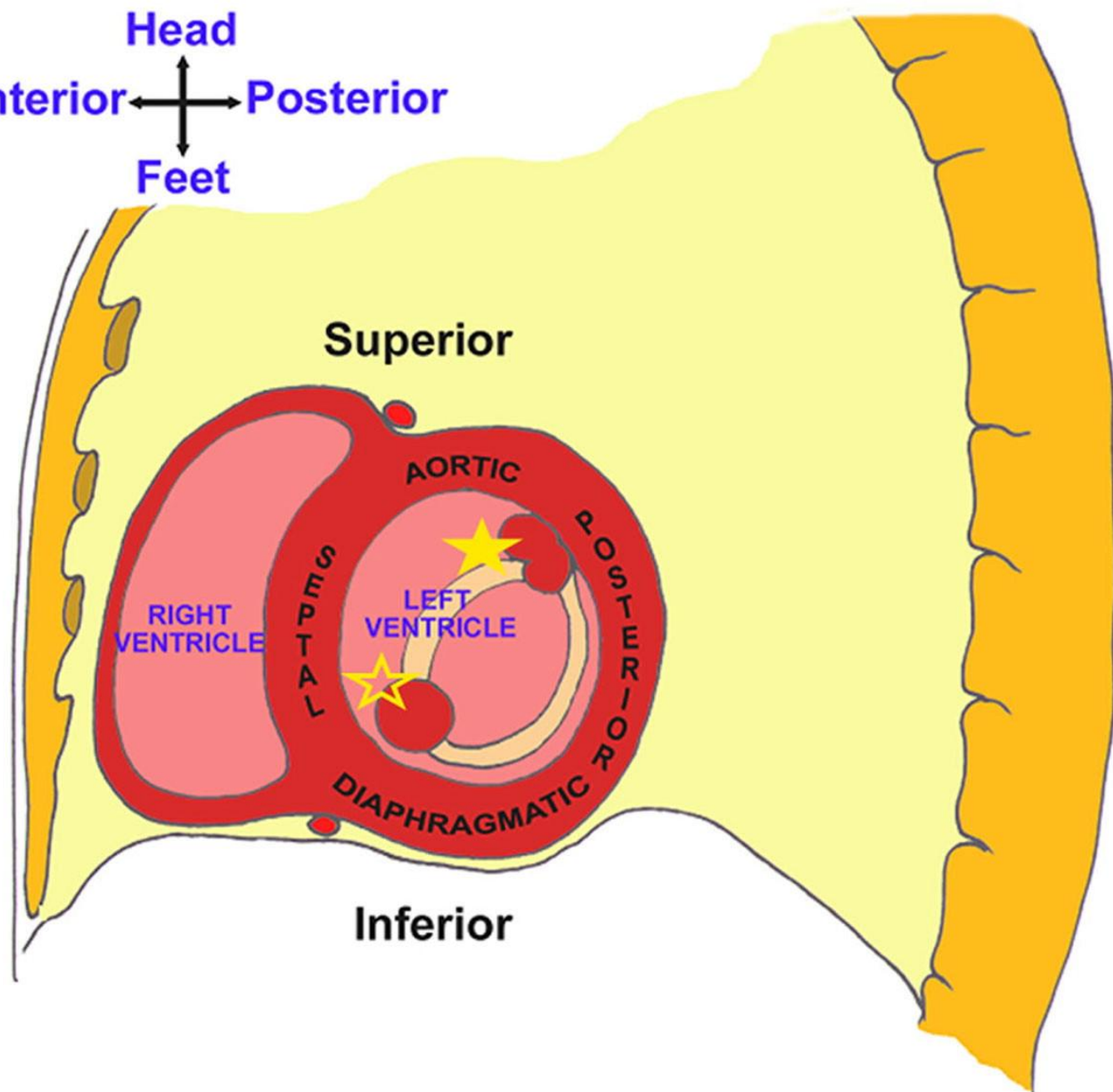
tromboembolizm

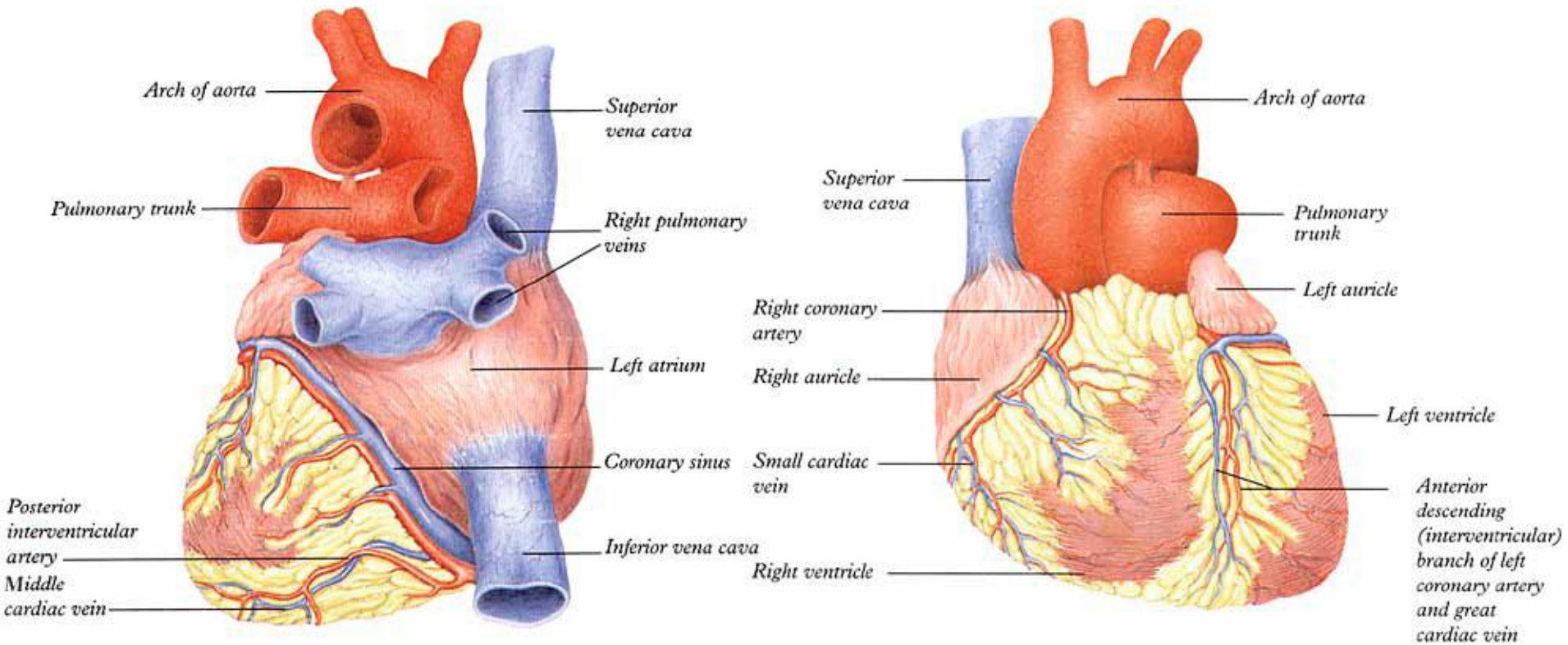
endokardit

Antikoagulasyona bağlı



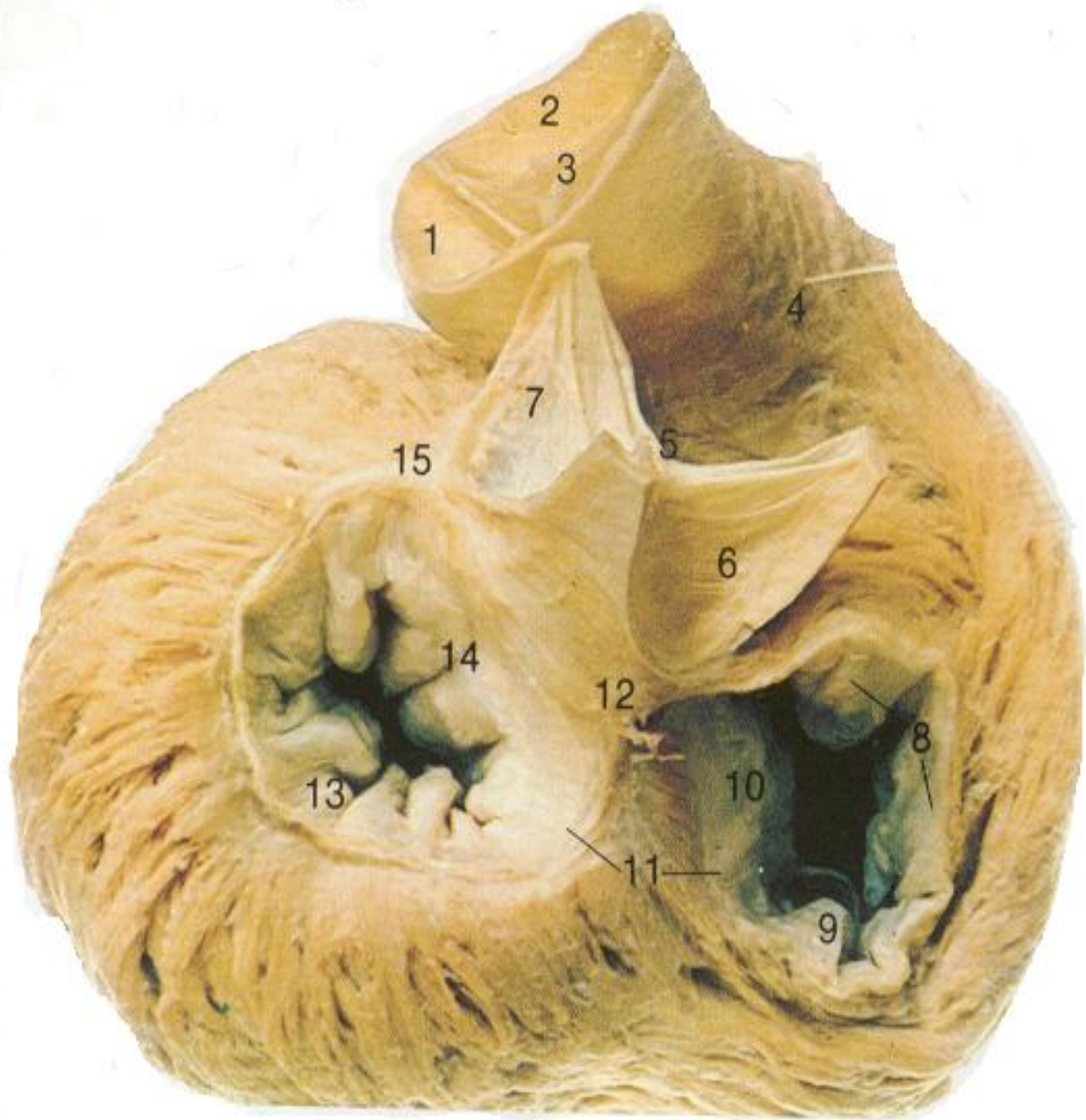
Head  
Anterior ← → Posterior  
↓  
Feet

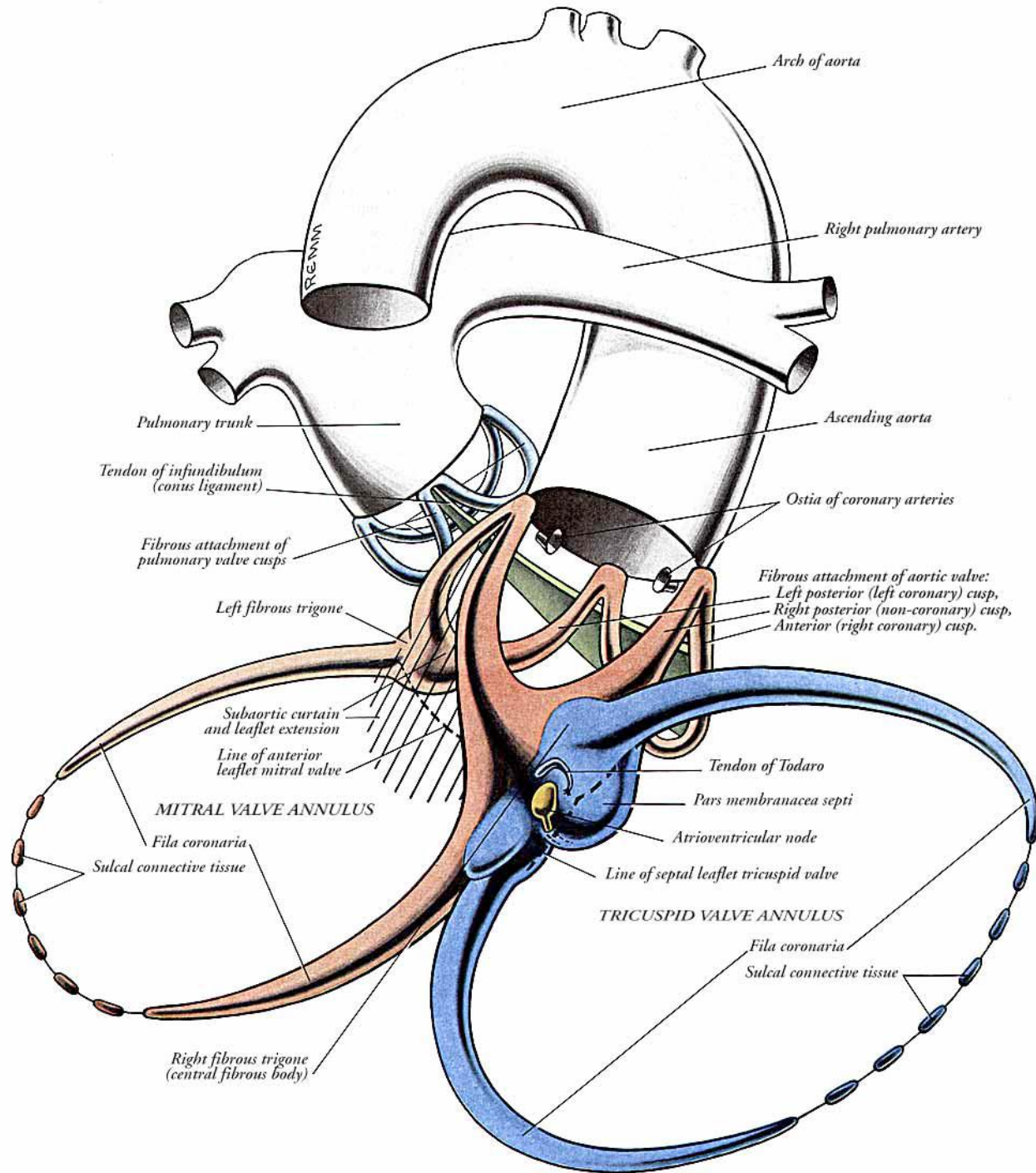




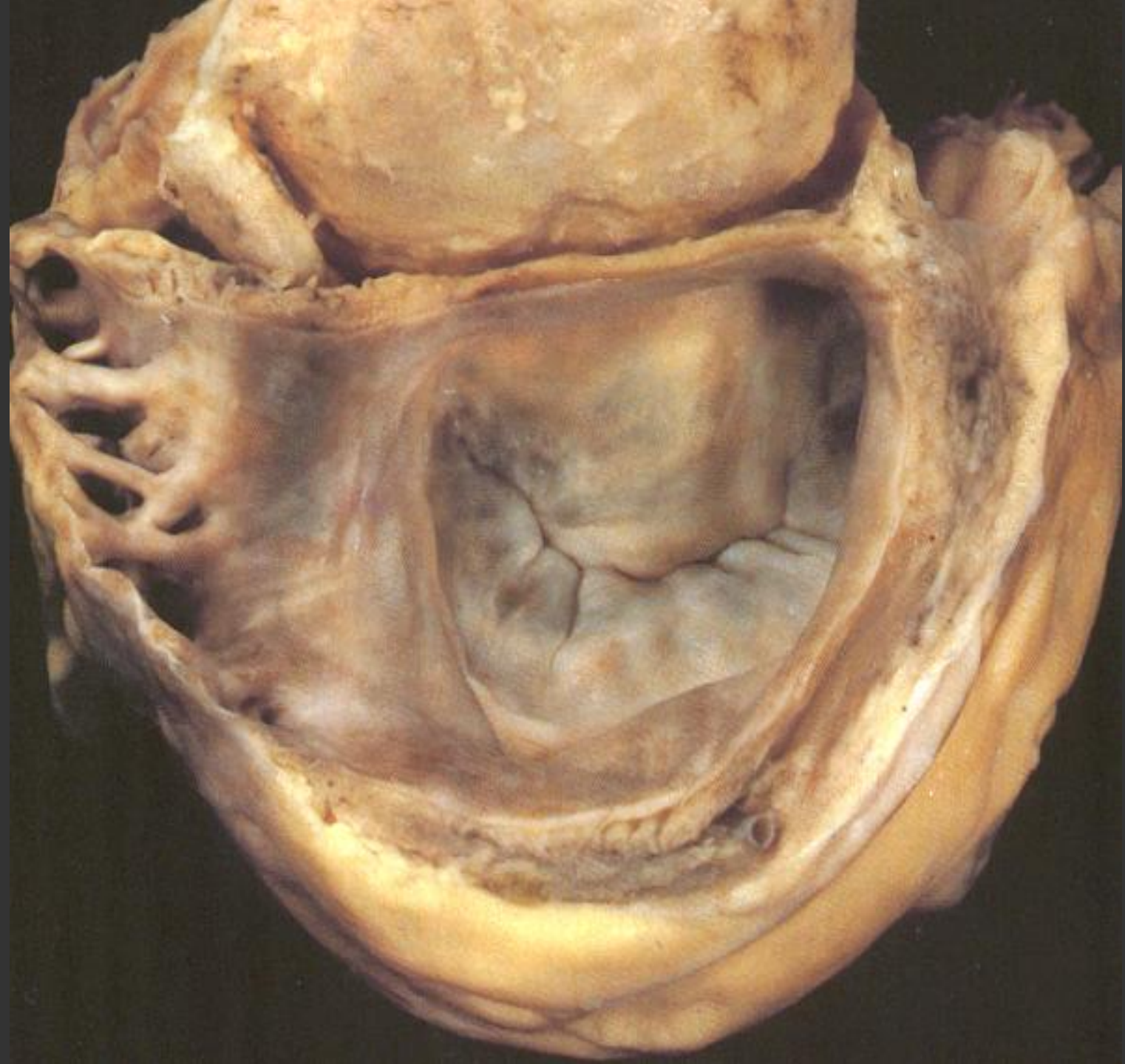


# MITRAL KAPAĀI

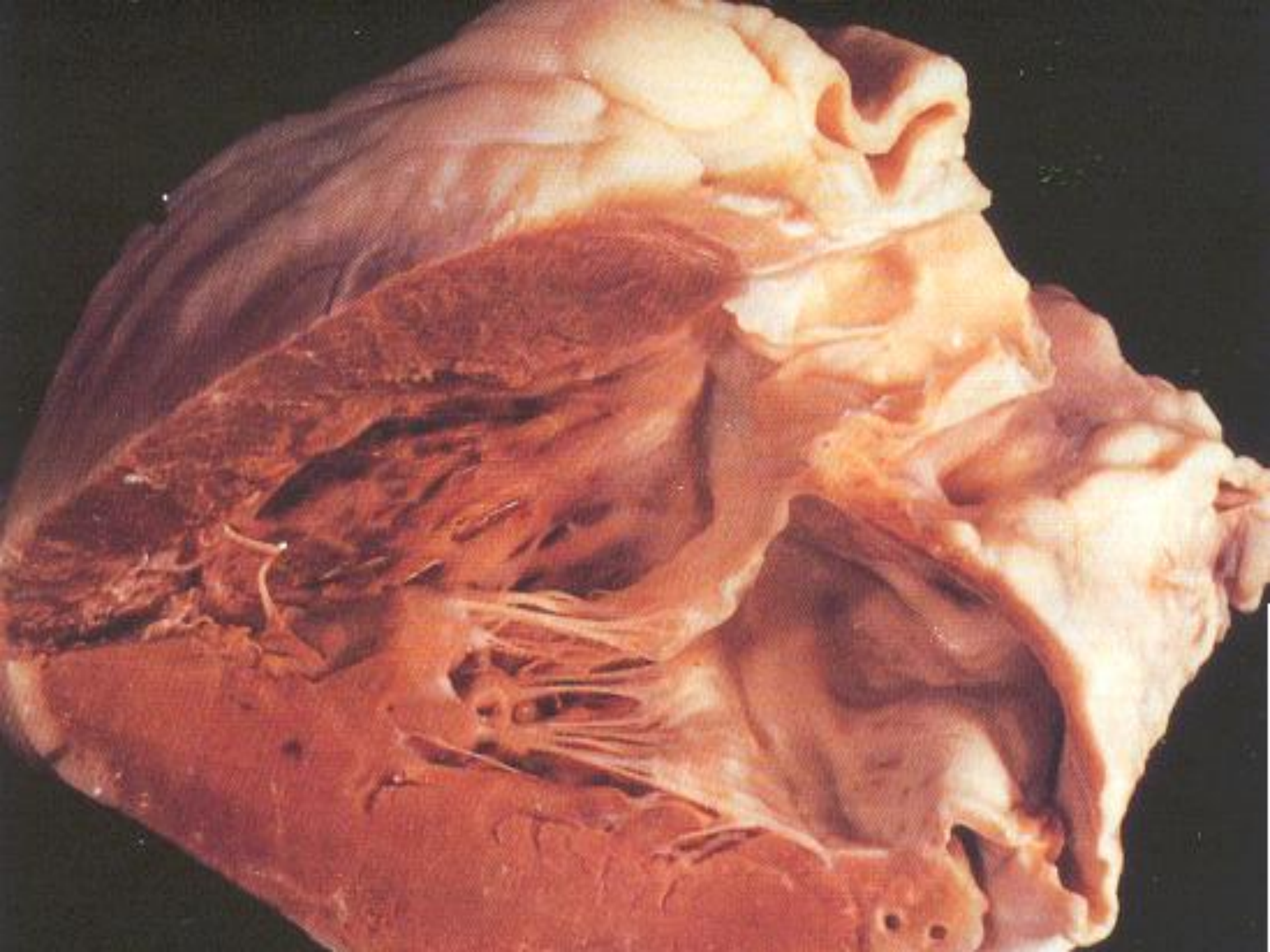












# Mitral Cerrahisine Tarihsel Bakış

1920 1930 1940 1950 1960 1970 1980 1990 2000



1925.  
Southar HS.  
Sol atrial  
apandajdan  
parmakla  
dilatasyon



1938.  
Glover & Davilla  
Anulusa  
sirküferensiyel  
sütür

1940'lar.  
Bailey C.  
Harken D.  
Brock R.  
Komissürotomi  
Valvuloplasti  
valvotomi

