**Basic cardiovascular disorders in hildren. Bacterial endocarditis in children.**

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**The cardiovascular system represents one from the most important system through its functions:**

* transport:
	+ - Of nutritive substances,
		- oxygen,
		- metabolites,
* The support of immune protection,
* Humoral regulation of multiple physiological processes.

**In contrast with adult, in children, indifferently from age, the cardiac pathology is dominated by:**

* + - congenital cardiac malformations
		- cardiomiopathies
		- disturbances of rhythm and conductibility
		- arterial hypertension*.*

**The functional peculiarities of cardio-vascular system**

* The child’s organism has net superior necessities to the heart due to more intense metabolism.
* The heart function has more favourable conditions in comparison with adults due to the absence in children of chronic intoxication(alchool, nicotine, diverse professional noxious factors etc.).
* The cardio-vascular system in children has the restoration possibilities more than in adults.
* The nervous regulation of cardiac activity in children is represented by *predomination of sympathetic* *system* on the parasympathetic.
* *The physiologic tachycardia* is characteristic for children, respectively high frequency of cardiac contractions (in new-born 120-140 beats/min.).
* *The lability of cardiac contractions frequency* is an important peculiarity of the child. It can be in:
	+ - screaming,
		- crying,
		- movement (accelerating),
		- sleeping (diminishing).

**The frequency of cardiac contractions per minute in function of age**

|  |  |  |  |
| --- | --- | --- | --- |
| **0 -24 hrs** | *94 – 145* | **1 – 3 yrs** | *98 – 164* |
| **1 - 7 days** | *100 – 175*  | **3- 5 yrs**  | *65 – 132* |
| **8 – 30 days** | *115 – 190*  | **5 – 8 yrs** | *70 – 115* |
| **1 – 3 months** | *124 – 190*  | **8 – 12 yrs** | *55- 108*  |
| **3 – 6 months** | *110 – 180*  | **12 – 16 yrs** | *55 - 102* |
| **6 – 12 months** | *112 – 178*  |  |  |

**The establishing of correct and complete diagnosis in a cardio-vascular disease in children needs the using of following diagnostic methods:**

1. Anamnesis
2. Physical examination
	* + inspection
		+ palpation
		+ percussion
		+ auscultation
3. **ECG**
4. **X-ray chest**
5. **Noninvasive graphic examinations:**

a) echocardiography;

b) fonocardiogram;

c) Methods of nuclear cardiology, pulmonary radiocardiography, radiospirometry;

d) tomodensitometry (computer triaxial tomography )

1. **Invasive examinations**: catheterism and angiography
2. **Investigation of fetal rhythm** (fetal cardiology).

***Anamnesis***

There is a directed discussion with the sick child and with his parents, about the his antecedents and the history of actual disease, with the evidence of present complaints and of motives to presentation at physician.

**Heredo-collateral antecedents**

The presence at another family members of:

* Congenital cardiopathies,
* Consanguinity,
* Dismorphisms specific for some congenital malformations,
* Cardiomegalies,
* Sudden unexplained death in youths.

**Personal antecedents**

Were observed in the first three months of pregnancy the follows:

* Toxic aggressions (intoxications or alcohol consumption by mother),
* Hormonal treatments,
* Exposures to radiation or viral infections (rubeola, rujeola, flu etc.)

**Especial attention to:**

* + - Antenatal history and cirumstances of birth,
		- Duration of pregnancy,
		- Birth weight,
		- Apgar scale,
		- Cyanosis at birth,
		- Difficulties in alimentation.
* Evolution of growing and development from the birth until the moment of addressing (physical and neuropsychical development),
* Resistance to infections,
* Presence of pulmonary infections (cardiopathies with left-right shunt),
* Appearance of acute pulmonary edema (mitral stenosis, arterial hypertension etc.),
* Syncopes (aortic stenosis),
* limping at the level of inferior members at effort (coarctation of the aorta).

**The principal symptoms cardio-vascular system affection**

**Palpitations** are the expression of cardiac organic or functional arrhythmia.

They can be generated by neuro-vegetative dystonia, by some functional states

More rarely in children, by some organic lesional background.

**Precordial** **pains** are alarming for patient, they can be manifested under the form of:

* sting,
* precardialgies,
* pression,
* burn,
* Thoracic constriction etc.,
* With precordial localizing.

If they have cardiac origin it are produced by:

* + - coronarian insufficiency (aortic stenosis),
		- Some congenital cardiopathies,
		- Pulmonary hypertension etc.

