

COR

Atrium dextrum, sinistrum cordis, auricula

Ventriculus dexter, sinister cordis

Septum interatriale, interventriculare

Valva tricuspidalis, mitralis, trunci pulmonalis and aortae.

Apex cordis, basis cordis

Facies sternocostalis, diaphragmatica

Margo dexter (acutus), sinister (obtusus s. facies pulmonalis)

Sulcus coronarius - sinus coronarius, right coronary artery and left coronary artery

Sulcus interventricularis anterior, posterior

Atrium dextrum

Parietis medialis - fossa ovalis, limbus fossae ovalis

Parietis superior - ostium venae cavae superioris

Parietis inferior - ostium v. cavae inferioris, valvula v. cavae inf., ostium et valvula sinus coronarii

Parietis posterior - torus intervenosus- sinus venosus

Parietis lateralis - crista terminalis

Parietis anterior – ostium atrioventriculare dextrum - valva tricuspidalis, auricula dextra - musculus pectinati

Ventriculus dexter

Inflow part - pars trabecularis

Outflow part - conus arteriosus - pars glabra

Crista supraventricularis

Valva tricuspidalis - cuspis anterior, posterior and septalis

Mm. papillares (anterior, posterior and septales) - chordae tendineae

Trabecula septomarginalis – m. papillaris anterior - its cords are attached to the anterior and septal cusps

M. papillaris post. - its cords - to the posterior and septal cusps of the valve

Mm. papillares septales send their cords to the posterior and septal cusps

Ostium trunci pulmonalis – valva trunci pulmonalis - valvulae semilunares ant., dx. and sin. – lunula, nodulus, sinus

Pulmonary valve stenosis - restriction of right ventricular outflow - the hypertrophy of the right ventricle

When free margins of the cusps are damaged by disease (endocarditis), the valve does not close completely - valvular incompetence results in pulmonary regurgitation which may be heard as a heart murmur

Atrium sinistrum

Parietis posterior - 2 vv. pulmonales dextrae and 2 vv. pulmonales sinistrae

Parietis anterior – ostium atrioventriculare sinistrum - valva mitralis s. bicuspidalis, auricula sinistra – mm. pectinati

Parietis medialis (septalis) - fossa ovalis, falx septi

Ventriculus sinister

Inflowing part - trabeculae carneae.

Outflowing part - aortic vestibule

Ostium atrioventriculare sinistrum - mitral valve - cuspis anterior et posterior

M. papillaris anterior et posterior - cords are connected to both cusps.

Mitral valve insufficiency – one or both leaflets extend back into the left atrium during systole. As a result, blood regurgitates into the left atrium producing a characteristic murmur.

Ostium aortae - valva aortae - valvula semilunaris dextra, sinistra and posterior - lunula, nodulus, sinus.

Bulbus aortae

Aortic valve stenosis is frequent valve abnormality that results in left ventricular hypertrophy. **Aortic valve insufficiency** results in aortic valve regurgitation that produces a heart murmur.

When **systole** begins, the tricuspid and mitral valves close; then pulmonary and aortic valves open. The contraction of ventricles ejects the blood from ventricles.

The **diastole** begins by the closure of the pulmonary and aortic valves, continues by opening of atrioventricular valves and the contraction of atria, which ejects the remaining blood from atria, follows.

Structure of the heart

Endocardium is a thin and glossy connective tissue membrane that lines all the chambers of the heart and covers the surface of all valves. Its surface is covered by endothelium continuous with the endothelium of the vessels. It is thicker in atria than in ventricles and in the left half than in the right one. The cusped valves are reinforced by fibrous plates (**lamina fibrosa**) that are at their periphery attached to the cardiac skeleton.

Fibrous skeleton of the heart

Anuli fibrosi (dexter, sinister, aorticus and trunci pulmonalis)

Trigonum fibrosum dextrum and sinistrum

Pars membranacea septi cordis

Myocardium may be divided to the working myocardium that forms most of the cardiac musculature and the conducting myocardium that generates impulses and conduct them through the heart.

Working myocardium

Atrial myocardium consists of 2 layers. The superficial layer is common for both atria. The reinforced muscular bundles in this layer: **fasciculus interauricularis horizontalis** connects ventral sides of both atria, **fasciculus interauricularis verticalis** indicates the position of the interatrial septum. The deep layer is separate for each atrium. The muscular bands: **fasciculus terminalis** produces the crista terminalis, **fasciculus limbicus anterior and inferior** that bound the fossa ovalis, **fasciculus intervenosus** forms the basis for the torus intervenosus.