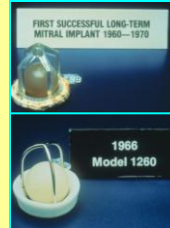


1953.  
Gibbon  
KPB  
makinası

1955.  
Logan &  
Turner  
mitral  
valve  
dilatatörü



1960.  
Starr  
ilk MVR



1969.  
Carpentier  
Gluteraldehitle  
fiksasyon  
Ring anuloplasti



1971.  
Carpentier  
MY  
Fonksiyonel  
sınıflaması



**Superior**

**Apex**

**Base**

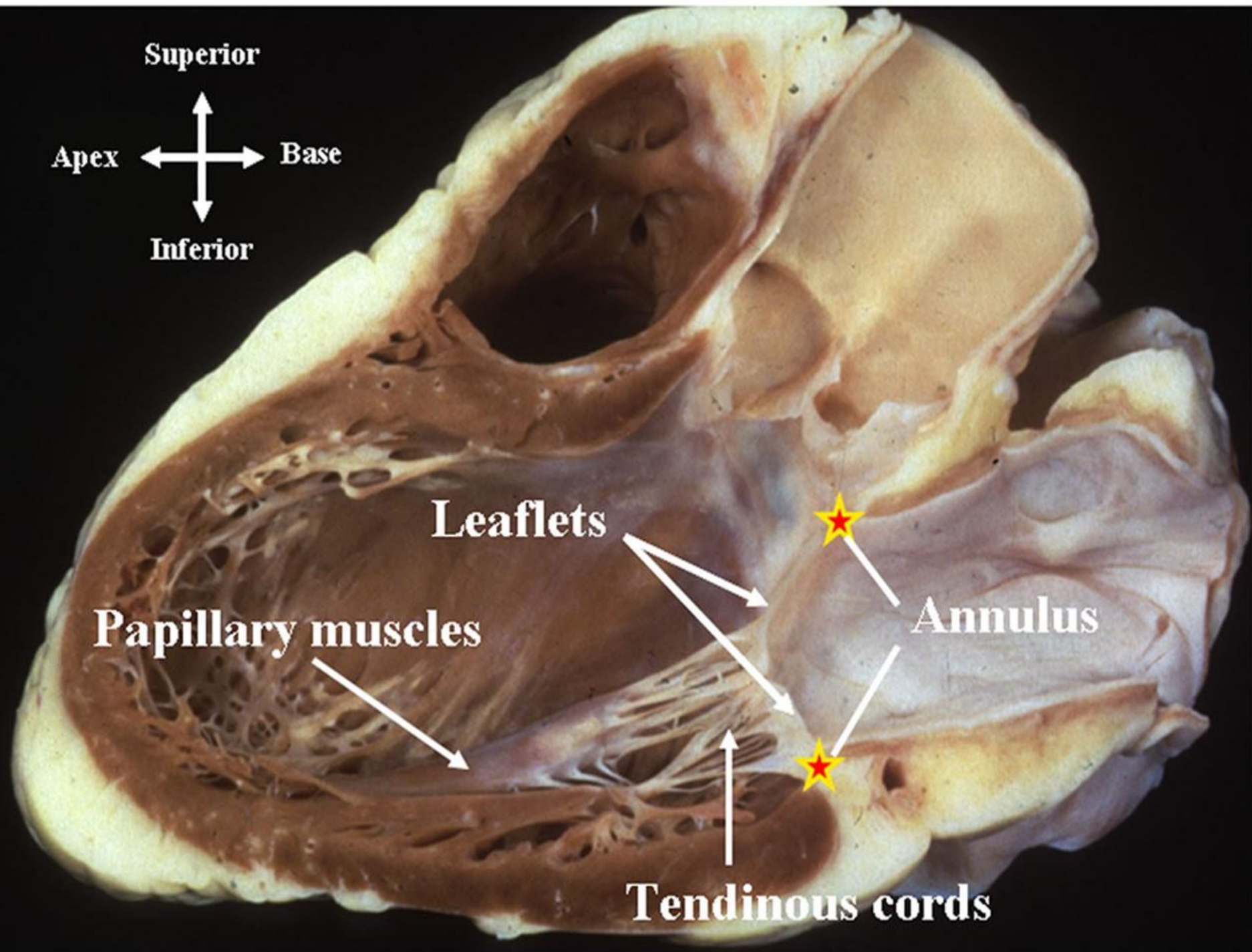
**Inferior**

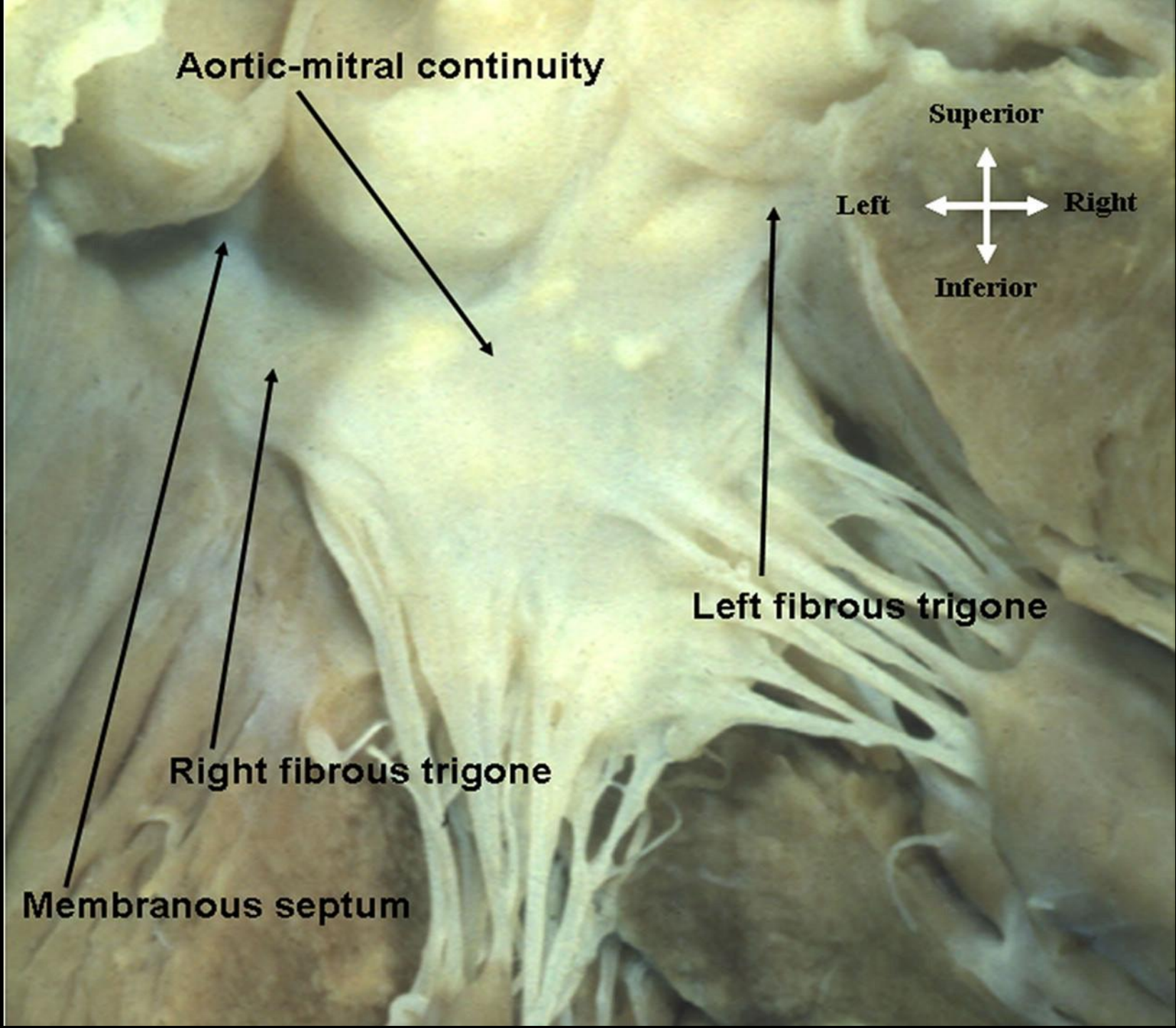
**Leaflets**

**Annulus**

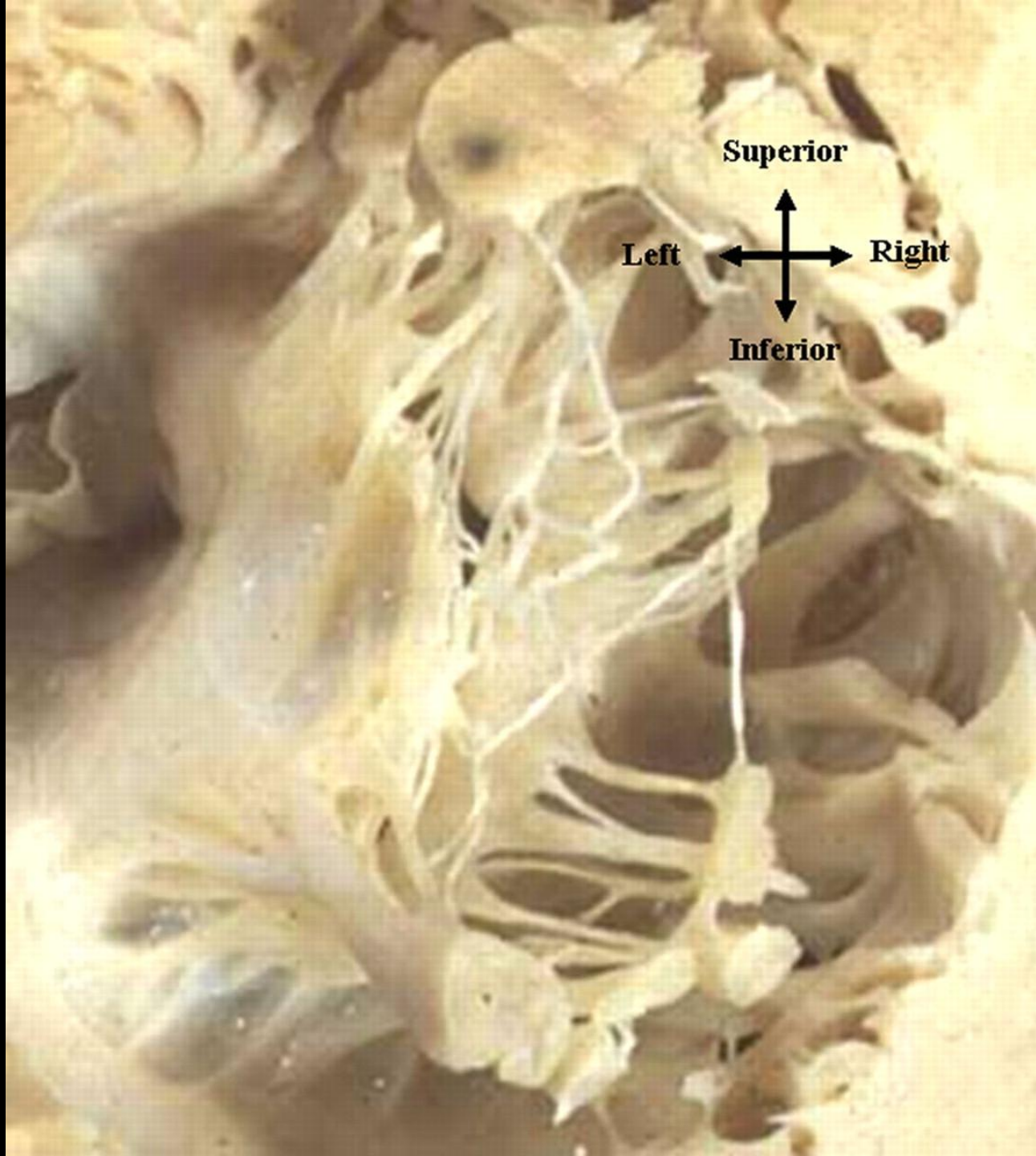
**Papillary muscles**

**Tendinous cords**









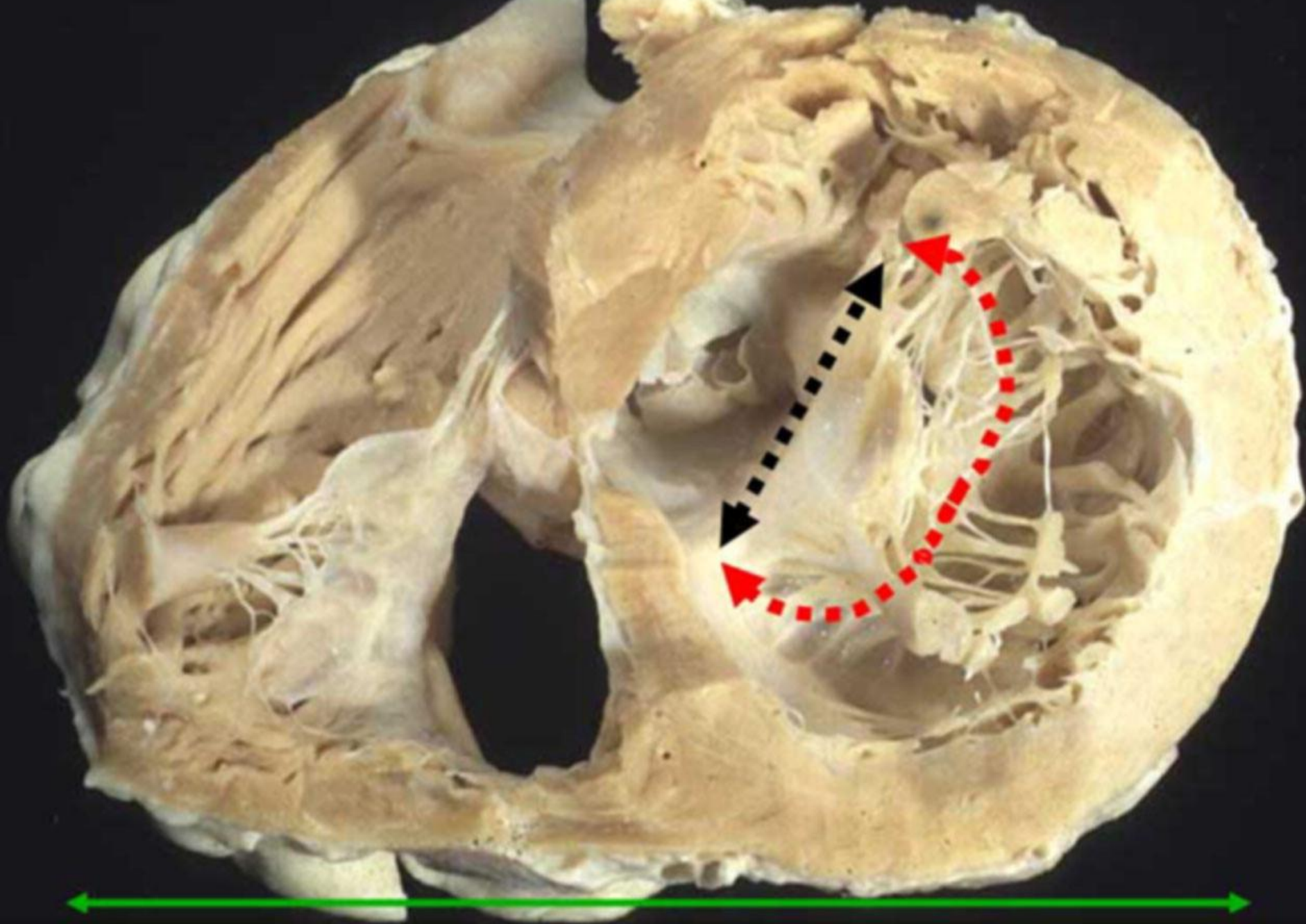
**Superior**

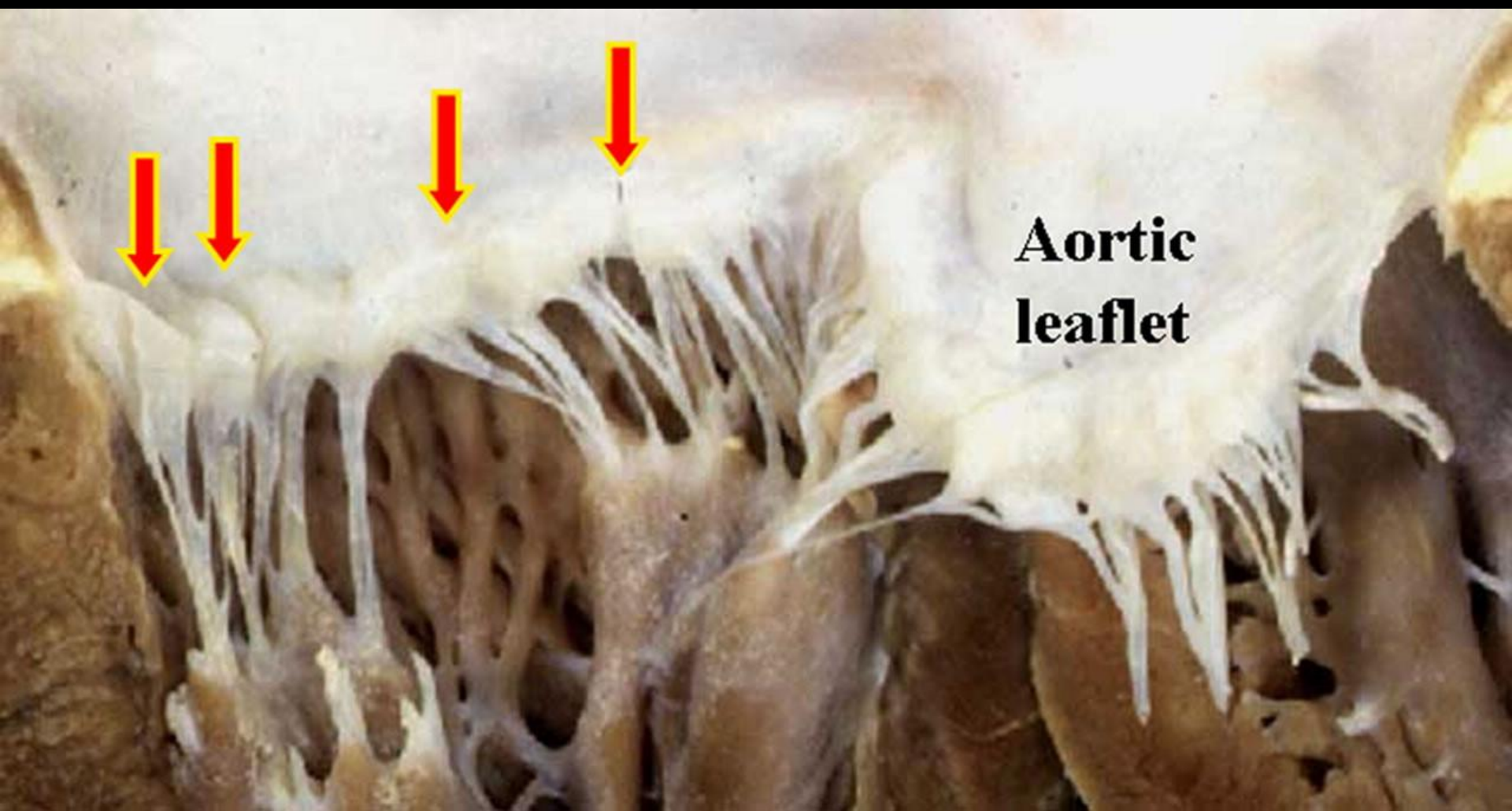
**Left**

**Right**

**Inferior**







**Aortic  
leaflet**



**Postero-superior muscle**



**Antero-inferior muscle**



**Aortic root**

**Tricuspid valve**

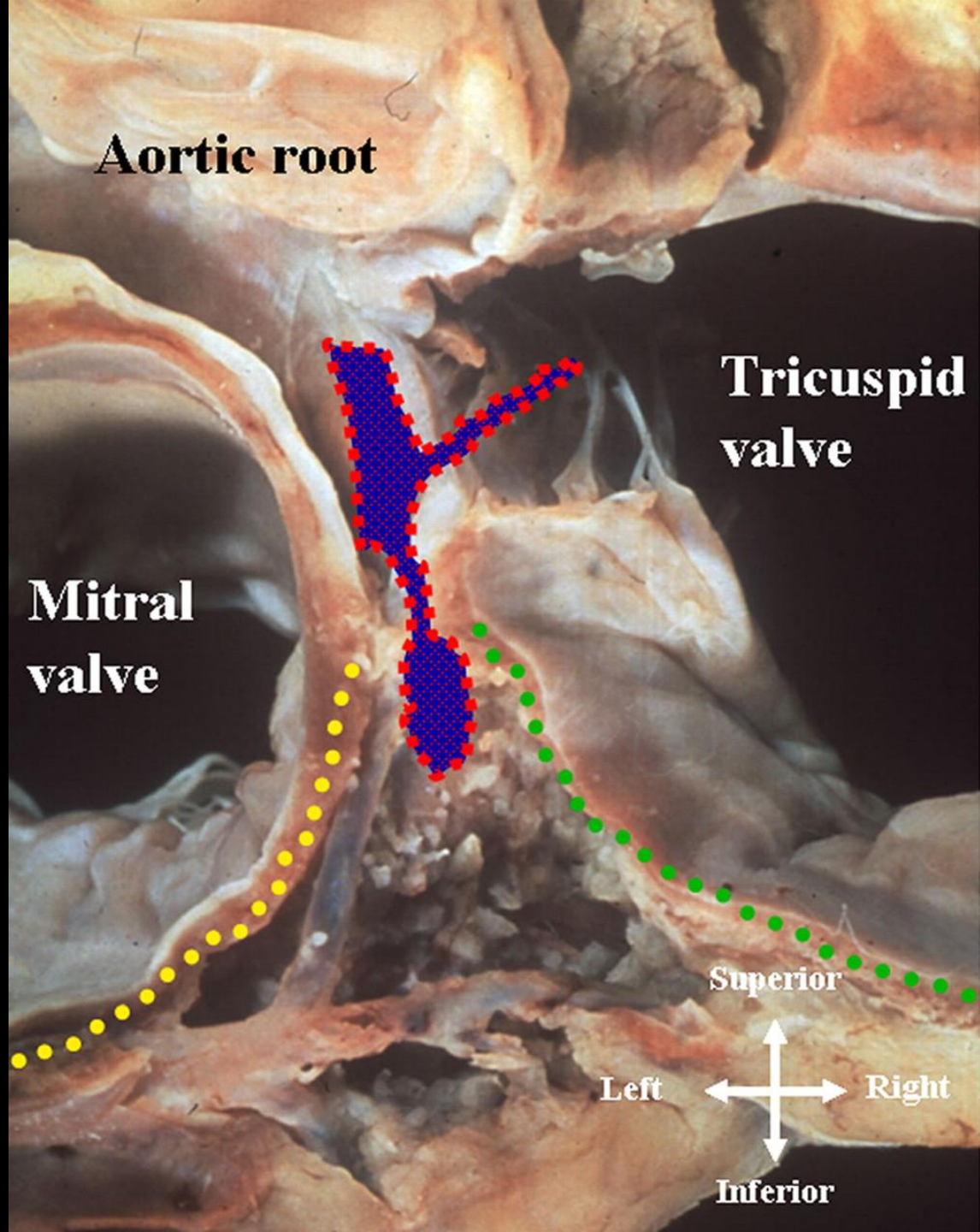
**Mitral valve**

**Superior**

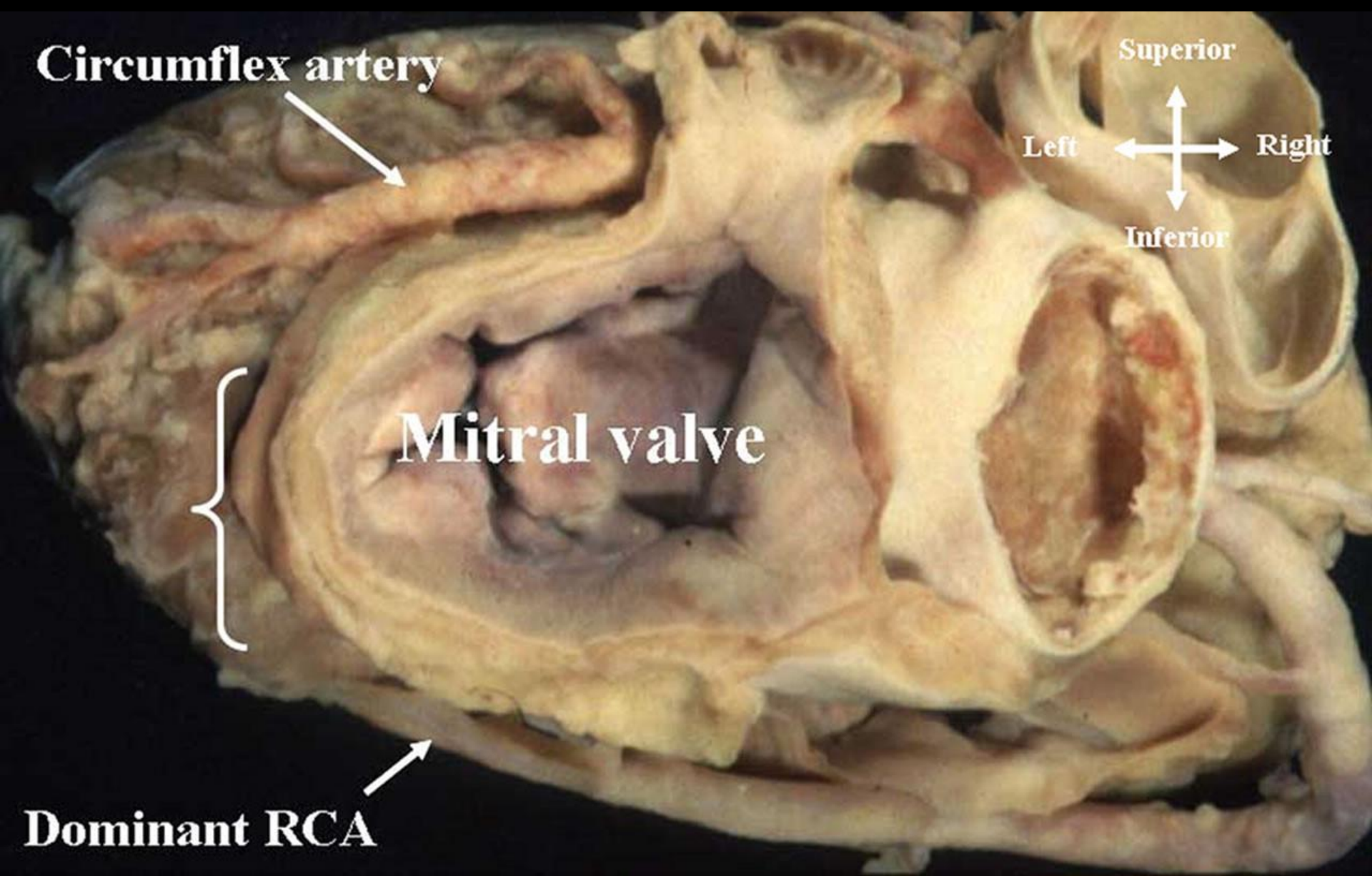
**Left**

**Right**

**Inferior**







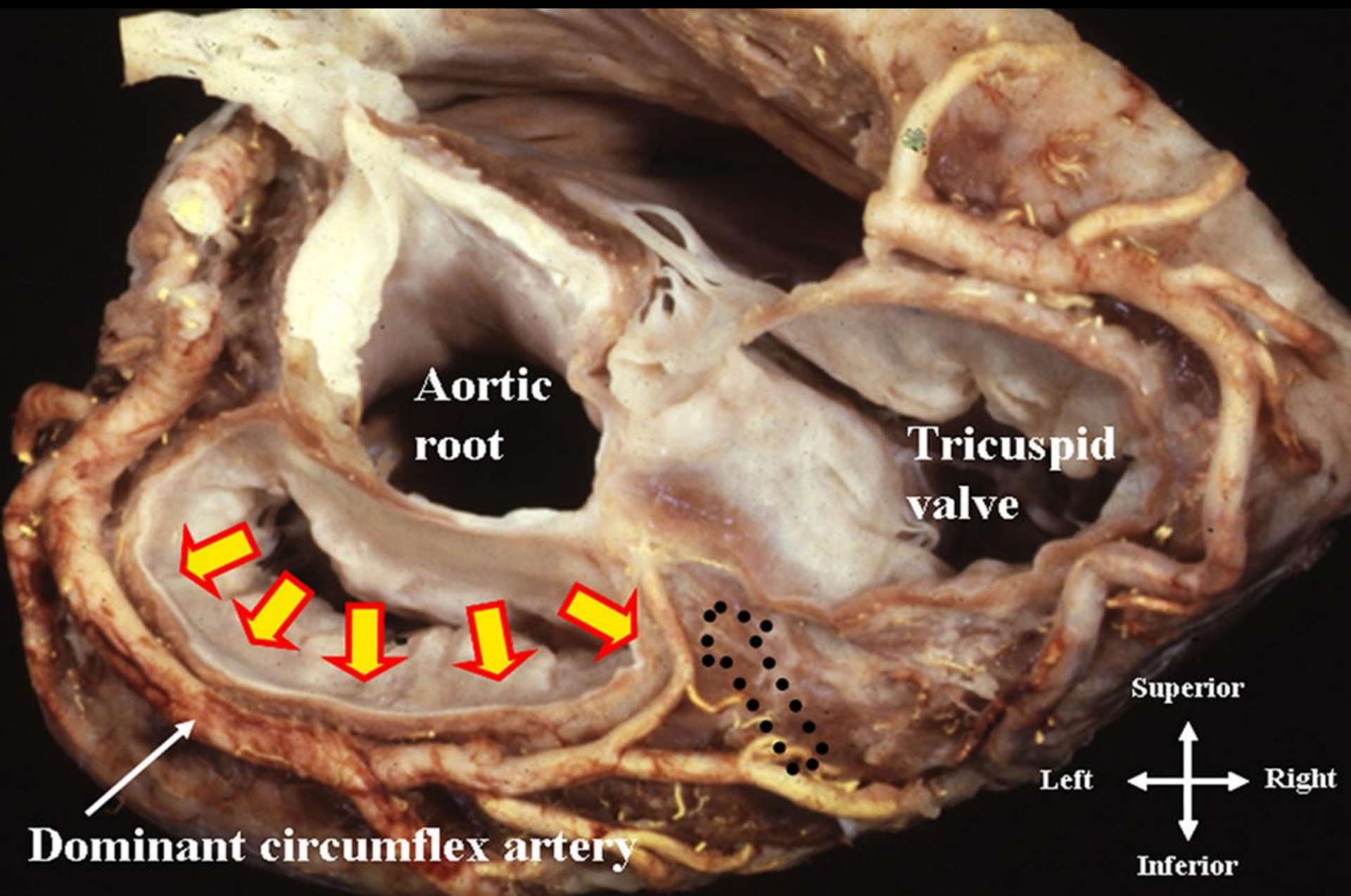
**Circumflex artery**

Superior  
Left      Right  
Inferior

**Mitral valve**

**Dominant RCA**





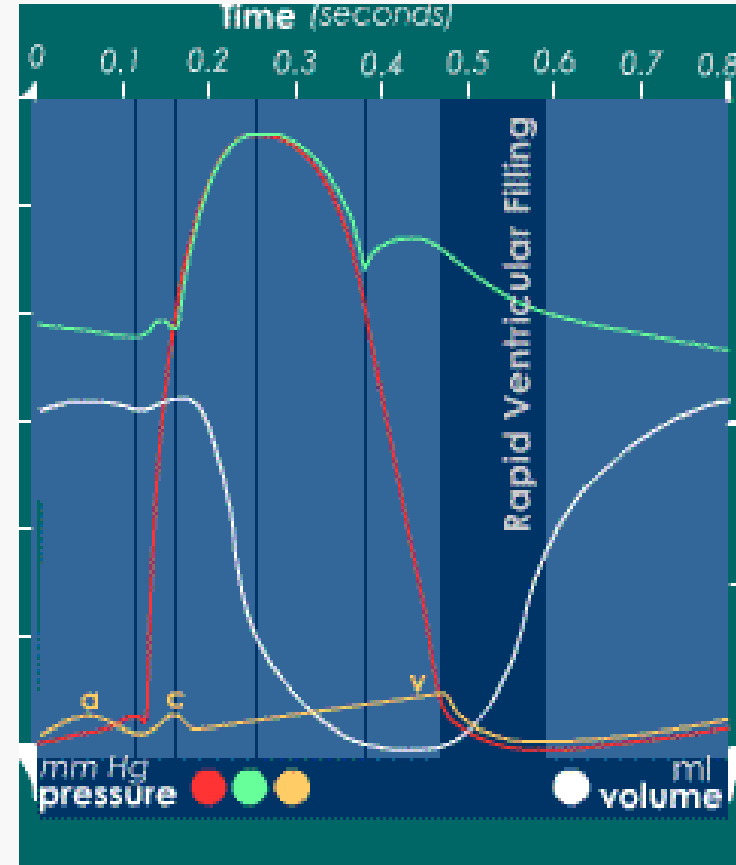
# Mitral Kapagın Dinamikleri

## diyastol

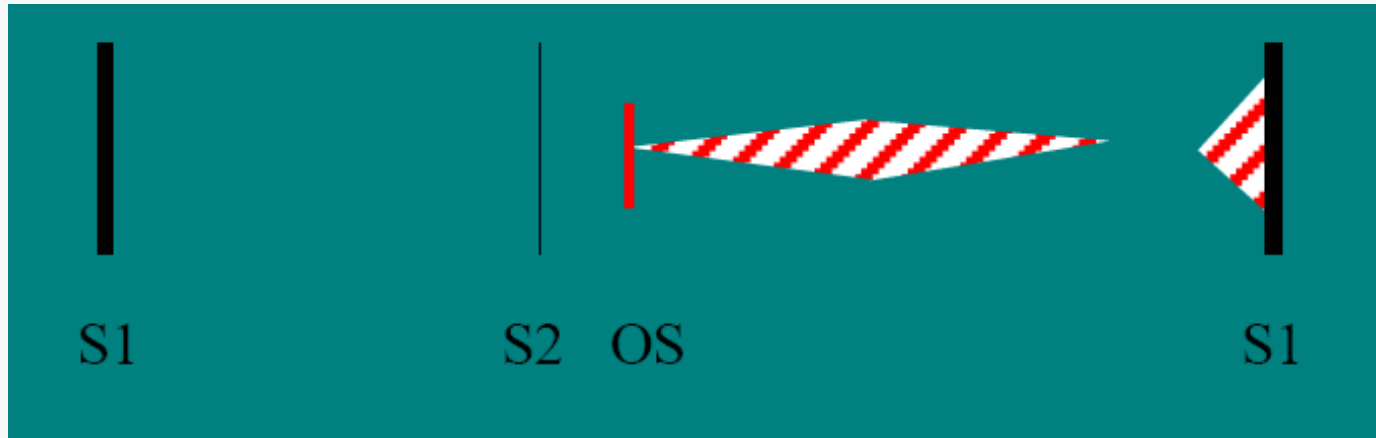
- isovolumetrik relaksasyon
- pasif ventriküler dolum (hızlı dolum, geç dolum)
- atriyal sistol (a-dalgası)
- Mitral kapak kapanması

## sistol

- isovolumetrik kontraksiyon
- hızlı ejeksiyon, hızı azalmış ejeksiyon
- Aort kapagının kapanması



# Mitral Darlığı



# Mitral Darlığı

## Etiyoloji

- ✓ **Romatizmal kalp hastalığı !!!**
- ✓ **Mitral anüler kalsifikasyon**
- ✓ **Neoplazm (sol atriyal miksoma)**
- ✓ **Konjenital mitral darlığı (paraşüt deformitesi)**
- ✓ **Aktif infektif endokardit**
- ✓ **SLE, karsinoid sendrom, Metiserjid, Hunter-Hurler Sendromu, Fabry hastalığı, Whipple hastalığı, Romatoid artrit**



# Romatizmal Ateş

*“kalbi ısırır ve eklemleri yalar”*

---

- 1. Mitral**
- 2. Aort**
- 3. Pulmoner**
- 4. Trikuspid**

# Mitral Darlığı

## Doğal Seyir

---

devamlı, ilerleyen, hayat boyu süren hastalık uzun latent periyod

örn: Romatizmal ateş için 20-40 yıl

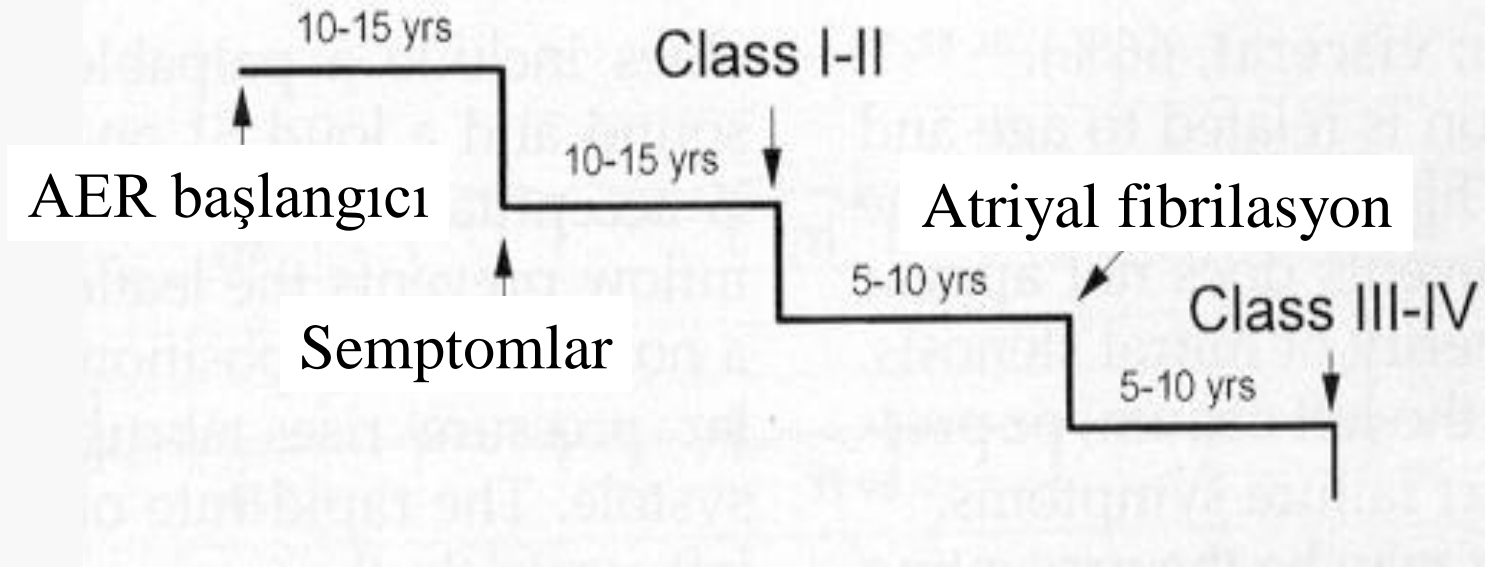
### Sağ kalım

Asemptomatik MD > 80% (10 yıl)

Semptomatik MD 0-15% (10 yıl)

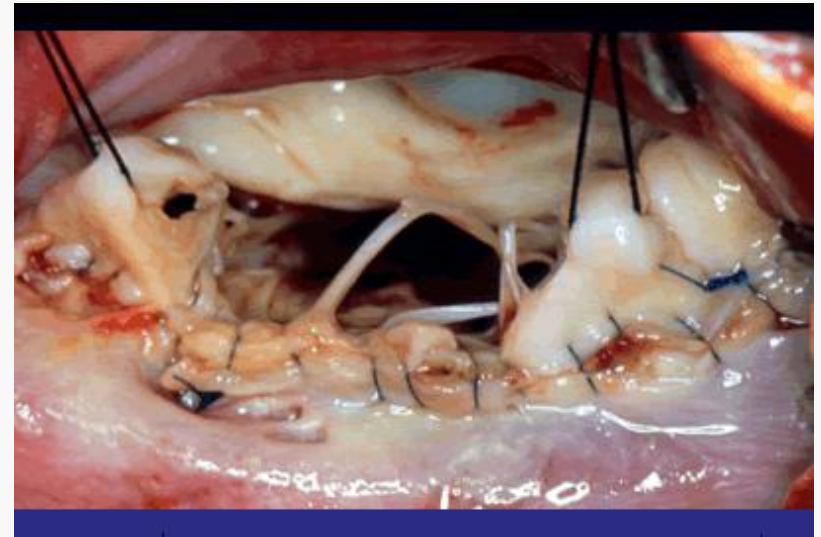
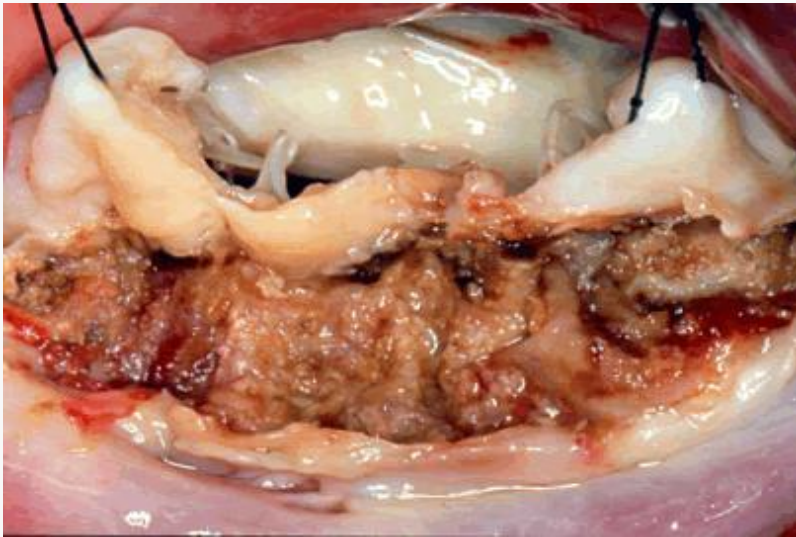
Pulmoner hipertansiyon < 3 yıl

ACC/AHA Practice Guidelines, November 1, 1998.



**Mitral darlığı:  
“platoların hastalığı”**

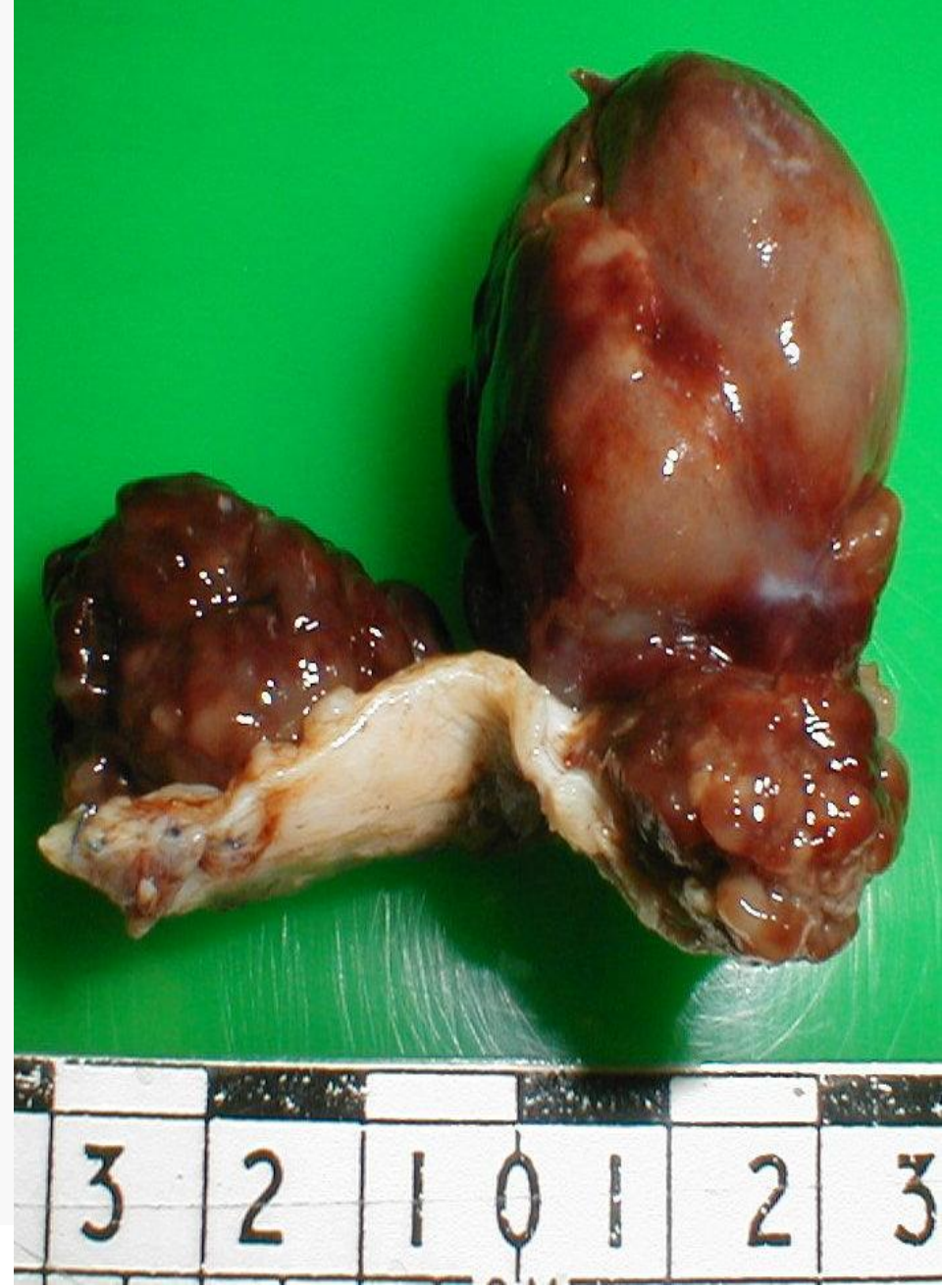
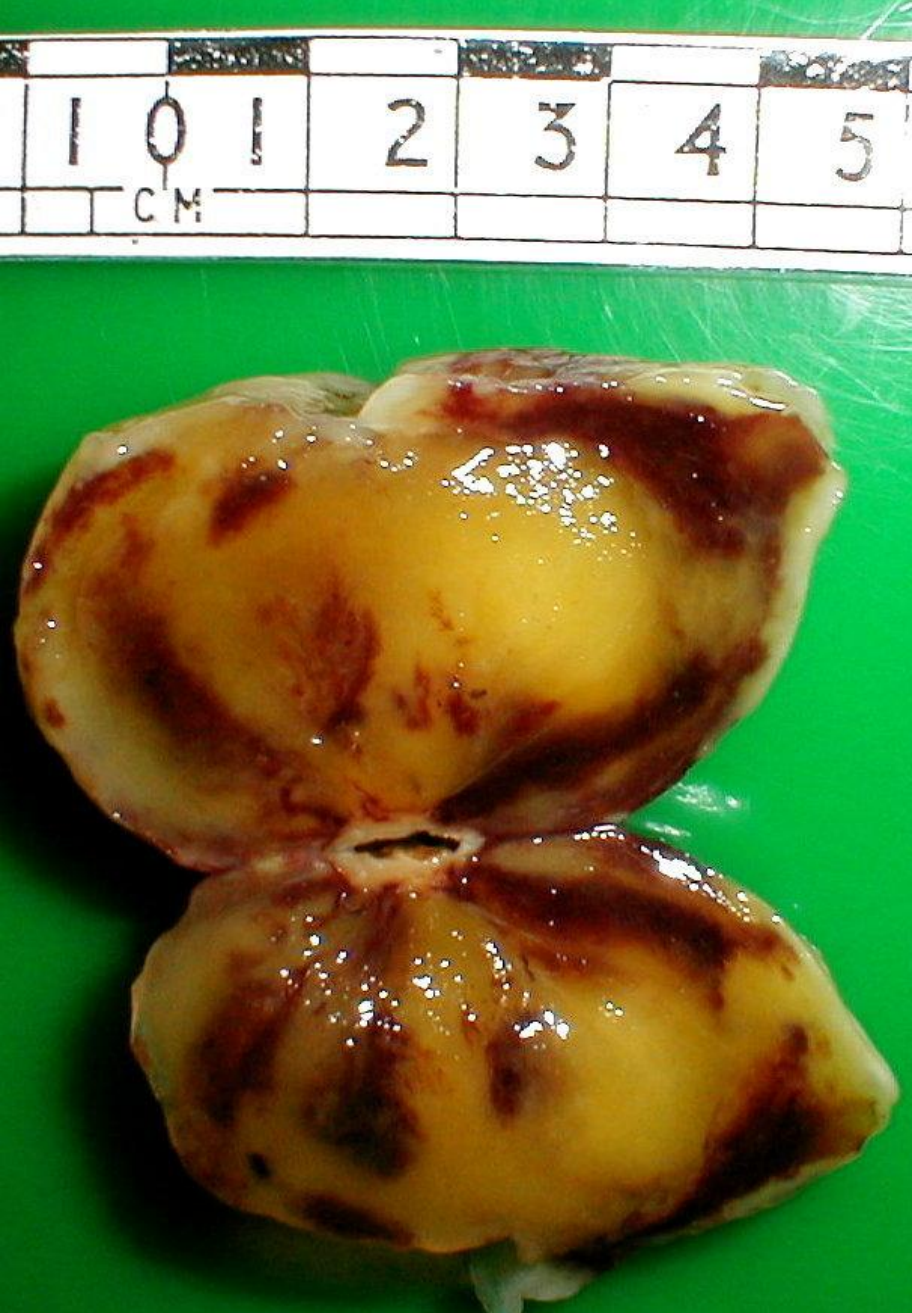
# Mitral Anuler Kalsifikasyon







**Atrial miksonoma**



**Atrial miksoma: Frajil, asit mukopolisakkarit matriks**

MI: 0.9  
T6210  
17 FEB 00  
09:14:16  
PROC 2/0/E/F3  
GLENFIELD HOSP

PAT T: 37.0C  
TEE T: 37.6C

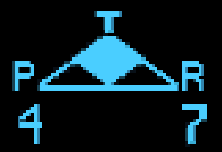
[hp]