There are a lot of situations (acute articular rheumatism , some myocardites, pericardites, endocardites, extrasystoles) which can produce precordial pains by noncoronarian cause.

The pains with precordial localization can also appear in intercostal neuralgia.

***Cyanosis***by cardiac type is central, appears when the reduced hemoglobin exceeds 5% and can be accentuated at effort.

***Dyspnoea*** is the result of tissue oxygenation disturbances; is met at effort (dyspnoea of effort), in rest (orthopnoea) or suddenly (paroxystic dyspnoea, sometimes nocturnal, acute pulmonary edema).

***The swoon***

* Loss of consciousness by short time, but with the keeping of vital functions (circulation and respiration).

**Syncope** - loss of consciousness, by short time, without keeping of vital functions:

* Marked decreesing until the stopping of cardiac contractions;
* Absence of pulse;
* Decreasing until the stopping of respiration.
* Falling of arterial pressure;
* Neurological manifestations;
* Duration 3-4 minutes, after 5 minutes the decerebration is producing.

**The physical examination of a child with cardio-vascular system affections**

* The physical examination of cardio-vascular system includes the same stages and methods as the general physical examination: inspection, palpation, percussion and auscultation.
* The examination includes not only precordial region or only cardio-vascular system, but the entire organism, because every sign can be very important.

**The peculiarities of cardio-vascular system inspection methods in children:**

1. The inspection of cardio-vascular system in children is performing in conditions in which the child is quiet or in the time of his sleeping.

2. There will be appreciated the constitutional type, the anthropometric parameters, the physical delaying being characteristic for children with severe cardiac affections, especially with congenital cardiac malformations .

1. The attention will be attracted to the presence of some stigmas of disembryogenesis/genetic syndromes(Marfan syndrome, Down syndrome/disease, Noonan syndrome, Turner, Klinefelter syndromes, Ellis von Creveld syndrome, etc), which include also the cardiac affection.
2. The teguments and adipose subcutaneous tissue will be inspected, being ascertaining the presence or absence of cyanosis, edemas, pallor, annular erythema, or another cutaneous lesions suggestive for a cardiopathy.
3. The inspection of cervical anterior region will evidence the turgidity /pulsation of jugular veins.

7. The inspection of precordial region will ascertaining the most frequent pulsations of the heart and magistral vessels.

***The peculiarities of palpation method in cardio-vascular system examination in children***

The palpation can give information about:

* *Cardiac volume,*
* *Apexian beat* (more upper in suckling babies),
* *Fremitus and gallop,*
* *Character of pulse,*
* *Quality of peripheral circulation etc*.

*The apex beat* in children is palpating in the precordial region with the palm and after that with the tips of the fingers:

* In children until 2 years it is situated in the IV left intercostal space 2 cm exteriorly from left medioclavicular line;
* In 2-5 years age – in the V intercostal space 1 cm exteriorly from left medioclavicular line;
* In more than 5 years age – in the V intercostal space on the left medioclavicular line.

Supplementarly the apex beat is also characterized by mobility and amplitude.

At palpation of precordial area there can be constated:

*Palpator equivalents of sounds or cardiac murmurs* (fremitus).

* The pulse in children is more difficult for evaluation due to age peculiarities.
* As a rule, the pulse is palpating on radial and femoral artery (its absence denotes the coarctation of the aorta).

The characteristics of pulse include:

* + - *frequency,*
		- *amplitude,*
		- *rhythm,*
		- *capacity.*
* *The frequency of pulse* in children can be appreciated also by big fontanelle, temporal, carotidian arteries pulsation.

***The peculiarities of cardio-vascular system percussion method in children***

* ***Percussion of the heart*** having a real value only after 4 years.
* The method remain however useful in conditions of endowment absence, in the case of intransportable patients or in diverse emergencies.
* At precordial area percussion two tonalities can be heared, comparatively with pulmonary sonority:
	+ - submatity - relative dullness (defines the heart covered by lungs);
		- matity- absolute dullness (not covered by lungs).
* The heart percussion is performing with finger taping directly on the chest, in horizontal position of the child.

***The technique of percussion:***

**I**. 3 lines are percussing:

* + right
	+ left
	+ superior

**II. The determining of right heart margin:**

* Is performing by superficial percussion;
* Is percussing- parallel with the ribs perpendicular on sternum- on the II-VI spaces, until the dullness of liver, after that 2 intecostal space upper and continuu to percut till subdullnes.
* In normal heart it not exceeds the right margin of sternum;

**III. The determining of left heart margin:**

* Performing of superficial percussion;
* We start in V intercostal space - apex beat;
* It is performing from periphery to the center –moving parallel to the ribs;
* In normal conditions, the left margin of the heart is on the line uniting the normal apex beat with subdull zones.