Mm. pectinati

Ventricular myocardium is thicker and is formed by 3 layers: the superficial layer is common for both ventricles, forms the left-hand spiral to the apex - **vortex cordis**. The middle layer is separate for each ventricle and is circular. The deep layer forms the basis for trabeculae and papillary muscles.

Conducting system

Nodus atrioventricularis

Fasciculus atrioventricularis - crus dextrum and sinistrum - subendocardial branches (Purkinje fibers).

Pericardium

Pericardium fibrosum

Basis - ligg. phrenicopericardiaca

Cupula

Pars sternalis - ligg. sternopericardiaca

Partes laterales

Pars dorsalis

Pericardium serosum.

Parietal pericardium

Visceral pericardium (epicardium)

Cavum pericardii - liquor pericardii

Vagina serosa arteriarum – sinus transversus pericardii

Porta venarum - sinus obliquus pericardii

Surface anatomy of the heart valves

The valves are grouped so closely that when they are listened to at their real sites, it is not possible to distinguish clearly the sounds produced at each valve. The blood tends to carry the sound in the direction of its flow, consequently the valve sounds are listened to at specified auscultatory areas that are situated superficial to the chamber or vessel through which blood has passed. The sites for auscultation of the sounds of individual valves are also points that limit the position of the heart at the anterior thoracic wall.

- A. The 2nd intercostal space 1 cm to the right from the margin of the sternum – **valva aortae**
- B. The 5th intercostal space at the margin of the sternum – **valva tricuspidalis**
- C. The 5th intercostal space 8 cm to the left from the sternum (1 cm from medial to the midclavicular line) – **valva mitralis**. The apex beat can be felt in this point.
- D. The 2nd intercostal space 2 cm to the left from the border of the sternum – **valva trunci pulmonalis**

Radiological anatomy of the heart

Because the heart and great vessels are full of blood, the cardiac shadow stands out in contrast to the clearer areas occupied by air-filled lungs. In PA radiograph of the thorax the right border of the cardiac silhouette is formed by: 1. v. brachiocephalica dx., 2. v. cava sup., 3. the right atrium, 4. v. cava inf. The left border: 1. the arch of the aorta (aortic knob), 2. the pulmonary trunk, 3. the left auricle, 4. the left ventricle. It is important to know it to detect abnormalities. Enlargement of the heart may result from hypertrophy, especially in cases of high blood pressure - the walls grow thicker by increasing of the heart musculature but also from dilation, owing to diseased valves.

Distantia mediodextra (Md) is the greatest distance of the cardiac shadow from the midline to the right (4-4.5 cm).

Distantia mediosinistra (Ms) is the greatest distance from the midline to the left (8-9 cm).

The transverse line of the heart – the sum of the Md and Ms (15 cm).

The length of the heart – connection between the transition of the VCS to the right atrium and the apex of the heart (13 cm)

The gradient of the heart determines the angle between the length and transverse lines (45 degrees).

The heart shadow area – 100-140cm².

Arterial supply of the heart

- A. coronaria cordis dx.** - rr. atriales dx.
- rr. ventriculares dx.
- r. marginalis dx.
- r. coni arteriosi
- r. nodi sinuatrialis
- r. nodi atrioventricularis
- r. interventricularis post.
- A. coronaria cordis sin.** - r. interventricularis ant.
- r. circumflexus

Venae cordis

1. Sinus coronarius cordis

- a) v. cordis magna
- b) v. cordis media

- c) v. cordis parva
- d) v. obliqua atrii sinistri
- e) v. posterior ventriculi sinistri

2. Vv. cordis anteriores

3. Vv. cordis minimae

Lymphatics:

Truncus lymphaticus anterior sinister – truncus lymph. post. – nodus lymph. retroaorticus

Truncus lymph. ant. dx. – nodus lymph. praeaorticus

Nerves:

Plexus cardiacus spf. (ganglion cardiacum)

Plexus cardiacus prof.

Plexus coronarius dx. et sin.

Nn. cardiaci (symp.) – accelerantes

Rr. cardiaci (parasymp.) – retardantes