



Petr Fila

CARDIAC SURGERY

- valve disease
- aortic dissection
- atrial fibrillation



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Surgery & Transplantation



Valve diseases - history

1950 - Bailey – closed aortic valvulotomy

1952 - Hufnagel – descending thoratic aortic valve

1956 - Murray – descending thoratic aortic homograft

end of 50th – Hurley, Kirklin – open valvulotomy

1960 - Harken, Starr – AVR with aortic ball valve

1962 - Barratt-Boyes – AVR with homograft

1965 - Binet – AVR with bioprosthesis

1967 – Ross procedure

1991 - David, Yacoub – aortic valve sparing surgery



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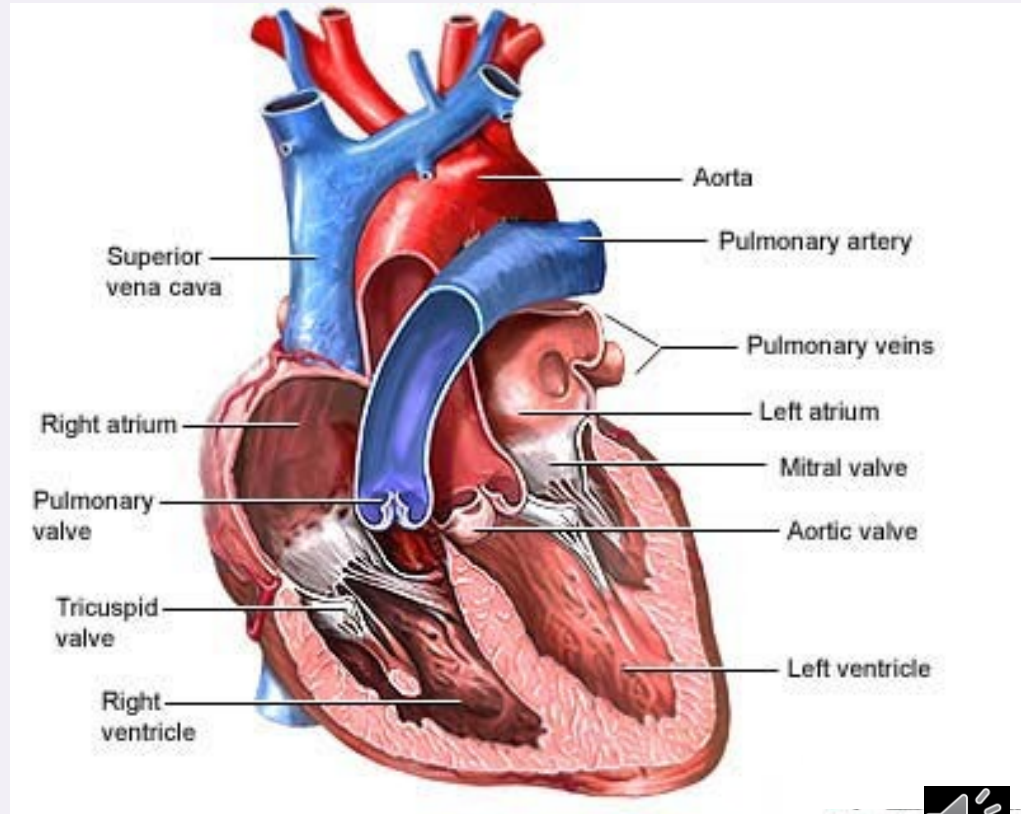
Anatomy of heart valves

Atrio-ventricular valves (Mi,Tri)

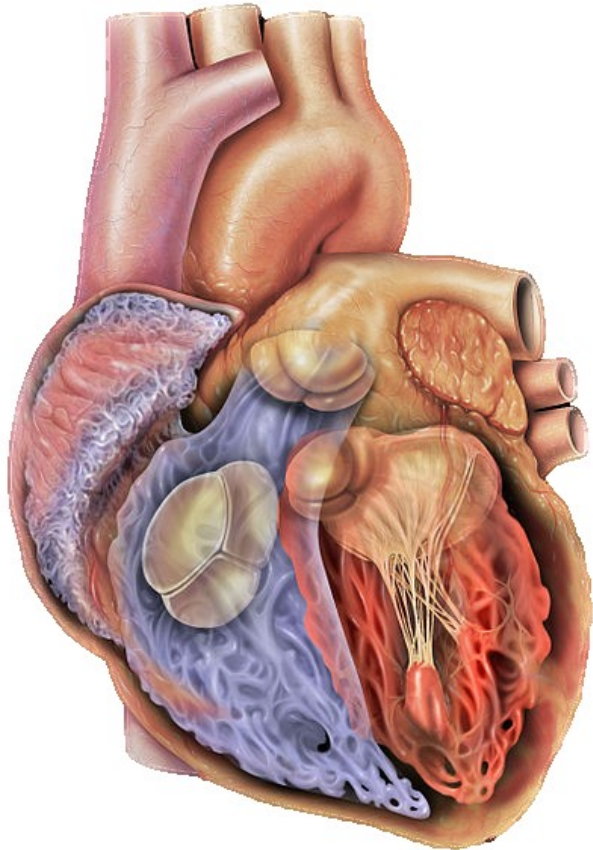
- leaflets
- anulus
- chords
- papillary muscles
- left /right ventricle

Ventriculo-arterial valves

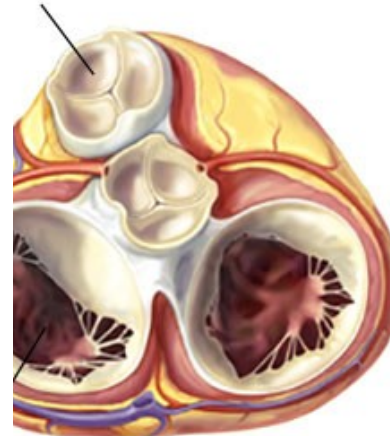
- leaflets
- anulus
- root
- ST junction



Anatomy of heart valves - localization

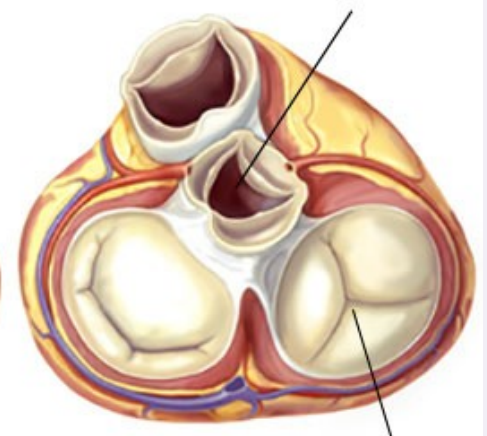


Pulmonary Valve



Mitral Valve

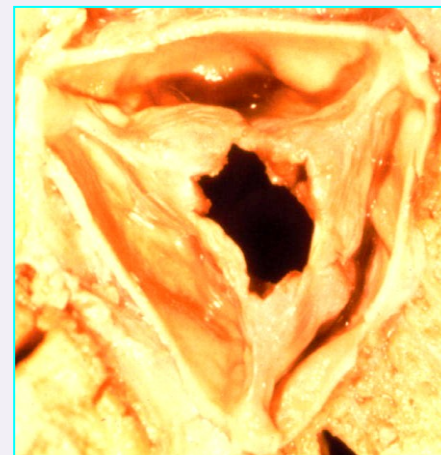
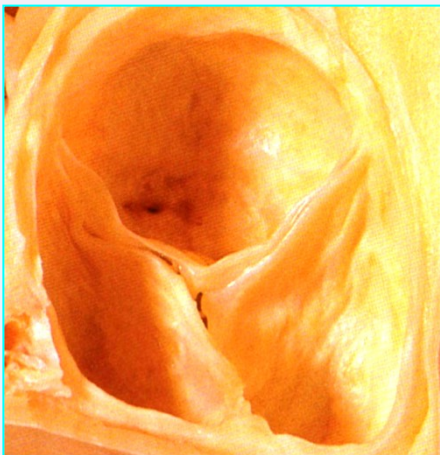
Aortic Valve



Tricuspid Valve

Aortic valve disease - stenosis

- Etiology** - degenerative
- congenital
- post-rheumatic



most often
AS risk factors

bicuspid - 2%
turbulent flow
aortic root dilatation!

+ Mi valve



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Aortic valve disease – stenosis – indication for surgery (AVR)

aortic valve stenosis (on ECHO)

+ symptoms (chest pain, dyspnea, syncope)

➔ **surgery**

— symptoms LV function? (\downarrow EF, LV dilatation)

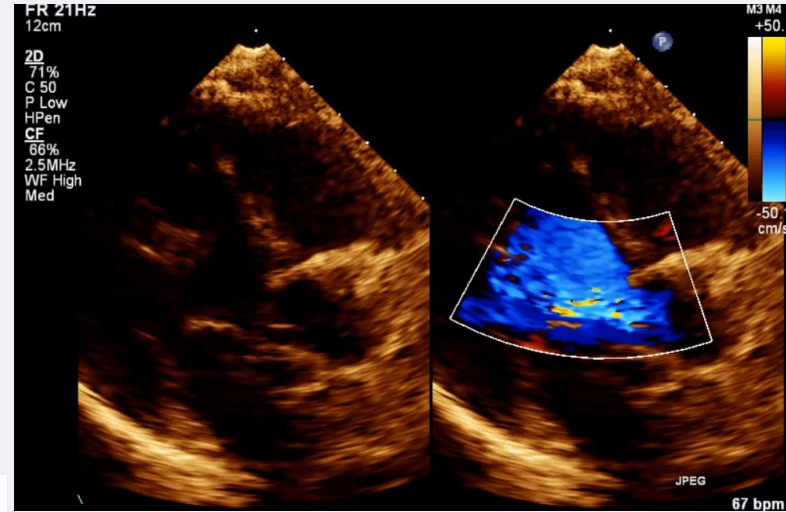
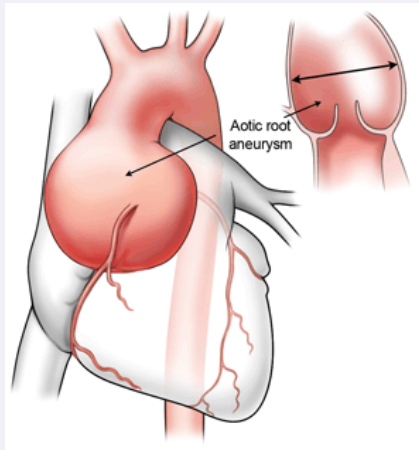
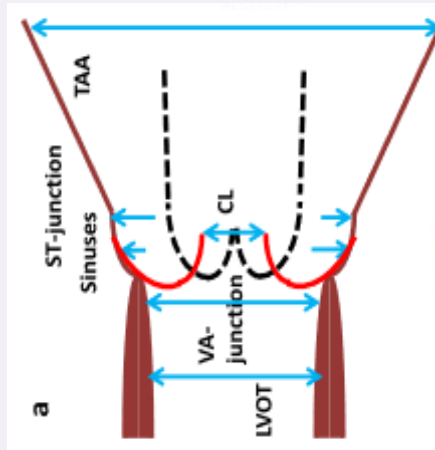
➔ **surgery**



Aortic valve disease - regurgitation

acute x chronic

- Etiology**
- post-rheumatic
 - endocarditis
 - congenital
 - degenerative
 - annulus/root/STJ dilatation