Ø 139 180

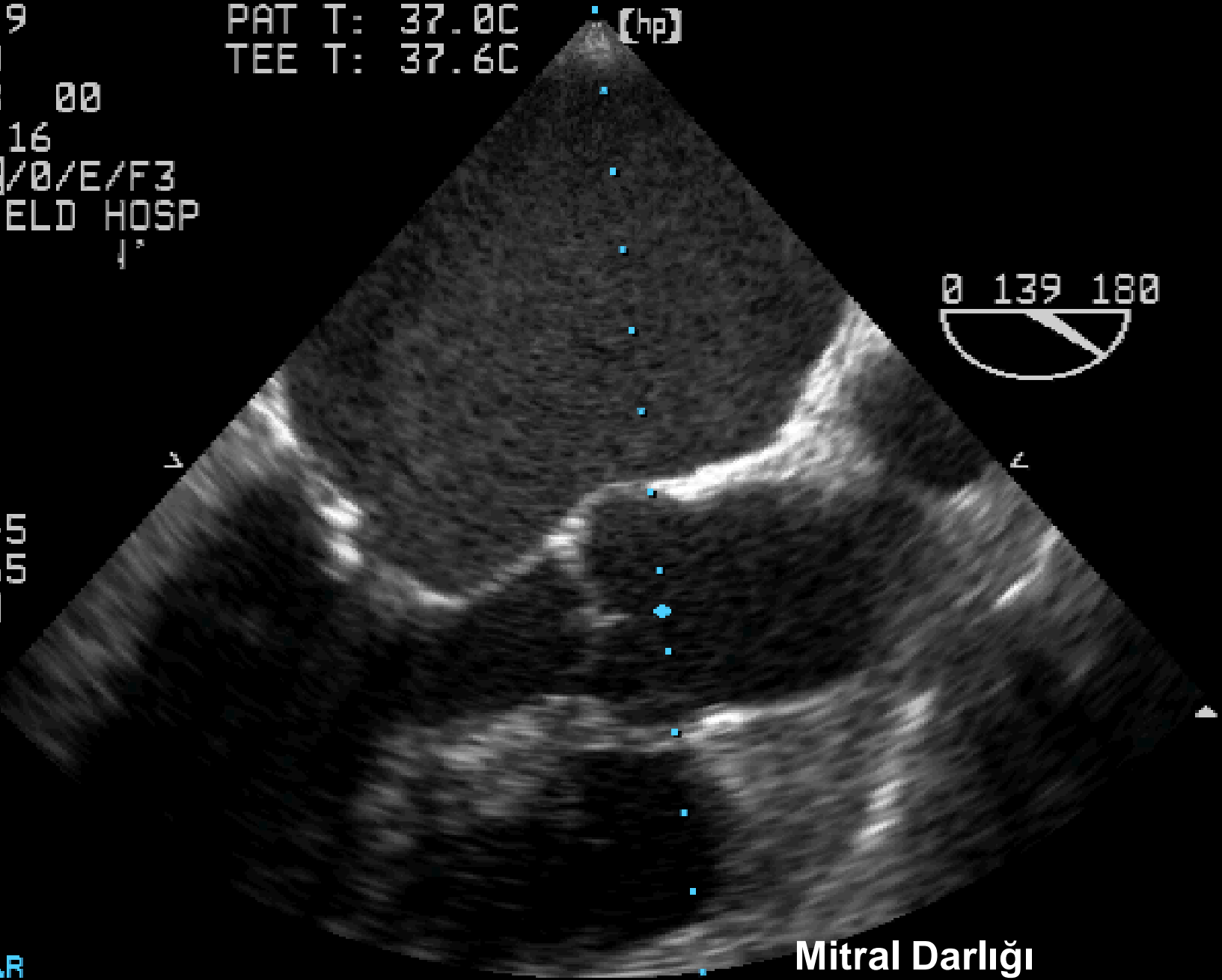
MP2

GAIN 45  
COMP 65  
97BPM

12CM  
56HZ



Mitral Darlığı  
Hokey-sopası deformitesi



TIS: 0.7

PAT T: 37.0C

[hp]

4.4MHz

T6210

TEE T: 38.6C

67

17 FEB 00

09:25:28

PROC 2/0/E/M2/A

GLENFIELD HOSP

ECHO 'DYLAN'



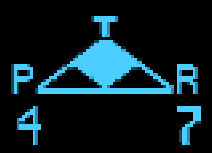
CM/S

67

MP2

GAIN 45  
COMP 65  
93BPM

10CM  
28HZ



**Mitral Darlığı  
Sol atriyumda SEK**

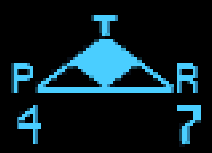


MI: 0.9  
T6210  
17 FEB 00  
09:07:57  
PROC 2/0/E/F3  
GLENFIELD HOSP  
ECHO 'DYLAN'

PAT T: 37.0C [hp]  
TEE T: 37.8C



MP2  
GAIN 45  
COMP 65  
99BPM  
12CM  
56HZ



**Mitral Darlığı**  
**Sol atriyal apandajda trombus**

# Mitral Darlığı

---

- ✓ **Normalde erişkinde mitral kapak orifis alanı**  
**MVA= 4-6 cm<sup>2</sup>**
- ✓ **Semptomların gelişmesi**  
**MVA < 2.5 cm<sup>2</sup>**
- ✓ **İstirahatte semptomlar**  
**MVA < 1.5 cm<sup>2</sup>**

# Mitral Darlığında Doppler EKO Değerlendirmesi

---

## Ortalama Gradient:

Hafif mitral darlığı

6 mmHg

Orta derecede mitral darlığı

6-12 mmHg

**Ciddi mitral darlığı**

**> 12 mmHg**

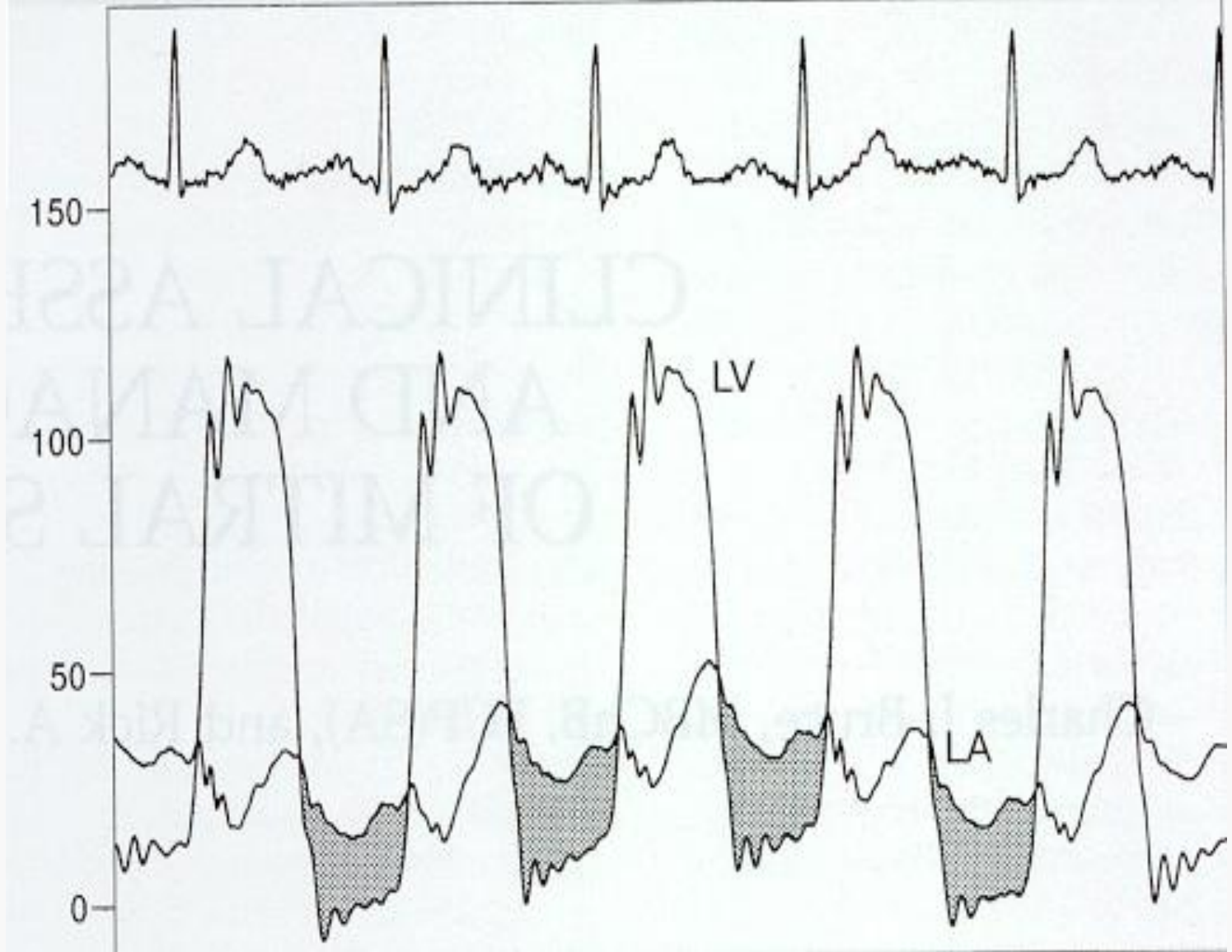
# MD Derecelendirmesi

---

## Mitral Kapak Alanı

Hafif mitral darlığı	1.5-2.0 cm <sup>2</sup>
Orta derecede mitral darlığı	1.0-1.5 cm <sup>2</sup>
<b>Ciddi mitral darlığı</b>	<b>&lt; 1.0 cm<sup>2</sup></b>





**Mitral Darlığında diyastolik transmitral gradient ölçülür**

# **Mitral Darlık**

## **Medikal tedavi**

---

- ✓ **Tuz kısıtlaması, diüretikler**
- ✓ **Antikoagulasyon**  
**AF ve embolik olay öyküsü**
- ✓ **Romatizmal ateş ve endokardit**  
**proflaksisi**

# Mitral Darlık MVR

## Endikasyonları

---

- ✓ **Semptomatik hastalar NYHA III-IV ve orta dereceli MD**

**EOA < 1.5 cm<sup>2</sup>**

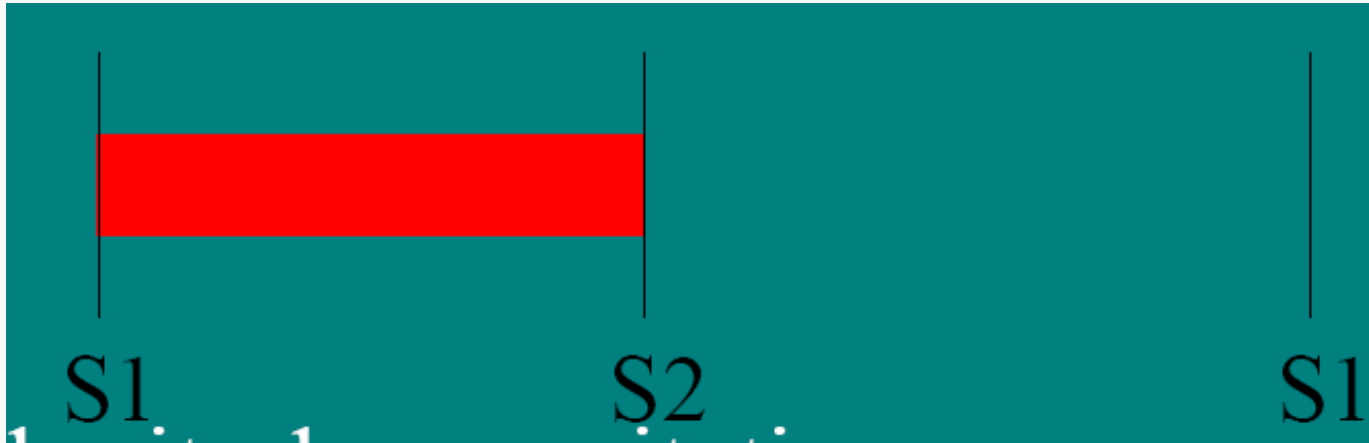
**Ortalama gradient > 5 mmHg**

- ✓ **NYHA I-II**

**Ciddi MS (EOA < 1.0 cm<sup>2</sup>)**

**Ciddi PH (PAP > 60mmHg, istirahatte)**

# Mitral Yetmezliđi





# Mitral Kapak Prolapsusu



# Mitral Yetmezlik

## “Carpentier Klasifikasyonu”

### Tip I

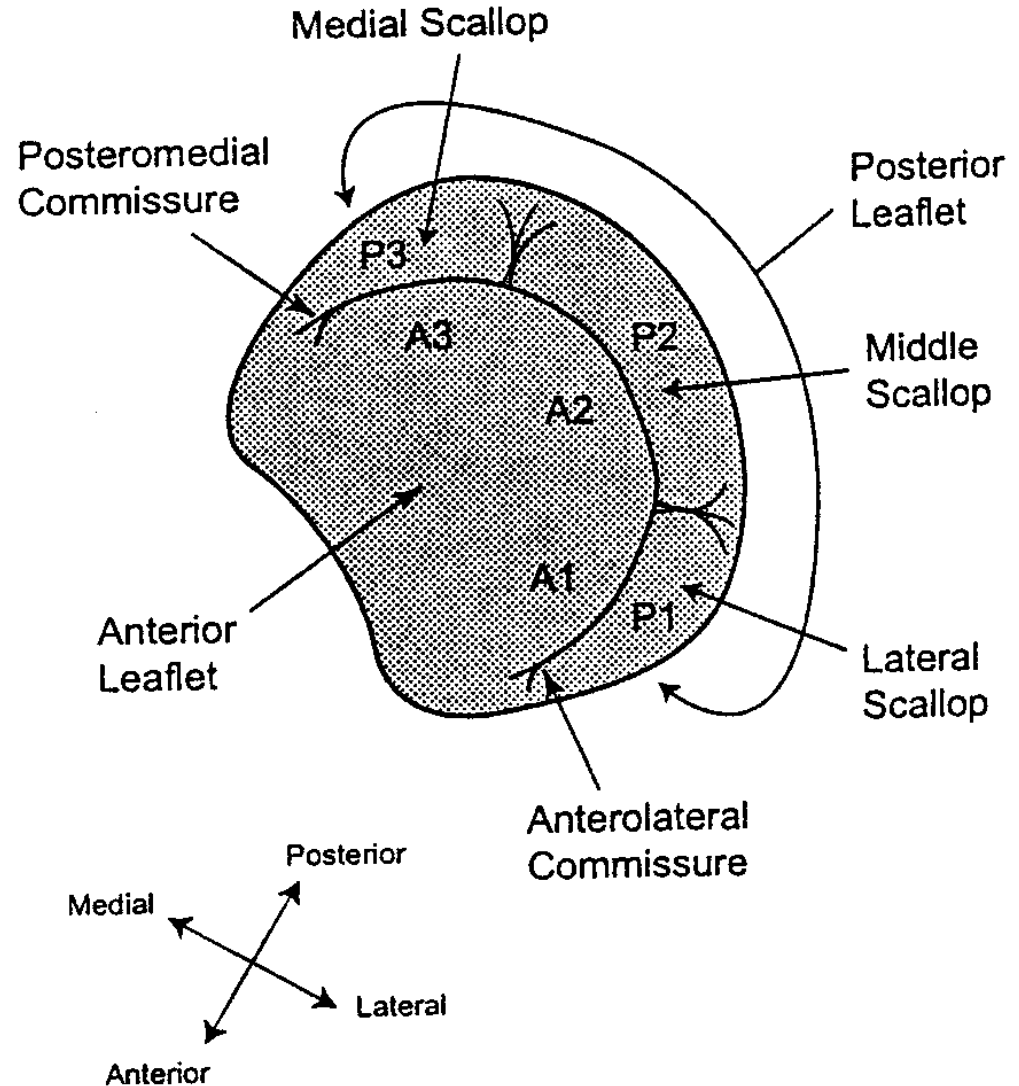
normal kapakçık hareketi, santral yetersizlik, posterior annüler dilatasyon

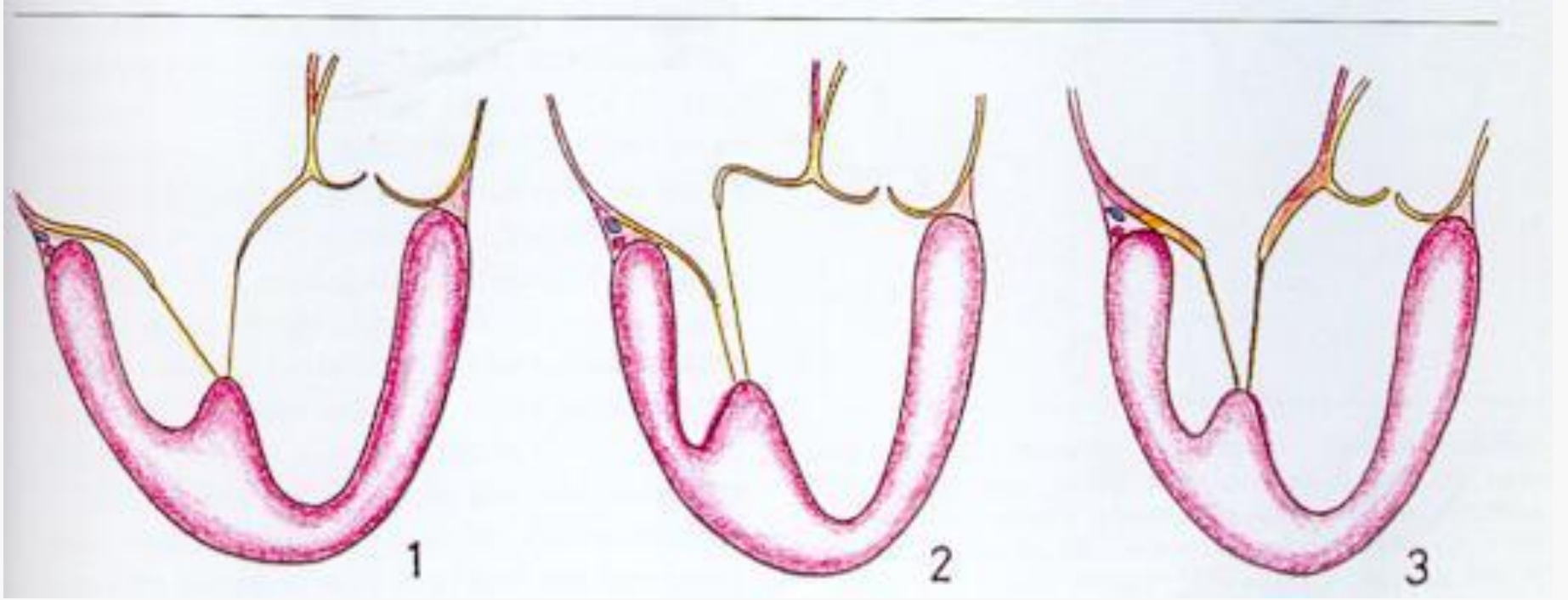
### Tip II

kapakçık prolapsı

### Tip III

sınırlanmış kapakçık hareketi  
diastol sırasında (IIIa),  
sistol sırasında (IIIb)



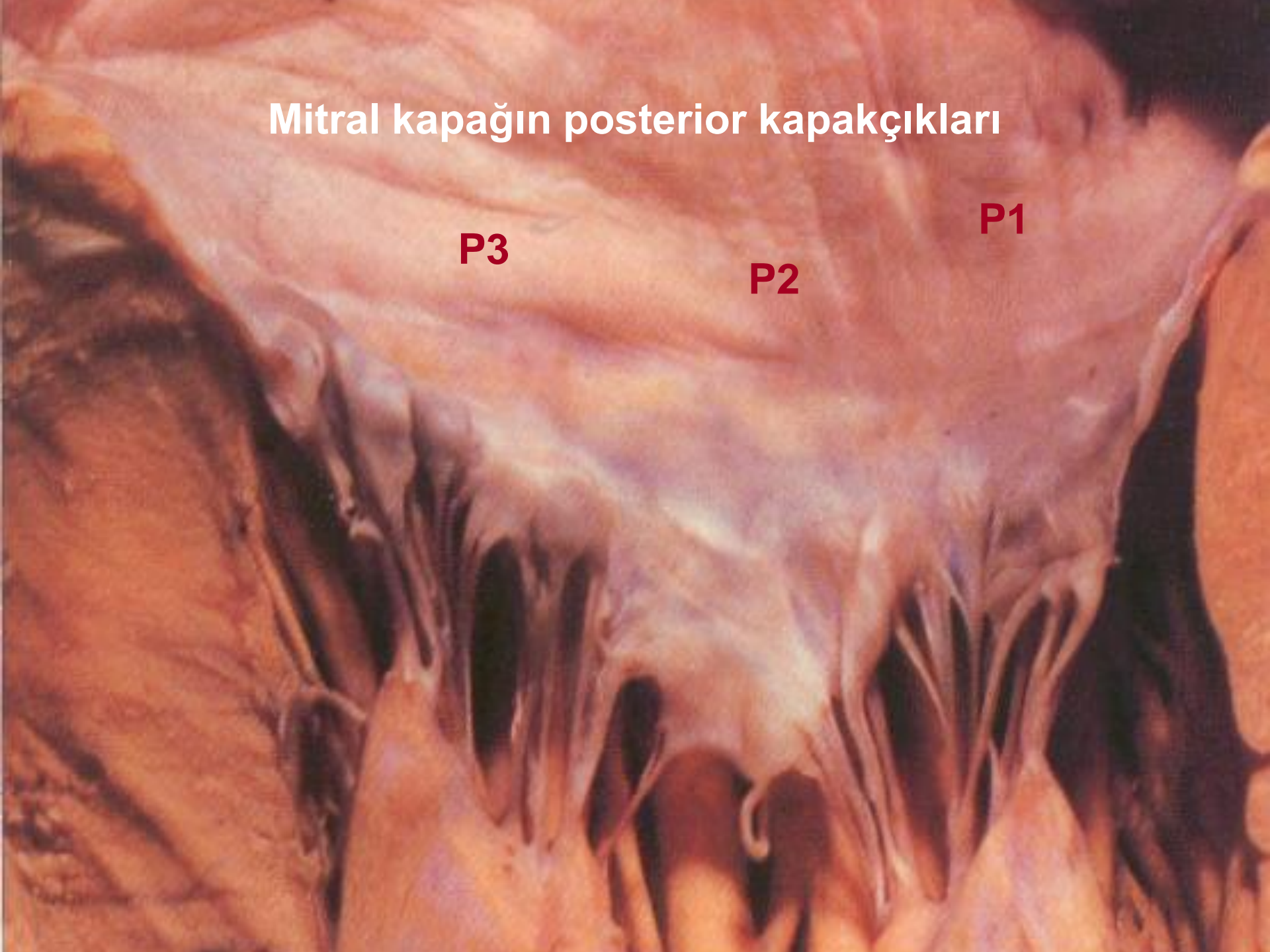


# Mitral kapağın posterior kapakçıkları

**P3**

**P1**

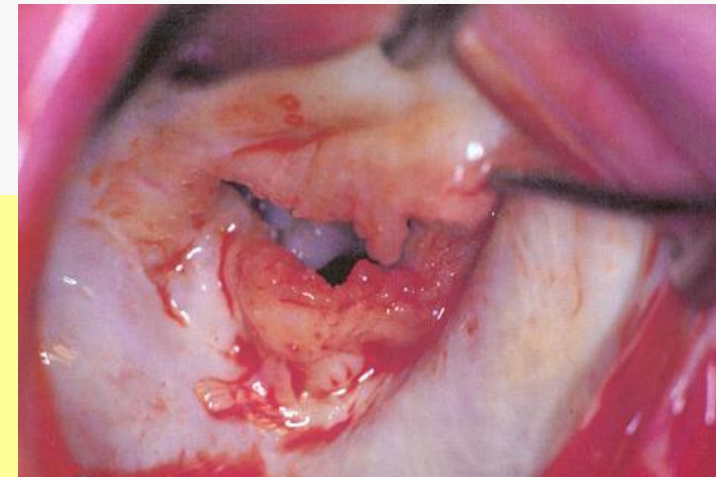
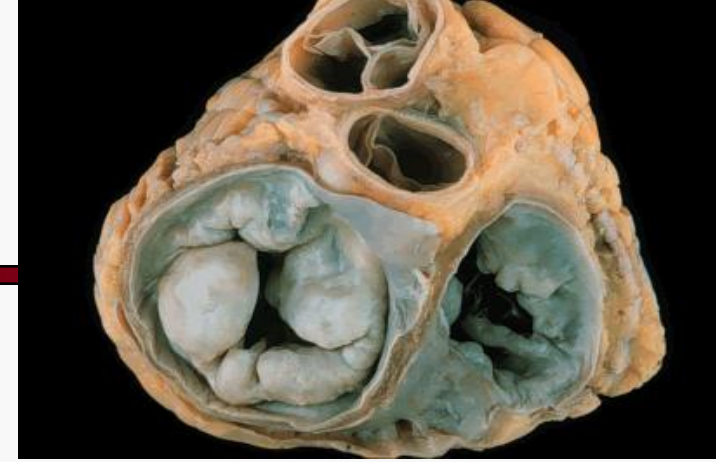
**P2**



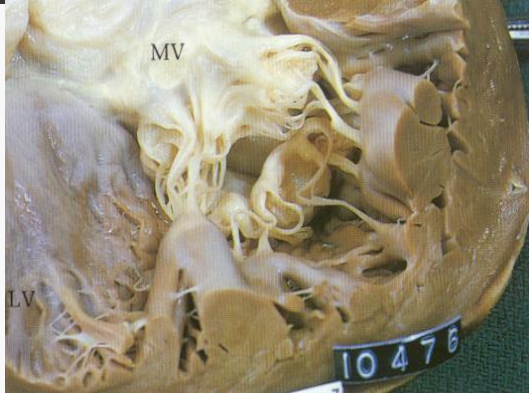
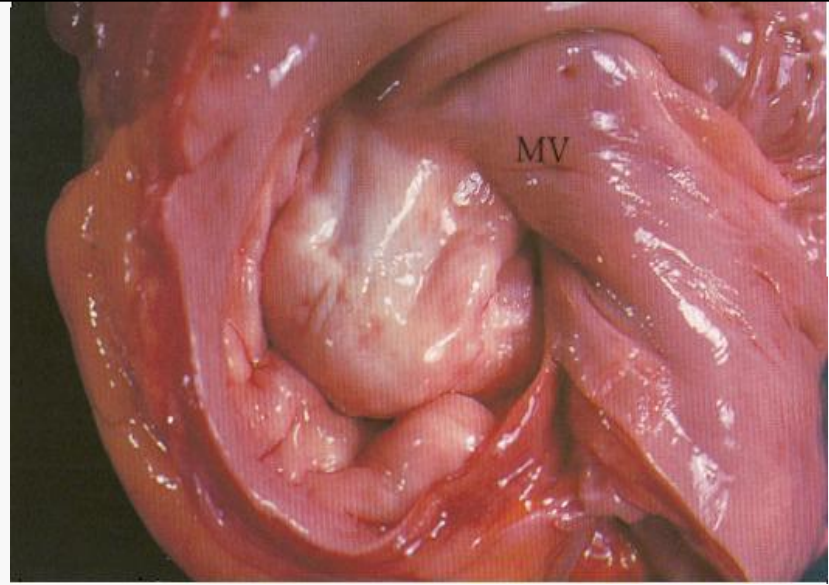
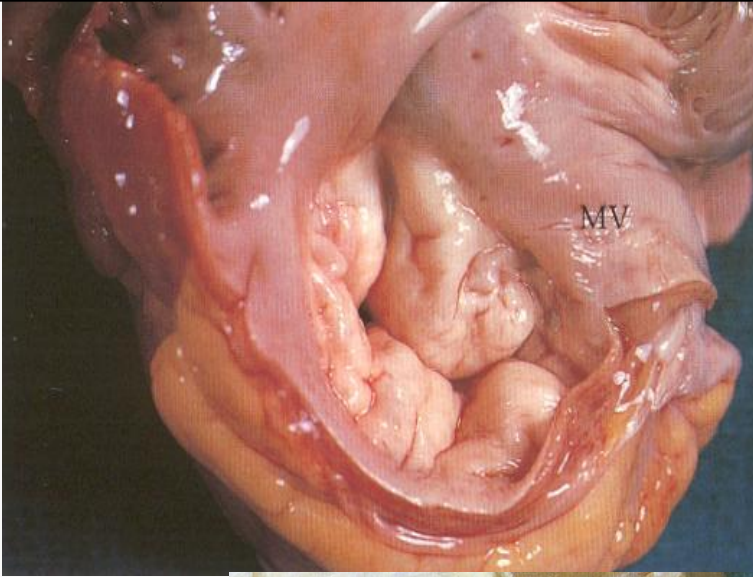


# Mitral Yetmezlik Etyolojisi

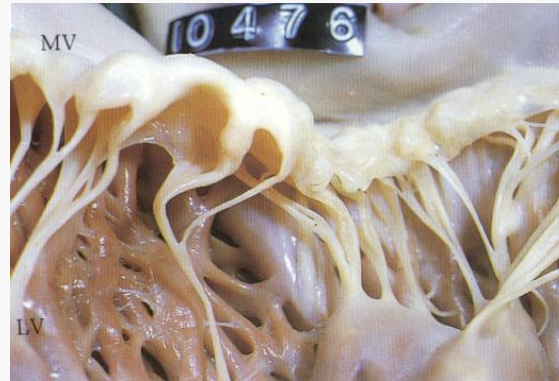
✓ Dejeneratif	44-50%
✓ Romatizmal	20-42%
✓ İskemik	7-17%
✓ Enfeksiyöz	3-8%
✓ Konjenital	3%
✓ K�nt toraks travmaları nadir	
✓ Dięer	1.5-2%



# Mitral kapağın miksömatöz dejenerasyonu



**Redundan korda**

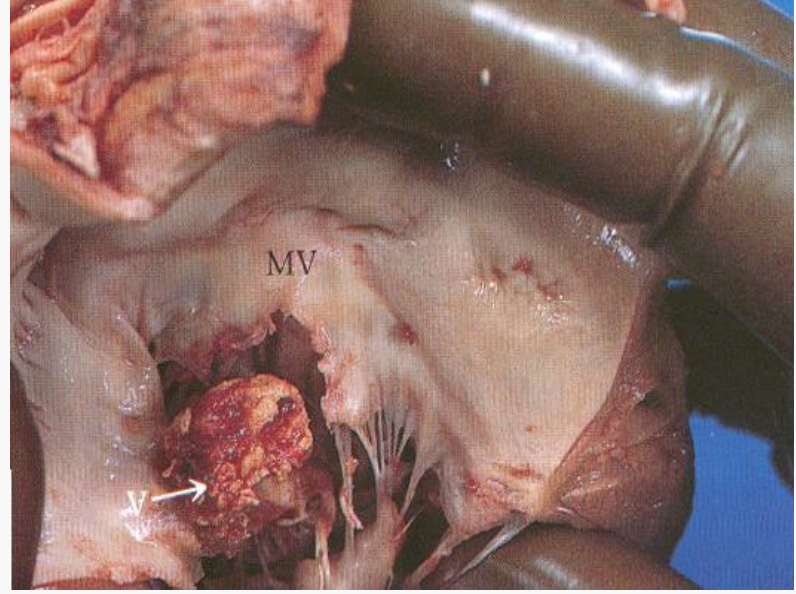


**Nanda NC. 1989 Atlas of Color Doppler  
Echocardiography**





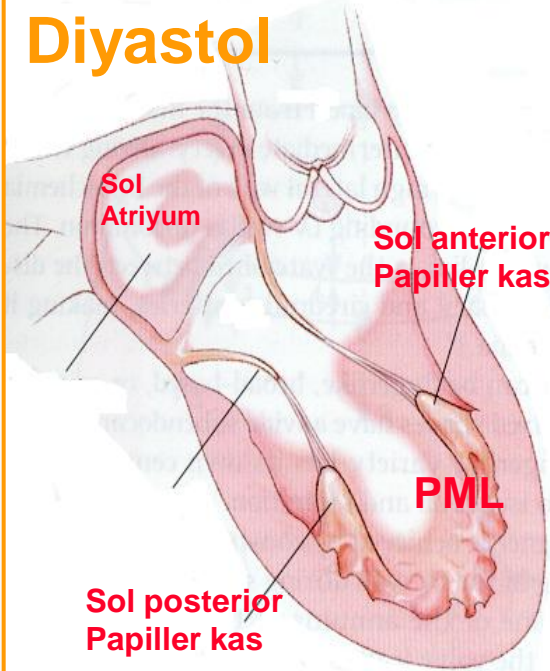
**Mitral kapakçıkların  
nodüler kalınlaşması**



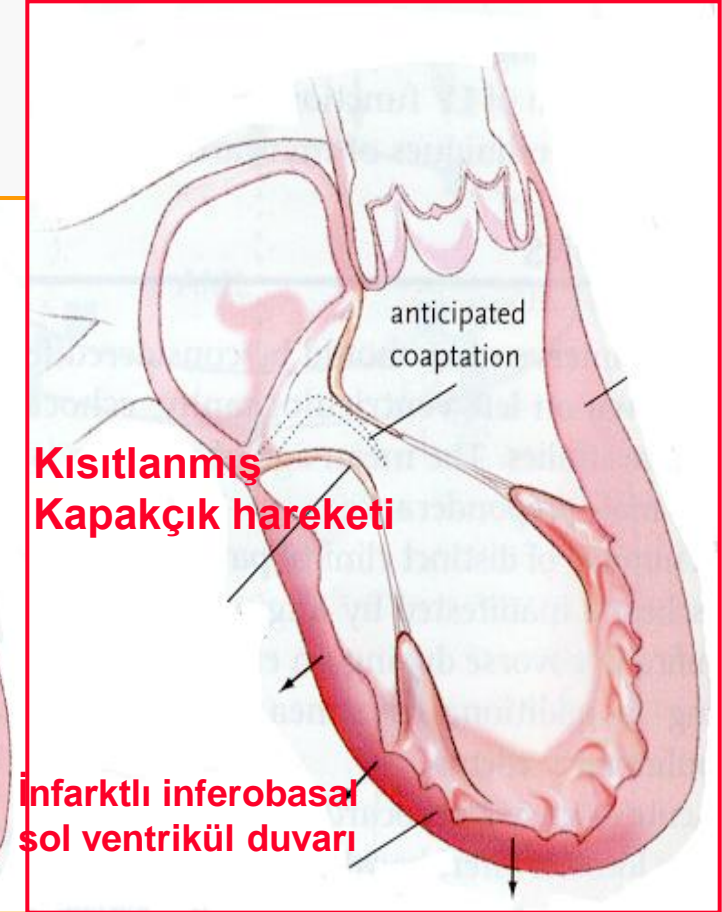
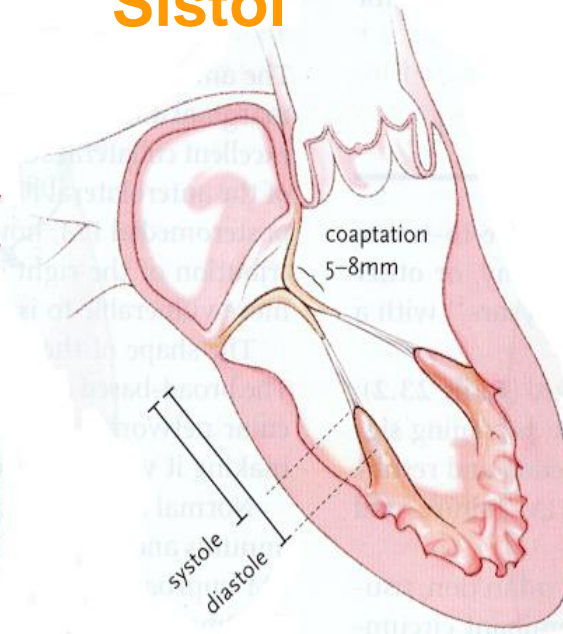
**Libman-Sacks endokarditi  
Noninfeksiyöz verrüköz vejetasyon**