**VI. The determining of superior margin:**

* Is performing by superficial percussion;
* Is percussing- parallel with the ribs perpendicular on sternum till subdullnes

**The limits of relative cardiac dullness in children are relatively more that in adults (,,dilated heart”):**

Age until 2 years:

* + - right: right parasternal line;
		- left: 1,5-2 cm exteriorly from medioclavicular left line;
		- superior: rib II.

Age of 2 - 7 years:

* + - right: 0,5-1 cm exteriorly from parasternal right line;
		- left: 0,5-1 cm exteriorly from medioclavicular left line;
		- superior: II intercostal space.

Age of 7-12 years:

* + - right: right sternal line;
		- left: left medioclavicular line;
		- superior: rib III.

The cardiac dullness is increased at percussion in pericarditis, myocarditis, dilative cardiomyopathies and decreased in pulmonary emphysema and in pneumothorax.

**ANATOMIC LOCALIZATION OF HEART VALVES AND POINTS OF AUSCULTATION**

The auscultation respect the same rules as in adult, with an stethoscope adequate to the age.



* *The cardiac sounds* in children are *more frequent, more intense* (the suckling has more thin thorax), *with the tendency to equalization* (in suckling).
* During the child’s growing, the I sound is accentuating on apex, and the II sound - on pulmonary artery, sometimes splitting variably with respiration.
* The presence of III sound in youths is physiological, due to good tonus of myocardium, which makes it to vibrate in the phase of rapid diastolic filling.
* ***Cardiac murmurs****,* appreciated auscultatively, are characterized by *the place of producing, duration, intensity, timbre, propagating and with or without association of fremitus.*

***Degrees of intensity by Levine
(Freeman-Lee)***

* **degree 1(1/6)**: audible only in a room with reduced level of noise; are merosystolic
* **degree 2 (2/6)**: murmurs by low intensity
* **degree 3 (3/6):** medium intensity, not heard at partial detaching of stethoscope from the thorax
* **degree 4 (4/6):** increasedintensity, are listening at partial detaching of stethoscope from the thorax
* **degree 5 (5/6):** highintensity, are listening with the stethoscope at small distance from the thorax
* **degree 6 (6/6):** are listening at distance from thoracic wall or by direct hearing.

***After the period of appearance*** the murmurs are classified in:

* + - systolic
		- diastolic
		- systolo-diastolic
		- continuous

***After duration*** they can be:

* + - protosystolic
		- mezosystolic
		- telesystolic
		- holosystolic

***The cardiac murmurs*** are also classifying in:

* + - organic;
		- functional.

**The organic murmurs** are characterizing by: high intensity, as a rule by 4-6 degree, are propagating out from the heart limits, are accompanied by fremitus.

**The organic murmurs also can be:**

* valvular – in congenital or acquired valvular defects;
* myocardial – which appear in inflammatory processes or in myocardium dystrophy;
* Organic murmurs in the case of congenital anomalies of heart/magistral vessels.

***Functional murmurs*** can have a different genesis and localization, as a follows:

* *anemic* - which appear at rheologic circulant blood peculiarities modification ( in the case of anemia, thyrotoxicosis, fever);
* *cardiopulmonary* - appear at respiratory pathways compression;
* *functional murmurs due to magistral vessels compression*;
* *hypertonic murmurs*, due to papillar muscles hypertonia;
* *murmurs at pulmonary artery*, at its bifurcation;
* *myocardic murmurs*, which appear in children as a result of long-term maitaining of chronic bacterial foci(chronic tonsillitis), with direct toxico-infectious action on the heart.

***Systolic murmurs:***

* + - are auscultatively perceived on the basis of heart in cardiac congenital pathologies;
		- are auscultatively perceived on apex in acquired pathologies;
		- are auscultatively perceived on the heart basis in stenosis.

***Diastolic murmurs:***

* + - Have at origin the acquired valvulopathies;
		- Being perceived on apex suggest the acquired stenosis;
		- Being perceived at basis can characterize the acquired valvular insufficiency.