Mitral valve diseases

Stenosis

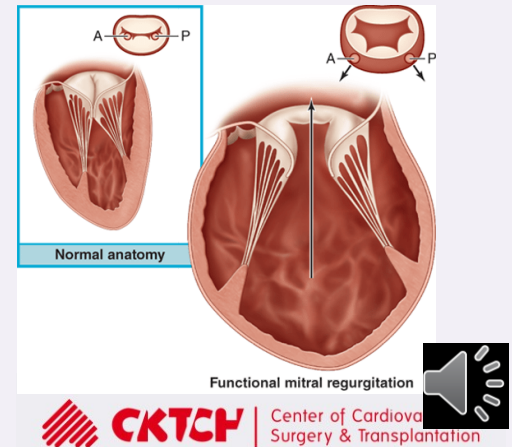
- Etiology** - post-rheumatic
- degeneration (calcification)

- Indication for surgery** - symptoms (dyspnoea)
- $MV \leq 1,5\text{cm}^2$
- atrial fibrillation
- pulmonary hypertension

Regurgitation (acute, chronic)

- Etiology** - myxomatous degeneration (leaflet prolaps, chords rupture...)
- post-rheumatic
- endocarditis
- ischemic (MI, LV dysfunction)

- Indication for surgery** - symptoms
- $RV > 40\text{ml}$, $RF > 40\%$,



Tricuspid valve disease

Stenosis

- Etiology**
- post-rheumatic
 - carcinoid syndrom

Indication for surgery - gradient > 2-3mmHg

Regurgitation

- Etiology**
- relative...annulus dilatation
 - endocarditis

Indication for surgery - TriR grade III-IV



Heart valve surgery

1. Valve sparing – if it's possible

X risk of failure valve sparing surgery → redo surgery

2. Valve replacement

X risk of valve prosthesis



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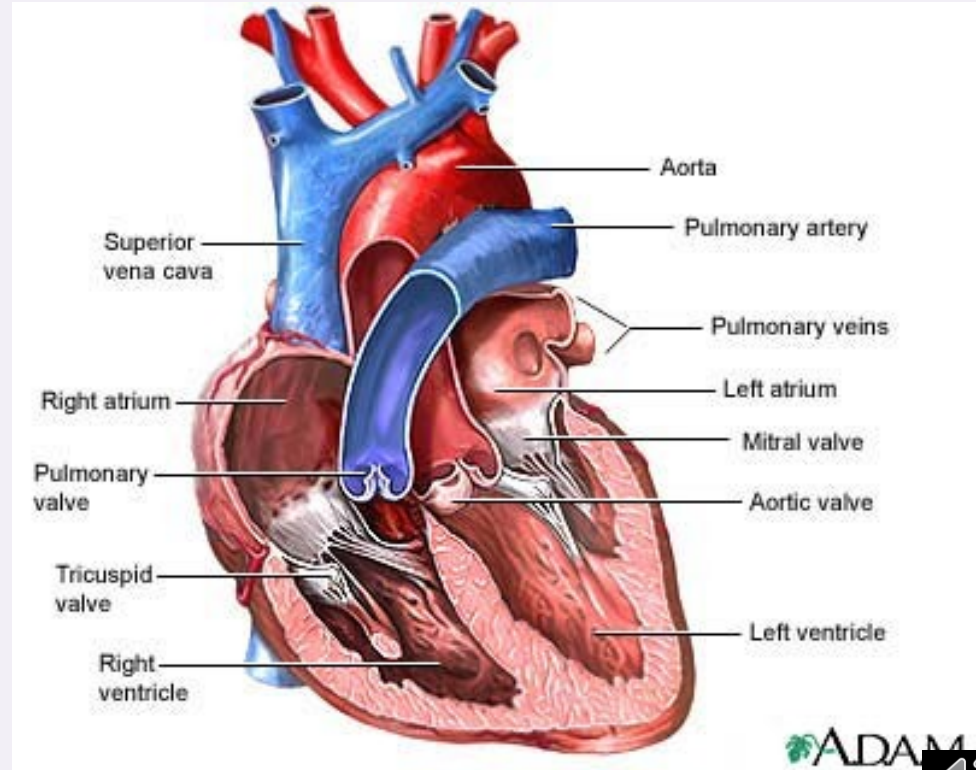
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Anatomy of heart valves

Ventriculo-arterial valves

- leaflets
- anulus
- root
- STJ



ADAM



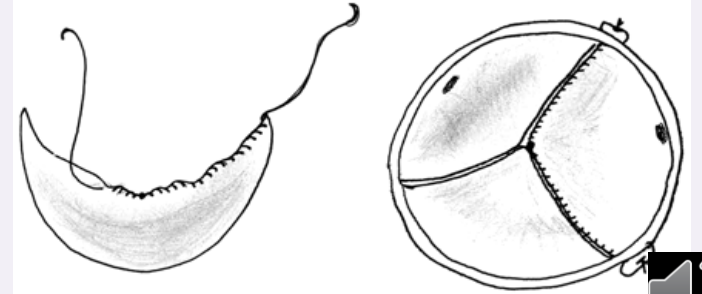
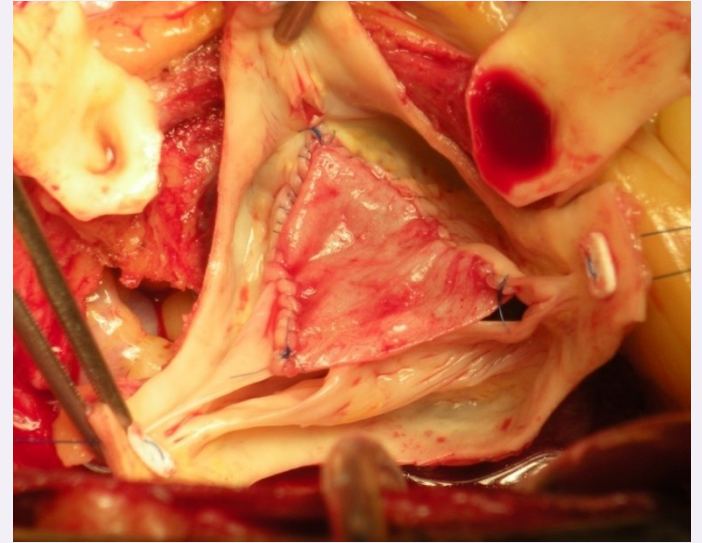
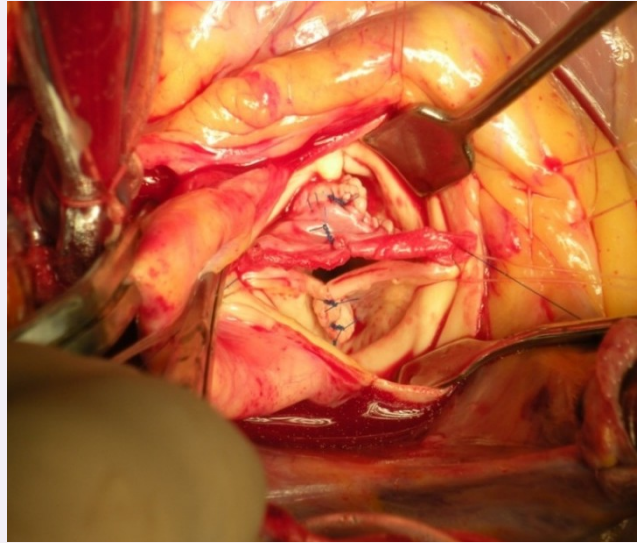
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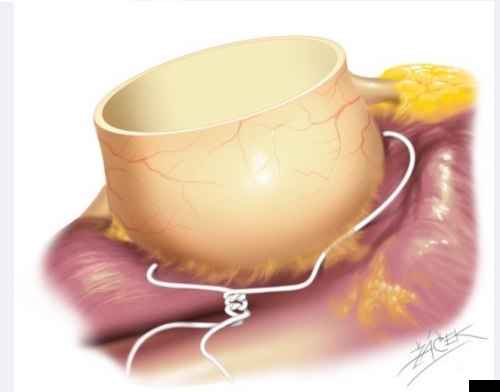
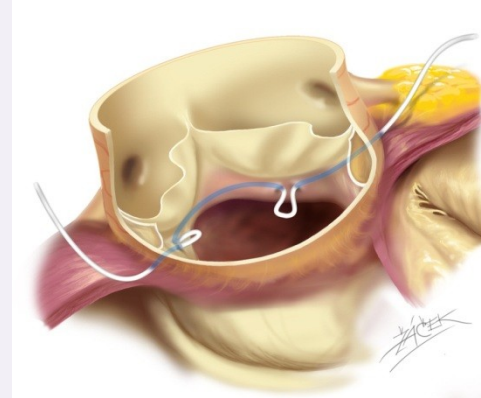
Aortic valve sparing surgery

Leaflets



Aortic valve sparing surgery

Annulus



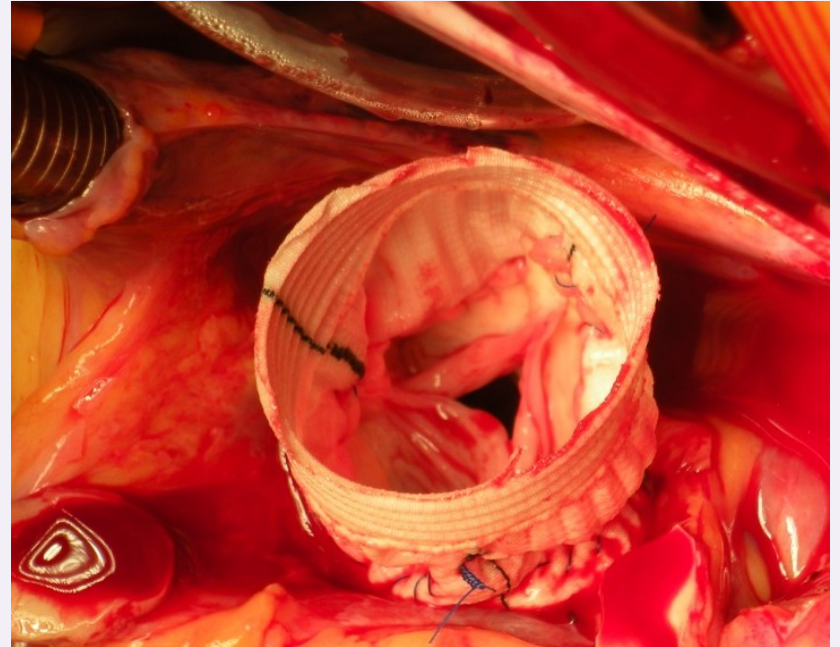
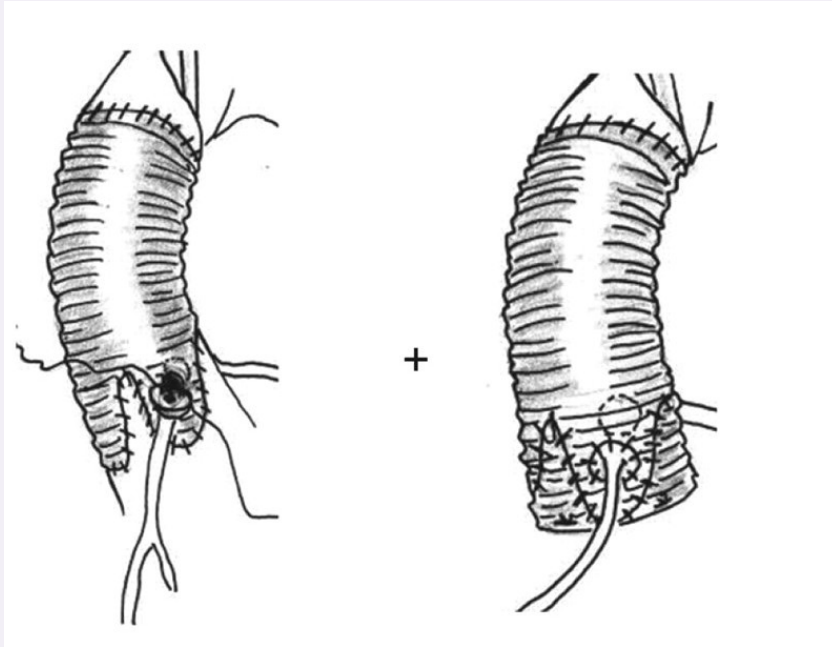
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Aortic valve sparing surgery

