LECTURE

ISCHEMIC HEART DISEASE.
CARDIAC SURGERY
Relevance of topic

Death-rate from cardiovascular pathology: in Russia 700 on 100 thousand populations. For 1 dies 1 mln. 300 thousand people. In Ukraine death-rate 1037 on 100 thousand populations. Outside of medical institutions dies - 70%. In Poland - 444 on 100 thousand populations. EU - 275 on 100 thousand populations.

Surgical methods of treatment IHD are dominate in developed countries. In Ukraine and Russia - a pharmacological methods. Operations of heart: in Ukraine - 12.700 for year (death-rate - 2,1%). In Germany - till 80 000 operations (death-rate <3%).


Stent of coronary artery: Ukraine - 60 on 1 mln. populations. In Poland - 833 on 1 mln. populations. USA - 3.300 on 1 mln. populations.
Prospects of development of cardiosurgery

- Radialogical diagnostics (angio-, coronarography);
- Computer 3D modeling;
- X-ray technologies;
- Endovascular dilatation of coronary artery with stent;
- Endovascular valve implantation;
- Mini invasive surgery of heart and aortas;
- Apparatus of artificial blood circulation;
- Artificial heart;
- Transplantation of heart and valve.
Classification of IHD

1. Sudden coronary death.
2. Angina pectoris.
   - Angina pectoris tension. For first time appeared. Stable and Unstable (progressive).
   - Angina pectoris at rest (spontaneous).
   - Special form of angina pectoris (Prinzmetal’s).
3. Myocardial infarction (MI).
4. Postinfarction cardiosclerosis.
5. Cardiac insufficiency.
6. Disturbances of cardiac rhythm.
**IHD. ATHEROSCLEROSIS OF CORONARY ARTERY**

**Risk factors of IHD:**

- Smoking;
- Obesity;
- Hypodynamia;
- Diabetes mellitus;
- Genetic predisposition.
Physical examination.

During examination of patient: index of the mass of body (BMI), frequency of heart rate, parameters of pulse, arterial pressure of both hands. Possible revealed signs of disturbances of lipid exchange: xanthoma, xanthelasma palpebrarum, clouding of cornea, stenosis of main artery (carotid, subclavian, hip and others). During auscultation can be heard 3rd or 4th heart sounds, sistolic murmur on apex of heart, pathological pulsation of pericardial region.
LABORATORY STUDIES

Minimum list of laboratory findings of patient under primary examination: determination of contents in blood: haemoglobin, cholesterol, triglyceride, glucose, AST, ALT, kreatine.

Additional laboratory factors: cholesterol subfaction, lipoprotein; parameters of hemostasis (thrombocytes, time of coagulability, fibrinogen and others.). C-reactive protein.
DIAGNOSTIC OF IHD

Instrumental diagnostic.

Main instrumental methods of diagnostics:
- Electrocardiography (ECG);
- Echocardiography (EHOOG);
- Volume stress-tests;
- Coronary angiography (CAG);
- Scintigraphy of myocardium;
- Emission myocardial tomography;
- Computer tomography;
- X-ray picture of thorax organ;
- ECG tests with physical activity (PHA).
- transesophageal auricular electric stimulation.
- Ambulatory monitoring of ECG.
- Multi spiral computer tomography (MSCT) of heart and coronary vessels.
Rentgenocontrast method. It make possible to define the place and degree of constriction of coronary artery.

**Technology.** Local analgesia. Catheter through femoral (radial) artery in aorta, for-that in coronary artery. Contrast - omnipac. Possible polipositional visualization.

**Relative contraindications to CAG:**
- Acute kidney insufficiency;
- Chronic kidney insufficiency;
- Allergic reactions on contrasting material;
- Acute gastrointestinal bleeding, intensification to peptic ulcer;
- Coagulopathy;
- Severe anemia;
- Acute violation of brain blood circulation;
- Acute violation of psychic condition;
- Severe accompanying diseases;
- Decompensated heart insufficiency or acute lungs edema;
- Severe violation of electrolytic exchange;
- Fever unknown aetiology and acute infectious diseases;
- Infectious endocarditis;
- Polyvalent allergy.
Treatment of IHD

Conservative treatment:

Uncomplicated IHD:
- reductions of cholesterol level and lipoproteides;
- improvement of blood flow in coronary artery, reduction need for oxygen;
- reduction of load on heart;
- acute heart attack of myocardium - system thrombolytic.

Surgical revasculization of myocardium:
- aorta-coronary bypass;
- mini invasive aorta-coronary bypass;
- removal of postinfarction aneurysm, insufficiency of mitral valve.

Endovascular methods of treatment:
- intracoronary thrombolysis;
- coronary angioplasty.

Indications to revasculization:
- proximal stenosis of coronary artery >50% of lumen;
- percutaneous transluminal coronary angioplasty (PTCA) – stenosis of 1/2 coronary artery.
OPERATIONS ON HEART

AABC - apparatus of artificial blood circulation.

Cardioplegia - a stop of cardiac activity.

First operation with AABC, college Dzhefferson, 1953 John H. Gibbon.
Operative approach to heart

- Middle sternotomy.
- Lateral thoracotomy.
- Bilateral thoracotomy.
- Mini approach and mini invasive technologies
Operative approach to heart

- Bilateral thoracotomy
Operative approach to heart

- Mini approach and mini invasive technologies
Shunt from artery and veins of patients from aorta to coronary arteries below contraction.

Shunt from internal thoracic artery – mammaro-coronary bypass.