**The measurement of arterial pressure** is obligatory in pupil and adolescent, and if necessary will be performed in suckling baby and infant. The measurement of arterial pressure will taking into consideration:

* Patient position(sitting or recumbent),
* Dimension of the cuff (adecuate for age),
* Obtained values will be compared with the respective centilic tables.



**CONGENITAL HEART DISEASES**

Congenital heart diseases (CHD) are the consequences of different external and internal noxious agents which affect of fetus in the embryonic stage from 2 – 8 weeks (up to 3 months).

***Etiology***

* Viral: Coxsakie B virus, mumps, cytomegalovirus, herpes, influenza,
* Drugs: lithium, thalidomide, phenothiazines, meprobamate, anticonvulsivants (hydantoin), vitamin D,
* Alcohol in pregnancy, smoking,
* Maternal diseases: diabetes in mother, systemic lupus erythematosus, radiation and hypoxia.

***Classification***

 **A. ABNORMAL COMMUNICATION BETWEEN SYSTEMIC AND PULMONARY CIRCULATION.**

 1. ASD.

 2. VSD.

 3. Atrio-ventricular septal defect.

 4. PDA.

***CHD with left-to-right shunt (diameter more than 1 cm) and pulmonary arterial hypertension have the following clinical manifestations:***

1. Signs appear from the first day or week of life;
2. Dyspnea with tachypnea;
3. Cough;
4. Drawing of intercostals muscles;
5. Profuse transpiration;
6. Growth curve stationary or slow ascending;

***Clinical manifestations:***

* *Recurrent bronchopulmonary infections, short stature, pallor of skin;*
* *Deformed thorax;*
* *Hepatomegaly;*
* *Apex beat is down and lateral*
* *Systolic thrill by palpation.*
* *CHD with pulmonary hypertension leads to low intensity systolic murmur and marked second heart sound****.***

***X-ray findings****:*

* Cardiomegaly (cardio-thoracic index 0,6 – 0,65); moderate enlargement of both left atrium and ventricle.
* Hilar and perihilar pulmonary vessels are dilated and pulmonary fields are accentuated.

**ECG**

* Increased volume in the left cavities.
* Overloading of right ventricle may lead to pulmonary hypertension.
* Biventricular hypertrophy is found.

***ECHO cardiography****:* Right ventricular dilatation and pulmonary artery dilatation.

***Evolution:***

* Total or partial closure of the defect (75-80%) with good prognosis.
* 20% of children may result in Eisenmenger’s syndrom in the first year of life. In this case the pulmonary resistance is higher than the systemic resistance which leads to right-to-left shunt. In these cases cyanosis increases.

***Treatment****:*

 The treatment for CHD with shunt left to right is medical and surgical.

* In moderate VSD medical treatment is given for correcting respiratory irregularities due to cardiac failure with ionotropic agents and diuretics.
* Surgical treatment
* Interventional treatment

**B. ANOMALY OF THE LEFT VENTRICULAR OUTLET.**

1.Aortic valvular/supra/undervalvular stenosis.

2. Coarctation of aorta.

**C. ANOMALY OF THE RIGHT VENTRICULAR OUTLET.**

 1.Isolated pulmonary valve stenosis.

 2.Pulmonary artery branch stenosis.

 3.Pulmonary atresia.

 4.Tetralogy Of Fallot.

**D. ATRIOVENTRICULAR VALVULAR ANOMALIES**.

 1.Congenital malformation of the mitral valve. a)congenital mitral stenosis.

 2. Congenital malformation of the tricuspid valve. a) tricuspid atresia.

 3.Ebstein’s anomaly.

**E. ANOMALOUS GREAT VESSELS AND CORONARY ARTERIES.**

 1. Transposition of great vessels (D-transposition).

 2. Corrected type of transposition of great vessels (L-transposition)

**F. ANOMALOUS RETURN OF PULMONARY VEINS.**

 1. Partial Anomalous Pulmonary venous return.

 2. Total Anomalous Pulmonary venous return.

**G. MALPOSITION OF THE HEART AND THE VISCERA.**

 1.Dextrocardia.

 2.Levocardia.

 3.Mesocardia (medial).

**ARRHYTHMIAS**

An arrhythmia (also called dysrhythmia) is an abnormal rhythm of the heart, which can cause the heart to pump less effectively.

**Symptoms of arrhythmia**

* weakness
* fatigue
* palpitations
* low blood pressure
* dizziness
* fainting
* ECG changes

**Why does it happen**

* the heart's natural pacemaker (the sinus node) develops an abnormal rate or rhythm.
* the normal conduction pathway is interrupted.
* another part of the heart takes over as pacemaker.