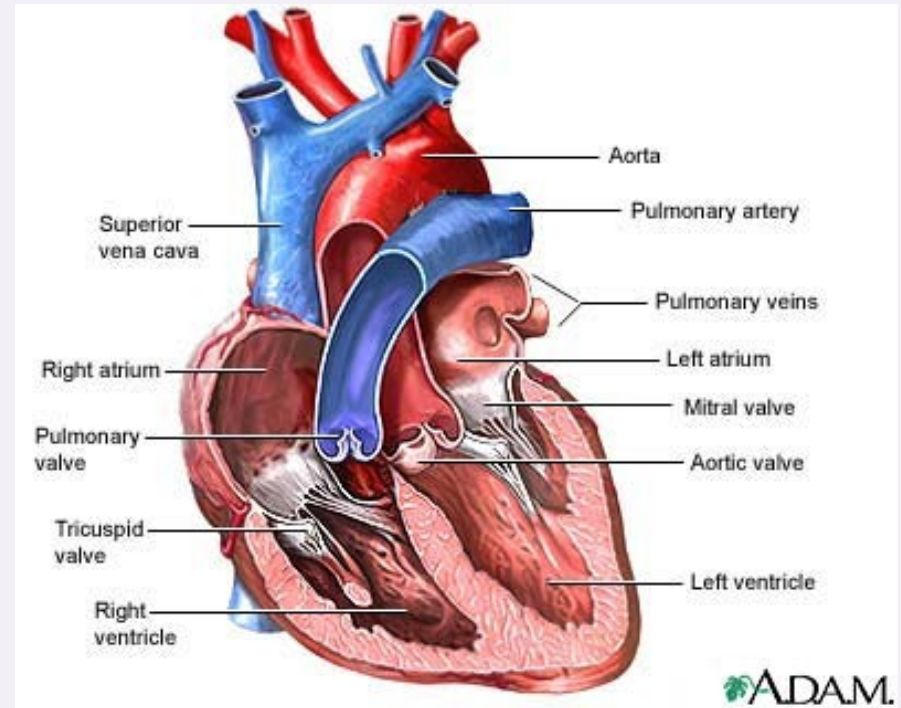
Root



Anatomy of heart valves - localization

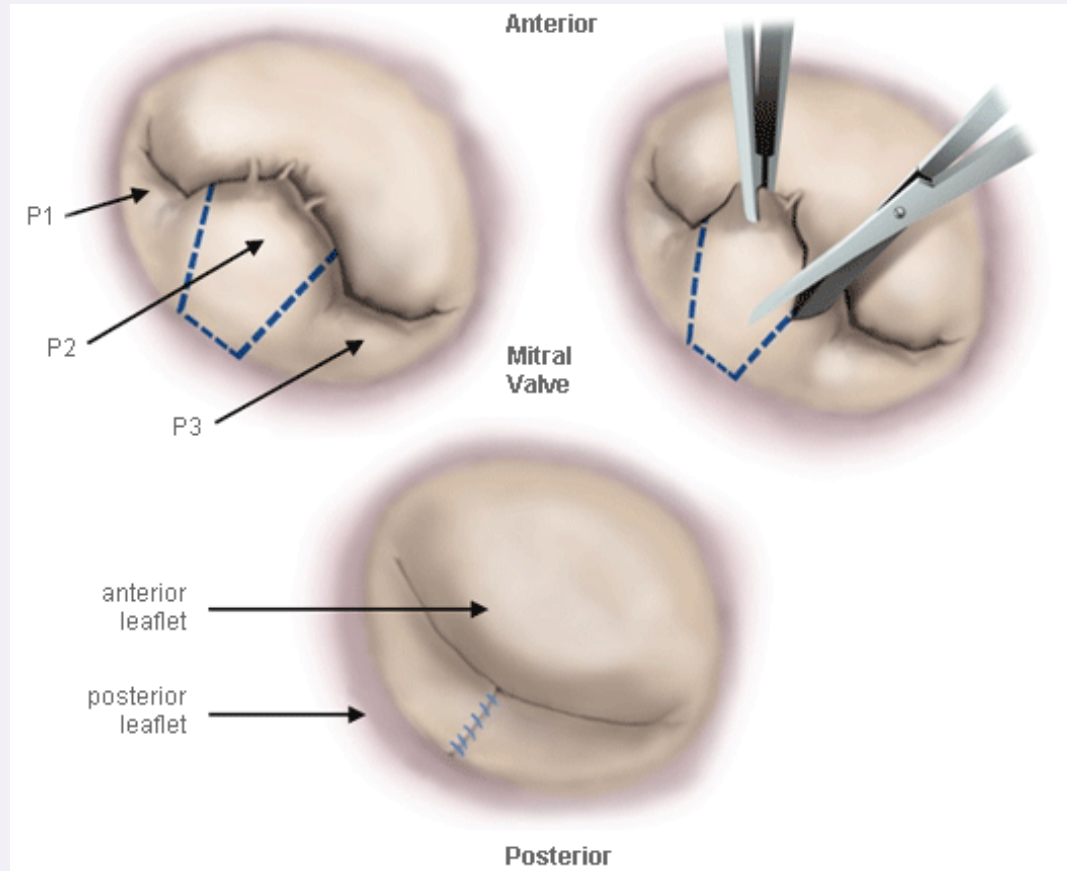
Atrio-ventricular valves (Mi,Tri)

- leaflets
- anulus
- chords
- papillary muscles - *limited*
- left/right ventricle - *limited*



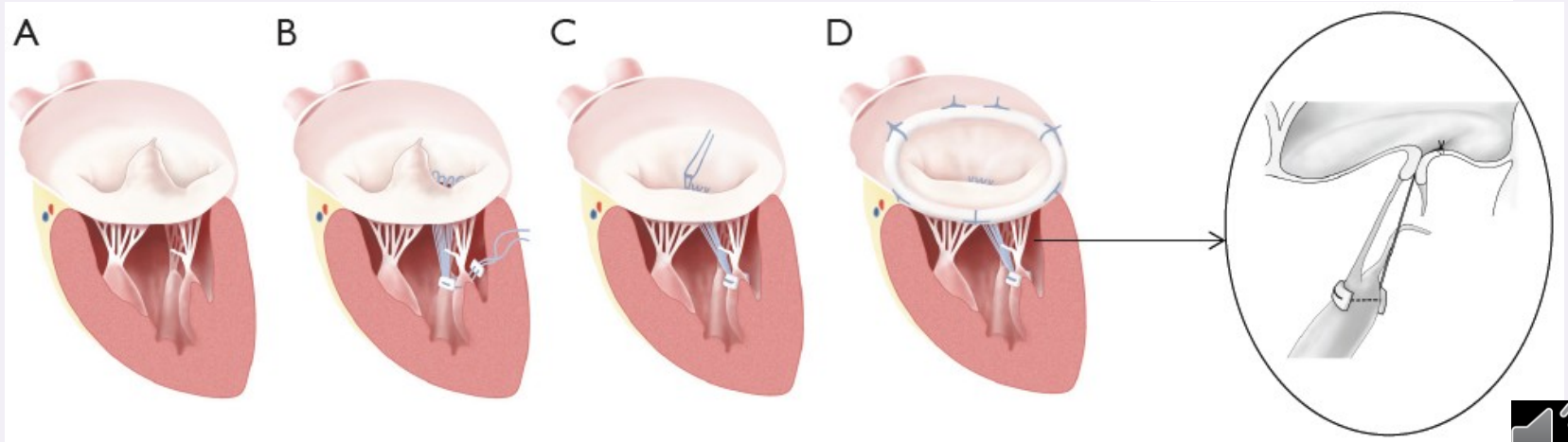
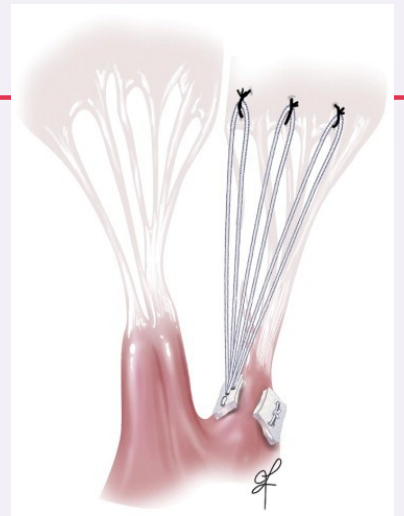
Mitral valve reconstruction surgery

Leaflets



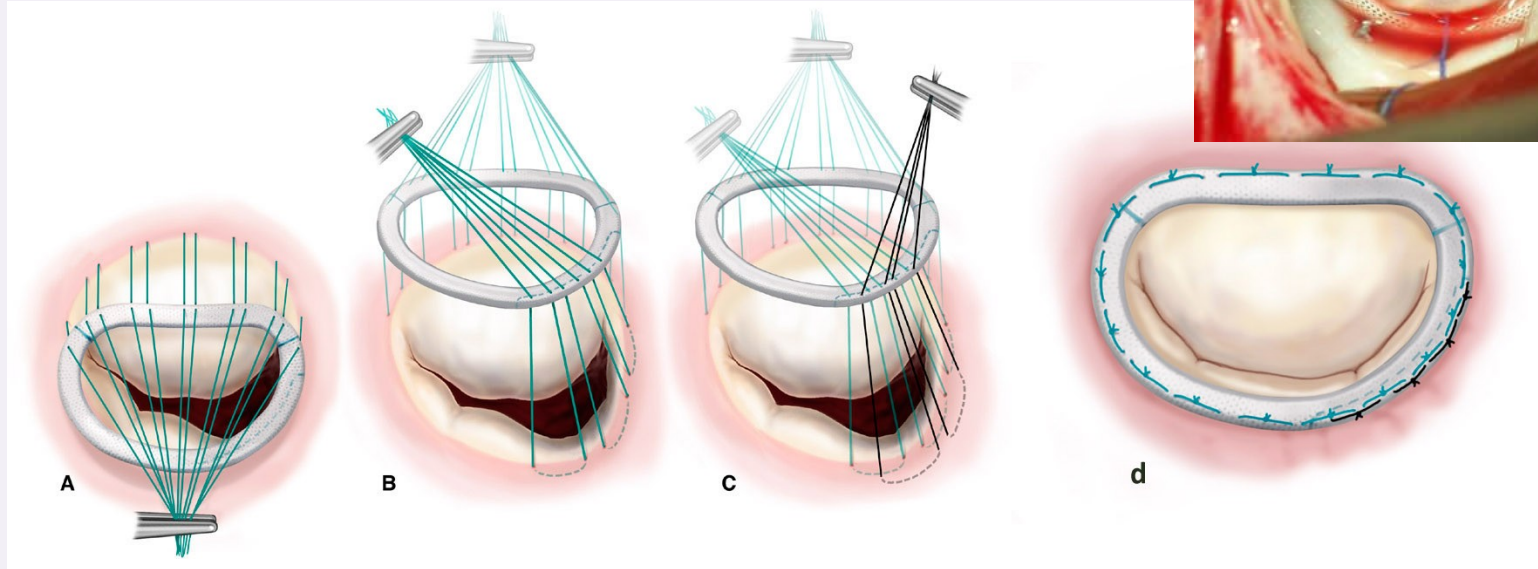
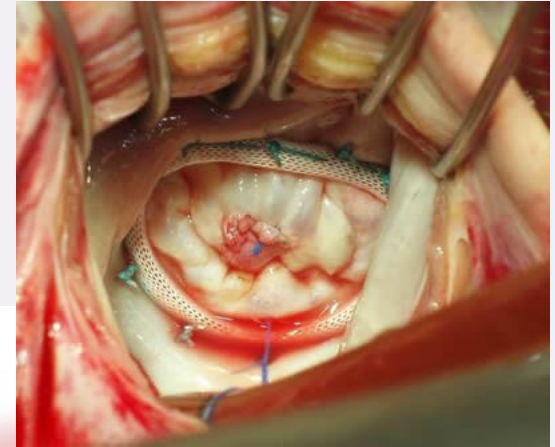
Mitral valve reconstruction surgery