# İskemik Mitral Yetmezliği

## Diyastol



## Sistol

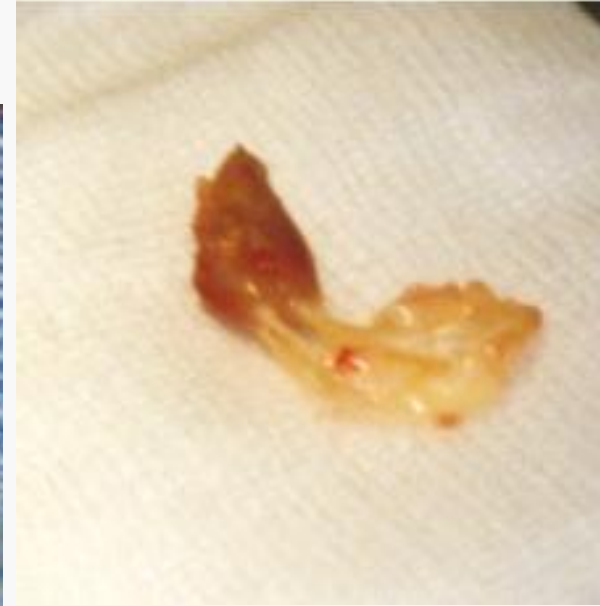


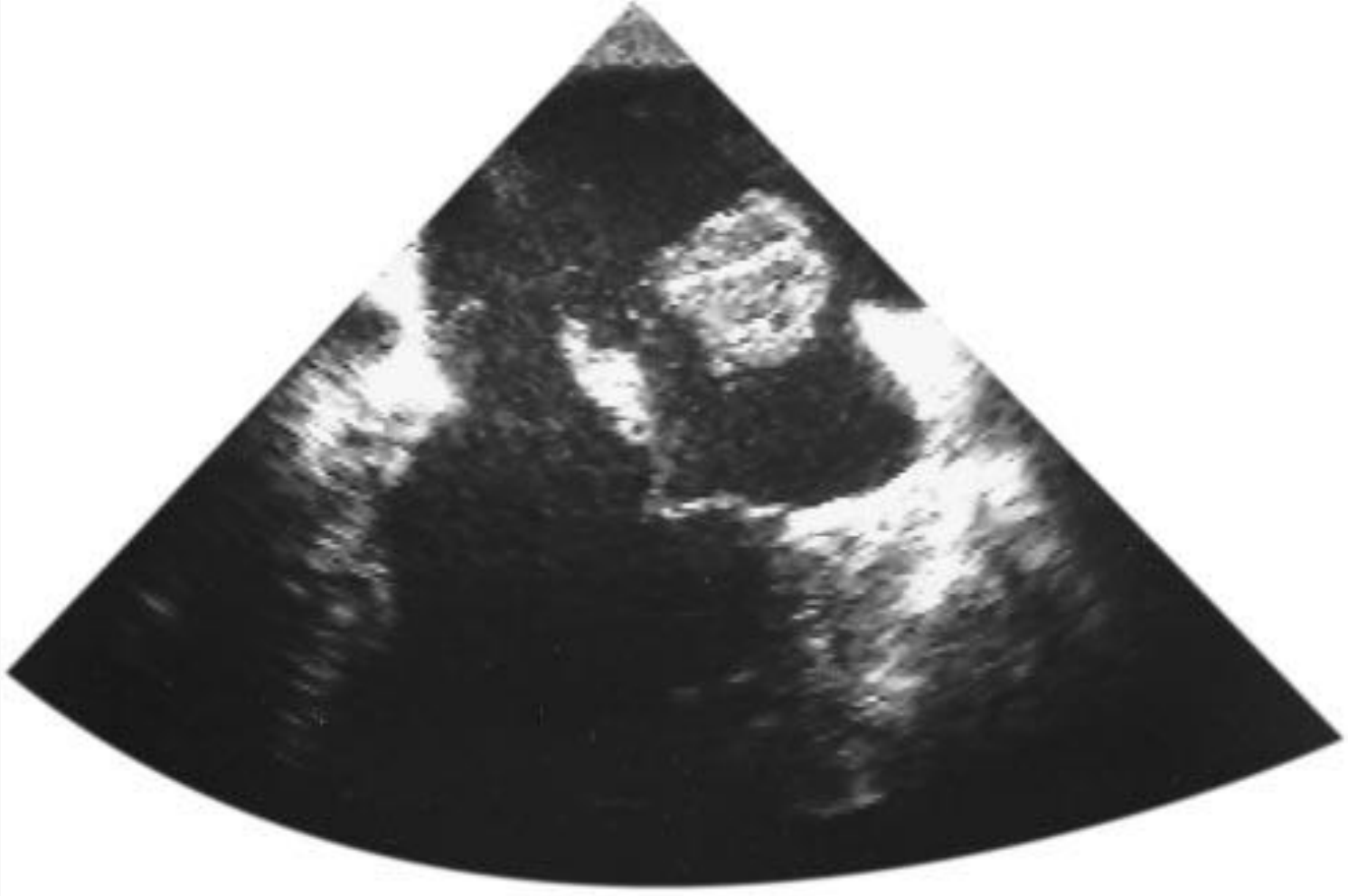


# Papiller Kas R pt r ne Baęlı MY: Acil Cerrahi

Normotensifse..... nitroprussid

Hipotensifse..... nitroprussid + dobutamin + IABP





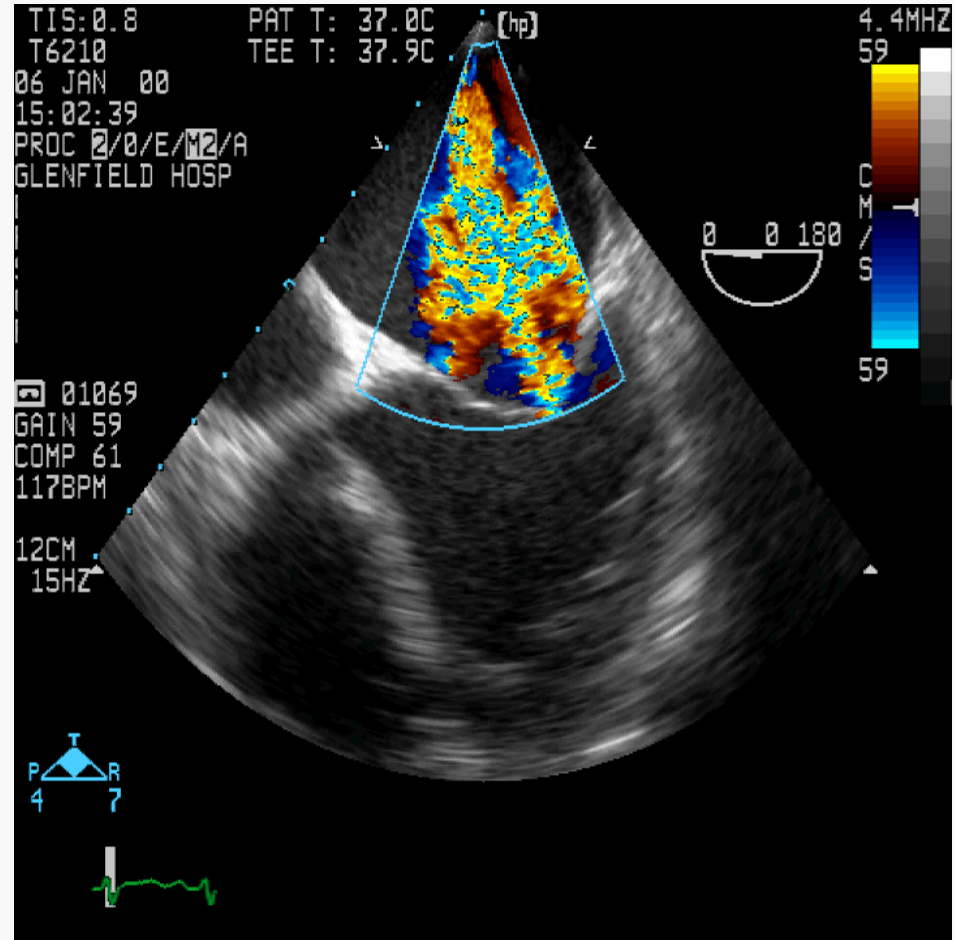
TEE: flail mitral kapak, sol atriumda gözlenen  
rüptüre anterior papiller kas

Mitral and Tricuspid Valve Rupture After Moderate Blunt Chest Trauma  
Peter L. Bailey et al. Ann Thorac Surg 2000;69:616-8

# Mitral yetmezlik derecelendirmesi

## EKOKARDİOGAFİK

- ✓ Yetmezlik jet alanı
- ✓ Yetmezlik fraksiyonu
- ✓ Efektif yetmezlik açıklığı
- ✓ Pulmoner venöz akım paterni
- ✓ Sol atriyum boyutu
- ✓ anterior mitral kapakçık - annulus oranı



# Mitral Yetmezlik EKO Karakteristikleri

---

## Yetmezlik jet alanı

- |            |                           |
|------------|---------------------------|
| ✓ MY yok   | 0 - 1.5 cm <sup>2</sup>   |
| ✓ MY hafif | 1.5 - 4.0 cm <sup>2</sup> |
| ✓ MY orta  | 4.0 - 7.0 cm <sup>2</sup> |
| ✓ MY ağır  | > 7.0 cm <sup>2</sup>     |

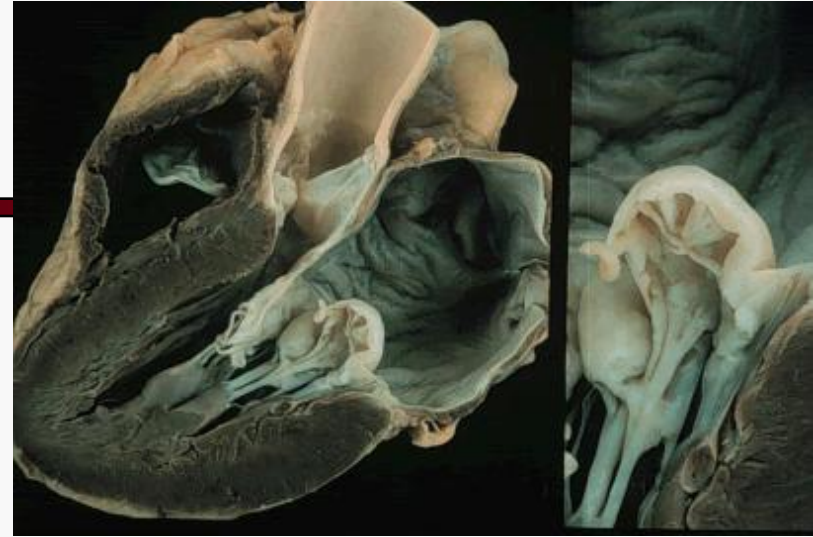


# **Non-iskemik Mitral Yetmezliğinde Mitral Kapak Cerrahisi Endikasyonları**

- ✓ **Akut semptomatik MY (onarım gerektiren)**
- ✓ **Asemptomatik hastalar**  
**hafif-orta sol ventrikül disfonksiyonu EF= %30-60**  
**Sol ventrikül sistol sonu çapı (SVSSÇ) = 45-55 mm**
- ✓ **NYHA FC II-IV**  
**normal sol ventrikül fonksiyonu**  
**EF > 60%**  
**SVSSÇ < 45 mm**

# Mitral Kapak Operasyonları

- ✓ **Mitral Kapak Onarımı**
- ✓ **Mitral Kapak Replasmanı**
  - mitral apparatusların kısmi veya tam korunumu ile
  - mitral apparatus çıkarımı ile
- ✓ **MVR + CABG (iskemik MY)**



## **MVreplasman dezavantajları**

---

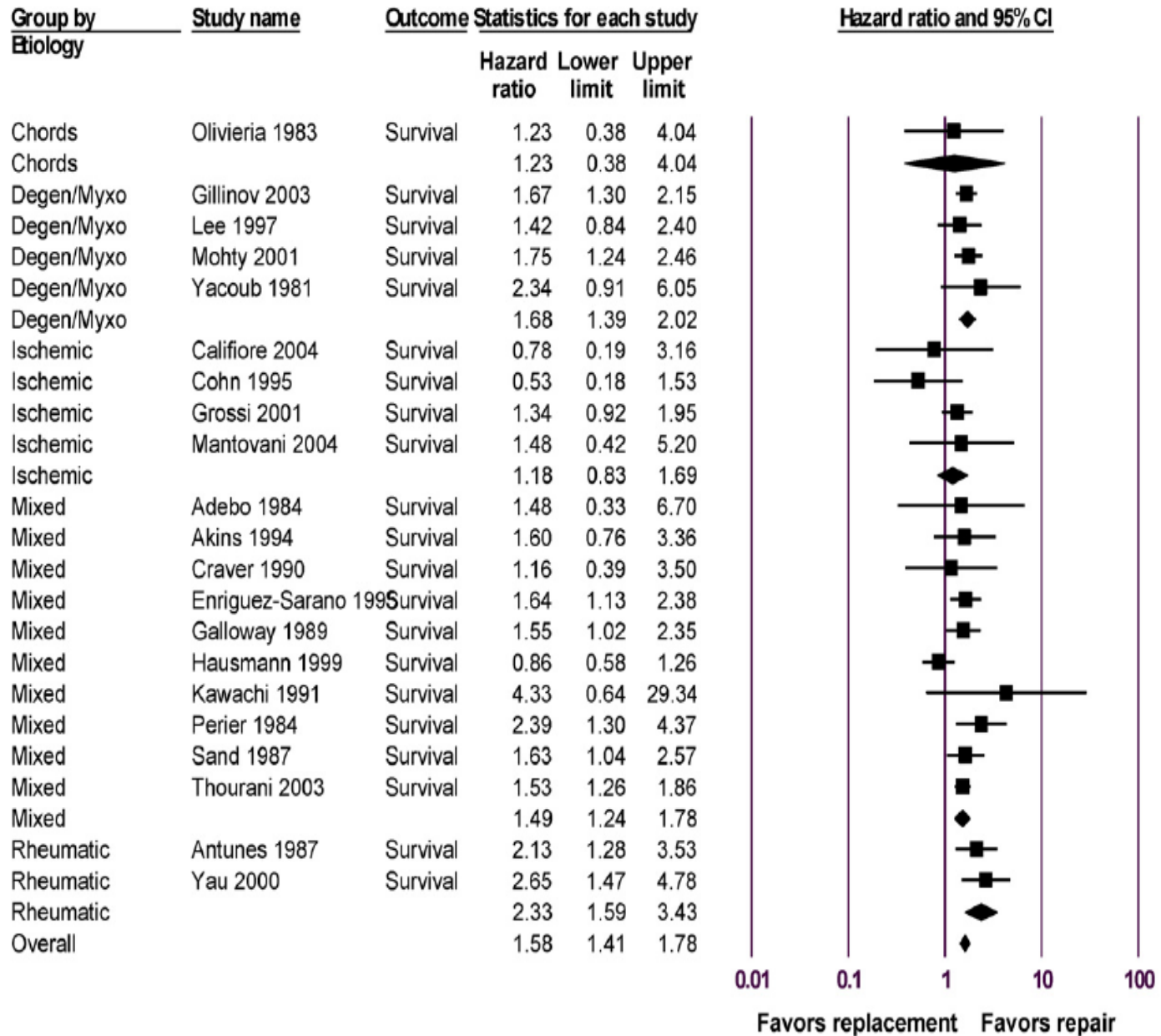
	<b>İnsidans (/hasta/yıl)</b>
<b>Prostetik kapak trombozu</b>	<b>0.1-5.7</b>
<b>Embolizasyon</b>	<b>1-4</b>
<b>Hemoliz</b>	<b>Genellikle subklinik</b>
<b>Enfeksiyon</b>	<b>%3-6</b>
<b>Kapak dejenerasyonu</b>	<b>10-15 yılda %30 biyoprotez reop.</b>

---

# Meta-analiz Sonuçları

## MV replasman vs MV onarım

## Yaşam oranları

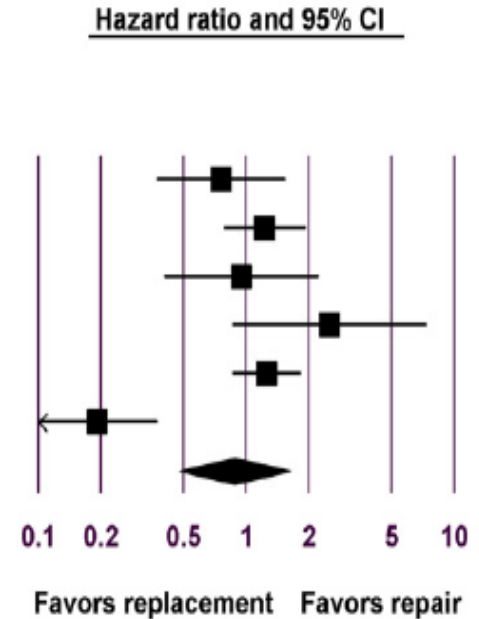




## Meta-analiz Sonuçları

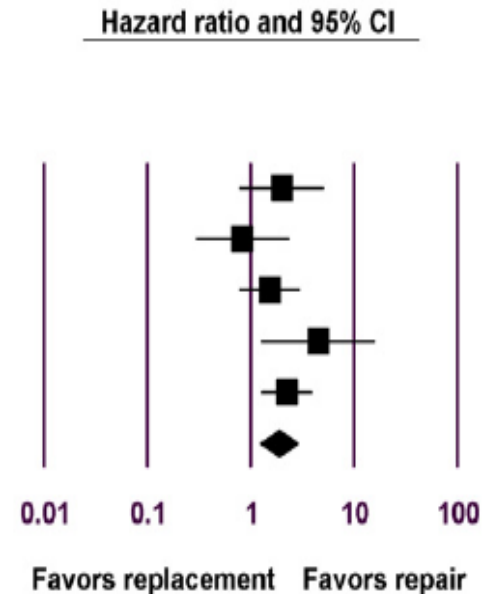
## MVreplasman vs MVonarım

<u>Study name</u>	<u>Outcome</u>	Hazard ratio	Lower limit	Upper limit
Enriquez-Sarano 1995	Reoperation	0.76	0.37	1.54
Mohty 2001	Reoperation	1.23	0.78	1.94
Perier 1984	Reoperation	0.95	0.40	2.24
Sand 1987	Reoperation	2.52	0.86	7.41
Thourani 2003	Reoperation	1.26	0.86	1.85
Yau 2000	Reoperation	0.19	0.10	0.38
		0.88	0.48	1.62



## Reoperasyon

<u>Study name</u>	<u>Outcome</u>	Hazard ratio	Lower limit	Upper limit
Akins 1994	Thromboembolism	2.02	0.78	5.21
Galloway 1989	Thromboembolism	0.83	0.29	2.35
Lee 1997	Thromboembolism	1.54	0.78	3.04
Perier 1984	Thromboembolism	4.51	1.27	15.99
Yau 2000	Thromboembolism	2.25	1.27	3.99
		1.86	1.24	2.81



## Tromboembolizm

# Neden Mitral Kapak Onarımı?

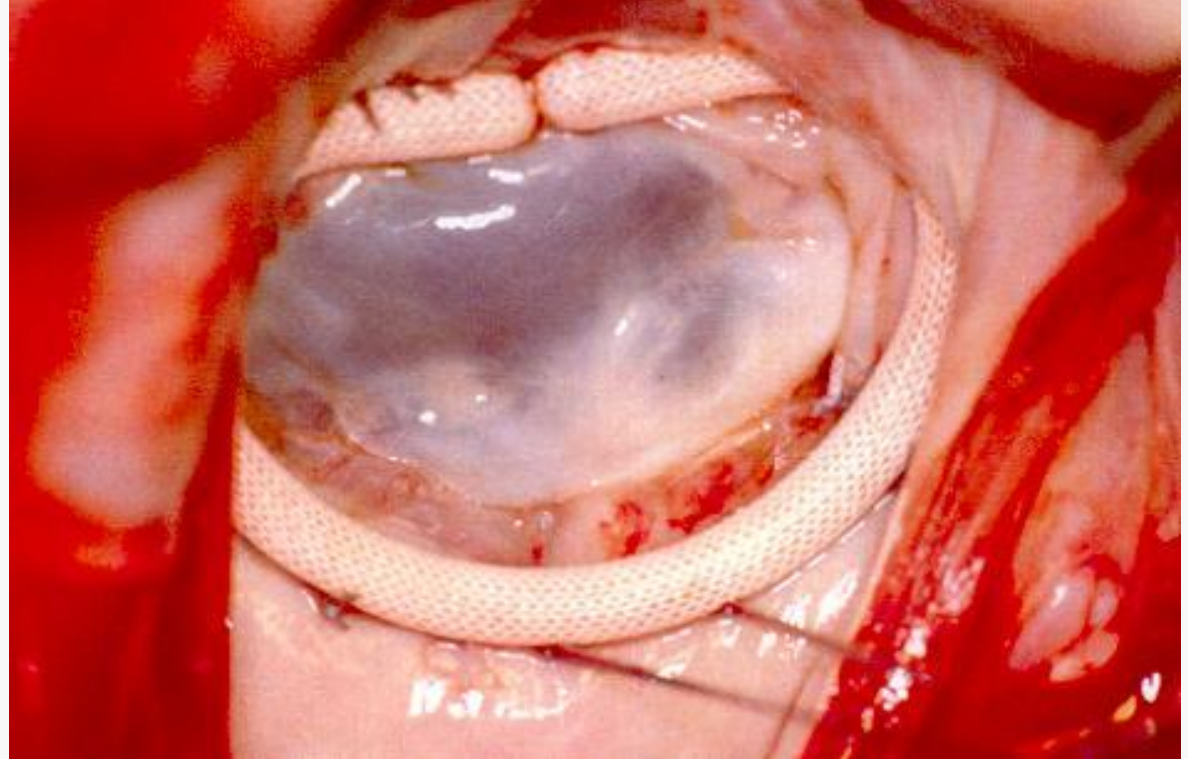
**Düşük morbidite ve mortalite**

**Düşük tromboembolizm oranları**

**Sol ventrikül fonksiyonlarının daha iyi korunması**

**Endokardite rezistans**

**Durabilite**



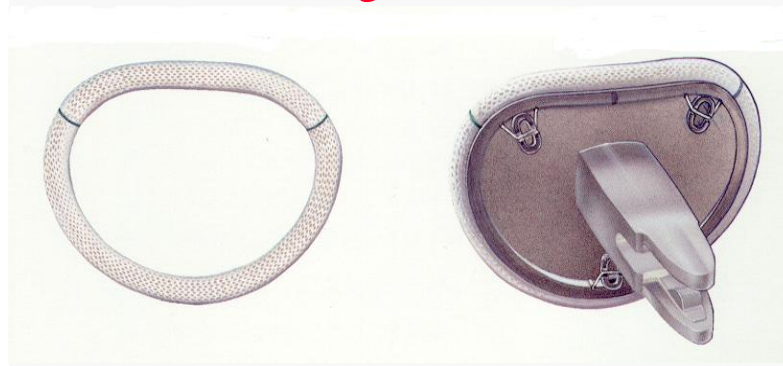
**Mitral kapak cerrahisine alınan hastalarda MV onarım oranları;**

<b>ABD</b>	<b>%44.3 (Savage EB et al. 2003)</b>
<b>Avrupa</b>	<b>%46.5 (Iung B et al. 2003)</b>

# Organik Kronik Mitral Yetmezliği, Dejeneratif



Carpentier-Edwards  
Classic mitral A  
annuloplasti ring  
(Edwards Lifesciences)



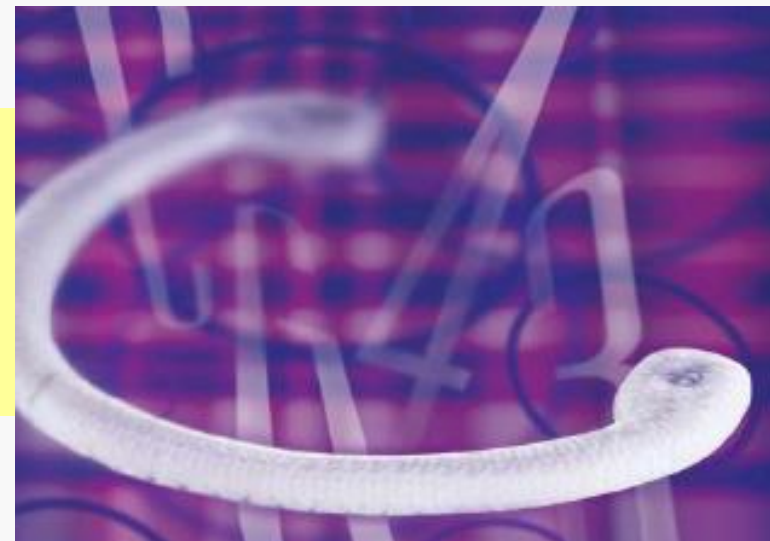
Carpentier-Edwards  
Physio annuloplasti Ring  
(Edwards Lifesciences)



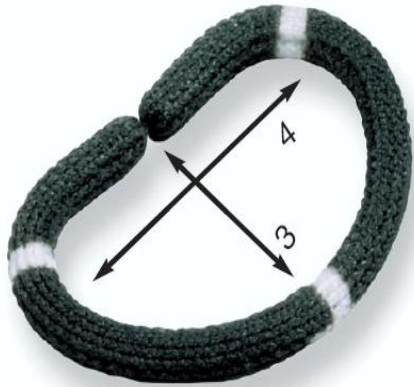
Myxo Etlogix annuloplasti ring  
(Edwards Lifesciences)



Colvin-Galloway  
Future Composite  
Ring, semi-rigid  
(Medtronic,  
Minneapolis, Minn)



## Organik Kronik Mitral Yetmezliği, Non-Dejeneratif



AnnuloFlo  
annuloplasty ring  
(CarboMedics/Sorin  
Group, Arvada, Colo)



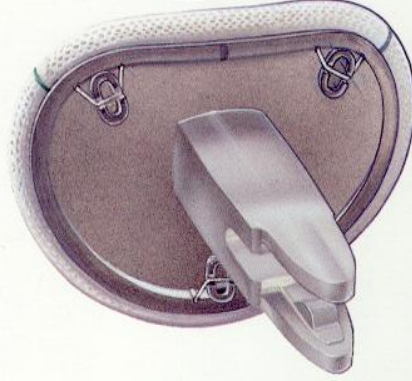
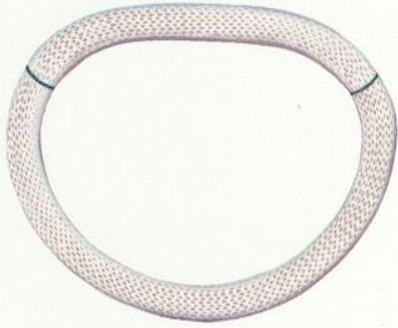
Carpentier-  
McCarthy-Adams  
IMR Etlogix ring  
(Edwards  
Lifesciences)



GeoForm  
annuloplasty ring  
(Edwards  
Lifesciences)

Rigid Saddle Ring with EZ Suture™ Cuff (St. Jude Medical, St. Paul, Minn)





**Carpentier-Edwards Physio Anuloplasti Ring**

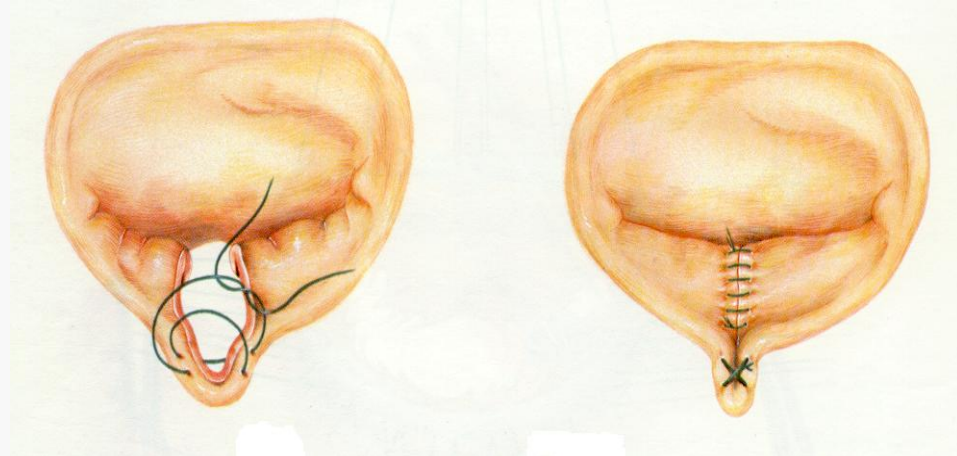
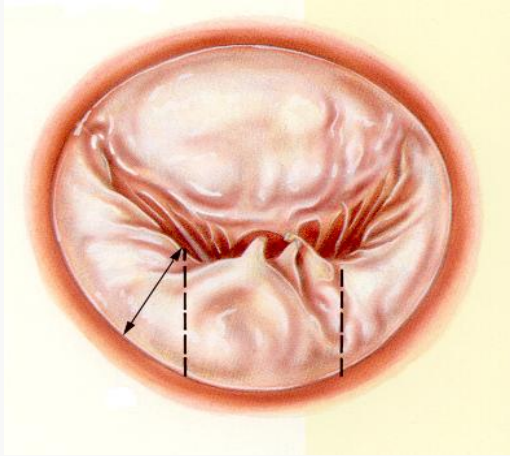


**Duran Ancore Anuloplasti Sistemi**

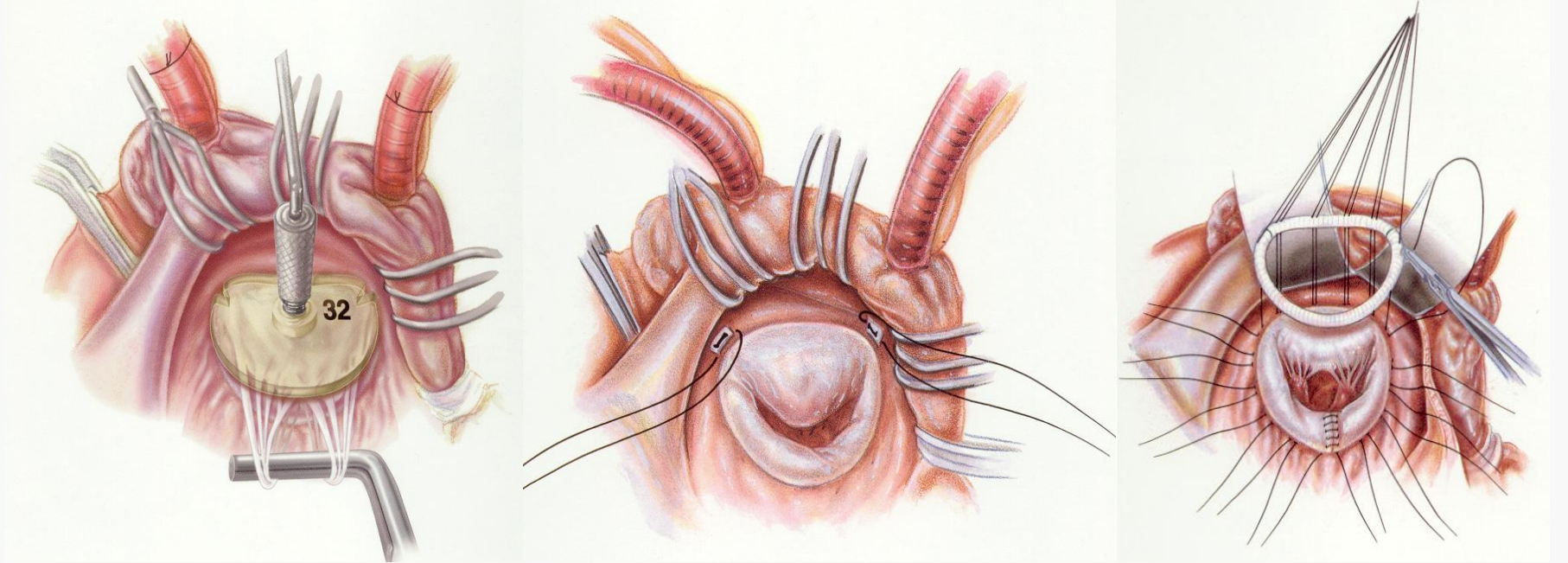


**Cosgrove-Edwards Anuloplasti Sistemi**

# Posterior Kapakçıkta Kuadrangüler Rezeksiyon

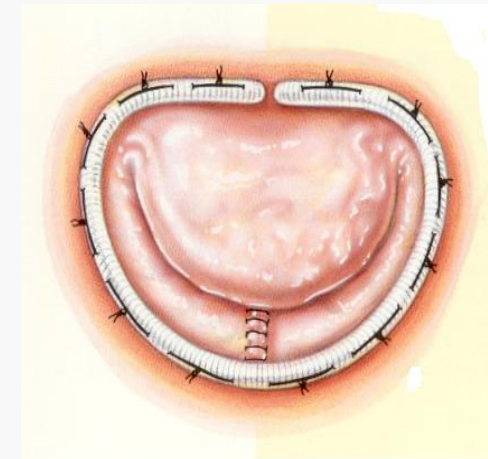
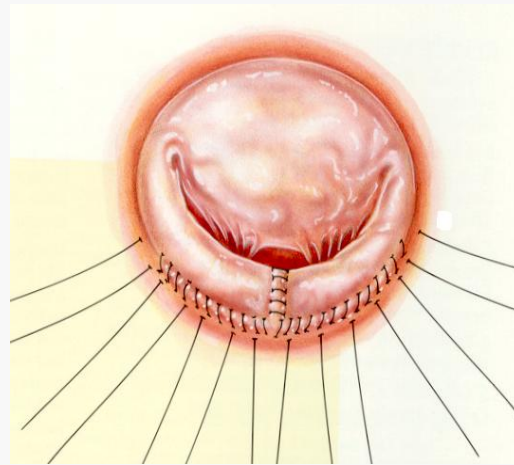
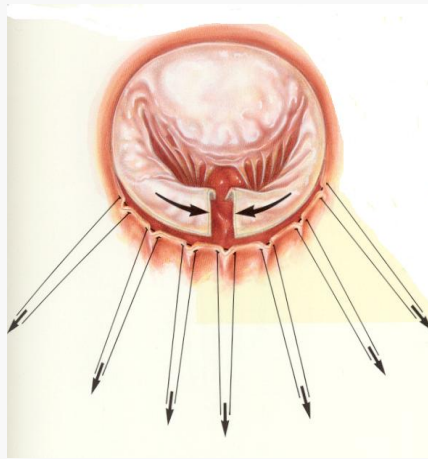
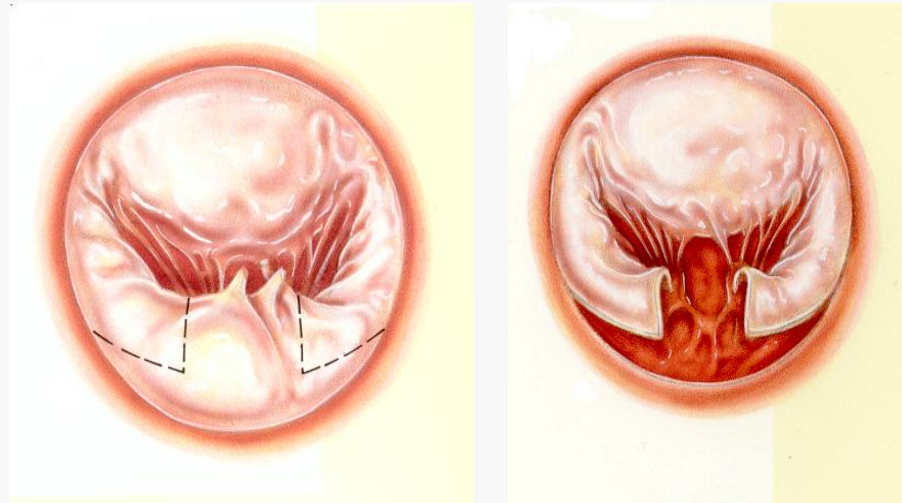


## Dođru ölçümün yapılması



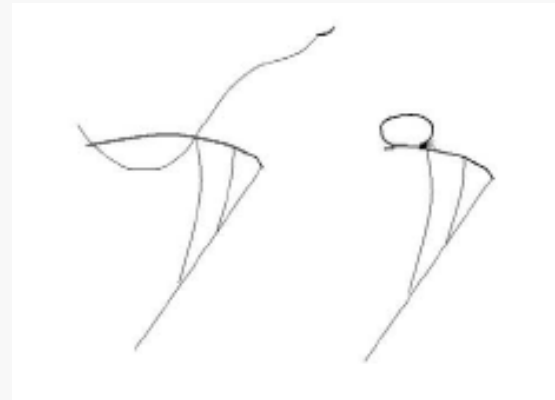
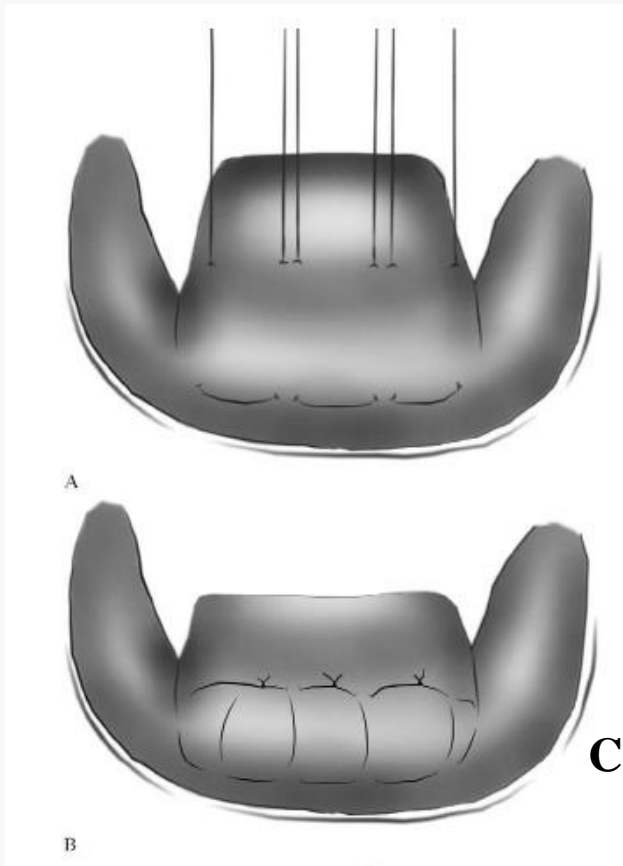