**ATRIAL ARRHYTHMIAS**

* + Sinus arrhythmia
	+ Sinus tachycardia
	+ Sick sinus syndrome
	+ Premature supraventricular contractions or premature atrial contractions (PAC)
	+ Supraventricular tachycardia (SVT), paroxysmal atrial tachycardia (PAT)
	+ Atrial flutter
	+ Atrial fibrillation

 **VENTRICULAR ARRHYTHMIAS**

* + Premature ventricular contractions (PVC's)
	+ Ventricular tachycardia (VT)
	+ Ventricular fibrillation (VF)

**Diagnosis**

Electrocardiogram (ECG)

* resting ECG
* exercise ECG, or stress test
* signal-average ECG

Holter monitor

* + - * continuous recording
			* event monitor, or loop recording

 Electrophysiologic study (EPS)

 **Treatment**

* Lifestyle modifications
* Medication
* Cardioversion
* Ablation
* Pacemaker
* Implantable cardioverter defibrillator
* Surgery





**INFECTIOUS ENDOCARDITIS
Definition -** IE is a severe infectious disease, in which septic grafts are localized on valvular endothelium or on other normal or pathologic cardiac structures, producing vegetations which determine the structural and functional local lesions and systemic emboles.

Etiology

IE is produced by microorganisms:

* Intensively pathogenic (staphylococcus)

 *and with*

* Reduced patogenity (streptococcus viridians)

CLASSIFICATION

Acute IE

* on normal valves,
* severe clinical picture,
* decease < 6 weeks.

Subacute IE

* valvular, congenital diseases,
* With long-term evolution,
* decease in 3-12 months in the absence of treatment.

Physiopathology

* IE on native valves
* IE on valvular prostheses
	+ - precocious appearance (< 60 days)
		- late appearance (> 60 days)
* IE of toxicomans

Infectious agents

* St. viridans and staphylococccus – 75 %
* Acute IE– St. aureus, St. pneumoniae, Neisseria meningitides, N. gonorrhoeae, St. pyogenis, Hemophilus.
* Subacute IE – St. viridans, St. epidermidis.
* Gram negative bacilli – E. coli, Klebsiella, Proteus Enterobacter, Serratia, Pseudomonas – 4 - 9 %
* Gr. HACEK - Hemophylia , Actinobacillus, Corinebacterium, Eikenella, Kingolla - 0,1-3,6 %.
* Fungi – Candida, Aspergillus - 5-10 % (toxicomans, having valvular prostheses, immunosuppressed)
* Anaerobic bacteria < 1%
* Rickettsia and viruses produce exceptionally IE
* IE with negative hemocultures - 5-15 % (germs with↓ virulence which don’t grow on usual media– mycobacteries, chlamidies, fungi)

Predisposing factors

All cardiac diseases producing disorders of sanguin flux

IE on native valves:

* rheumatismal valvular diseases
* valvular regurgitations
* Prolapse of mitral valve 2-10%
* Degenerative cardiac diseases 20-40 %
* Cardiac congenital malformations (CCM) – Potent ductus arteriosus (PDA), VSD , bicuspidal Ao V, CoAo , TF , St. of PA -4-13 %

Cardiac surgery

* Cardiac prosthesis
* intervention under extracorporal circulation
* i.v. drugs administration (cocaine) 7-14 %.

Pathomorphology

* Unique ∕ multiple vegetations, mm→cm.
* Valvular destructions, rupture of papillar m., of tendinous chords and IV septum.
* Aneurisms and valvular abcesses.
* Myocarditis,
* Myocardial abcesses,
* Mitral insufficiency,
* Pericarditis .