Papillary muscles Chords



Mitral valve reconstruction surgery

Annulus

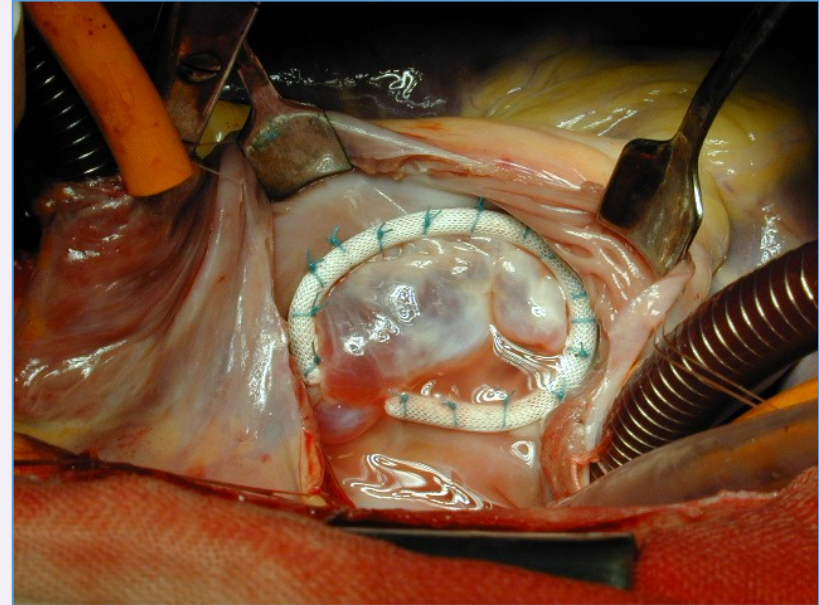
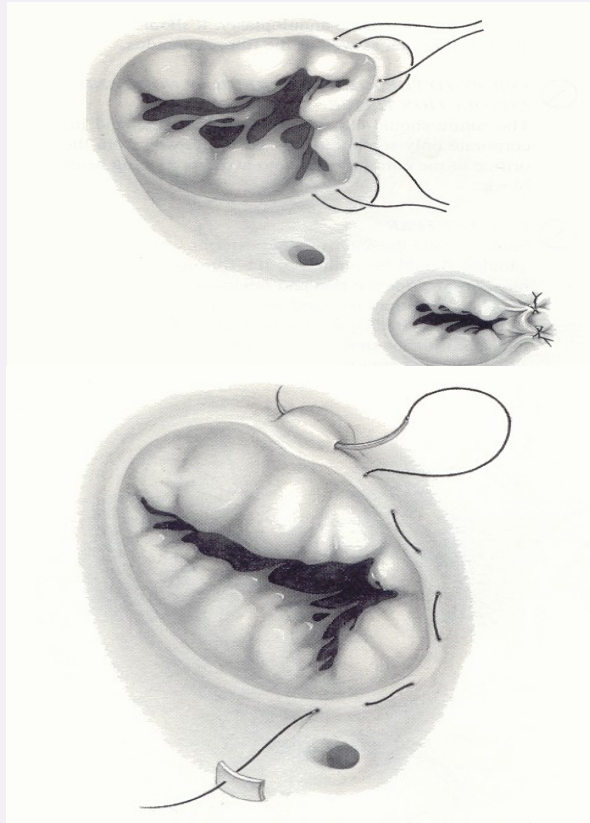


Tricuspid valve reconstruction surgery

Annulus

Leaflets

(chords)



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Valve replacement - mechanical



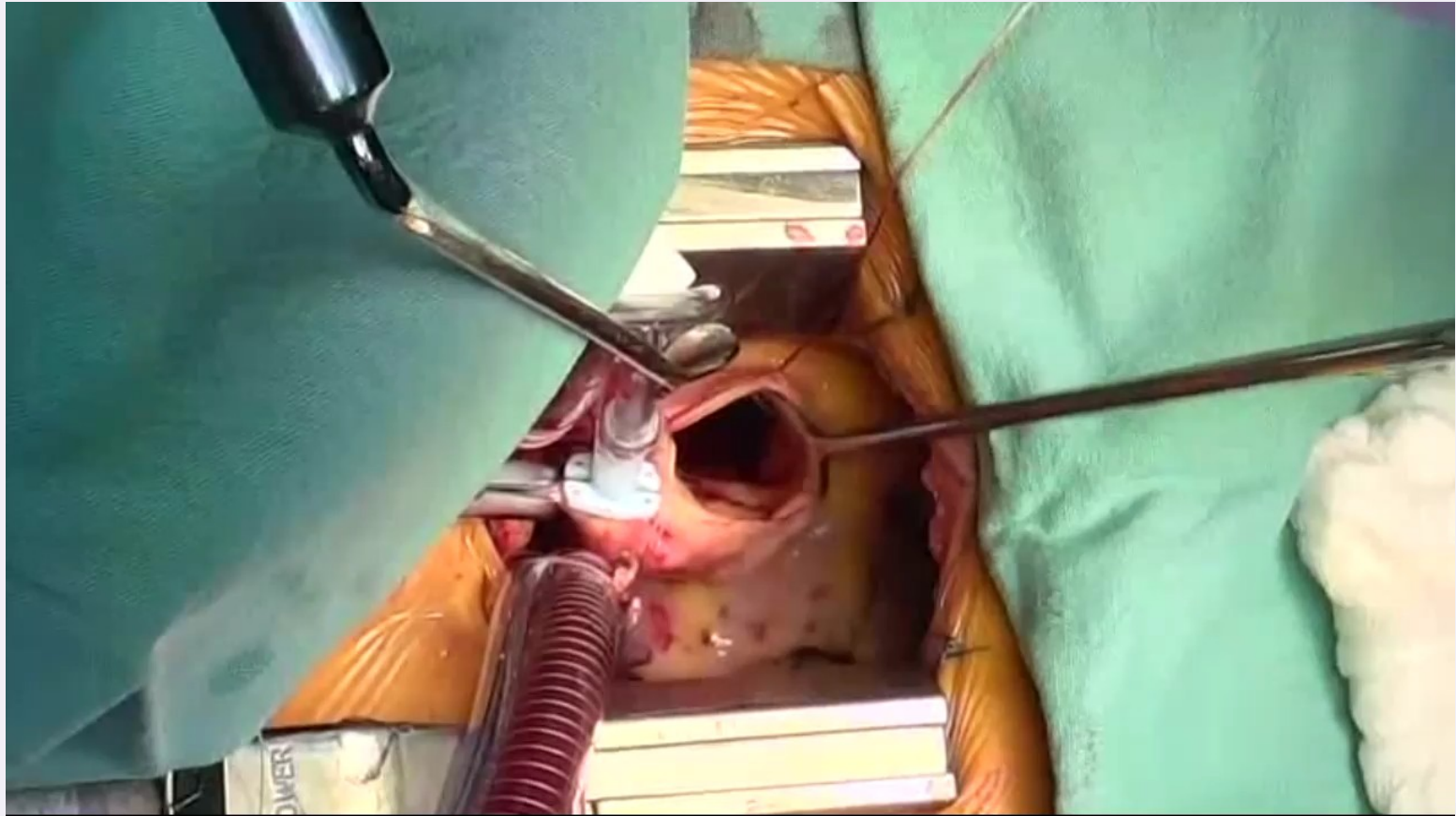
Valve replacement - biological



Aortic valve replacement - video



Aortic valve replacement – sutureless bioprosthesis



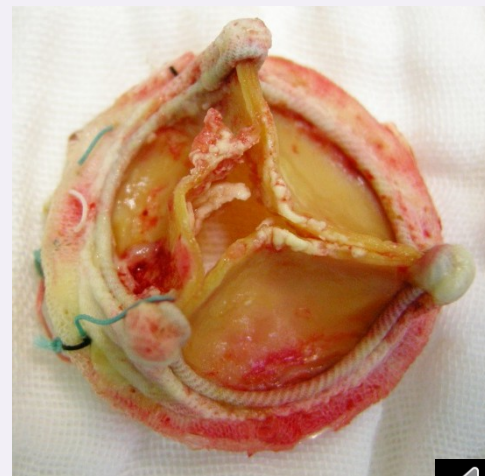
Mechanical vs. biological valves

Mechanical

- advantages - long-term durability
- disadvantages - need of anticoagulation

Biological

- advantages - no anticoagulation
- disadvantages - limited durability



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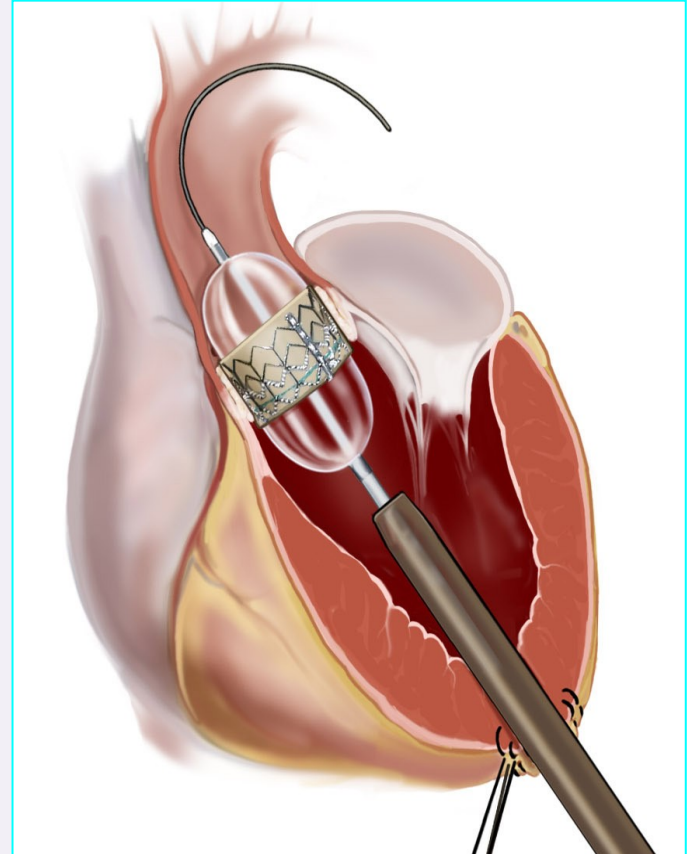
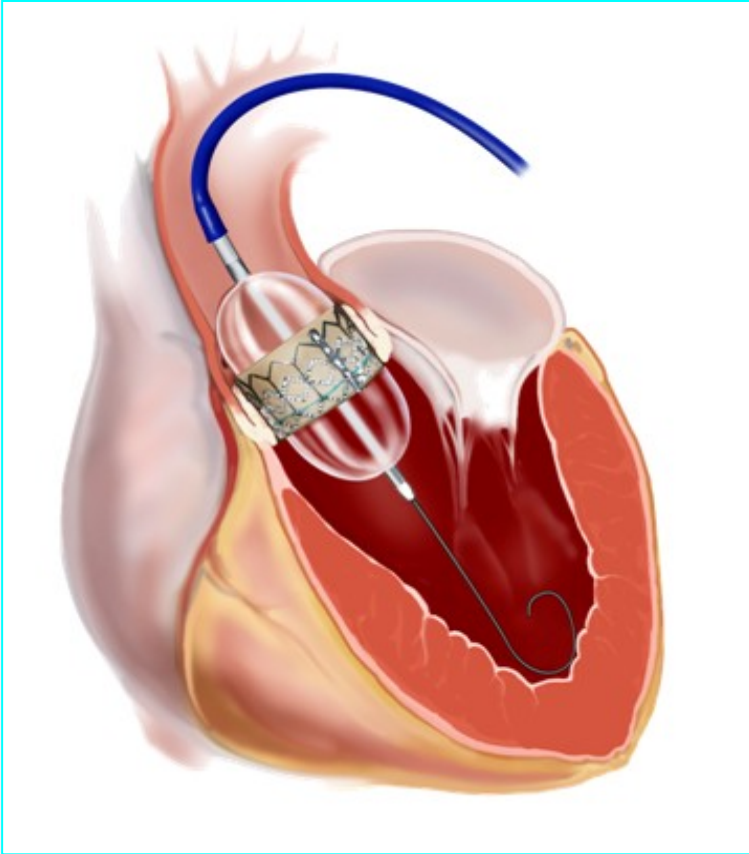
Complications after valve replacement