# Sliding leaflet tekniği “Carpentier”

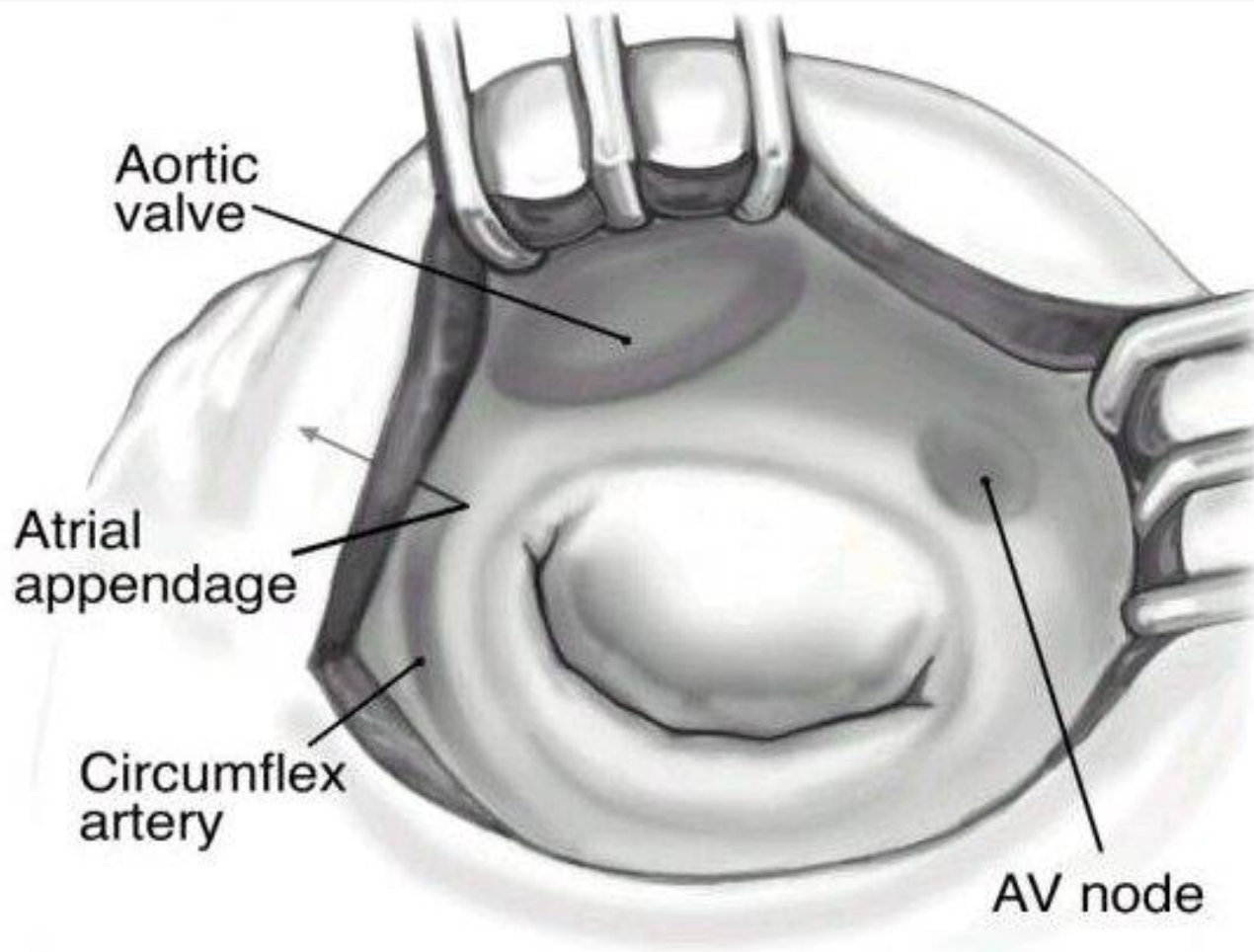


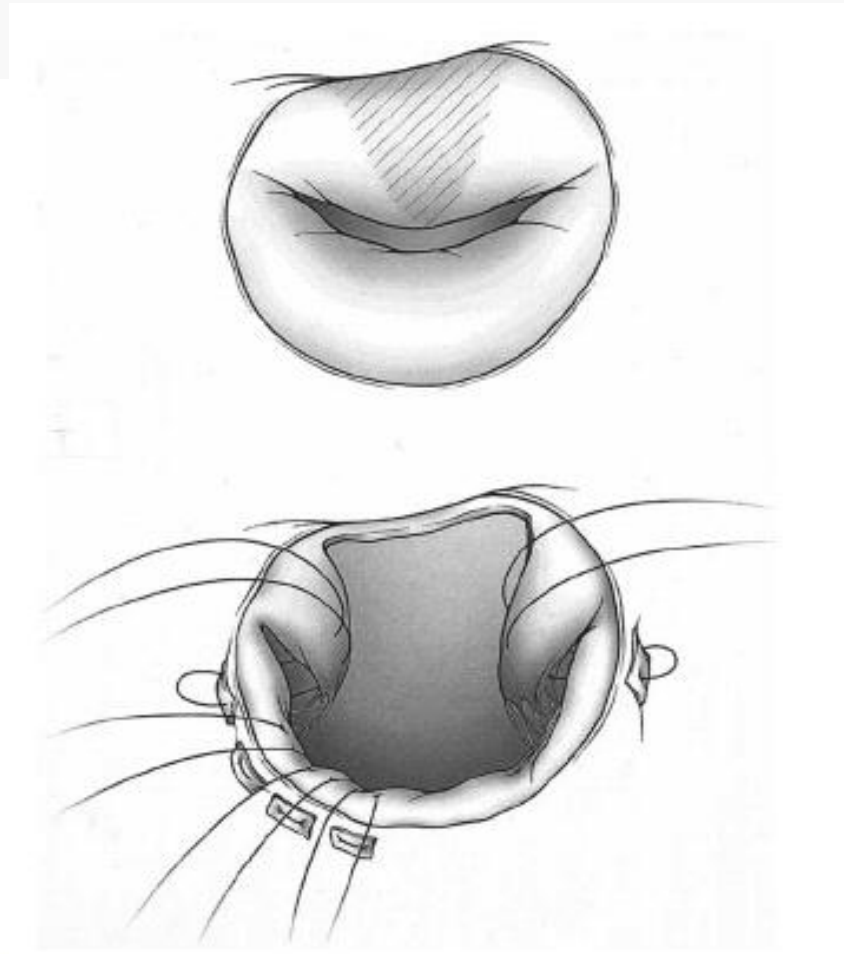
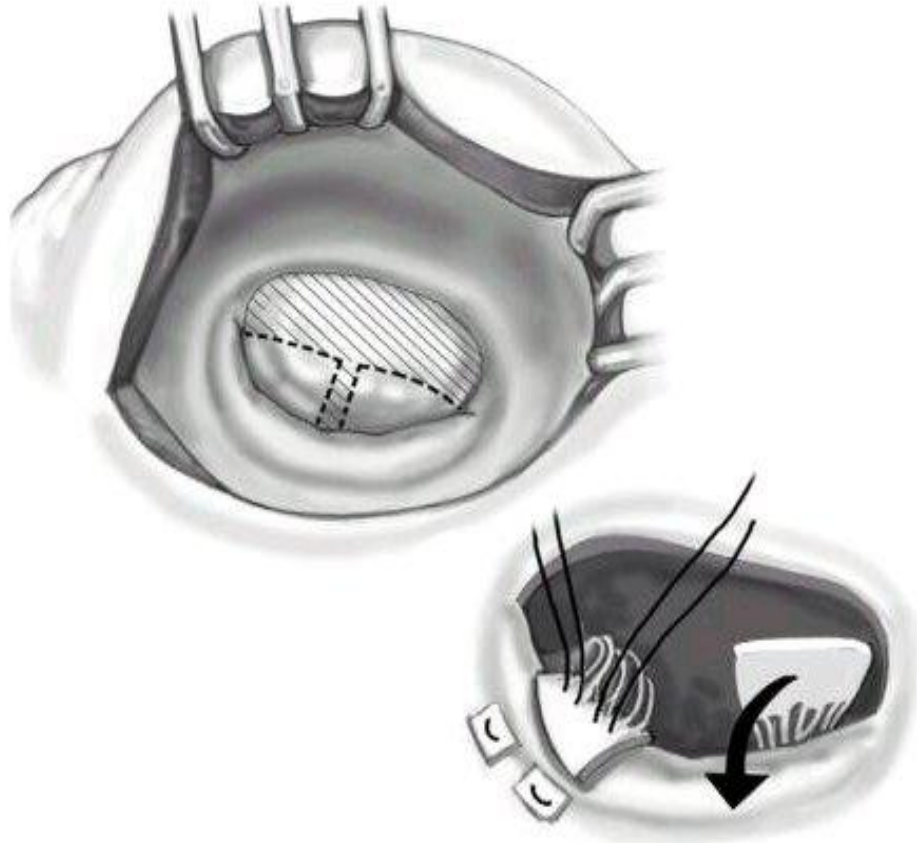


# Longitudinal Plication of the Posterior Leaflet in Myxomatous Disease of the Mitral Valve

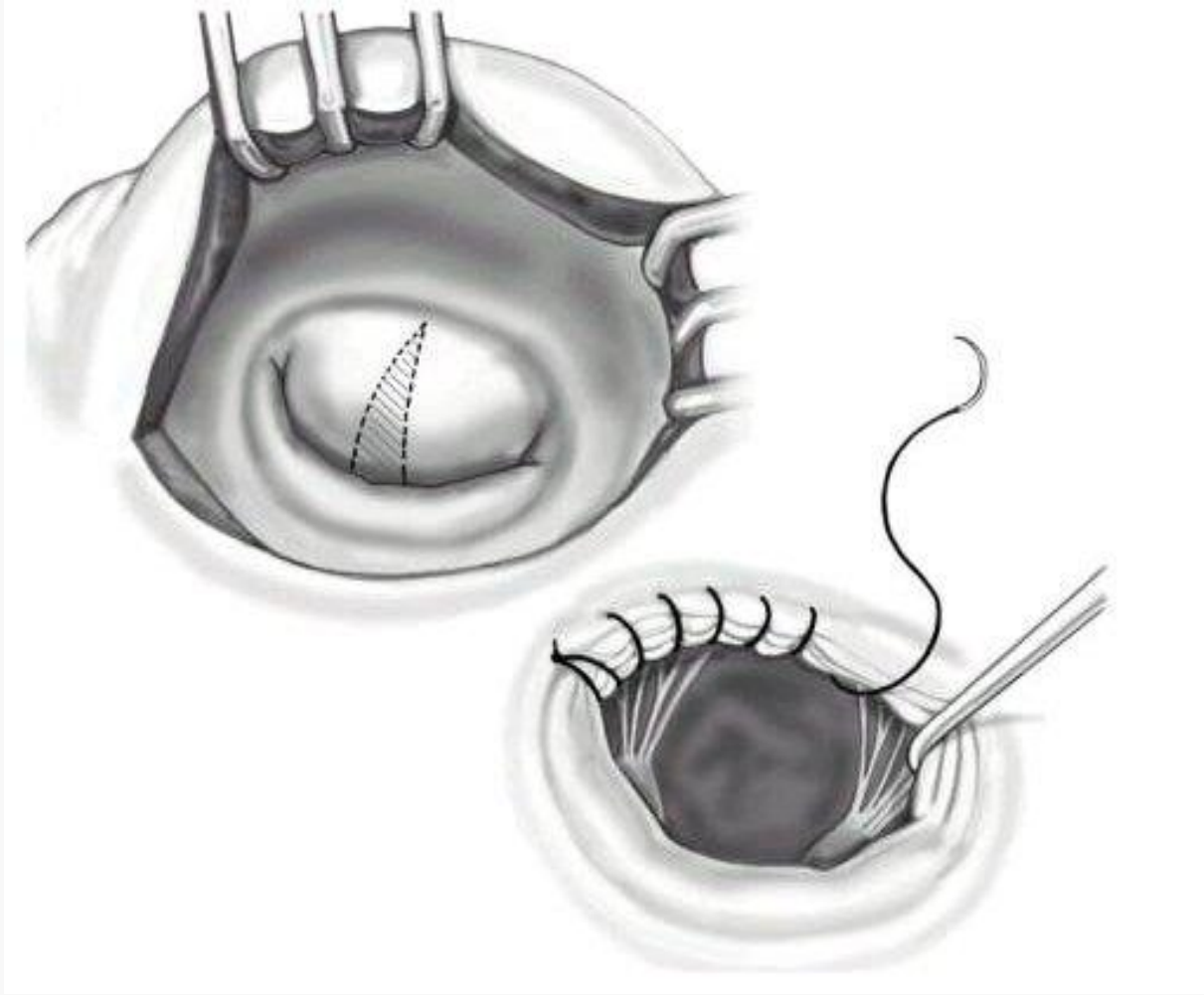


Calafiore AM. Et al. Ann Thorac Surg 2006;81:1909–10





*Retention of the subvalvular apparatus during mitral valve replacement for IMR, as described by Calafiore and coworkers*

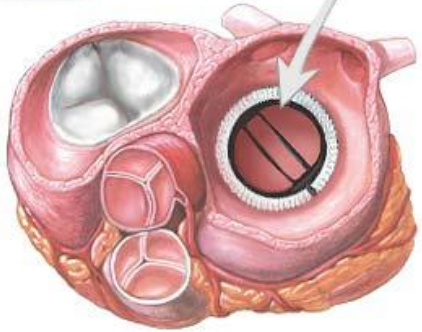


**MVR sırasında anterior kapakçığın korunması**

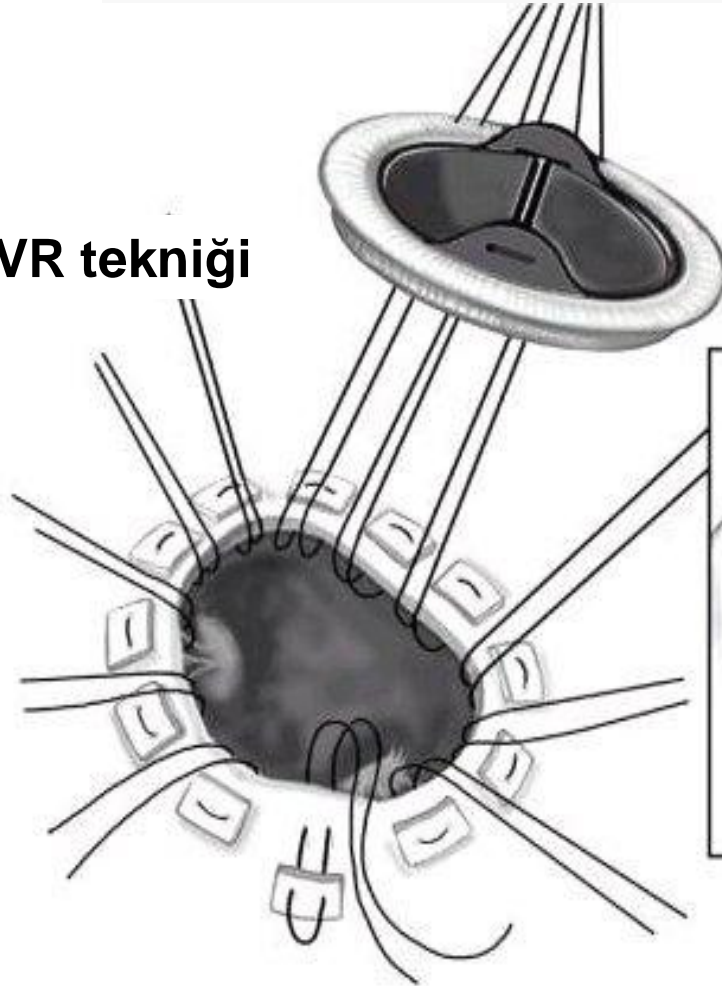




Mechanical valve



## MVR tekniği

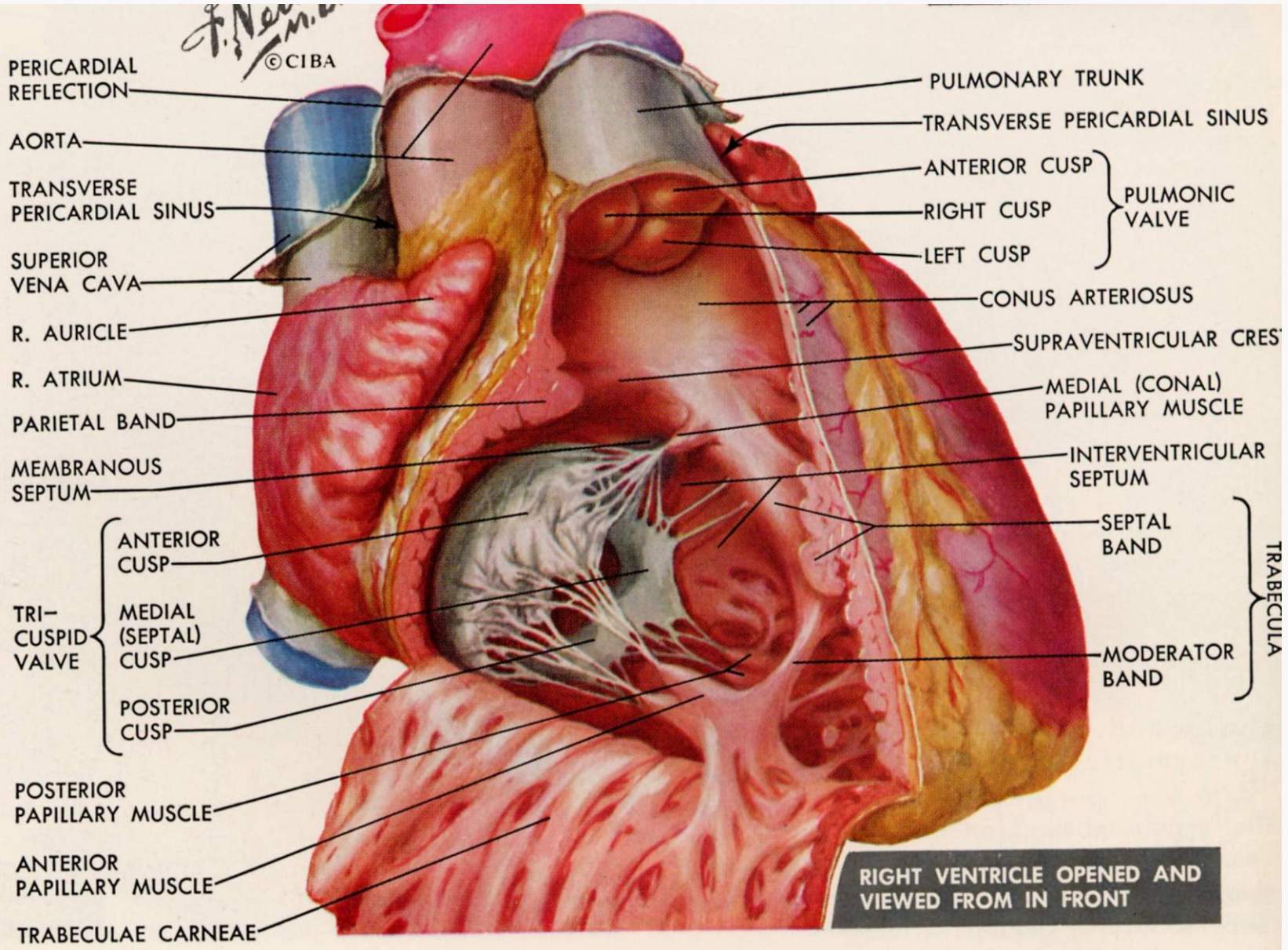


# **Trikuspid Kapak**

# **Trikuspid Kapak**

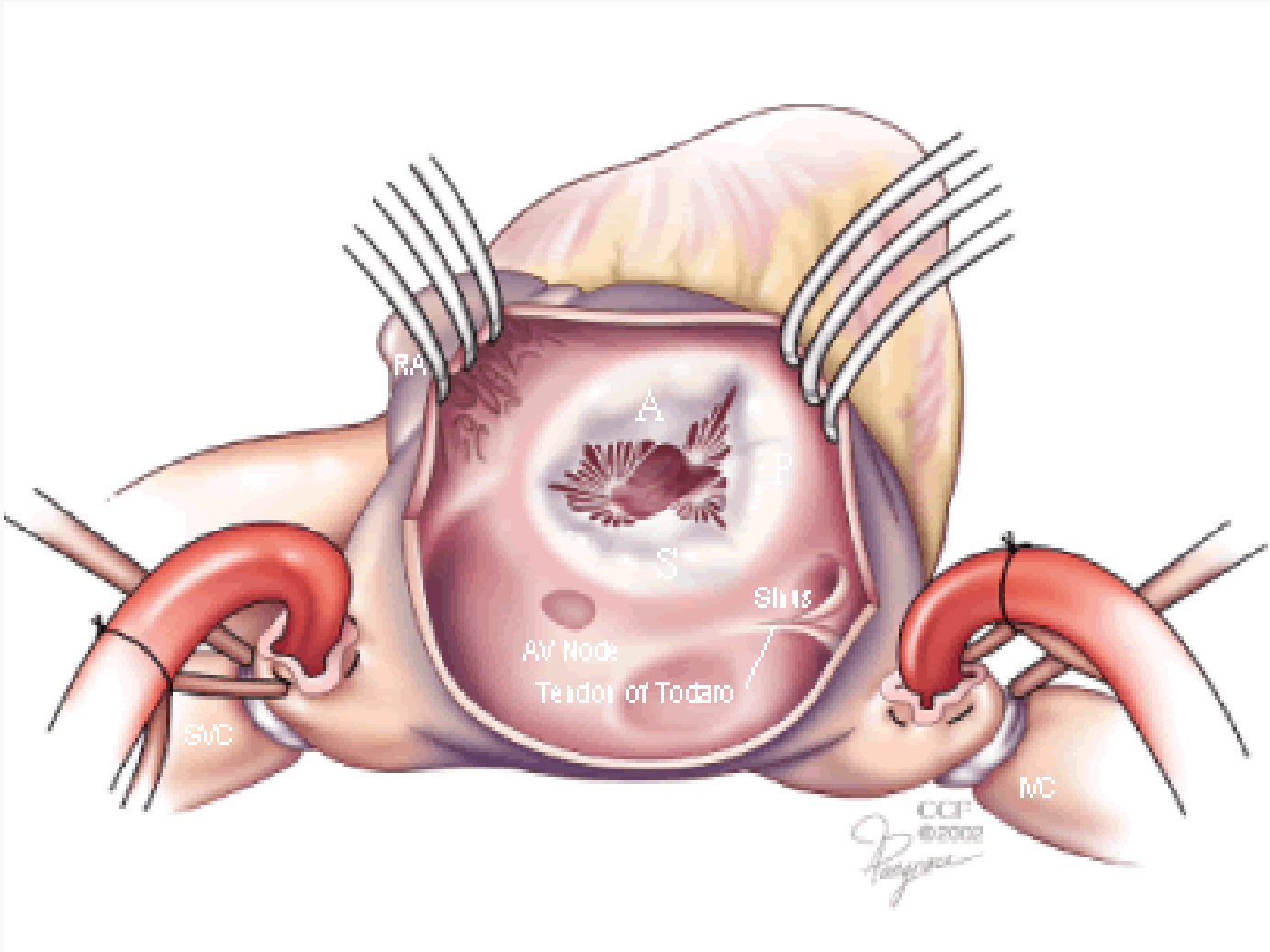
---

- ✓ **Fibröz iskelet**
- ✓ **Kapak (anterior, posterior, septal)**
- ✓ **Chordae tendineae**
- ✓ **Papiller kas x 3**
- ✓ **Sağ ventrikül ve atrial duvar**



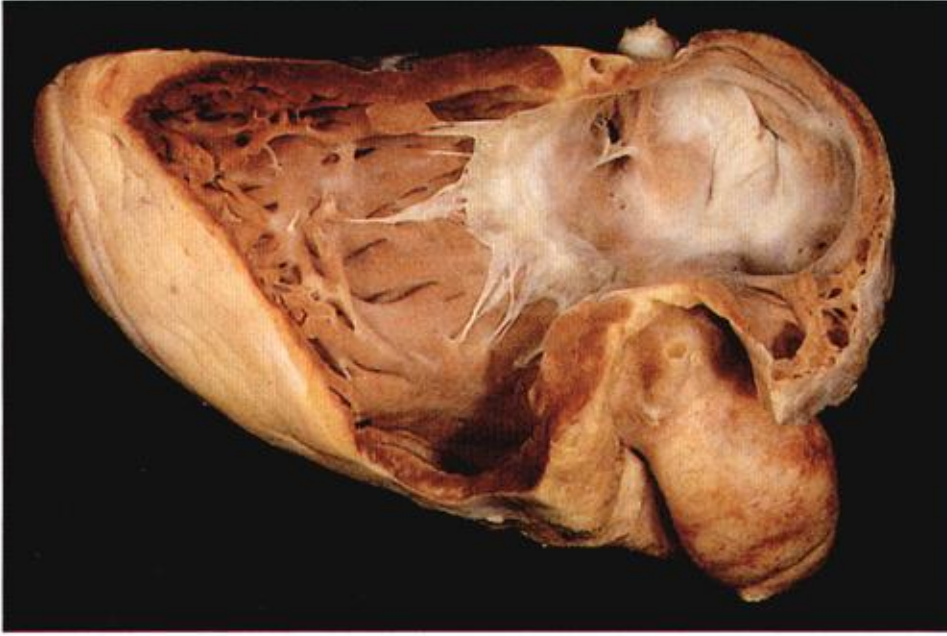
**RIGHT VENTRICLE OPENED AND VIEWED FROM IN FRONT**





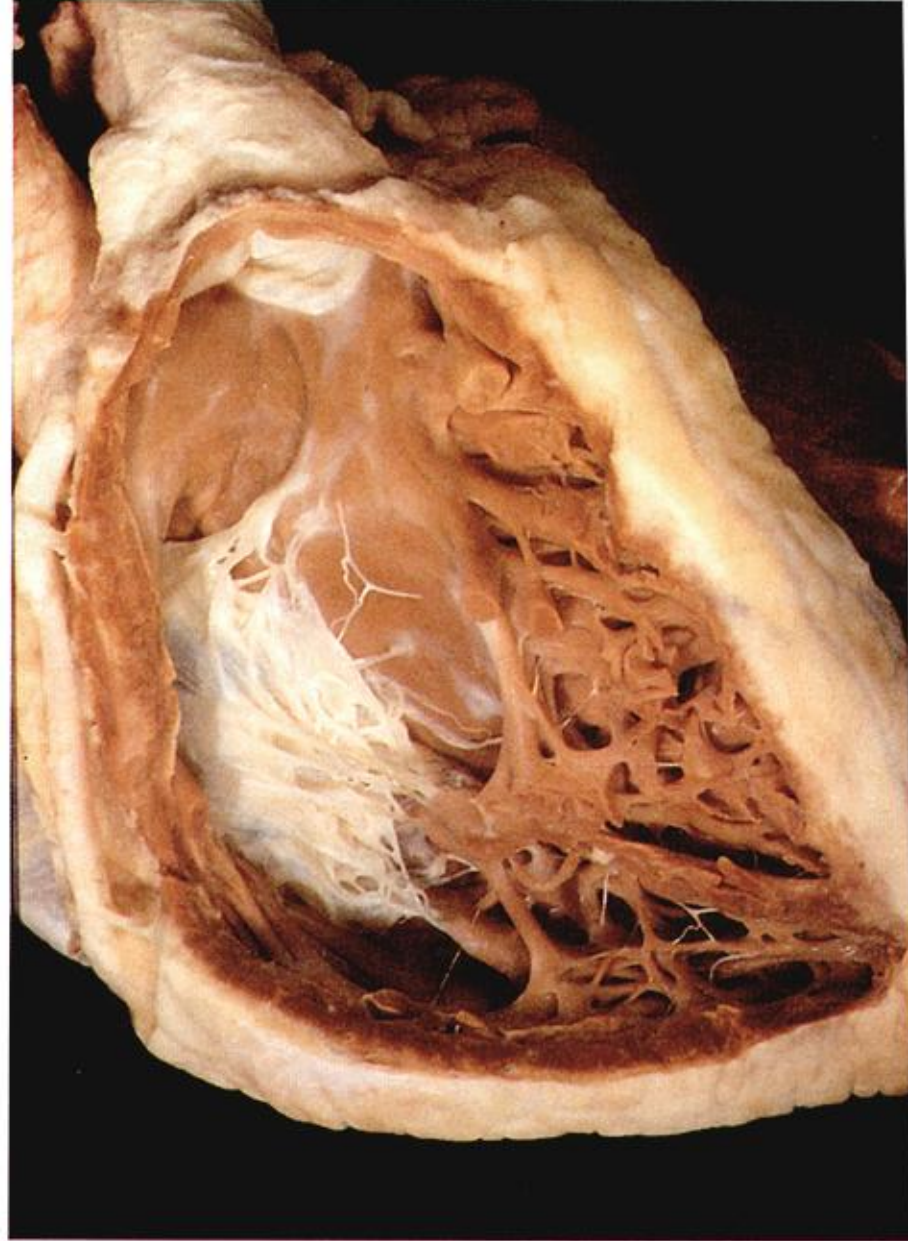
# **TRİKÜSPİT KAPAK HASTALIKLARI**

# Triküspid Kapak

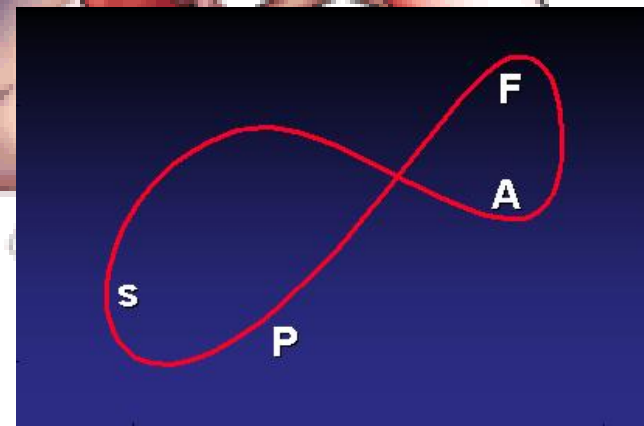
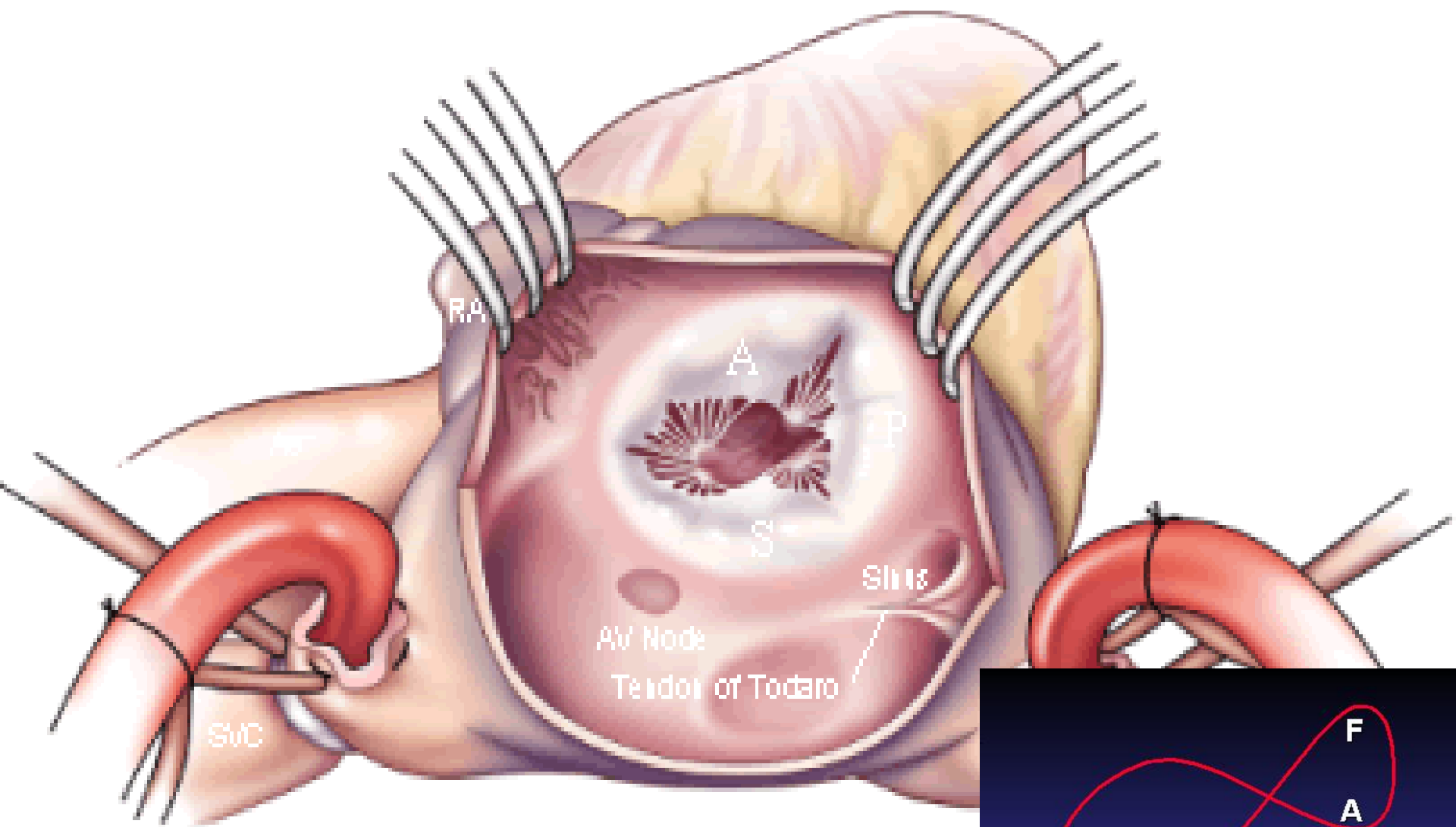


A

Fibröz iskelet  
Kapak (anterior, posterior, septal)  
Chordae tendineae  
Papiller kas x 3  
Sağ ventrikül ve atrial duvar



B





# Triküspid Yetmezliği (TY)

## PRİMER

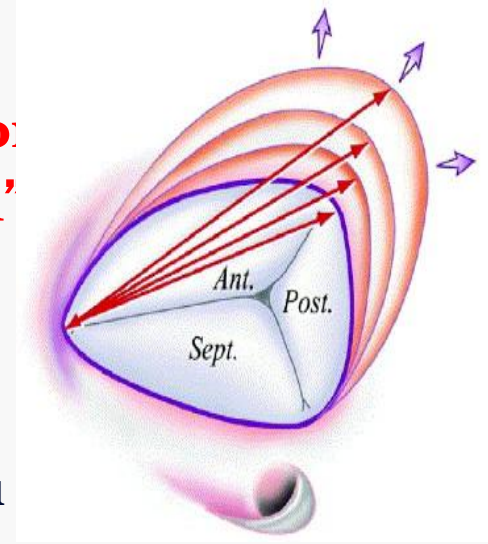
- Endokardit
- Karsinoid sendrom
- Romatizmal
- Miksomatöz
- Ebstein anomalisi
- Endomiyokardial fibrozis
- Travma
- İyatrojenik (tel çekimi, RV biopsi)

## SEKONDER

Anüler dilatasyon  
“fonksiyonel TR”

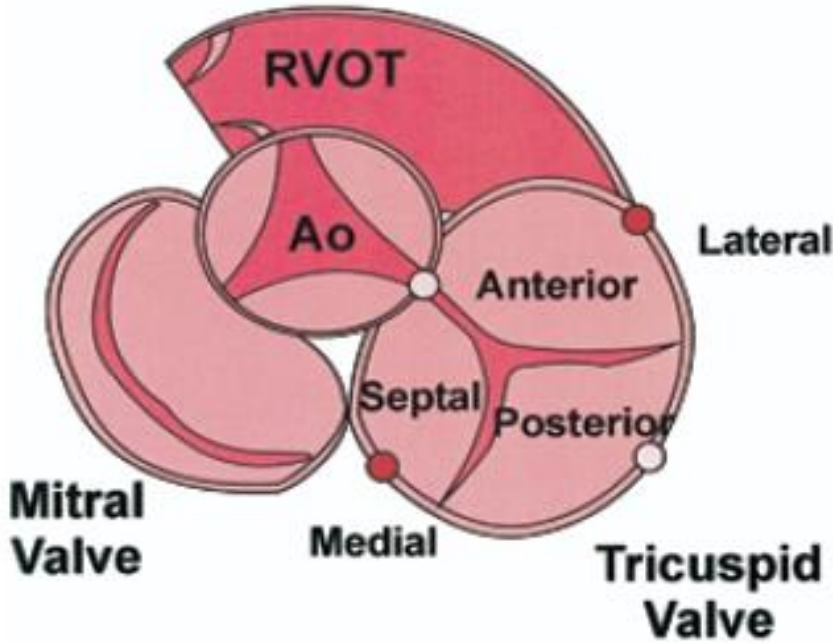
Sol kalp hastalığı  
(ventriküler)

- Kronik akciğer hastalığı (Cor Pulmonale)
- Primer pulmoner hipertansiyon
- İntrakardiyak şant