Clinical picture

* Incubation: < 1 week in acute IE

 1 – 12 weeks in subacute IE

* Determined clinical manifestations:
	+ - * Infectious process
			* Bacteriemia or septic emboles
			* Systemic arterial emboles
			* Depositions of CIC
* Sudden (acute) – fever 39-40 , chills, sweating, arthralgies, myalgies
* Insidious – subfebrility, fatigability, astenia, ↓of weight, aggravation of cardiac failure.
* Systemic complications: cerebral, retinian, splenic emboles.
* Fever:
	+ - Moderate (38 -38,5),
		- Irregular
		- >39 – 40, chills
		- Decreases after 3 days of correct treatment
		- Prolonged fever (St. aureus , gram “-” bacilli, fungi, nozocomial inf.)
* Cardiac murmurs- 85% absent in IE of right heart
* Diastolic murmur in patient without valvulopathy = patognomonic for IE
* Peripheral skin and eyes manifestations – 50%
* Anemia - constant in acute and subacute IE, teguments “café au lait”
* Petechiae - red-purplish-blue colored, 20-40% localized on conjunctiva, superior members. Disappear in 2-4 days
* Linear hemorrhages – proximal localization under nails
* Osler nodes - small, prominent, painful, on the level of calves and soles
* Janeway spots - small erythematous macules on palms and soles (staphylococcal IE)
* Roth spots - fluffy retinal exudates
* Hyppocratic fingers - in IE with long-term evolution
* Splenomegaly - 30% more frequently in long-term evolution
* Clinical manifestations produced by emboles
* Mycotic aneurisms – 2 – 10%, at cerebral level with poor symptomatology
* Clinical manifestations of acute and chronic heart failure

Laboratory data

* Normochrome , microcytary anemia- 70 -90%
* Leucocytosis , ↑ ESR, ↑ C-reactive protein and rheumatic factor, ɣ-globulin, cryoglobulins and CIC ↑ , complement ↓
* Hemocultures in 90-95 % +
	+ Volume blood ∕medium of culture = 1:10
	+ 3 – 6 hemocultures in first 24 h (subacute IE)
	+ 3- 6 hemocultures in 2 – 3 h (acute IE)
* Ex. of urine: proteinuria, hematuria
* New methods– the goal- to identify bacterial DNA
* Serologic methods to identify the causal agent in hemocultures

**ECHO–CG –** identifies morphologic changes, vegetations, valvular lesions, local complications.

**Diagnosis**

ECG and X-ray –minor role

CT or nuclear magnetic resonance – patients with neurologic symptoms

Fundamental etiopathogenetic aspects

* Predisposing diseases ∕ drugs i.v.
* Persistent bacteremia
* Vascular phenomena
* Pathologic intracardiac manifestations (ECHO – CG)
* Certain IE
* Histologic aspect with culture - from vegetations, valves (surgery and necropsy)
* Clinical criteria:
* 2 major criteria,
* *or*
* 1 major criterion and 3 minor
* *or*
* 5 minor criteria

**Major criteria**

* Positive hemocultures (St. viridians, bovis; GR. NACEK , St. aureus)
* Finding on ECHO – CG of vegetations, abcesses , dehiscent prosthetic valves.

**Minor criteria**

* Predisposing cardiac diseases
* Fever 38˚
* Vascular phenomena
* Immunologic phenomena
* Not typical and not persistent microbiologic evidences
* ECHO- CG suggestive elements of IE, but not corresponding to major criteria

**Differential diagnosis**

* Acute articular rheumatism
* Thrombotic endocarditis (afebrile, hemocultures “- “, inflammatory syndr. absent)
* cardiac myxoma 90% localized in atrium, syncope ∕ sudden death
* SLE – fever, peri- ∕ myo- ∕endocarditis, ECG –ischemic changes

**Treatment**

* Eradication of infection using medical and surgical means
* Treatment of complications
* Prevention of infections
* Antibacterial (a/b) treatment :
* Early, sufficiently long periods for vegetations sterilization bactericide antibiotics, parenteral adm., 4-6 weeks.
* Acute IE: Nafcillin ∕ Oxacyllin ∕ Cefalosporin ∕ Vancomycin + Gentamycin
* subacute IE: Penicillin G ∕ Ampicyllin + Gentamycin
* After germ izolation→ aimed A/B therapy
* Good prognosis if fever↓ in 5 – 7 days, reserved if fever persists >7 days.

**Surgical treatment**

* Moderate ∕ severe CF, data of valvular dysfunction
* Unstable protheses
* Uncontrolled infections
* Absence of efficient therapy
* Pseudomonas aeruginosa
* Pulmonary valve endocarditis with staphylococcus and intracardiac complications
* Significant emboles
* Falling after optimal therapy

**Prophylaxis of IE**

Cardiac affections with high∕ medium risk

Procedures for which the prophylaxis is performing:

* Dental affections with bleeding
* Tonsilectomy, adenectomy
* Gastrointestinal surgery
* Bronchoscopy with rigid bronchoscope
* Esophagial dilatations
* Retrograde endoscopic cholangiography
* Surgery of biliary pathways
* Catheterization of urethra
* Urologic surgery
* Infection and drainage of some infected tissue.

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