- thrombembolism
- bleeding
- valve dysfunction (pannus, thrombus)
- prosthetic endocarditis

2 - 4% per year

Mortality 1% per year

TAVI – transcatheter aortic valve implantation

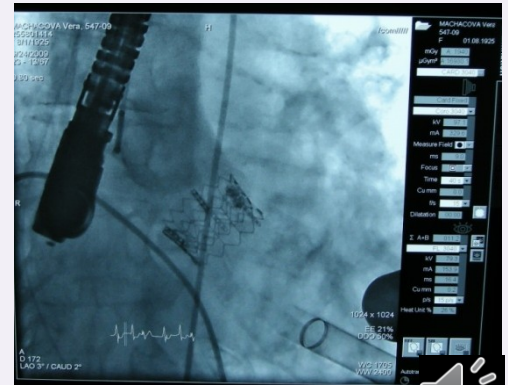
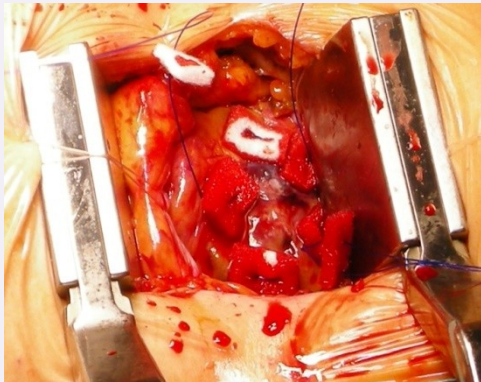
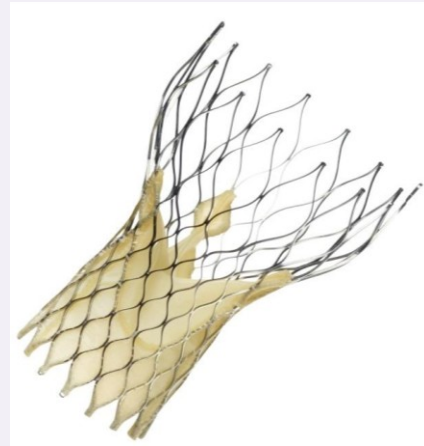


Edwards SAPIEN XT Transcatheter Heart Valve with the NovaFlex+ Transfemoral System

Edwards SAPIEN XT Transcatheter Heart Valve
with the Ascendra+ Delivery System
Transapical



TAVI



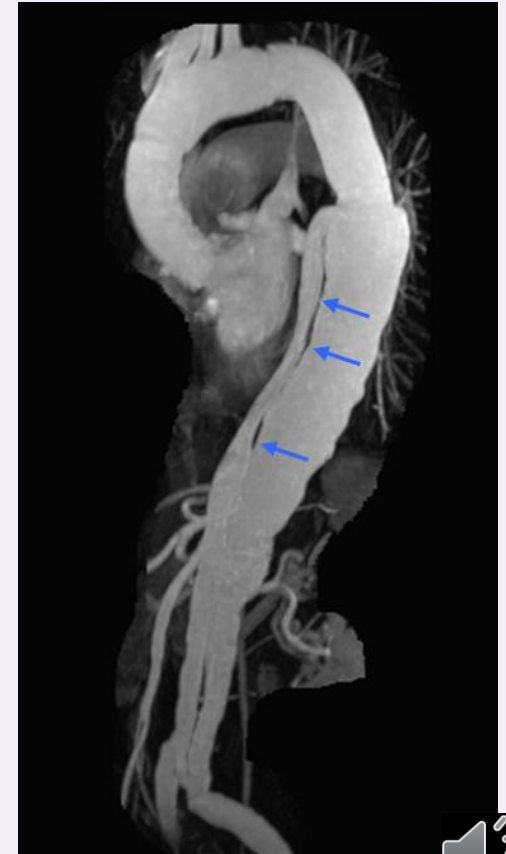
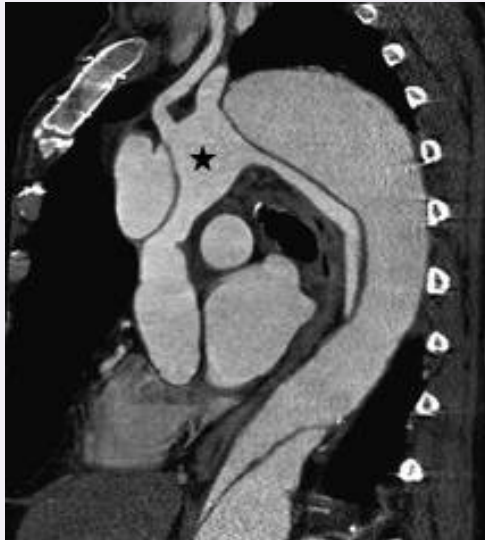
Aortic dissection

tear in the inner wall of the aorta causes blood to flow between the layers of the wall of the aorta and force the layers apart

→ true and false lumen

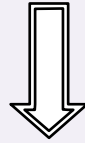
- acute (< 2 weeks)

- chronic



Aortic dissection

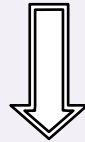
Splitting tunica media



**Weakening of the walls of the false lumen
Impaired flow of aortic branches**



Risk of rupture



**Tamponade
Malperfusion – brain, myocardial,
visceral, extremity**



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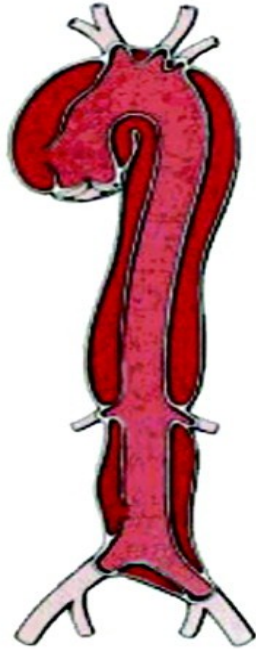
Aortic dissection

- hypertension
- connective tissue disorders (Marfan, Ehlers-Danlos, Turner)
- degenerative or inflammatory disease of aortic wall
- iatrogenic injury
- atherosclerosis
- bicuspid aortic valve
- aortic dilatation
- trauma
- polycystic kidney disease
- coarctation of the aorta
- ...



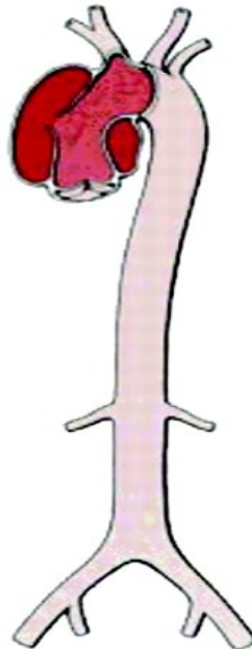
Aortic dissection - classification

De Bakey Type I



Stanford

Type II



Type A

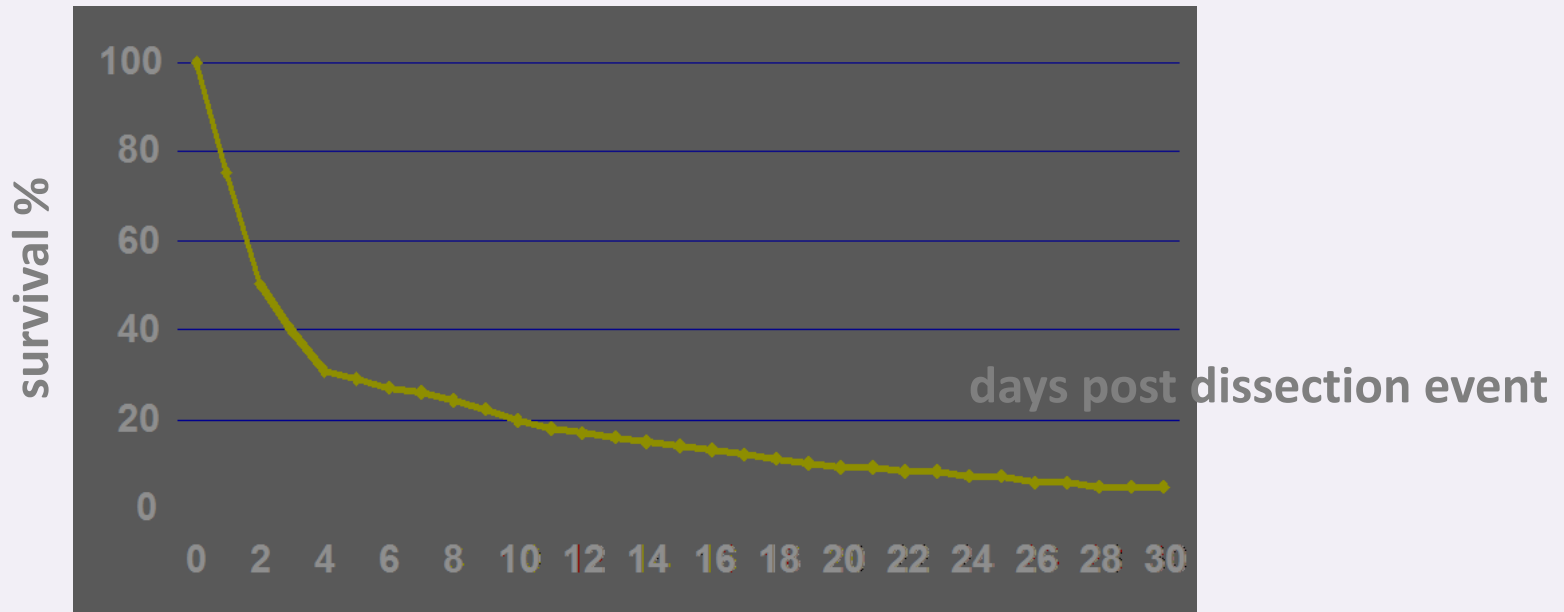
Type III



Type B



Survival of untreated pts with type A aortic dissection



- 50 % (36–72 %) of untreated pts with acute type A dissection die within 48 hours
- mortality rate 1 % / hour
- the survival rate without treatment at 1 month is approximately 5%
- after 3 weeks approx. 90 % †



Aortic dissection - symptoms

PAIN!!!