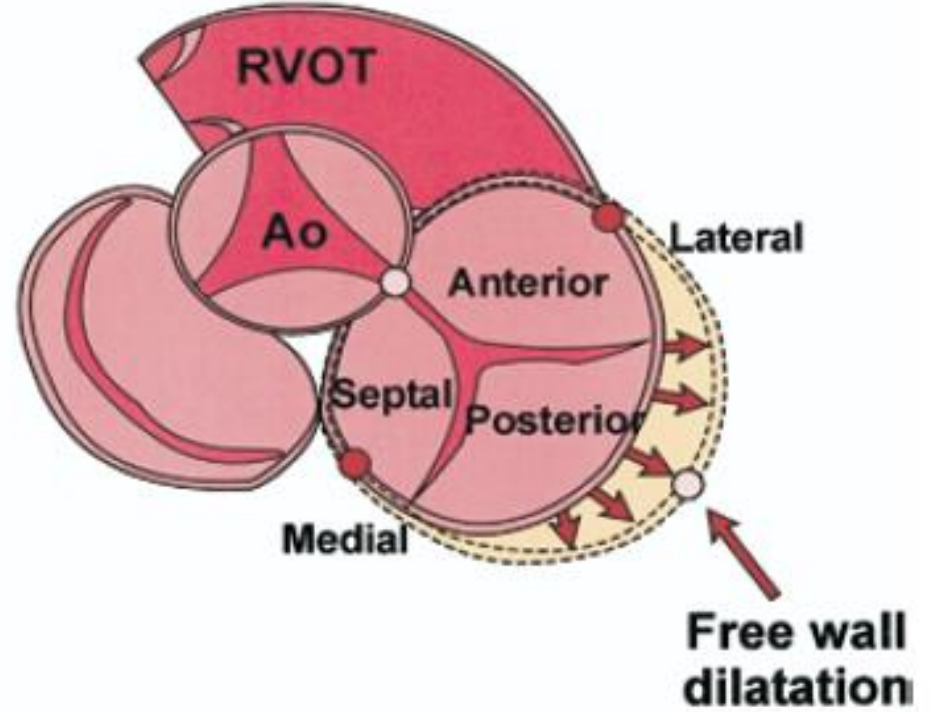


**A**

○ High Points  
● Low Points

**B**

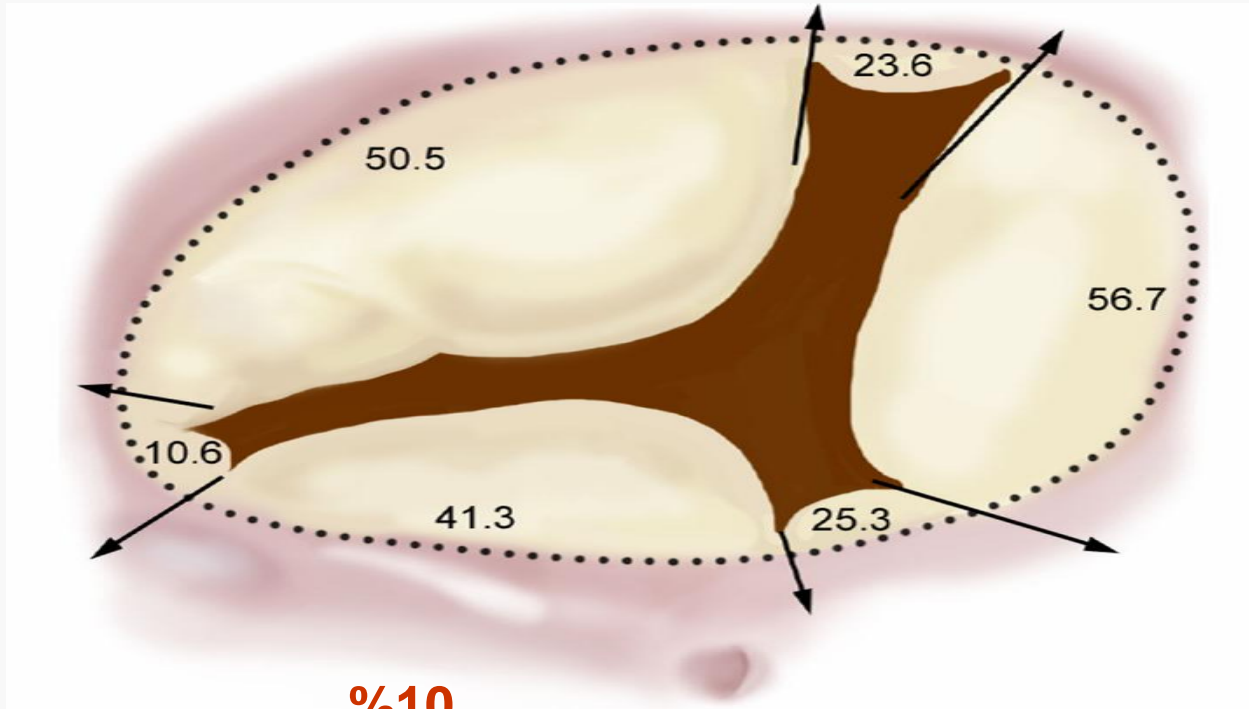
○ High Points  
● Low Points



Atrium tarafından triküspid kapağın görünümü

# Anüler Dilatasyon

**%40**



**%80**

**%10**

TIS: 0.8

PAT T: 37.0C

[hp]

4.4MHz

T6210

TEE T: 37.8C

56

06 JAN 00

15:06:04

PROC 2/0/E/M2/A

GLENFIELD HOSP

01069

GAIN 59

COMP 61

109BPM

12CM

19HZ



CM/S

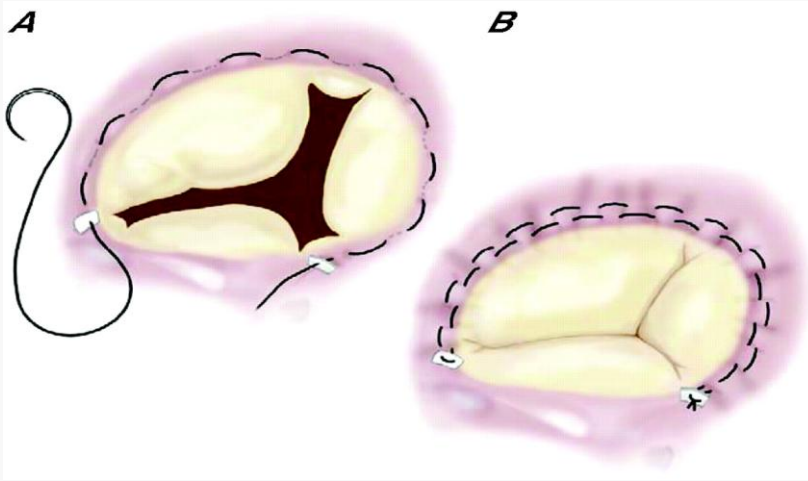
56



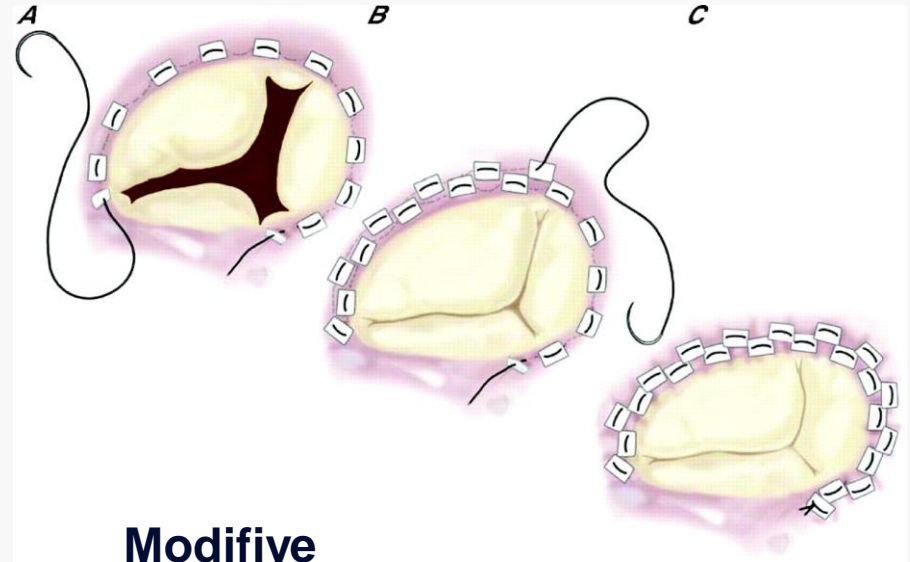


# Cerrahi Tedavi

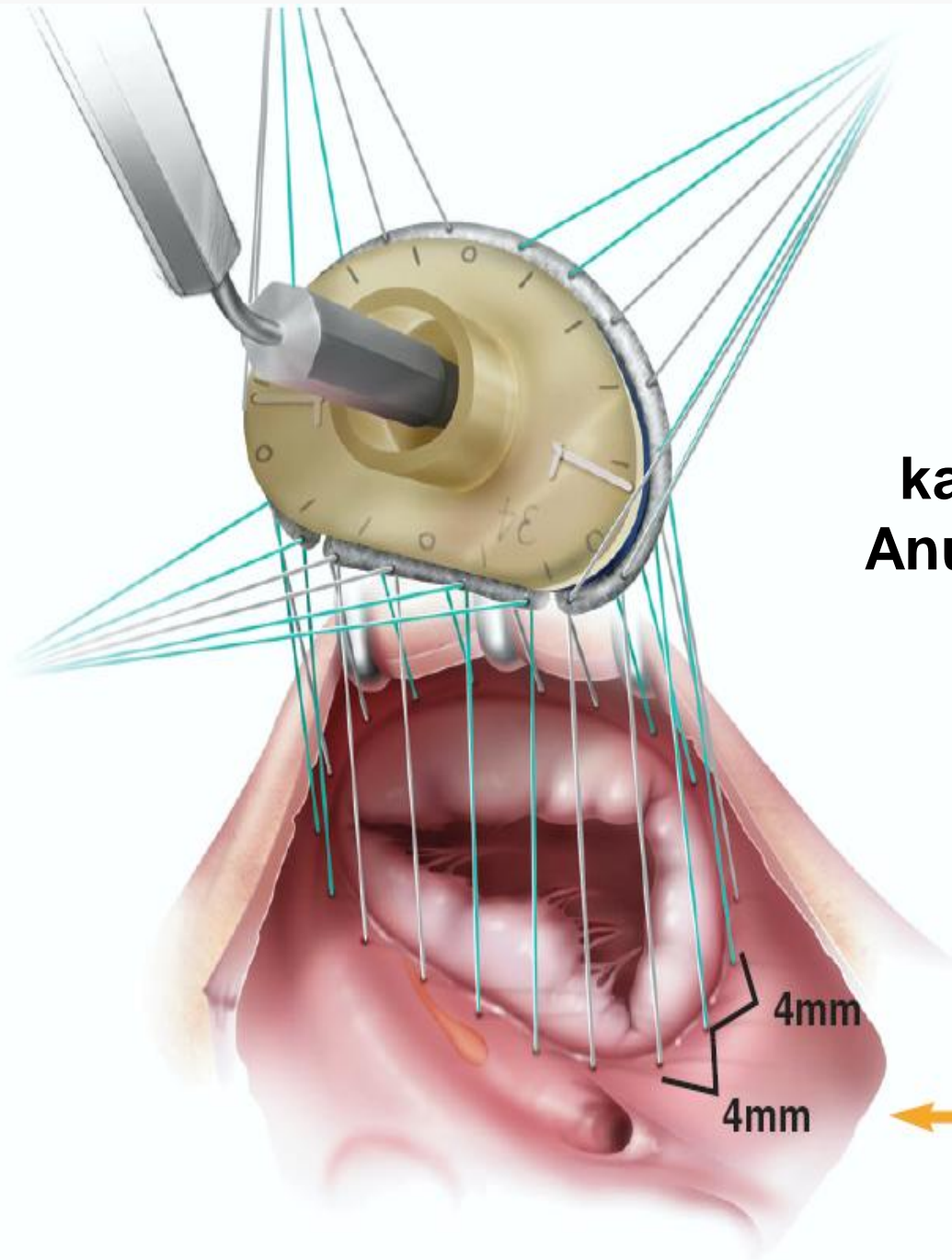
## De Vega Anuloplasti Teknikleri



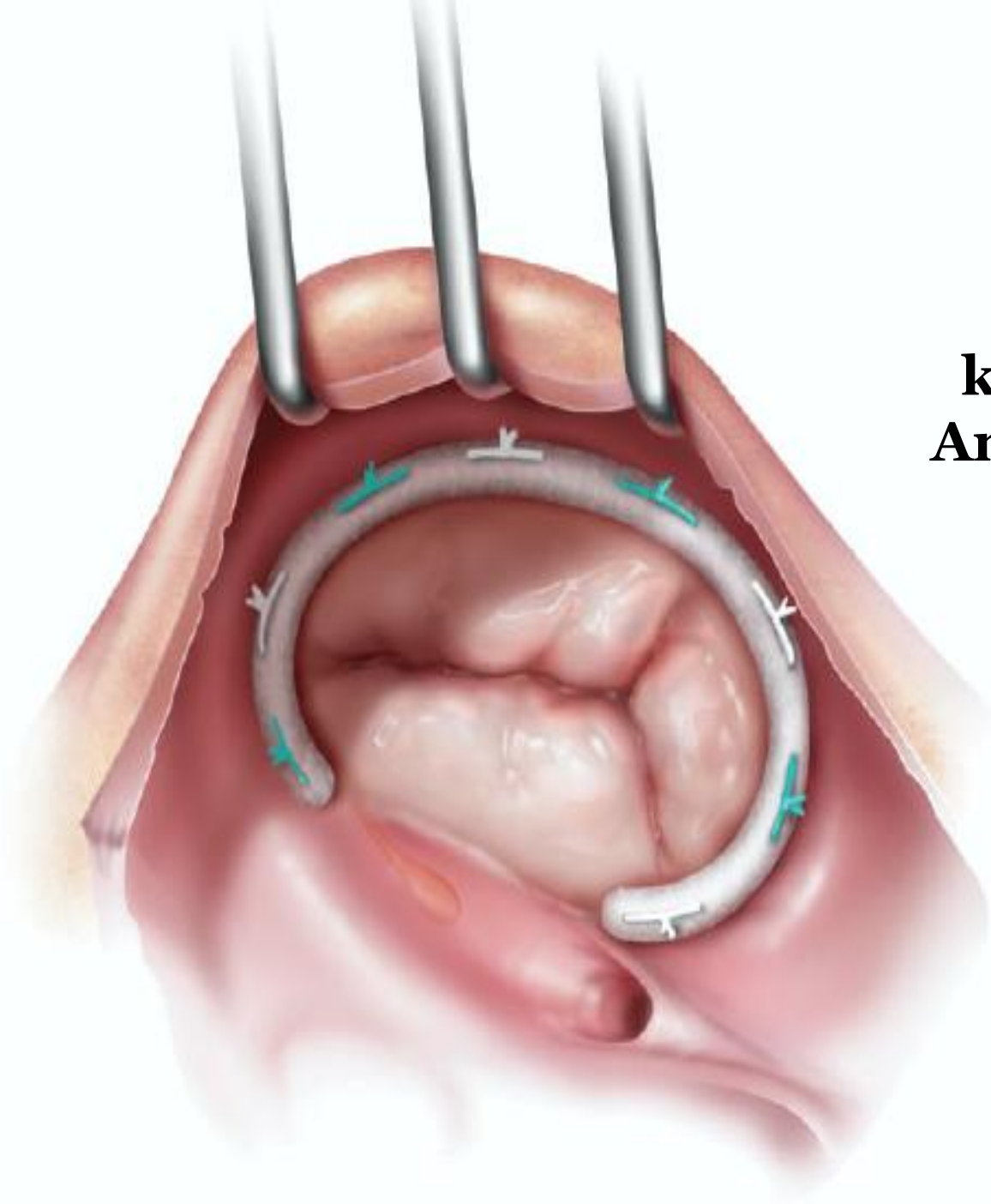
**DeVega Anüloplasti**



**Modifiye  
DeVega Anüloplasti**



**Trikuspid  
kapak onarımı  
Anuloplasti Ring**



**Trikuspid  
kapak onarımı  
Anuloplasti Ring**

# **Triküspid Endokarditi**

---

- ✓ **İ.V. ilaç kullanımı**
- ✓ **İmmunsuprese hastalar**
  - **HIV**
  - **malignite**
  - **organ transplantasyonu**
  - **Kalıcı venöz kateter**

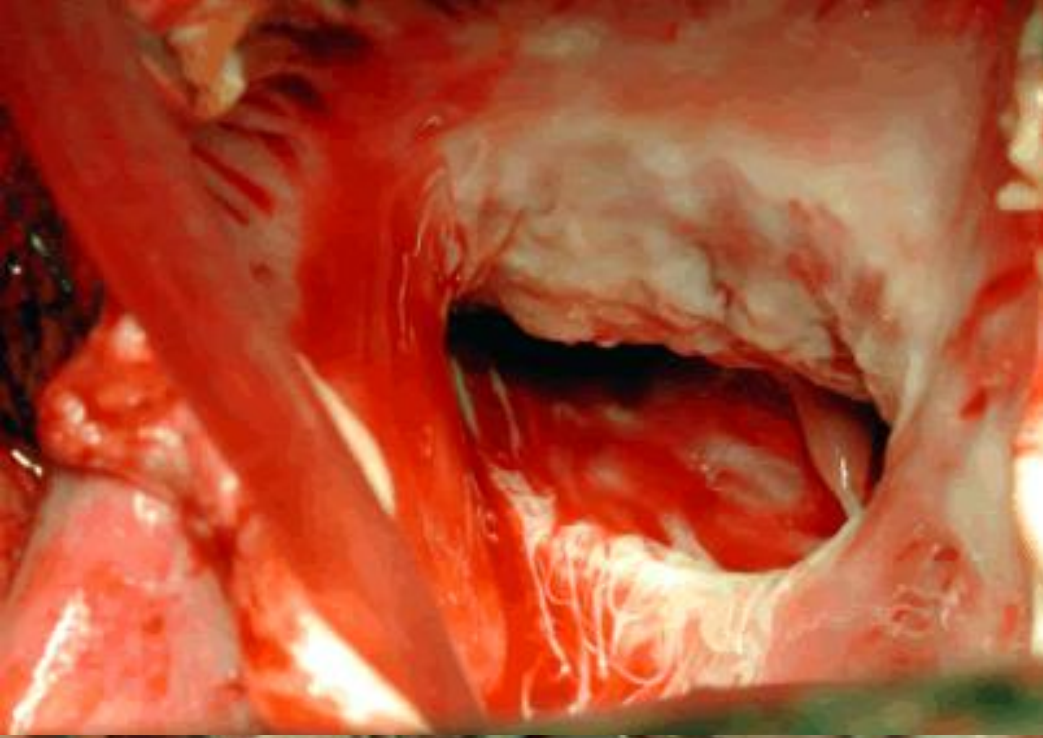


# Triküspid Endokarditi

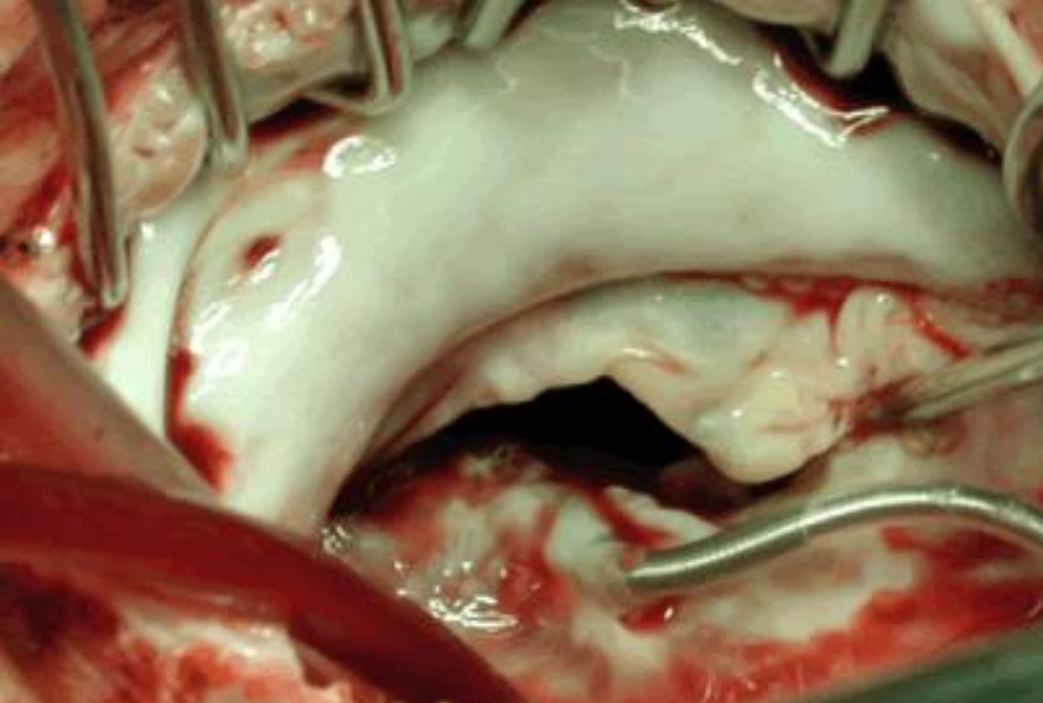


# Karsinoid Sendrom

- ✓ **Malign karsinoid genellikle metastatik olup ince barsaklardan (ileum) ve karaciğerden kaynaklanır.**
- ✓ **50% hastada karaciğerden kaynaklanan, epizodik sendrom olarak; flashing, bronkospazm ve diyare gözlenebilir.**
- ✓ **Karsinoid RA ve RV endokardiumunu, pulmoner doku ve kapakları içermektedir.**
- ✓ **Serotonin (5-HIAA); fibröz plak mediyatörüdür.**
- ✓ **Sıklıkla septal ve anterior kapak üzerindedir.**



**Travmatik septal kapak,  
kordal rüptür**



**Tel çekimi ile  
septal kapak rüptürü**

TIS:0.8

PAT T: 37.0C

[hp]

4.4MHZ

T6210

TEE T: 37.8C

56

06 JAN 00

15:06:04

PROC 2/0/E/12/A

GLENFIELD HOSP

01069

GAIN 59

COMP 61

109BPM

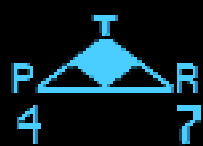
12CM

19HZ



CM  
M  
S

56



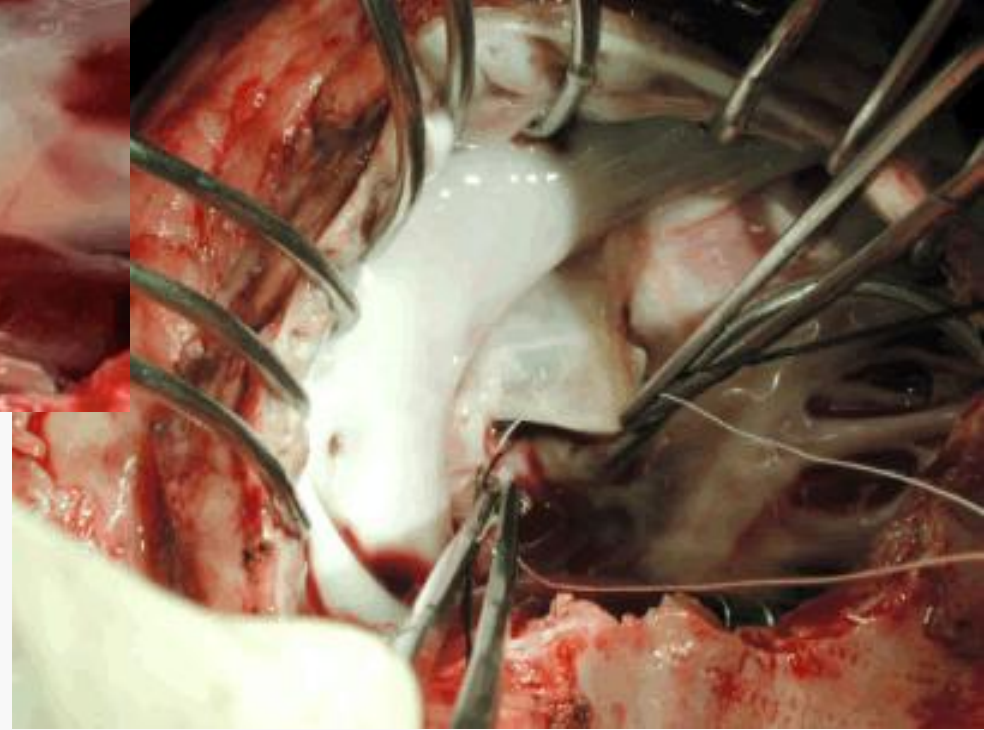
**Renkli doppler çoğu tanıda güvenilir**

# Cerrahi

---

- ✓ **Triküspit kapak onarımı**
  - **Carpentier prostetik ring**
  - **Duran prostetik ring**
  - **Cosgrove prostetik ring**
  - **DeVega annuloplasti**
  - **Trikuspid kapak replasmanı**
- ✓ **Triküspit kapak eksizyonu ile birlikte acil replasman**





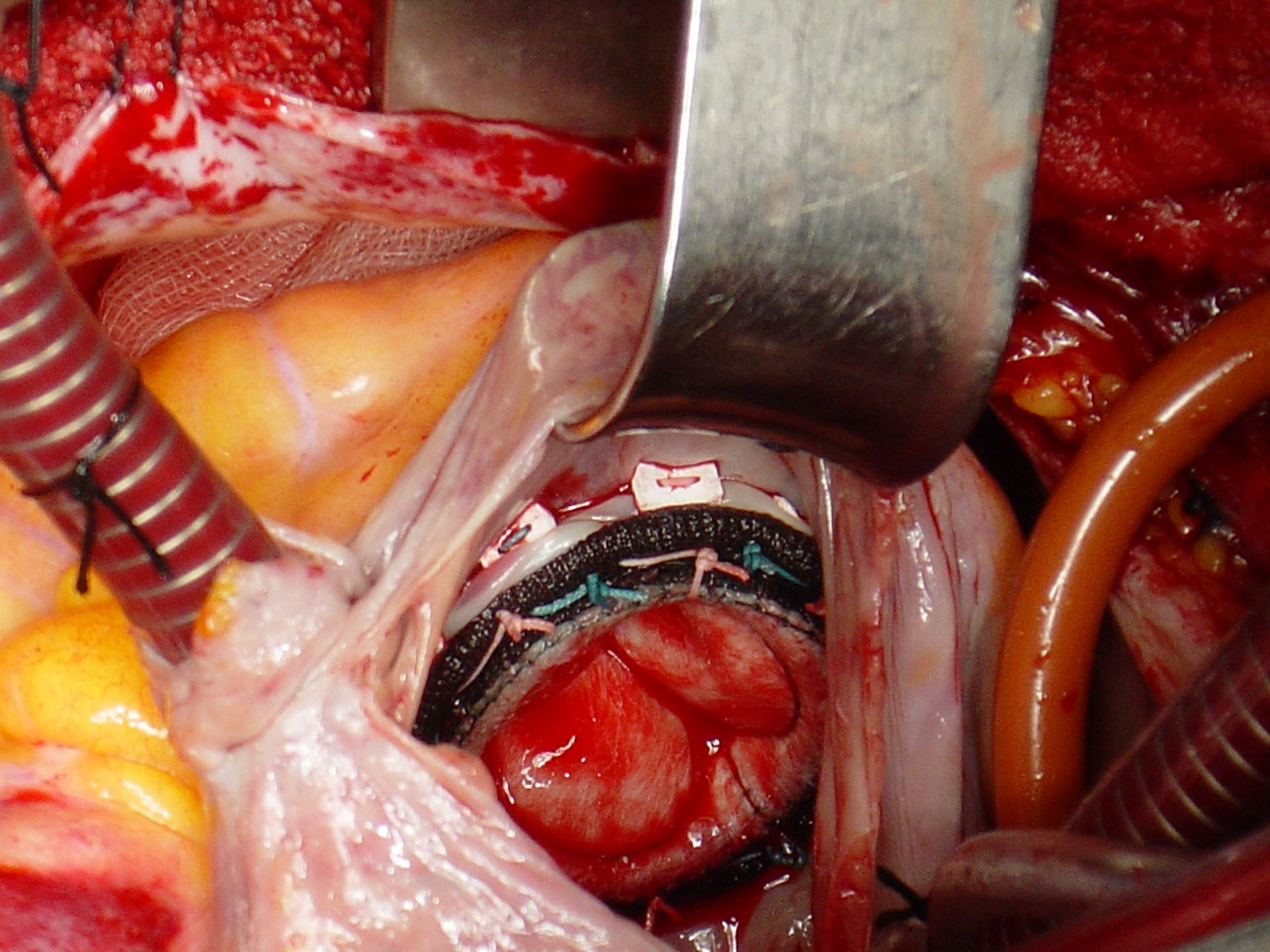
Triküspit anüloplasti ve septal kapak tamiri

# **Triküspit Kapak Replasmanı**

---

- ✓ **Ebstein' s anomalisi**
- ✓ **Kalbin karsinoid sendromu**
- ✓ **Mekanik protezlerde tromboz büyük risktir ve triküspitte bu oran mitral ve aorttan daha yüksektir**
- ✓ **Porcine heterograft; erişkinlerdeki bu kapak seçimi ile dayanıklılık 10 yılın üstündedir**





# **Triküspit kapak eksizyonu ile birlikte acil replasman**

---

## **Eroin bağımlılığında triküspit endokarditi**

- ✓ **Endokarditin eradikasyonu için hastalıklı kapak eksizyonu önemlidir**
- ✓ **Devamlı antibiyotik tedavisi**
- ✓ **çoğu hastada triküspit kapak hasarı tolere edilebilir**
- ✓ **Enfeksiyon kontrolü ve 6-9 ay sonra biyoprotez kapak için eksizyon yapılabilir**

# **Trikuspid Darlığı**



# Etyoloji

---

- ✓ **romatizmal (çoğunlukla-90%)**
- ✓ **Konjenital triküspit darlık**
- ✓ **Sağ atrial tümör**
- ✓ **Sağ ventrikül içine doğru akımda tıkanıklık**
  - **Metastatik karsinoid sendrom**
  - **Endomiyokardiyal fibrozis**
  - **Triküspit kapakta vejetasyon**
  - **Kalp dışı tümörler**

210 TEE T <37.0C  
JAN 01  
14:18  
C 2/0/L/F3  
NFIELD HOSP  
O 'DYLAN'  
TOE NEW  
SON  
LIP  
8669  
OPD/AH/AMM

**RA  
miksoma**

**LA miksoma**



N 50  
P 65  
BPM  
M  
HZ

**Sağ ve sol atriyal miksomalar**



# Tedavi

---

- ✓ **Ciddi tuz kısıtlanması**
- ✓ **Diüretik tedavisi**
- ✓ **Karaciğer fonksiyonlarını düzeltme**

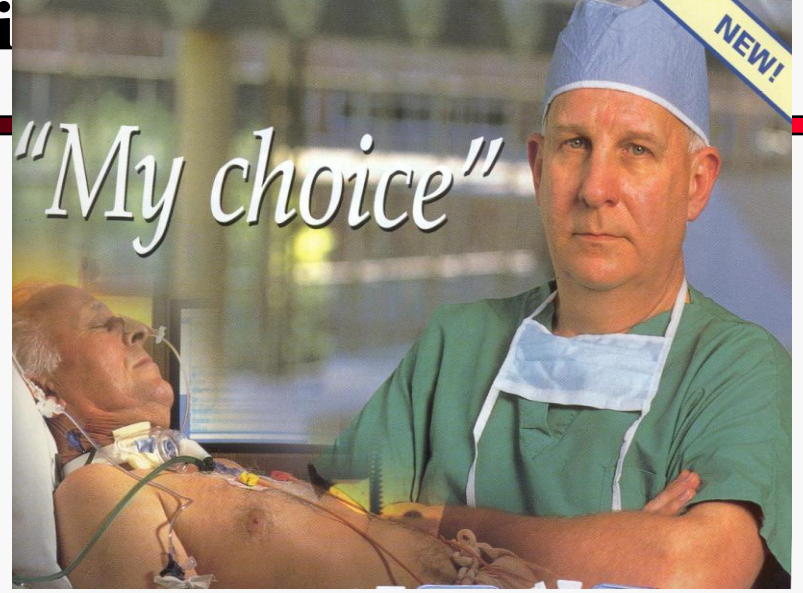
# **Triküspit Darlığı Cerrahi**

---

- ✓ **Ortalama diastolik basınç gradyenti  $> 5$  mm Hg**
- ✓ **Triküspit açıklık alanı  $< 2.0$  cm<sup>2</sup>**
  
- ✓ **Açık valvulotomi**
- ✓ **Triküspit kapak replasmanı (tercihen porcine “domuzdan elde edilen” biyoprotez)**

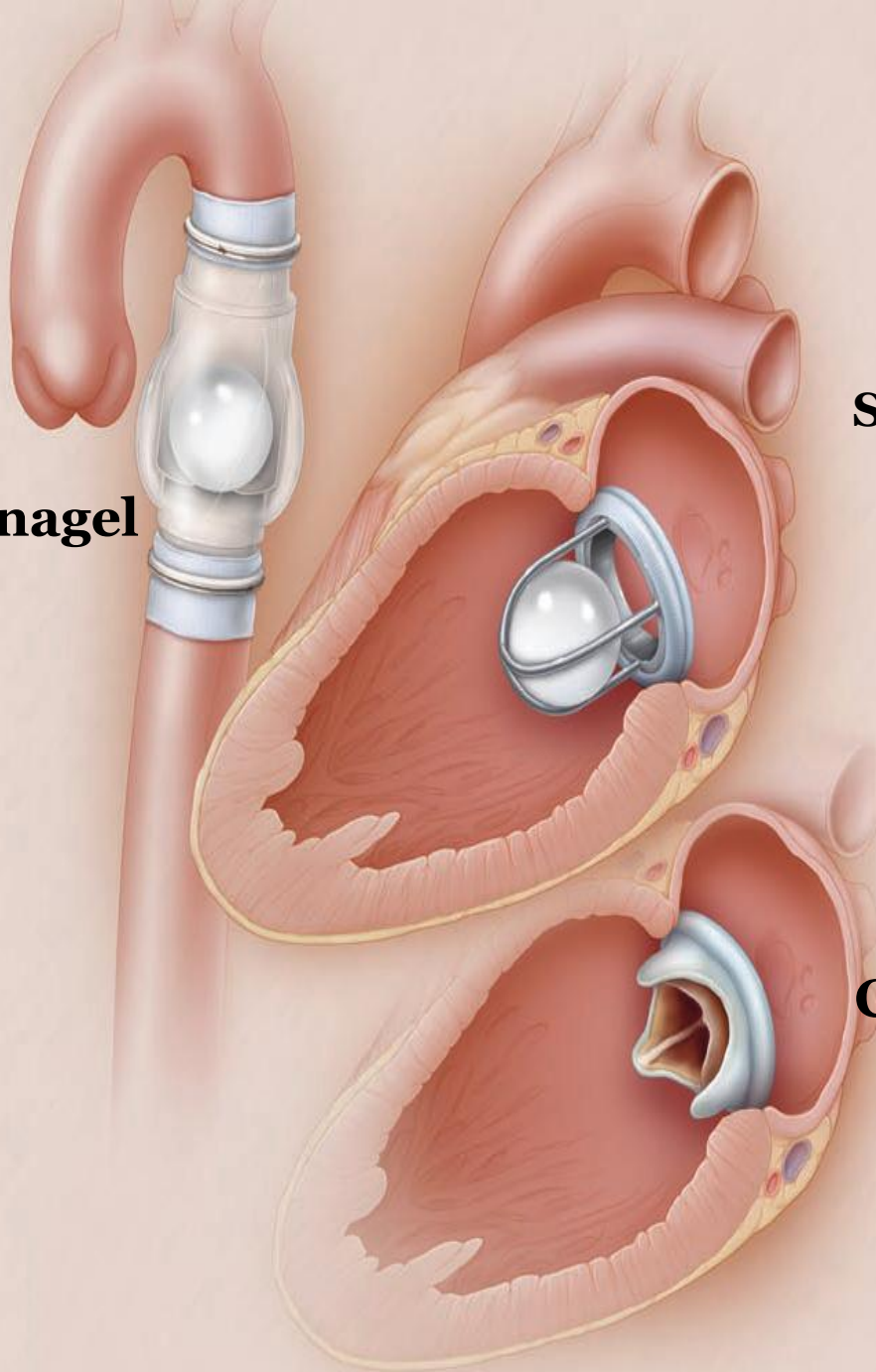
# İdeal bir kapağın özellikleri

- dayanıklı
- trombojenik olmayan
- kimyasal uygunluğu olan
- hemodinamik olarak nativ kapakla eşdeğer olan
- kolayca takılabilen
- hastanın rahatını bozmayacak; (Örn. sessiz çalışan)
- kolay temin edilebilen
- düşük endokardit riski olan