Develop 2-6 shunt in pass-by of stenotic area.

Duration of operation from 3 till 6 hours.
Material to aorta-coronary shunt:

- v. saphena magna;
- v. saphena parva;
- vv. antebrachii;
- a. thoracica interna;
- a. radialis;
- a. gastroepiploica;
- a. epigastrica superior.
ACB without ABC without cardioplegia.

In West Europe and USA - 30%-50%
In Ukraine - 95%

Preference: mini approach, reduction of risk of complications, early activation.
Mammaro-coronary bypass

Without AABC. Thoracoscopy.

- artery stands out atraumatic with surrounding vein;
- bypass from mini- approach;
- front-lateral mini- thoracotomy (5 sm) in 4 intercostal space on the left;
- duration - 70 minutes;
- "Golden" standard in West Europe and USA.
ENDOVASCULAR CARDIOSURGERY

Preference:
- Mini invasive procedure;
- It executed under local analgesia;
- Lesser risk of complications;
- Early activation and extract from hospital.

Problems:
- High-priced equipment (cardiograph);
- Possibility of conversion - puncture of arteries wall;
- Cost of stent (1000 $ and 2500 $).
PCTCA - percutaneous transluminal coronary angioplasty.

Catheter bottled dilation of vessel. Crushing of atherosclerotic plate. Implantation of metallic frame - stent in place of stenosis.

Duration of procedure 1-2 hours.
In Ukraine is revealed 4,000 valvular defect per year.

Valvular heart diseases:
- Rheumatic diseases;
- Postinfarction deformation;
- Infectious endocarditis;
- Degenerative changes.

Types of defects:
Stenosis - narrowing of valve.
Insufficiency - an incomplete closing.
Combination – stenosis + insufficiency.

Destruction of valve and perivalve structures. Reason - bacterial or fungous infection.

**Indication to operations:**
- Abscess formation;
- Decompensated heart insufficiency;
- Large (floating) elements on valve;
- Embolisms.

**Methods of surgical correction:**
- Reconstruction of valves;
- Prosthesis of valves.
**Reconstruction of valves.**

The autologous valve is saved.

**Preference:** does not need anticoagulant therapy, material - autologous fabrics.

**Defects:** effect can be temporary.
Prosthesis of valves

1. Artificial valves.

2. Biological valves:
- Autograft - a prosthesis device from autologous fabric;
- Homograft - a prosthesis device from human fabric;
- Ksenograft - from fabric of pig, calf.

Positive factors: anticoagulant therapy does not need, no noise when functioning. Negative factors: through 10-20 years degeneration and calcification.
CONGENITAL VALVULAR DISEASE

In Ukraine - is registered beside 7,000 children per years.

**Frequency** (in decreasing order):
1. Defect of interventricular septum.
2. Defect interatrial septum.
3. Open arterial channel (L.Botallus, XVI v.) - between aorta and pulmonary artery.
4. Coarctation of aorta - constriction neck of aorta (more often beside boy).

**Treatment.**
Operation of choice - endovascular procedure.
Open arterial channel.
Endovascular occlusion spiral "Flipper", system "Amplatzer". Occluders are fixed through femoral artery (or vein) and dispose unset of blood in pulmonary artery.

Coarctation of aorta. Dilation of stenosis and installation of stent.
SURGICAL TREATMENT OF ARITMIA

Main method - electric heart stimulation (EHS).
Implantation of cardiostimulator under skin or pectoral muscle. Battery - more than 10 years.

**Classification.**

1. **According to duration:**
   - Temporary EHS;
   - Constant EHS.

2. **According to rhythm frequency:** acceleration and deceleration EHS.

3. **According to anatomical part of heart:**
   - unicameral ventricular EHS;
   - unicameral auricular EHS;
   - bicameral cascade auricular- ventricular EHS
   - bicameral ventricular EHS.

4. **According to anatomical part of heart wall:**
   - **Myocardial (epicordial) EHS** - electrodes are implant in myocardium through arteries or through puncture of thorax.
   - **Endocardial EHS.** Electrodes are implant on veins in cavity right part of heart.
   - **Demand-EHS** (EHS at demand). EHS automatically defines the moments, when necessary stimulation. It make use of AV blockade and at acute period of IM.
Radiofrequency ablation (RFA):

It’s miniinvasiv destruction of conducting structures of heart, pathological cardiac pacemaker.

It is indication at supraventricular tachycardia: auricular tachycardia, atrial flutter.
TUMORS - MIXOMA OF HEART

Benign tumor of heart: from 1 mm till 15 sm, is covered by capsule. Has a crust, is fixed to wall of auricle or ventricle. 75% - a left auricle, 20% - a right auricle, 5% - a ventricle.

**Clinic:** At the beginning initially - without symptoms. Then - symptomatology of mitral stenosis and HI.

**Treatment:** surgical, ablation of mixoma with resection of septa.
Aneurysms and stratifications thoracic or abdominal aorta:
- Opened transabdominal operations.
- Laparoscopic operations.
- Endovascular stent.

*Stent.* Only not lengthy aneurysms. The cost - till $ 70,000.
Surgery of heart insufficiency

- Segmental resection of left ventricle.

- Cuneiform resection of left ventricle.
ARTIFICIAL HEART

- Short support. Temporary support before transplantation.
- Transplantation in Ukraine. Need for transplantation: Heart - 2,000 per years (execute - 5).
- Problem of transplantation - not technology, but organization!
thanks for your attention