- pre-shock symptoms (sweating, hypotension, tachycardia)
- malperfusion (peripheral or splanchnic ischemia)

CAVE:

ALWAYS CONSIDER AORTIC DISSECTION IN CASE OF ISCHEMIC EXTREMITY !

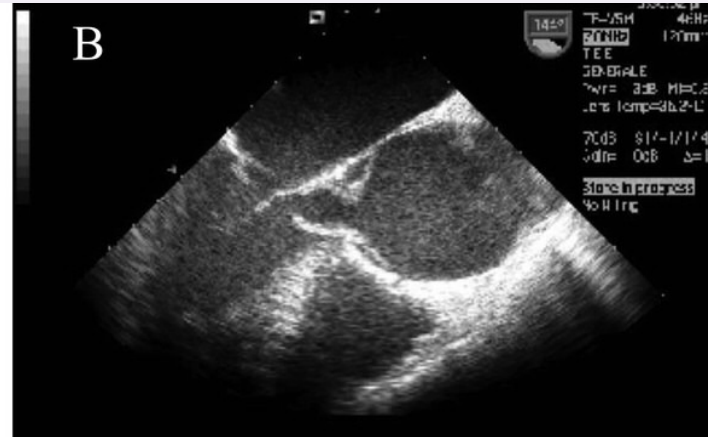
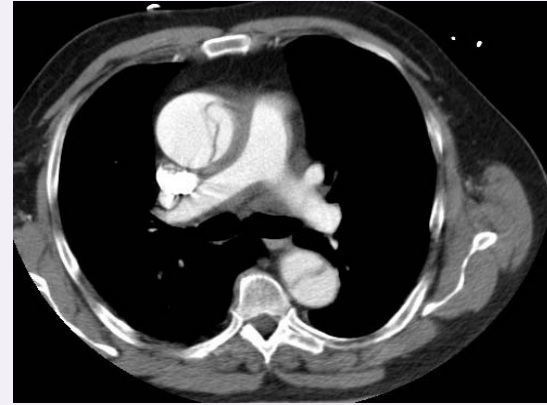
- neurological signs (stroke)
- no other symptoms (some patients are only complaining chest pain)



Aortic dissection - diagnosis

WITHOUT DELAY !!!

ECHO
CT-angio
(MR)



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Aortic dissection - therapy

Initial

analgetics

ANTIHYPERTENSIVE THERAPY (vasodilatation, betablockers)

Definitive

type A - surgery !!!

type B - no surgery

- intervention (stentgraft) :

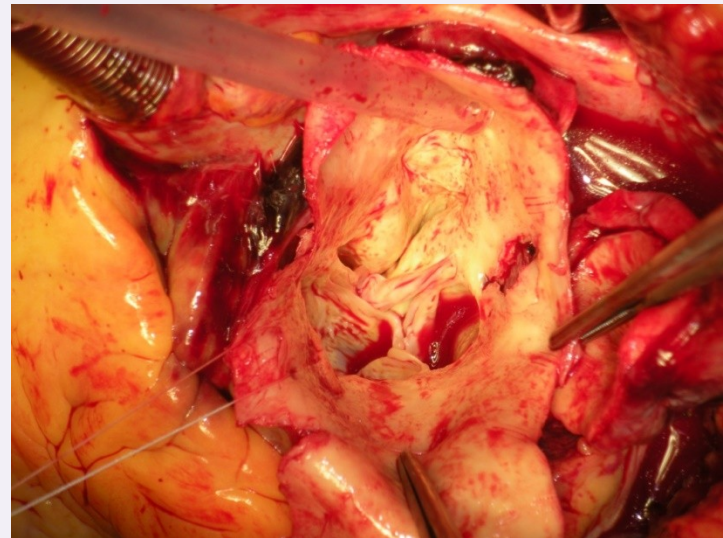
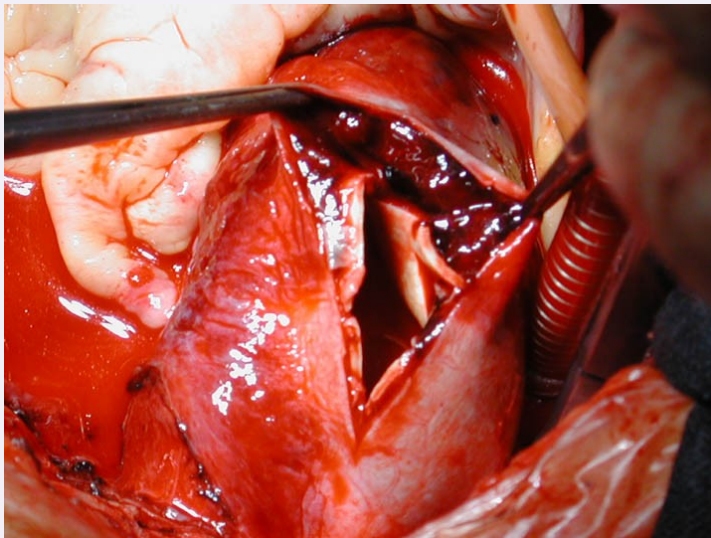
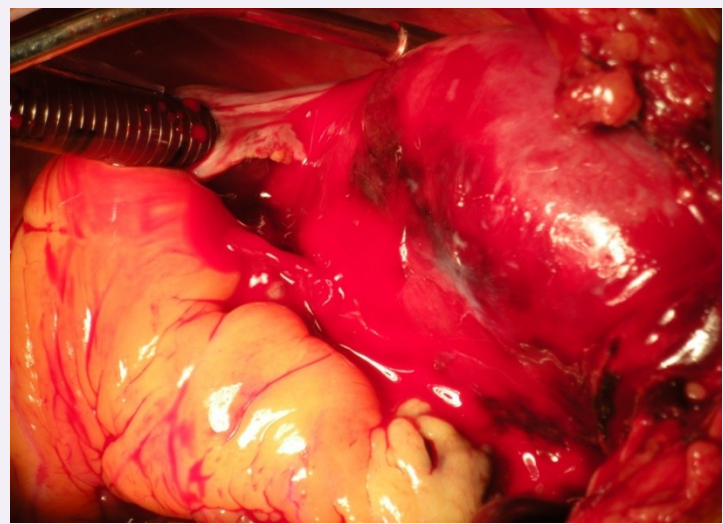
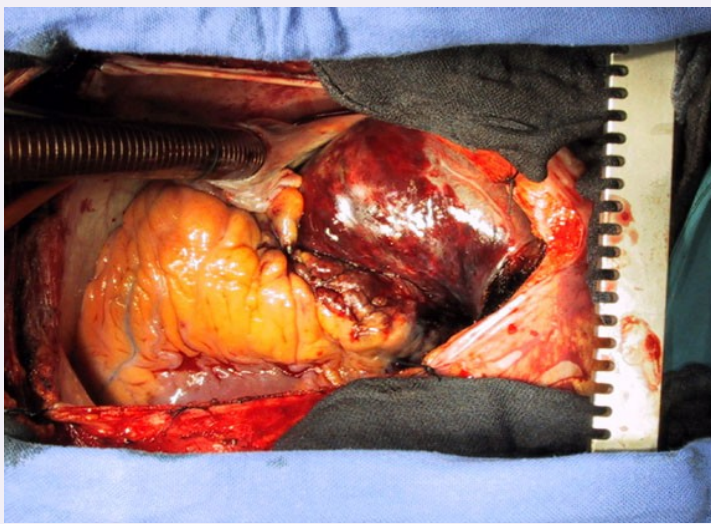
rupture

malperfusion

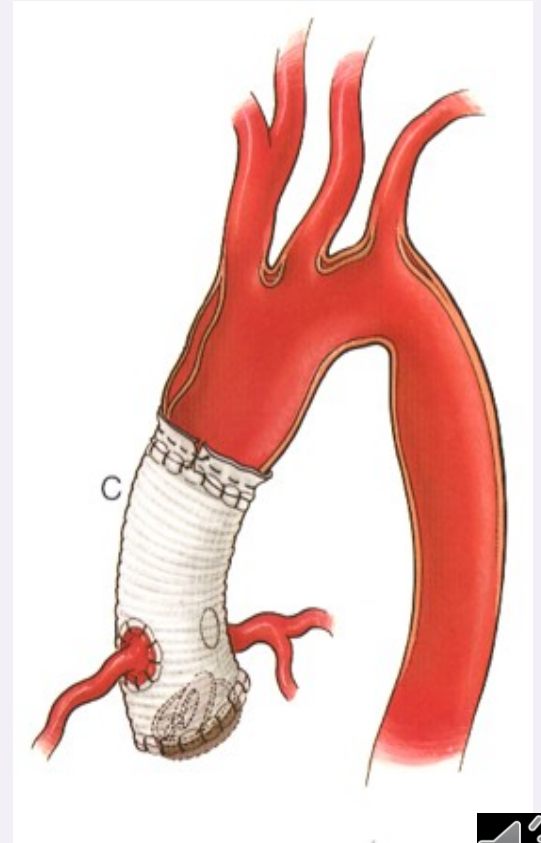
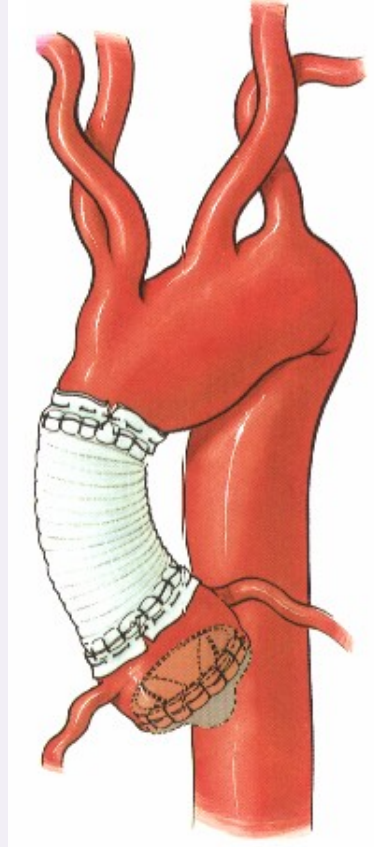
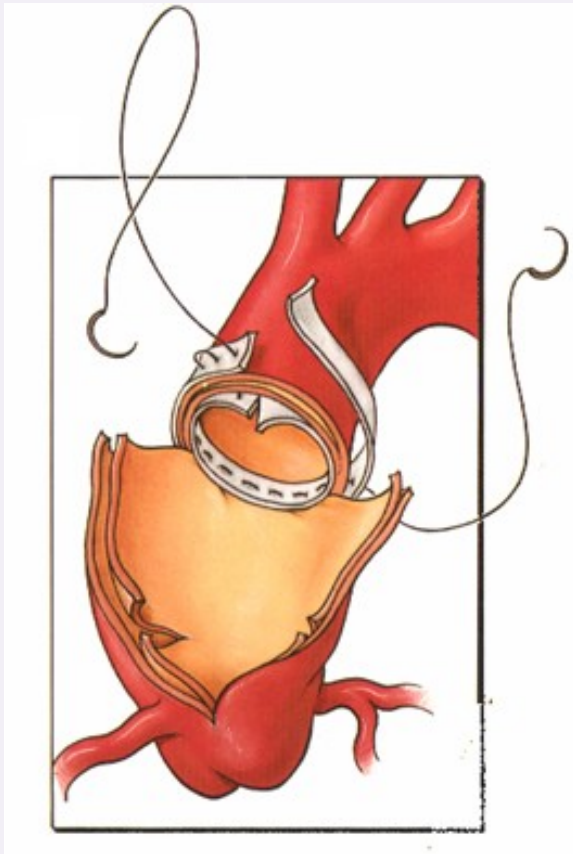
pain