**Charles Hufnagel**  
**1954**



**Starr-Edwards**  
**1960**

**Harken, 1961**

**Carpentier-Edwards**  
**1971**

# Biyolojik kapak olarak kullanılan dokular

*Grunkemeier & Bodnar. J Heart Valve Dis 1995*

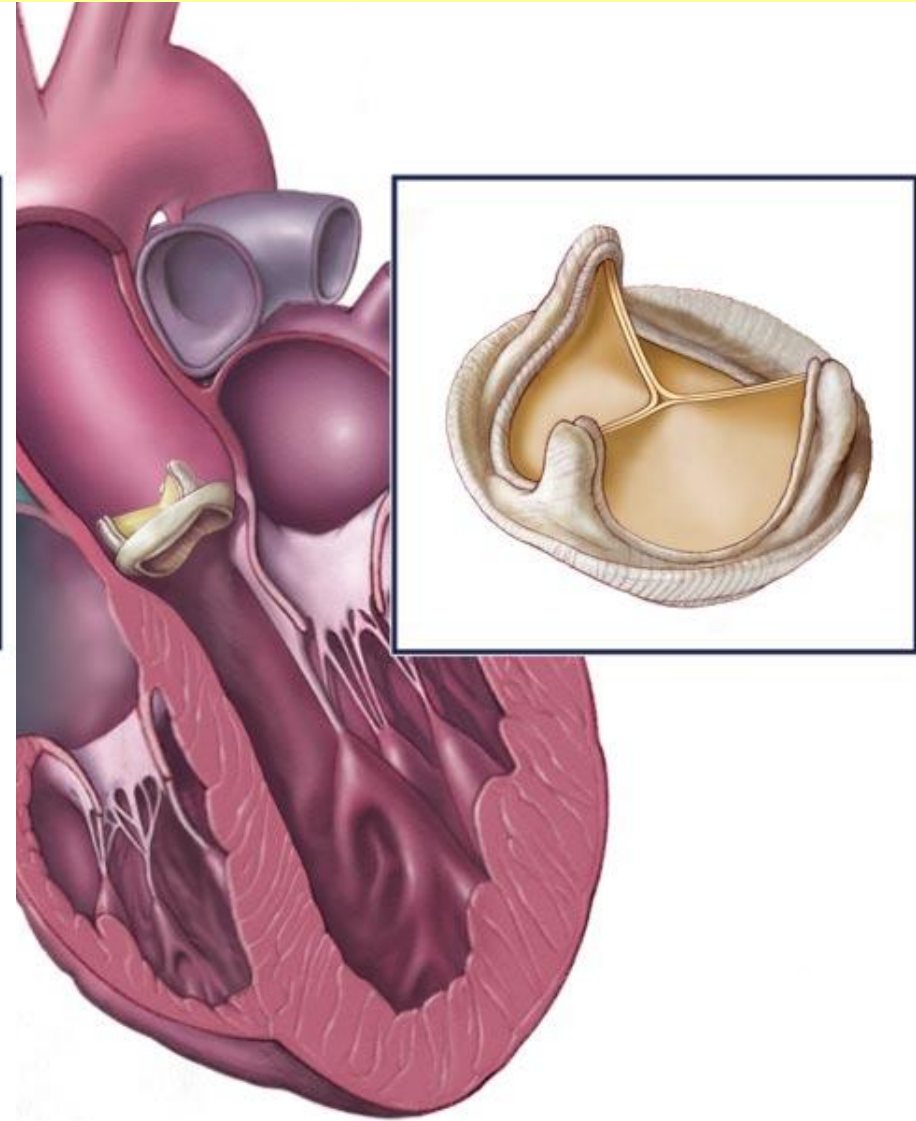
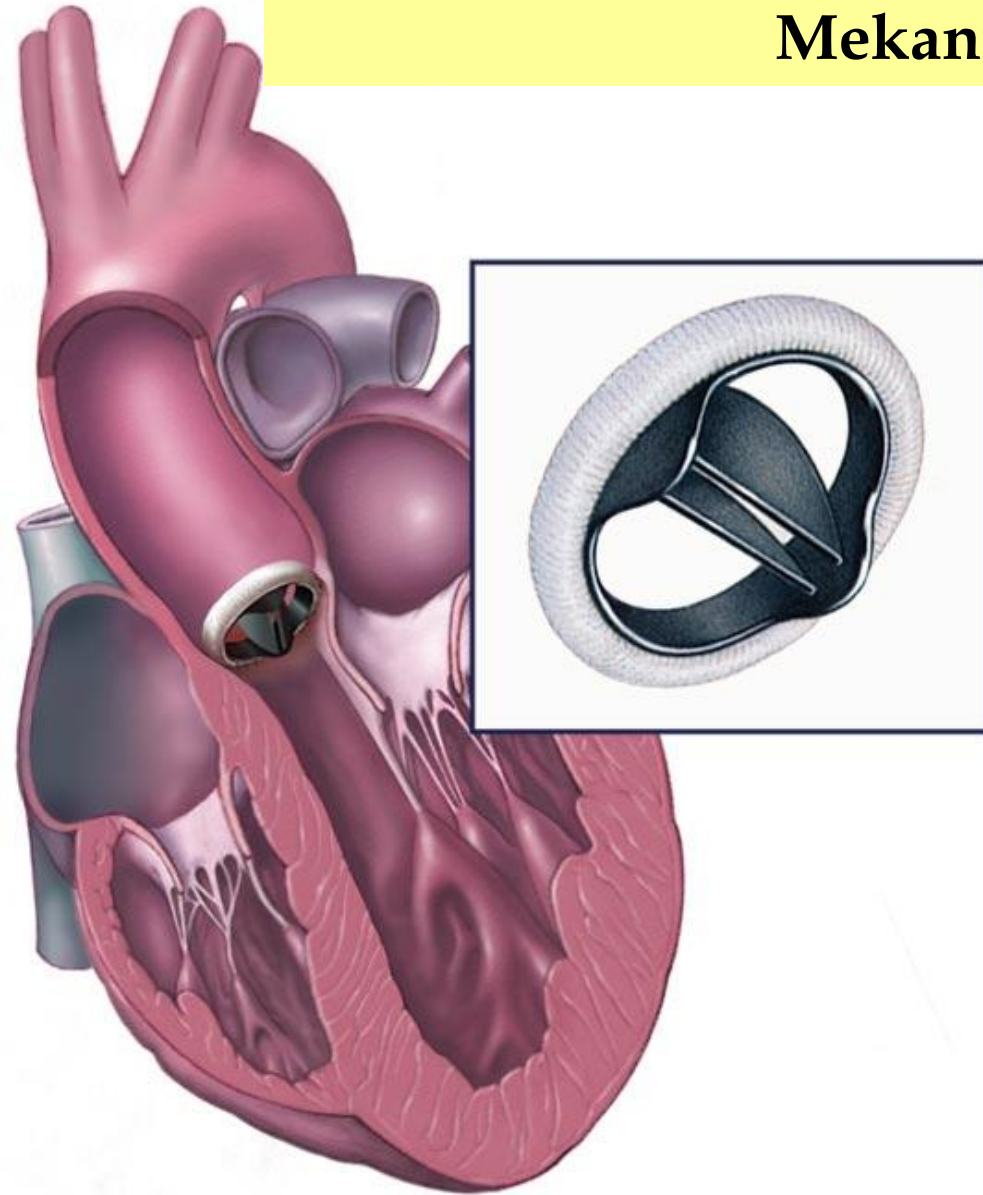
Donör	Kapak	Kapak olmayan
Otolog	Pulmoner kapak	Fascia lata pericardium
Homolog	Homogreft	Dura mater
Heterolog	Domuz aort kapağı	Sığır perikardiyumu

# Kapak cerrahisinde objektif başarıml kriterleri

- ✓ **Tromboembolizm** < **3%**
- ✓ **Kapakta tromboz** < **0.8%**
- ✓ **Bütün kanamalar** < **3.5%**
- ✓ **Büyük kanamalar** < **1.5%**
- ✓ **Paravalvüler kaçak** < **1.2%**
- ✓ **Majör paravalvüler kaçak** < **0.6%**
- ✓ **Endokardit** < **1.2%**

US Food and Drug Administration Objective Performance Criteria

# Mekanik vs Biyolojik



# Mekanik Kapak Tercih Nedenleri

---

- ✓ Yaş < 40
- ✓ Renal yetmezlik
- ✓ Uzun yaşam beklentisi
- ✓ Kompozit graft
- ✓ Antikoagulan kullanabilen hasta
- ✓ Başka bir mekanik kapağı bulunması
- ✓ Atrial fibrilasyon
- ✓ Geçirilmiş felç
- ✓ Öncesinde kapak dokusunda yetmezlik
- ✓ Çift kapak replasmanı

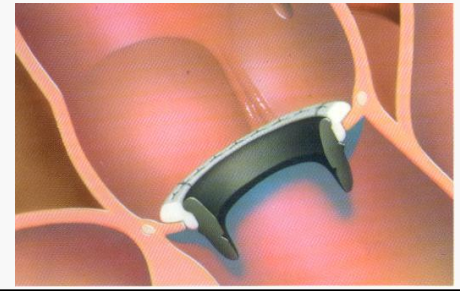


# **Biyoprotez Kapak İin Tercih Nedenleri;**

---

- ✓ Antikoagölan intoleransı**
- ✓ Antikoagölanın yüksek risk oluřturması**
- ✓ yař > 65**
- ✓ Kısa yařam beklentisi**
- ✓ Gebelik beklentisi**
- ✓ Öncesinde tromboze mekanik kapak**

# Hangi kapak?



## Hasta faktörü

- ✓ öncelik (antikoagülan-reoperasyon)
- ✓ Yaş
- ✓ Medikal uyum (kumadin kontrendikasyonları)
- ✓ Yaşam stili (gebelik beklentisi)

## Cerrahi faktör

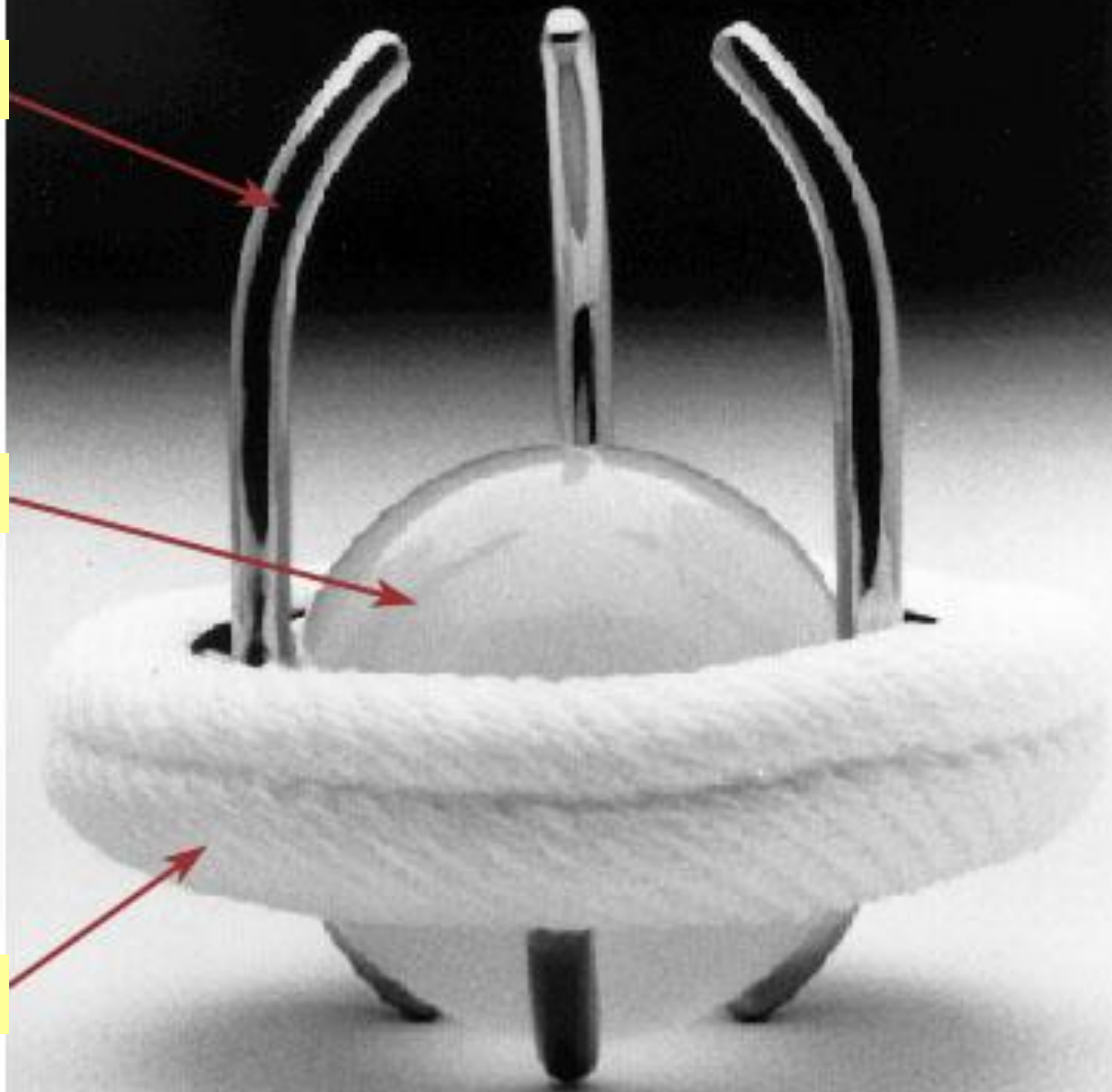
- ✓ Hastalık süreci (endokardit)
- ✓ Kalp anatomisi (küçük aort kökü)
- ✓ Teknik faktörler (kalsifiye aort kökü)



Kafes

Tıkayıcı top

Dikiş halkası



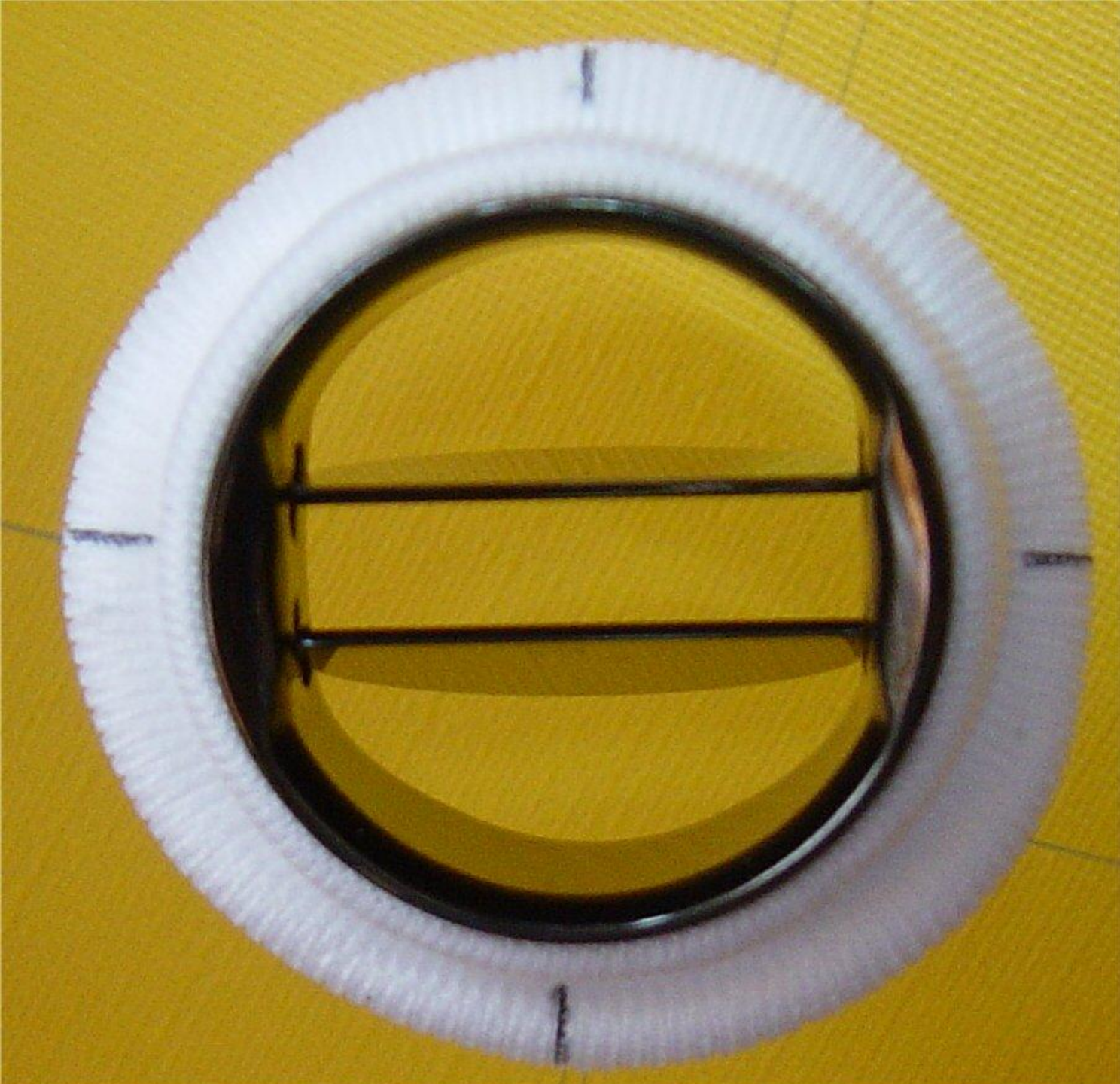


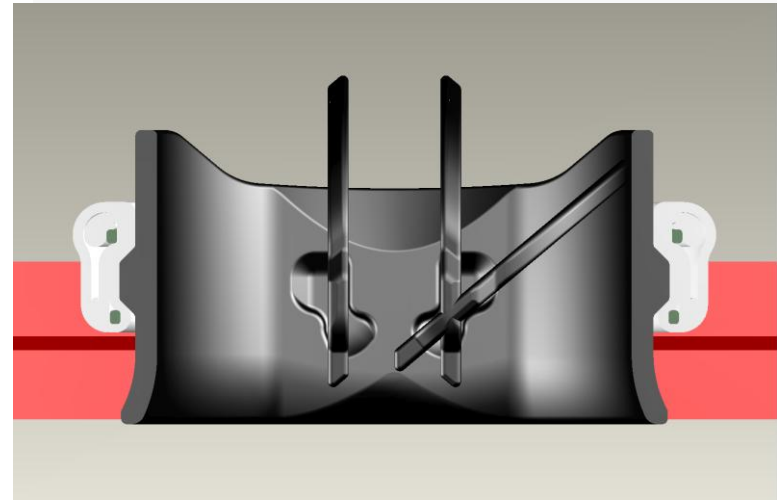
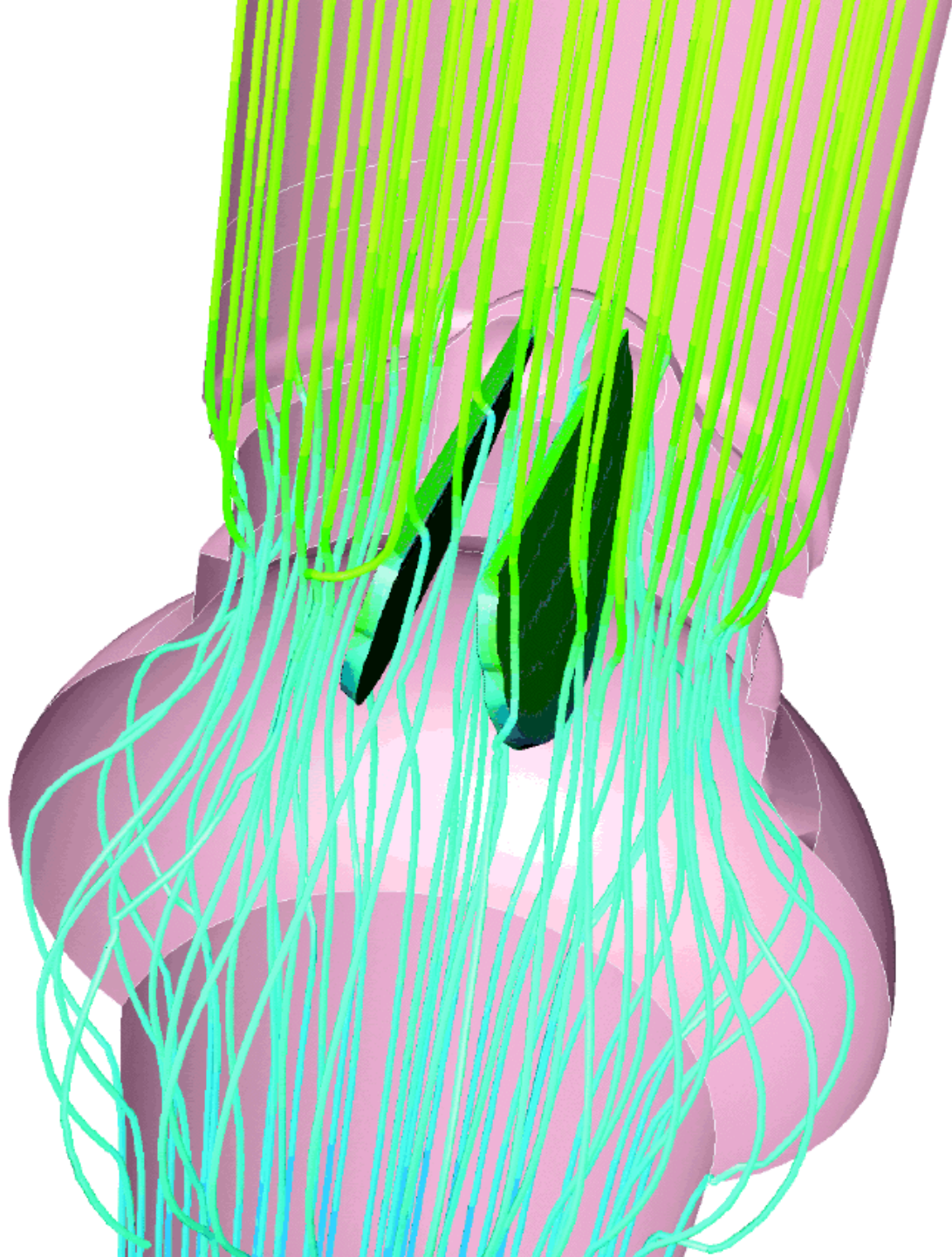


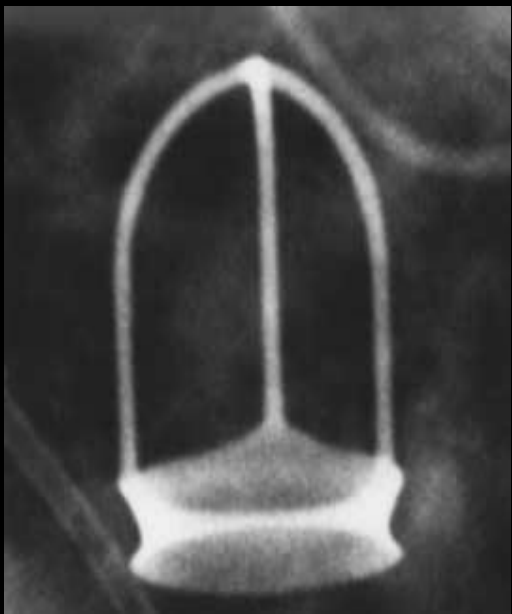














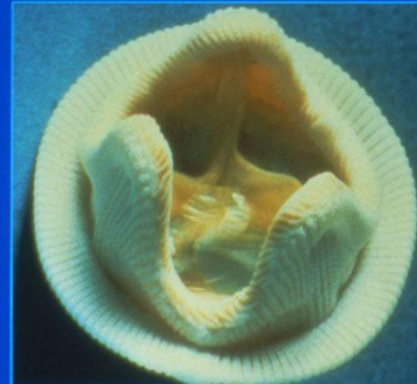


## Carpentier-Edwards® – 1968

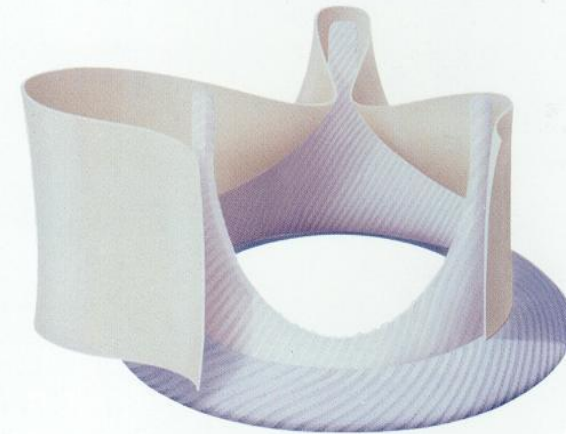
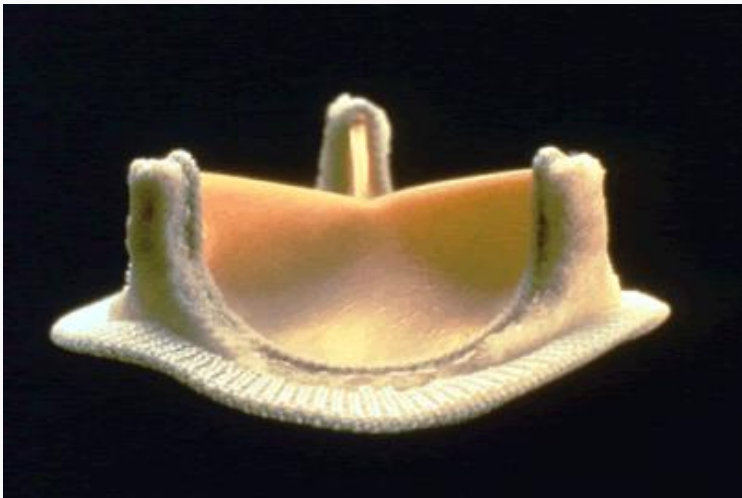


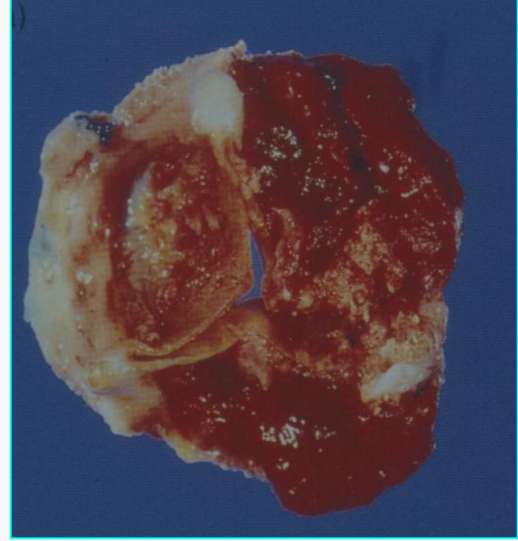
- Elgiloy™ Orifice Ring and Stents; Porcine Leaflets; Teflon® Cuff
- Flexible Stents
- High Profile
- Durability Limited by Calcification

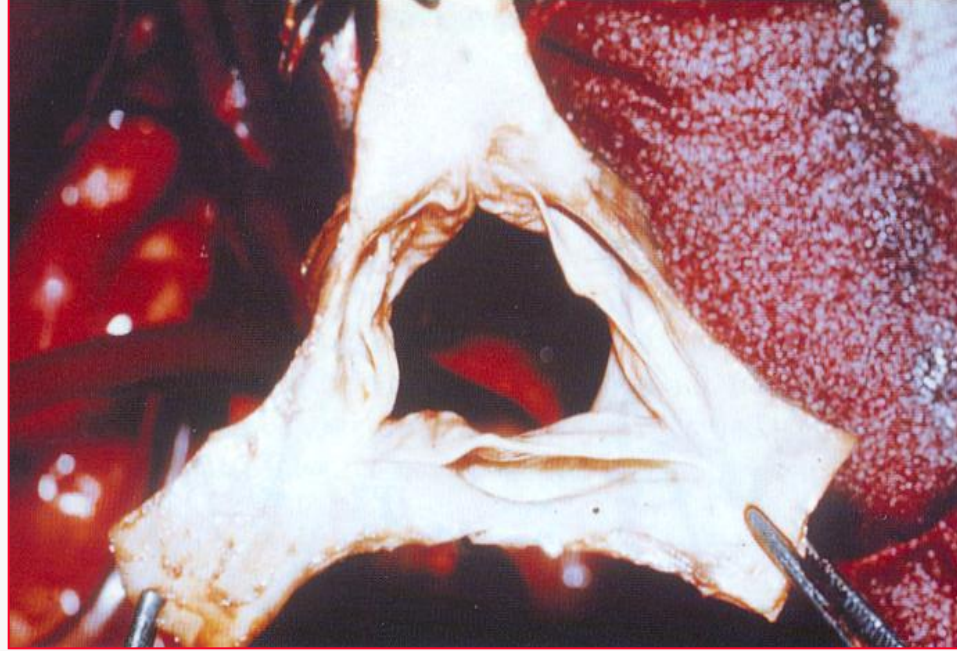
## Hancock™ – 1969



- Stellite™ Stiffening Ring; Porcine Leaflets; Polypropylene Stents; Dacron® Cuff
- Flexible Stents
- High Profile
- Modified Orifice – 1977
- Durability Limited by Calcification

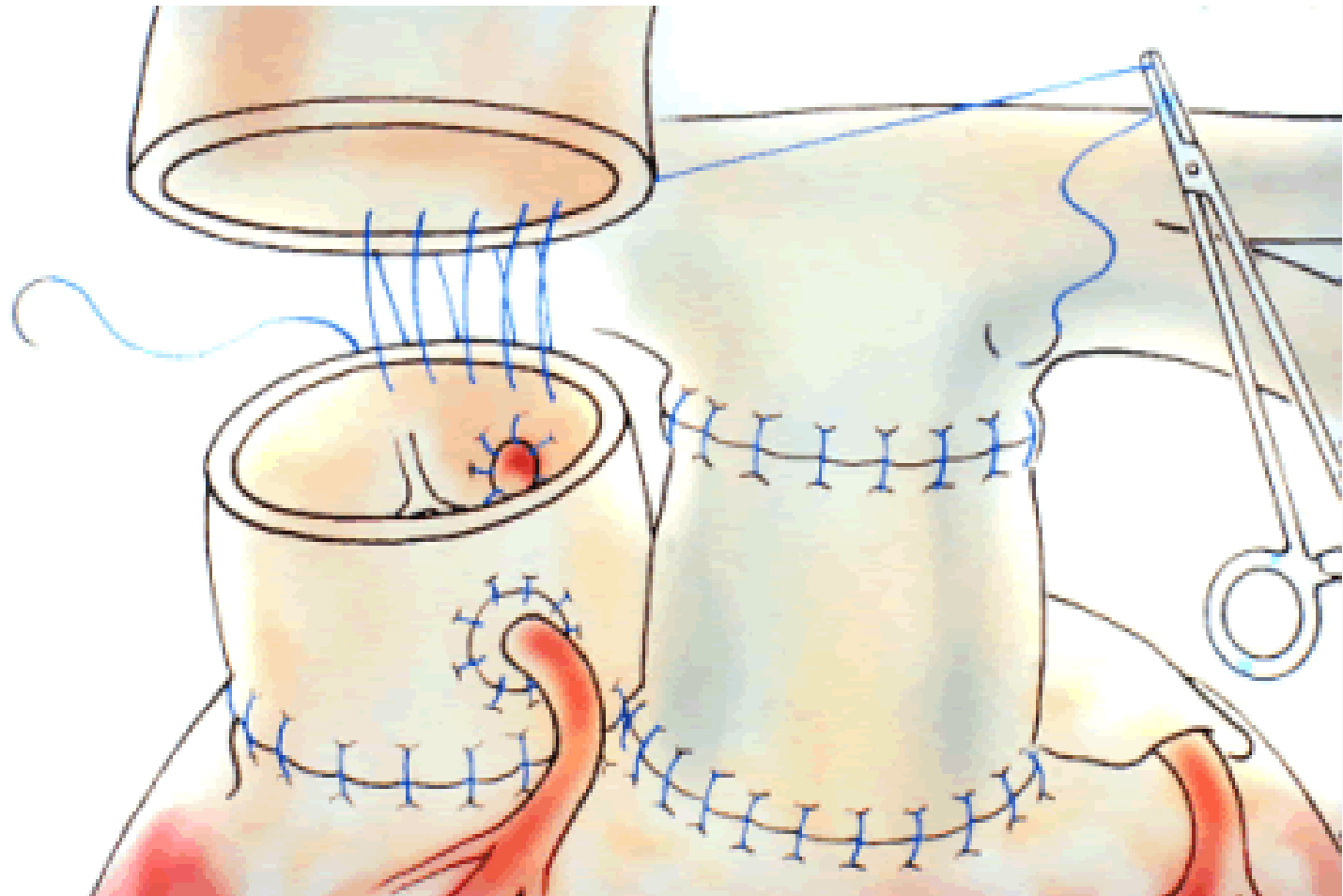




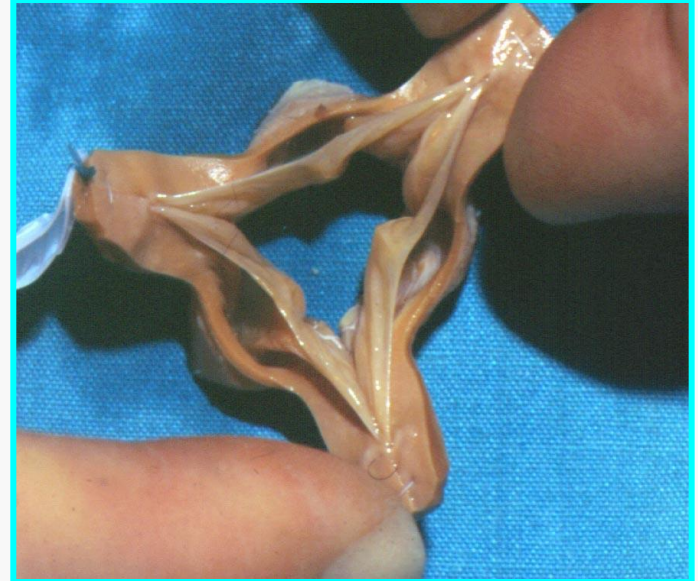


## **Aort homogrefti**

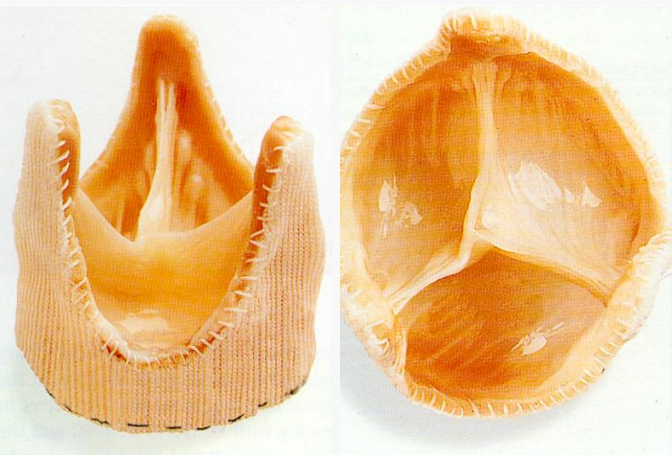
**“gerçek stentless kapaklar alanında altın standart”**



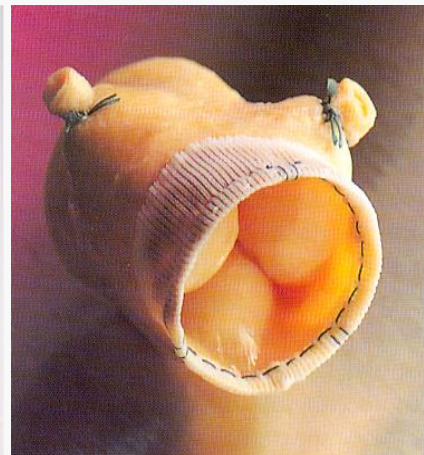
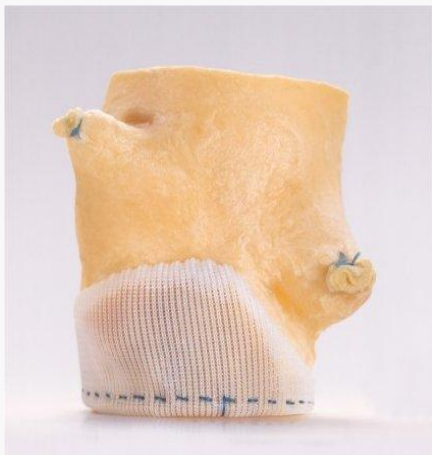




