The Heart 1: Cavities, Wall, Valves

- Why heart?
- What’s heart?
- How heart?
  - Structure
  - Function
  - Disease

David Sedmera
Charles University
First Faculty of Medicine
Institute of Anatomy
The Heart as Whole

- Incoming vessels
- Cardiac chambers
- Valves and support
- Outgoing vessels
Posterior View

- SVC
- IVC
- Pulmonary veins
- Aorta
- Pulmonary trunk
The Cavities: Four-Chamber View
Four-Chamber View: ECHO

Dr. M. Kocík, IV. Int. klinika
Chambers of the Heart

- Left atrium
- Right atrium
- Left ventricle
- Right ventricle

Atrio-ventricular valves
Semilunar valves

- Interatrial septum
- Interventricular septum
ASD

Female, 29 years
Right Ventricle - Inflow
Right Ventricle - Outflow
Left Ventricle - Inflow
Layers of chamber wall

3 layers, from outside in:

• epicardium
• myocardium
• endocardium
Myocardial Organization

3 layers of muscle:
- Outer oblique
- Middle circular
- Inner longitudinal
Detailed myocardial architecture
Heart MRI - fiber orientation
Myocardial Contraction

**Short axis view**
- Shortening velocity (cm/s)
- Ejection fraction (%)
- Paradoxical movement (MI)
The Valves 1. Nomenclature

- pulmonary
- tricuspid
- aortic
- mitral
- fibrous skeleton

(view from the top)
The Valves 2. Support

Papillary muscles

Tricuspid valve  Mitral valve
Cardiac Skeleton
The Valves 3. Function

(ventricle)
The Heart Cycle

1st

2nd
The Heart Sounds

First sound: AV valves closure

Second sound: arterial valves closure
Valve auscultation

All Physicians Take Money
Heart Murmurs

Aortic Insufficiency:
Long Diastolic Murmur (DM) with slow decrease of amplitude; high-frequency phonocardiogram.
Mitral Regurgitation

Male, 72 years old
Valve replacement
Heart in gated MRI imaging

5. Which orientation?
6. Anything wrong?
Answers

1. Liver
2. Right ventricle
3. Interventricular septum
4. Anterior papillary muscle in the left ventricle
5. Sagittal section
6. Lipoma of the interventricular septum
Angiography – LV function
Coming Next:

- Coronary arteries
- Cardiac veins
- Lymphatics
- Innervation
- Cardiac conduction system
- Development of the heart
References

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- Internet (radiographs)
- Dr. Kocík (echos)