progressive dilatation >10mm/30 days

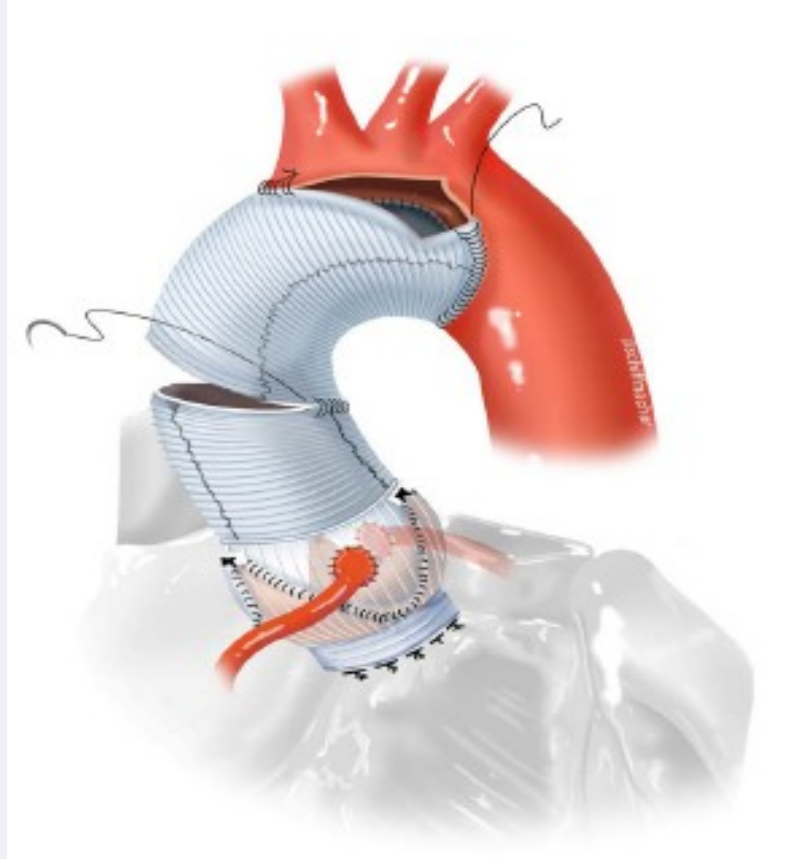
failure of hypertension treatment management



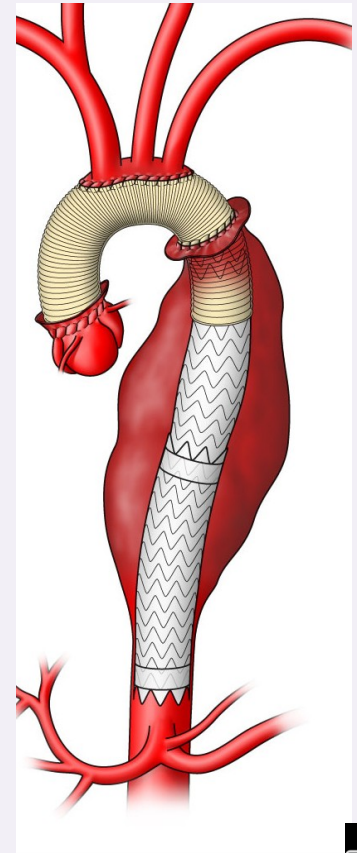
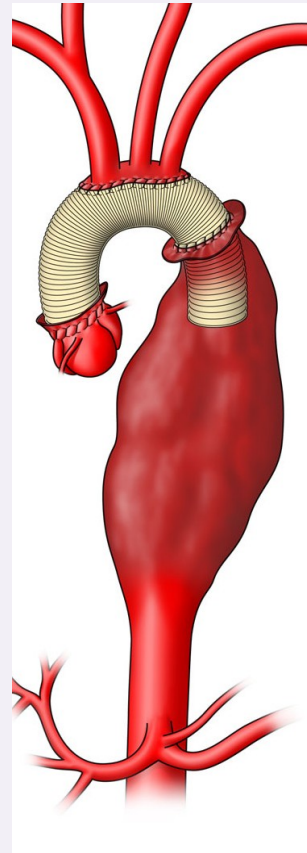
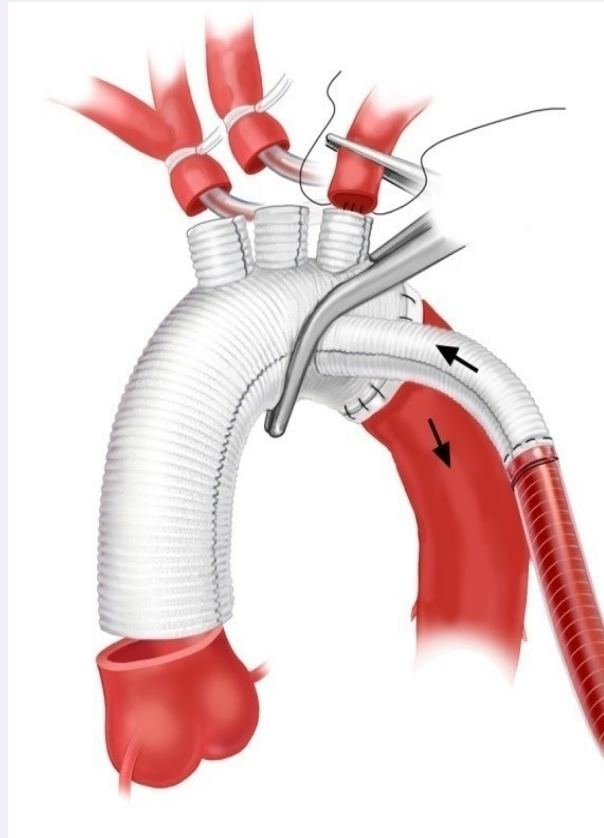
Aortic dissection - surgery



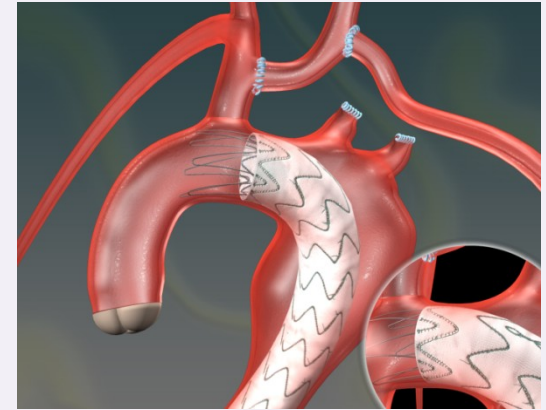
Aortic dissection - surgery



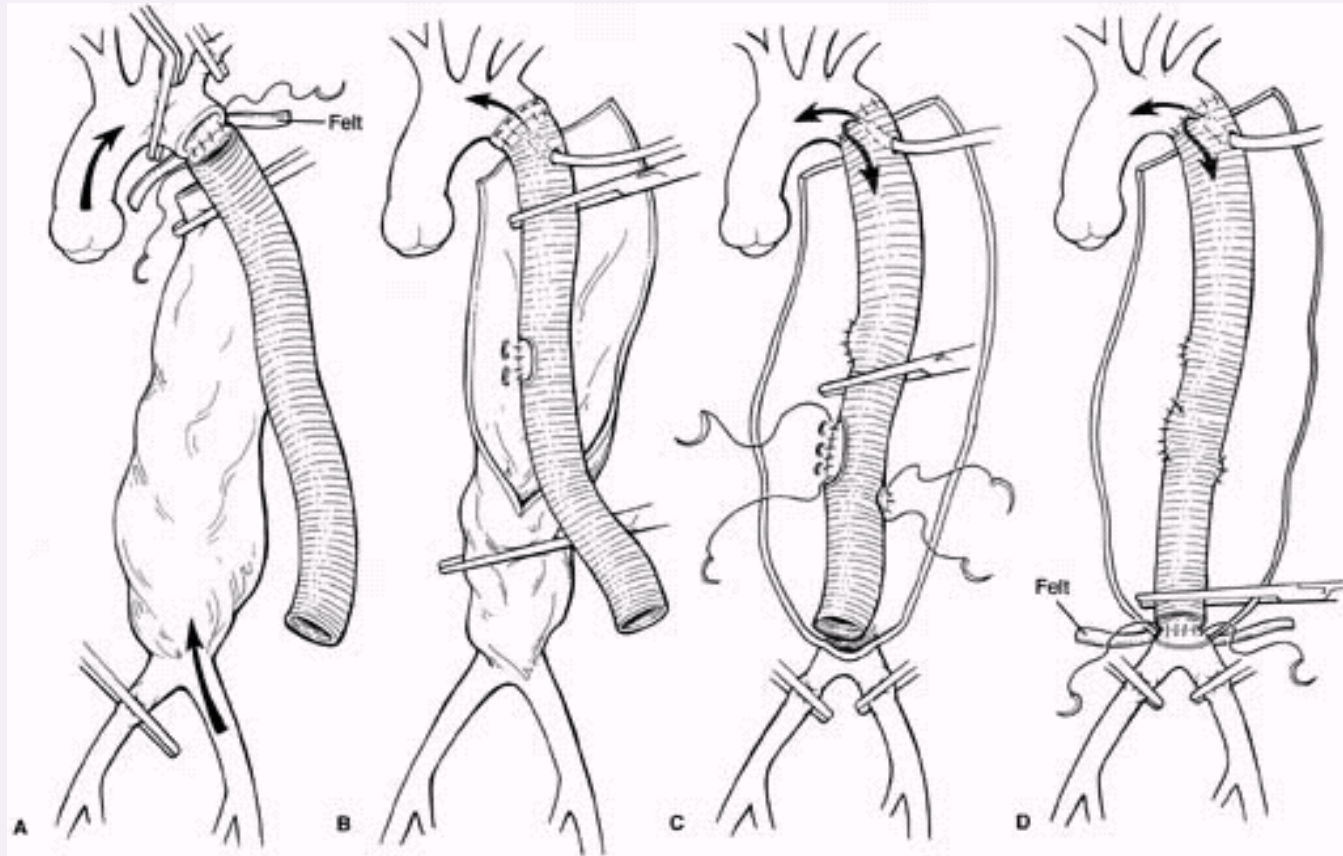
Aortic dissection - surgery



Endovascular therapy of aortic type B dissection



Aortic dissection type B - surgery



Aortic dissection therapeutic results

Prognosis without surgery

type A - within 48 hours of the event - 50% mortality
- survival rate at 1 month is approximately 5%