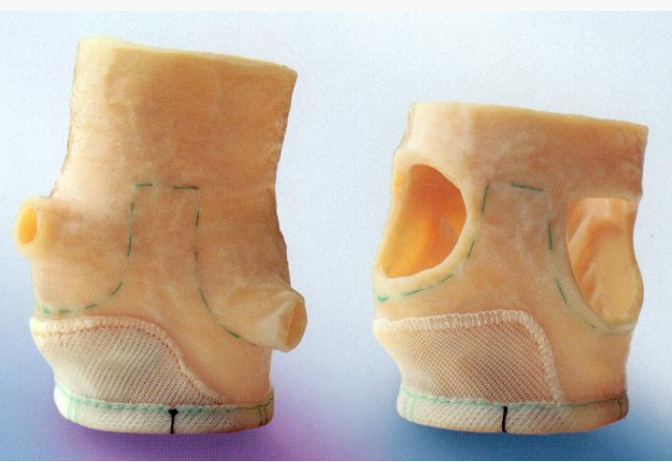
**Stentless Domuz Kapađı**



**Toronto SPV™ kapağı**  
St. Jude Medical  
(St. Paul, Minnesota, USA)



**Medtronic Freestyle™ stentless**



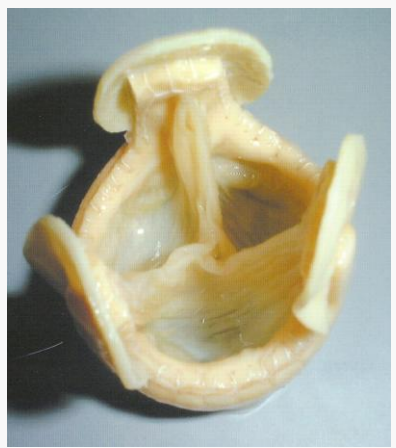
**Edwards Prima™ stentless**  
Baxter Healthcare Corporation,  
Edwards CVS Division  
(Irwin, California, USA)



**Cryolife-O'Brien®  
Aortic Stentless**  
Cryolife  
International  
(Atlanta, GA, USA)

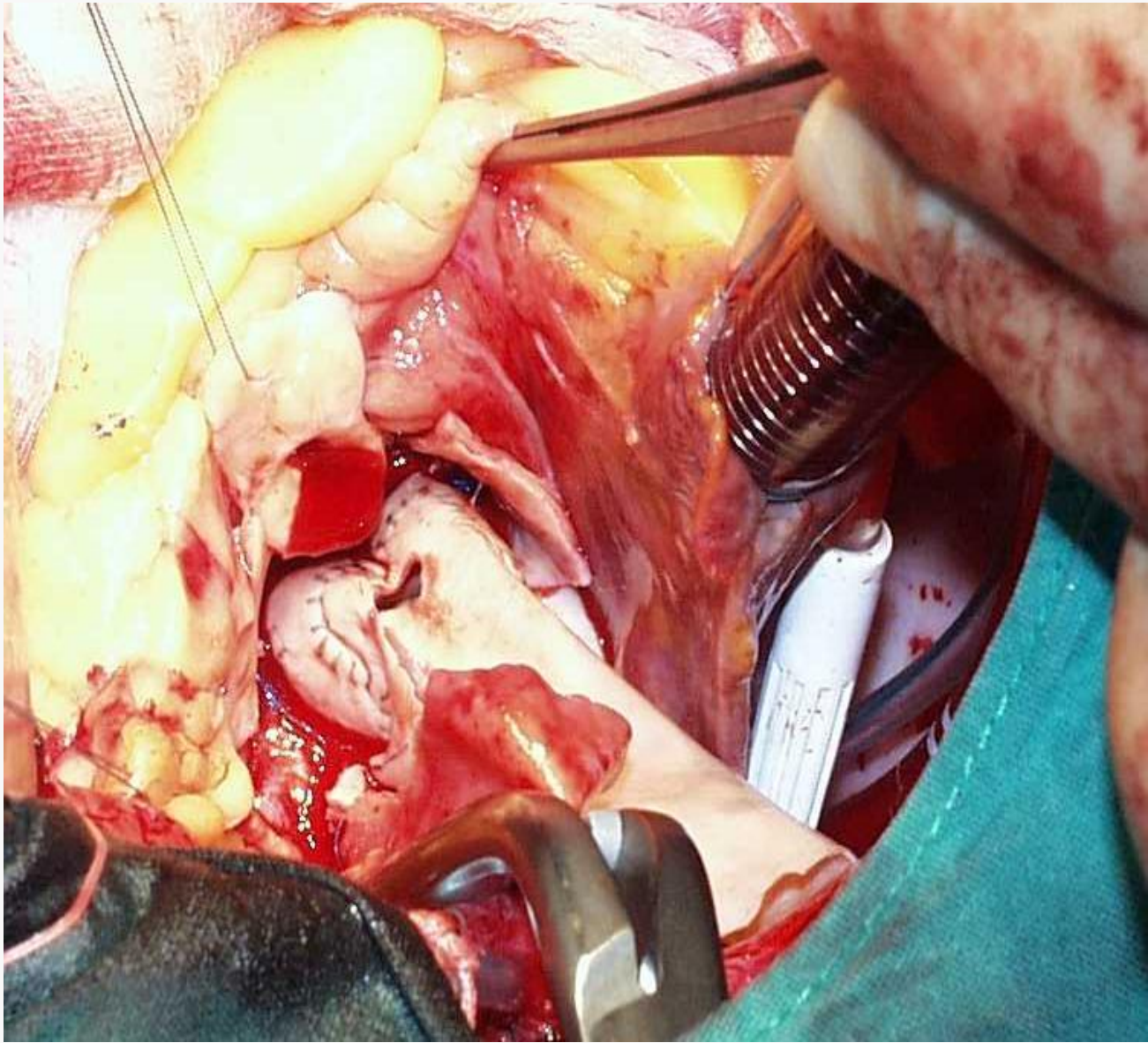


**Sorin  
Pericarbon™  
Stentless kapak**  
Sorin Biomedica  
(Saluggia, Italy)



**Shelhigh porcine  
stentless kapak**





# **Infektif Endokardit**

# TANIM

---

**Kalbin endotelyal yüzeyindeki mikrobiyal infeksiyon**

**Mortalite oranları %100'lerden, %5-10'lara düşmüştür**

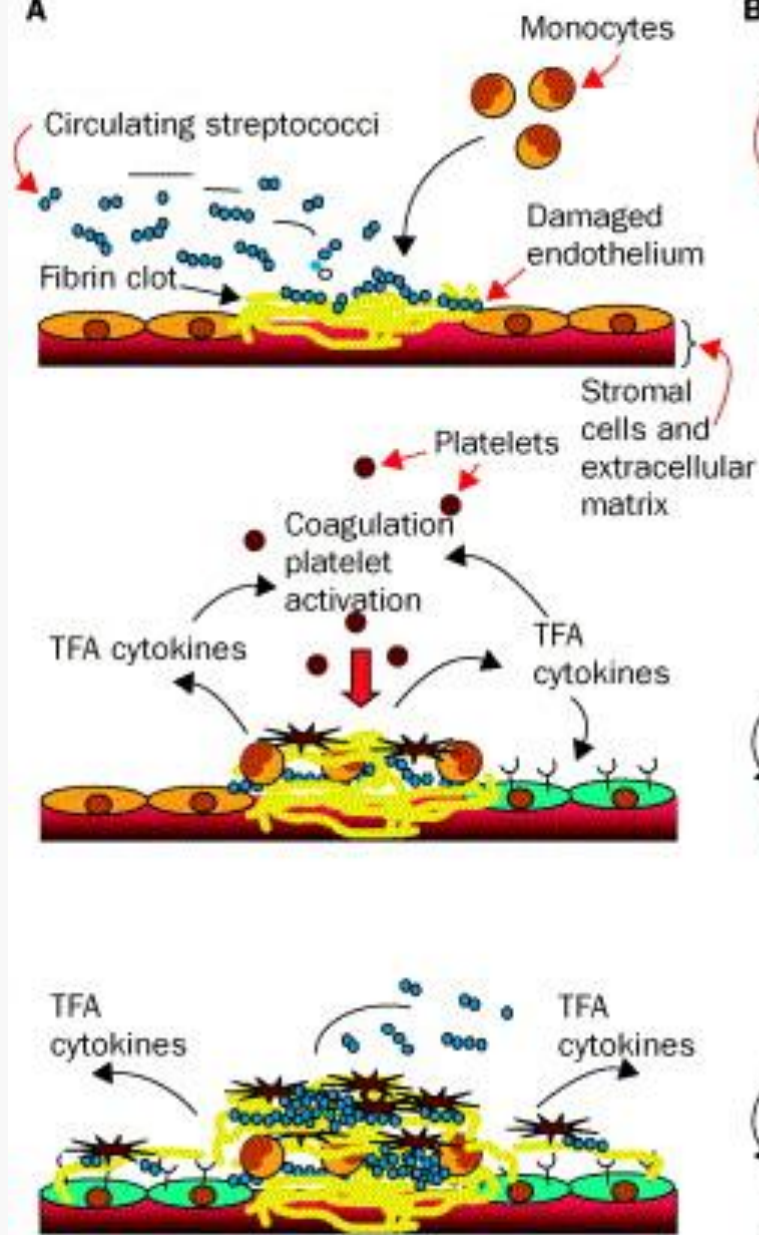
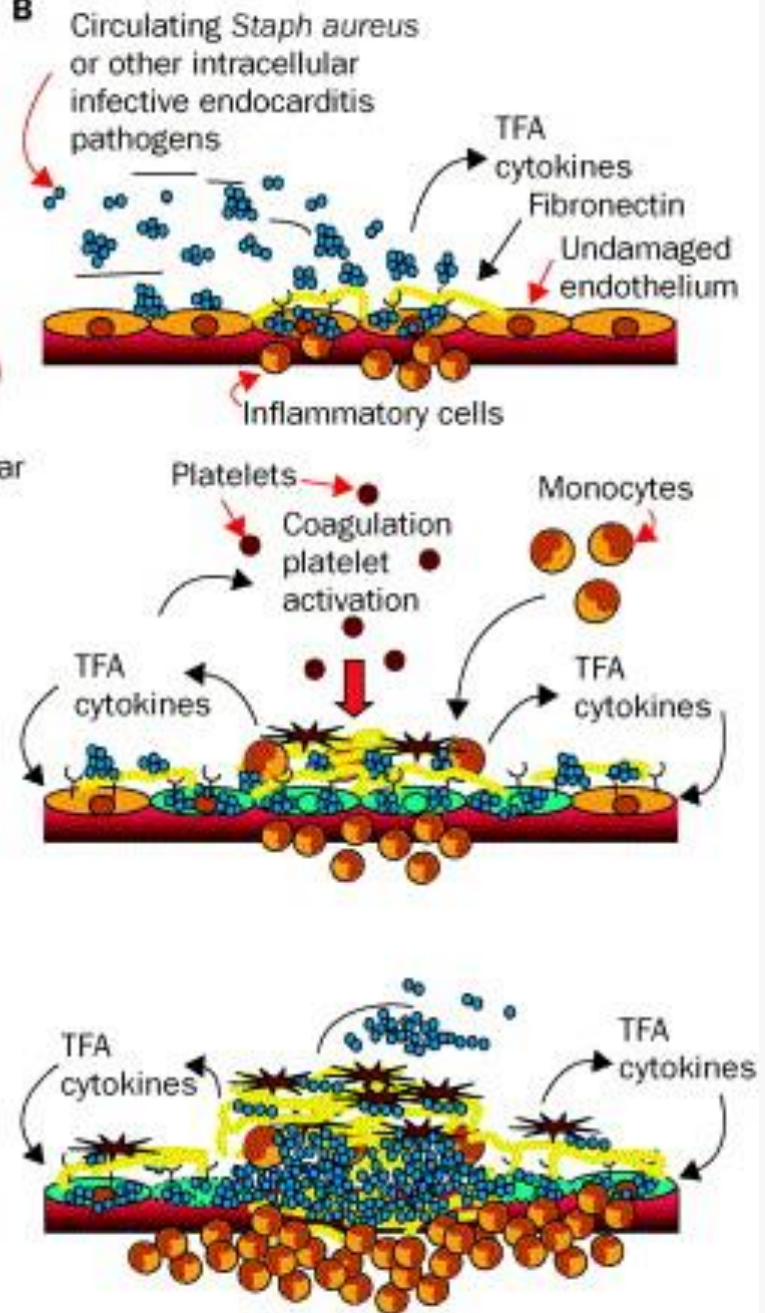
**Çeşitli etyolojik ajanlar ve farklı klinik seyir gösterebilir (NVE vs PVE)**



# İnfektif Mikroorganizma

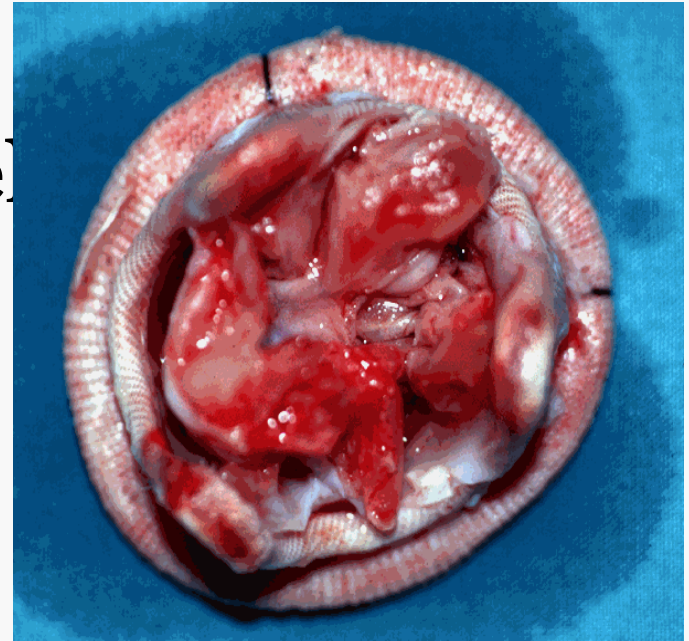
---

- ✓ **Bakteri**
- ✓ **Fungus**
- ✓ **Ricketsiya**
- ✓ **Klamidiya**
- ✓ **Virus**

**A****B**

# Vejetasyon

- ✓ **Mikroorganizma**
- ✓ **İnflamatuvar hücreler**
- ✓ **Platelet kümesi**
- ✓ **Fibrin**



# İE Yerleşimi

---

- ✓ **Kapak**
- ✓ **Septal defekt**
- ✓ **Korda tendinea**
- ✓ **Endokardiumun diğer bölgelerine**

# İE ESAS UNSURLAR

---

- ✓ **Kardiyak lezyon oluşumu**
- ✓ **Bakteriyemi (oral mukoza, genitoüriner yada gastrointestinal yol)**
- ✓ **Embolik fenomen**
- ✓ **Aktif endokardiyal süreç**



# Predispozan Risk Faktörleri

---

- ✓ **Mitral kapak prolapsı**  
**35%**
- ✓ **Prostetik kardiyak kapak (PVE)**  
**20%**
- ✓ **Konjenital** **15%**
- ✓ **immunosüpresyon** **10-15%**
- ✓ **İV ilaç kullanımı**
- ✓ **Romatizma**
- ✓ **Dejeneratif**
- ✓ **Asimetrik septal hipertrofi**

# Akut ve Subakut IE

## Akut İnfektif Endokardit

- ✓ Toksitesi önemli
- ✓ Günler ve haftalar içine kapakta yapısında bozulma
- ✓ Staf aureus tipik

## Subakut İnfektif Endokardit (SBE)

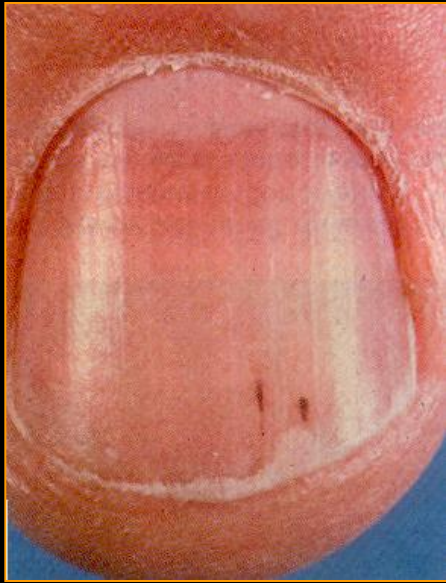
- ✓ Toksitesi hafif
- ✓ Haftalar, aylar içerisinde ilerler; metastatik infeksiyon düşük
- ✓ Streptococcus viridans, enterococci, staphylococcus epidermis, gram negatif coccobacilli etkindir

# KLİNİK

---

## FAME

- ✓ **F**ever (ATEŞ)
- ✓ **A**naemia (ANEMİ)
- ✓ **M**urmur (ÜFÜRÜM)
- ✓ **E**mbolic phenomena (EMBOLİ)



**Splinter or  
subungual  
haemorrhages  
15%**

**dark red, linear streaks in  
the nail bed of the fingers**





A



C



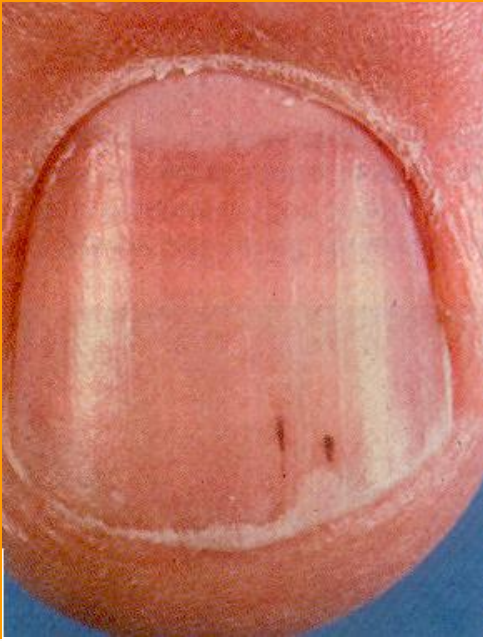
B



D



## İE periferik bulguları



**Splinter yada  
subungual  
hemorajiler (%15)**



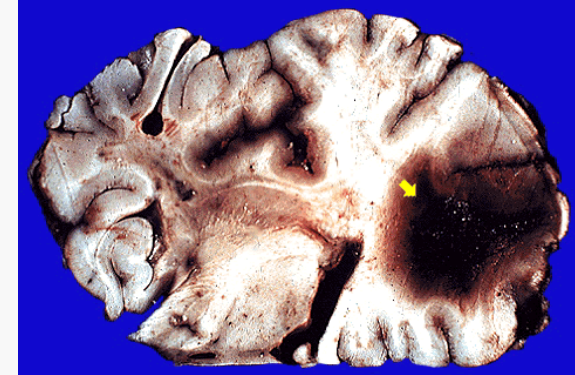
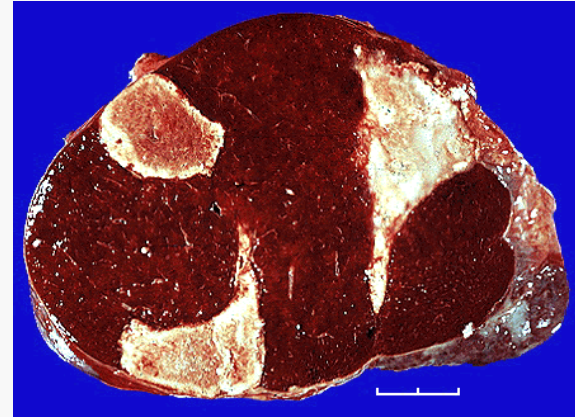
**Roth lekeleri 5%  
Ortası soluk retinal  
hemoraji**



**Osler nodülleri (%10-25)**

# Periferik Embolizasyon

- ✓ İE embolisi oldukça yaygındır
  - Beyin,
  - ekstremiteler,
  - koroner sistem,
  - dalak
  - böbrekler



# Nativ kapakta İE (NVE)

---

- ✓ **streptococci** **50-70%**
  - alpha haemolytic
  - **S. viridans**
- ✓ **staphylococci**  
**25%**
- ✓ **enterococci** **10%**
- ✓ **gram-negatif coccobacilli**  
**(oral flora mikroorganizması)**

# **gram-negatif coccobacilli HACEK grubu olarak bilinir**

---

**Haemophilus species**

**Actinobacillus**

**actinomycetemcomitans**

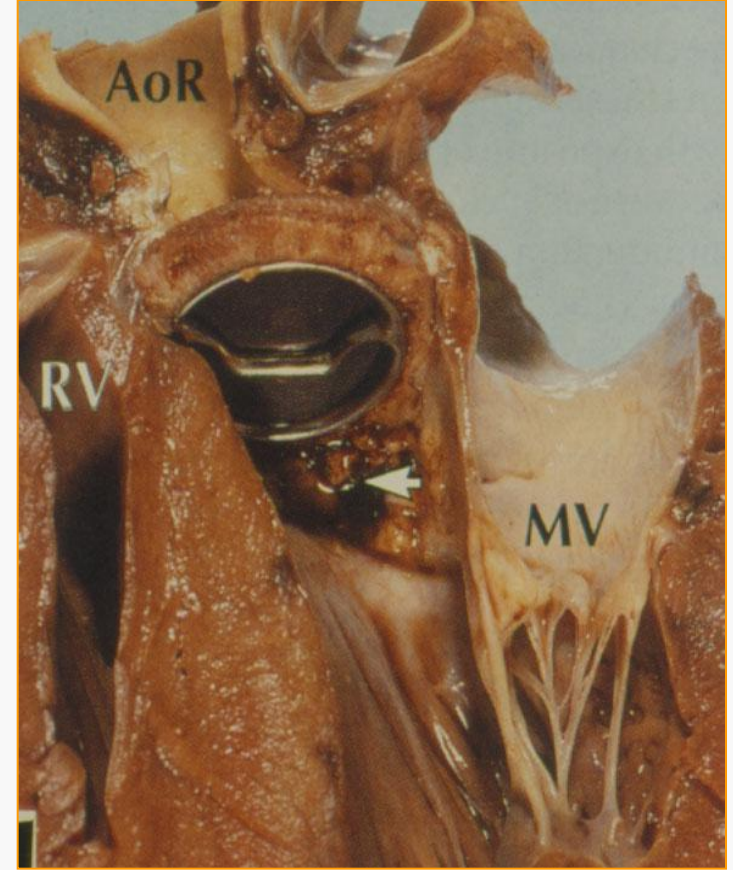
**Cardiobacterium hominis**

**Eikenella**

**Kingella**

# PROSTETİK KAPAK ENDOKARDİTİ (PVE)

1.4-3.1% İLK YIL  
İÇİNDE





# Prostetik Kapak Endokarditi (PVE)

## Erken PVE

(60 gün içinde)  
perioperatif kontaminasyon

<b>S. Epidermidis</b>	<b>%30-40</b>
<b>S. Aureus</b>	<b>%14</b>
<b>Gram-negative</b>	<b>%20</b>
<b>Diphtheroids</b>	<b>%12</b>
<b>Fungus</b>	<b>%10</b>

## Geç PVE

bakteriyemi (dental, GI,  
GU)

<b>Strep. Viridans</b>	<b>%25-30</b>
<b>S. Epidermidis</b>	<b>%25</b>
<b>S. Aureus</b>	<b>%10</b>

# Kesin Cerrahi endikasyonlar

---

- 1. Kapak disfonksiyonu yüzünden meydana gelen konjestif kalp yetmezliği**
- 2. Sallanan protez kapak**
- 3. İnfeksiyonun kontrol edilememesi:**
  - tekrarlayan bakteriyemi
  - etkisiz anti-mikrobiale tedavi
  - fungal endokardit
- 4. Etkin tedavi sonrası tekrarlama (prostatik kapaklar)**

# Relatif Cerrahi Endikasyonları

---

- ✓ Perivalvüler kaçak
- ✓ *Staphylococcus aureus* endocarditi (aort, mitral, prostetik kapak)
- ✓ Antibiyotik tedavisinden sonra tekrarlama (nativ kapakta)
- ✓ Negatif kültür sonucu olan ancak açıklanmayan tekrarlayan ateş ( > 10 gün)
- ✓ Büyük (> 10 mm) vegetasyonlar
- ✓ Tekrarlayan periferik embolizasyonlar

# Cerrahi Tedavinin Prensipleri

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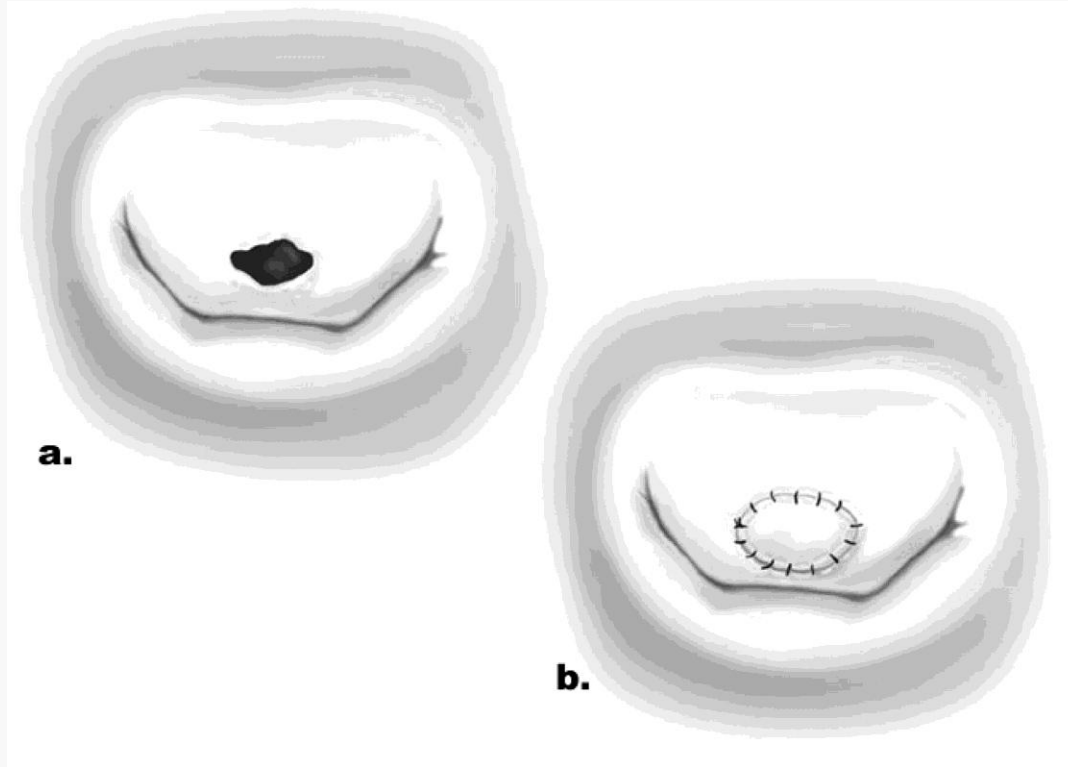
- ✓ **Tüm enfekte kapak dokusunun eksizyonu**
- ✓ **Abselerin debritlemesi ve drene edilmesi**
- ✓ **Hasarlı kapakların onarımı veya replasmanı**
- ✓ **Eşlik eden patolojinin onarımı: septal defekt, fistül**

# Cerrahi Teknikler

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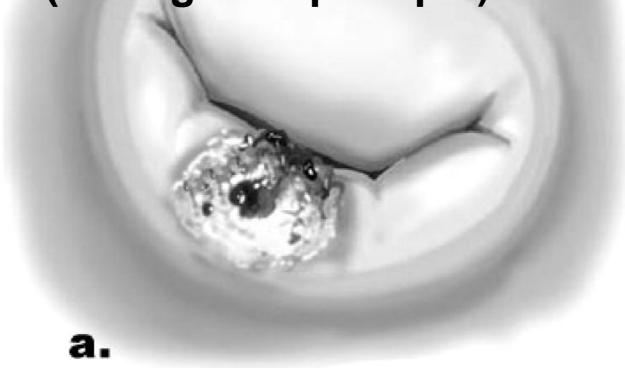
- ✓ **Aort veya mitral kapak için homogreft**
- ✓ **Aort kökü için komposit kondüitli kapak**
- ✓ **Kapakların primer onarımı veya yamalanması**
- ✓ **Kalp transplantasyonu**  
**Operasyon zamanı:**  
**Kardiyak fonksiyonları bozan ağır kapak yetmezliği**



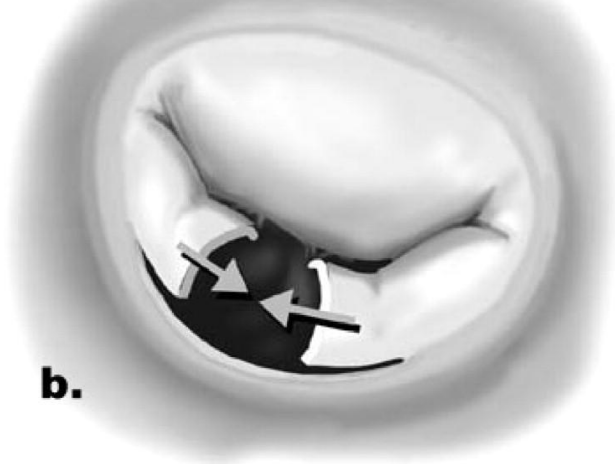


**Leaflet perforasyonu (anterior leaflet)  
otolog perikardiyal patch**

**Posterior leaflet endokarditi  
(P2 segment prolapsı).**



**P2 segment reseksiyonu**

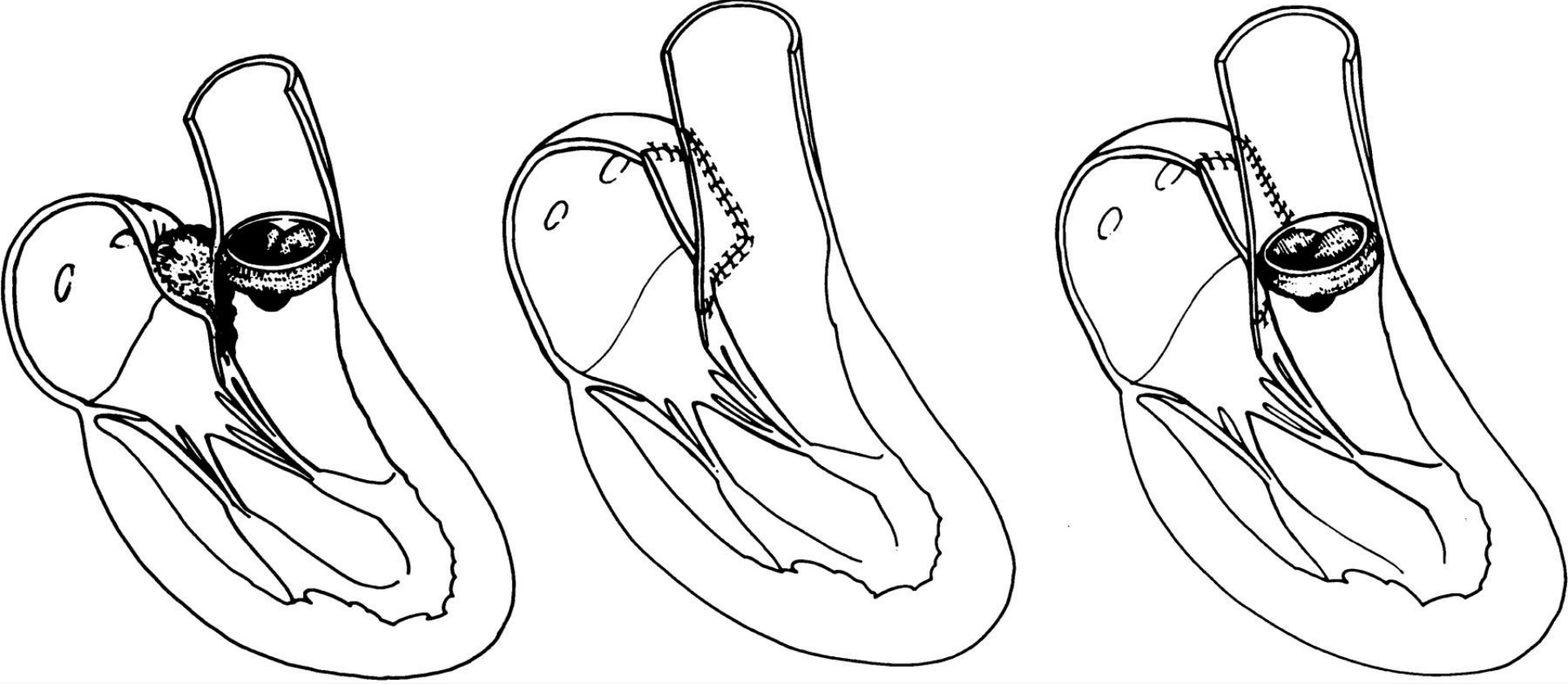


**Posterior anulusa kompresyon sütürleri**

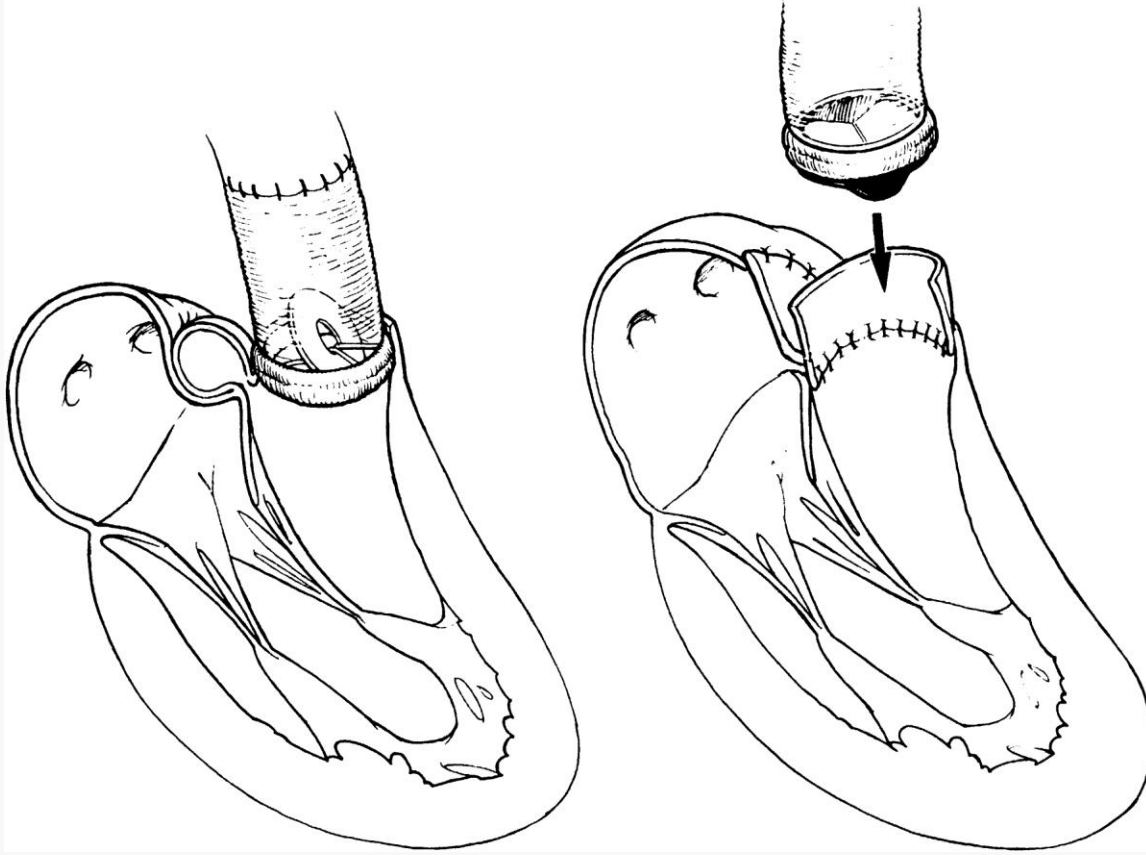


**Sliding plasti**





**Aork kökü apsesi onarımı:  
Bir patch sol atrium tepesine, başka bir patch aort köküne uygulanır**



**Aort kökü  
replasmanı sonrası  
Aort kökü absesi  
onarımı:**

# Fungal Endokardit

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- ✓ Vakaların % 5'i NVE
- ✓ Vakaların % 10'u PVE
- ✓ İ.V. madde bağımlılarında ve altta yatan sistemik hastalığı olanlarda sık
- ✓ Tanısı zordur çünkü çoğu hastada ateş ve beyaz küre sayımı normaldir
- ✓ Fungusun kültürde gösterilmesi zordur ve kan kültürü tipik olarak negatiftir



# Fungal Endokardit

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- ✓ **Büyük vegetasyonlar, sistemik emboli, miyokardın tutulması, medikal tedaviye dirençli**
- ✓ **Erken cerrahi müdahale gerekir çünkü medikal mortalite %100'e varır**
- ✓ **Hayat boyu anti-fungal tedavi**