Surgery

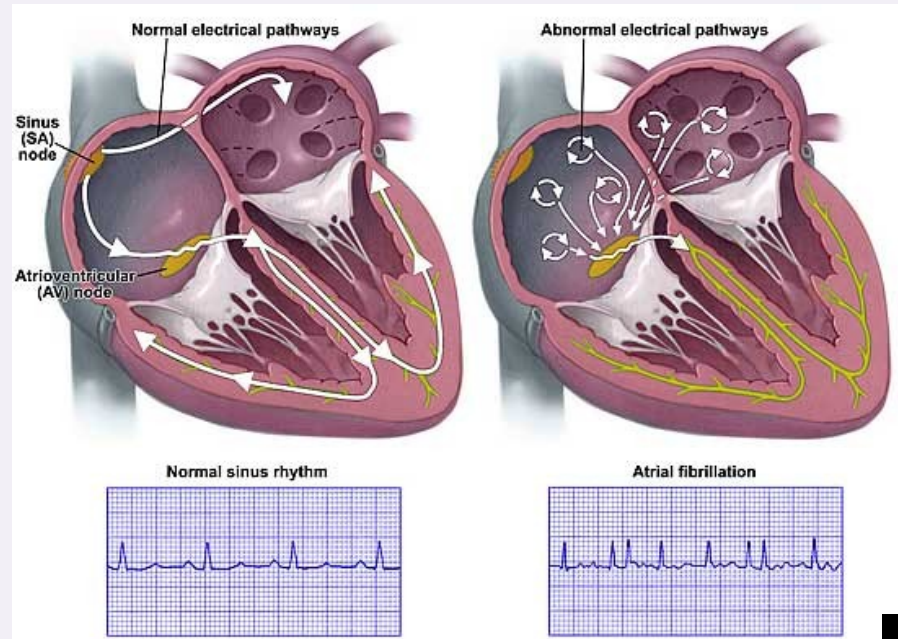
		survival	
	early mortality	1 year	5 years
Type A	10-25%	91%	75%
Type B	20-50%	93%	82%
stentgrafts	5-10%		

Conservative (no surgery) therapy

Type B 10-20%

Atrial fibrillation

- the most often SV dysrhythmias
- the most serious consequences
- no mapping during surgery



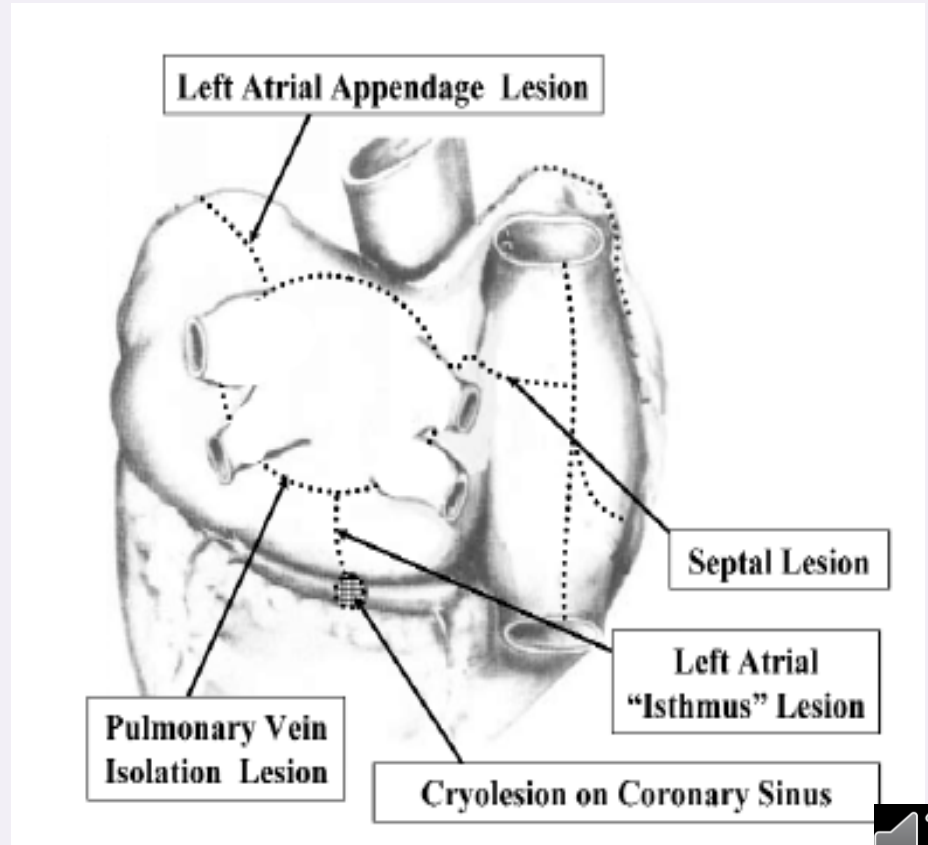
Atrial fibrillation – MAZE procedure

Lesions

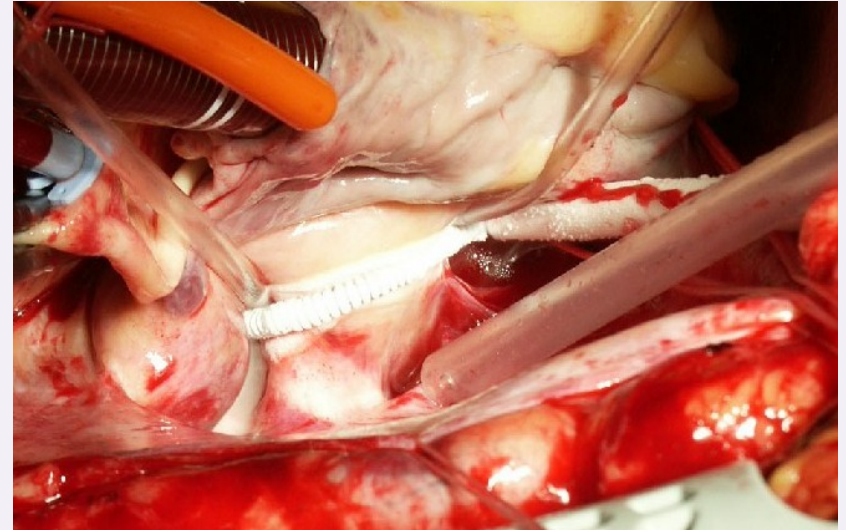
- transmural
- continual

Technique

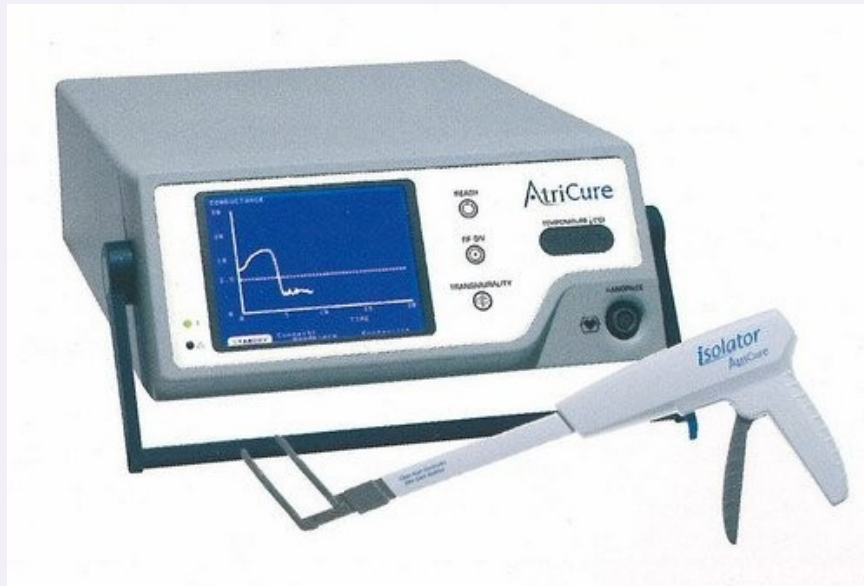
- surgical incision
- cryo energy
- radiofrequency energy



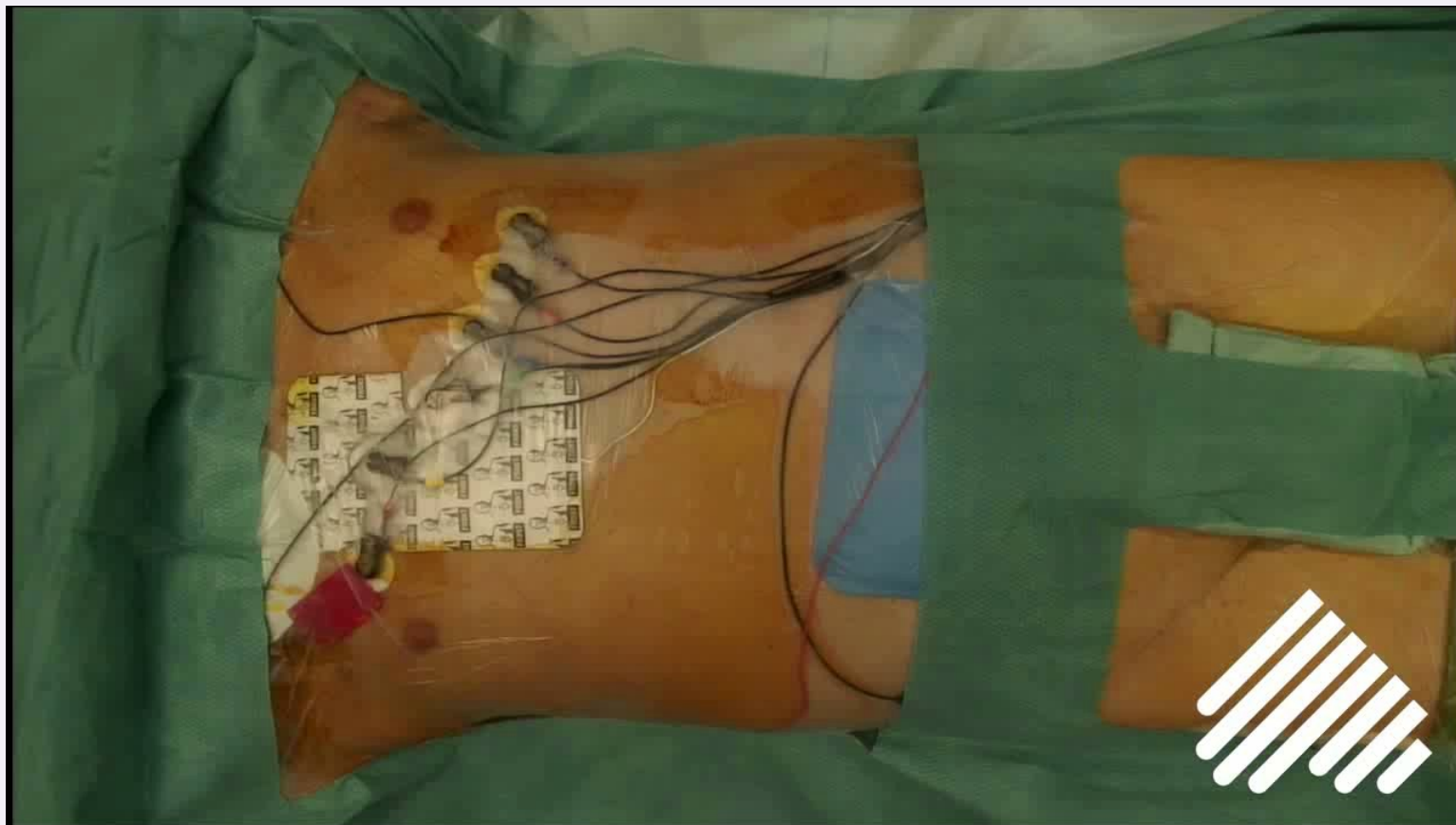
Atrial fibrillation – cryo MAZE



Atrial fibrillation – radiofrequency MAZE



Thoracoscopic MAZE procedure





Petr Fila
petr.fila@cktch.cz

