

DISEASES OF THE CARDIOCIRCULATORY APPARATUS

Total credits 13	Theory credits 2.5	Practical credits 10.5
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GENERAL OBJECTIVES

During the course, students must acquire the **theoretical knowledge and clinical skills** that enable them to identify the main problems caused by cardiovascular pathology, reach a diagnosis, indicate the diagnostic methods required in a logical order, and decide upon suitable treatment. Given the nature of this pathology students must be able to identify those problems which require urgent attention and know how to manage them, especially where there is a need for hospital admission or surgery.

SPECIFIC OBJECTIVES

A. *At the end of the course, students must be able to identify the main **problems** associated with cardiovascular pathology, specifically:*

1. Dyspnoea
2. Water/salt retention (congestion)
3. Chest pain
4. Palpitations
5. Syncope, shock and cardiorespiratory arrest
6. Arterial hypertension
7. Problems related to cardiac and vascular prostheses
8. Ischemia of the extremities
9. Ischemia of the different organs
10. Venous insufficiency

B. *Students must be familiar with the theoretical bases of the **diagnostic methods** used in cardiovascular pathology, specifically:*

1. Physical examination in cardiovascular pathology
2. Auscultation and other methods of simple, instrument-based examination
3. Non-invasive, instrument-based examination of the peripheral vascular system
4. Electrocardiography
5. Cardiac radiology
6. Echocardiography
7. Haemodynamics
8. Angiography and ventriculography
9. Other diagnostic methods: CAT, magnetic resonance, isotopes

C. *Students must be familiar with the diagnosis and medical/surgical treatment of the main **diseases** of the cardiocirculatory apparatus, specifically:*

1. Cardiac insufficiency
2. Shock
3. Arrhythmias
4. Acquired valvular disease
5. Coronary disease

6. Congenital cardiopathy
7. Myocardial disease
8. Pericardial disease
9. Hypertensive cardiopathy
10. Infectious endocarditis
11. Cor pulmonale
12. Cardiac tumours
13. Acute and chronic arterial disease
14. Aneurysms of the aorta and its branches
15. Cerebrovascular ischemia and ischemia of the abdominal organs
16. Venous and lymphatic disorders
17. Cardiovascular tissue and organ transplants
18. Specific knowledge of cardiac and vascular surgery

*D. Students must acquire the following **skills**:*

- Take a correct **history**, including investigating and interpreting the main symptoms. Students must be able to develop adequate doctor-patient **communication** and recognize symptoms through the expressions most commonly used by patients.
- **Explore** the most important signs associated with cardiovascular disease, and using them to identify the pathophysiological changes that cause them.
- Take the **arterial pulse**. Locate the most important pulses: carotid, radial, ulnar, femoral, popliteal, tibialis posterior and dorsalis pedis. Understand the most important properties of the pulse: frequency, regularity, volume and morphology. **Palpate the precordial region**: thrills, apical beat and abnormal beats. Inspect the **jugular pulse**. Identify the waves and jugular regurgitation. Hepatojugular reflex.
- Correctly determine **arterial pressure**. Know how to use the different kinds of sphygmomanometers.
- **Cardiac auscultation**. Recognize the most common sounds and murmurs. Technique of auscultation: focus, correct use of the membrane and the bell. Manoeuvres for modifying murmurs and sounds: body positions, Valsalva, apnoea.
- Explore **hepatomegaly, oedemas and pulmonary congestion**. Explore the **venous system**.
- Record an **electrocardiogram** and interpret the most common morphologies. Recognize the sinus rhythm and most common arrhythmias found in clinical practice: extrasystolic, sinus tachycardia, supraventricular paroxysmal tachycardia, flutter and atrial fibrillation, ventricular tachycardia, sinus bradycardia, AV blocking and ventricular fibrillation.
- Interpret a **simple chest x-ray**
- Identify cardiorespiratory arrest and perform cardiorespiratory **resuscitation manoeuvres**: ABC of reanimation.
- Be familiar with and apply special measures in surgical wounds. Managing thoracic and mediastinic **drainage**.
- Apply emergency measures in the case of a **vascular wound**.
- Interpret pathoanatomical reports and, together with the pathologist, produce a good clinicoanatomical description.

SYLLABUS

A. IDENTIFYING PROBLEMS

Students must have fully assimilated the information about identification of cardiovascular problems taught in the module *General Signs and an Introduction to Clinical Pathology* prior to studying the diseases of the cardiovascular system.

1. Dyspnoea

Dyspnoea of cardiac origin. Differential diagnosis with respect to functional dyspnoea (hyperventilation, anxiety) and dyspnoea of other aetiology, especially respiratory. Degree of severity according to current classification (NYHAC). Orthopnoea and paroxysmal dyspnoea. Symptoms that accompany cardiac dyspnoea: coughing and haemoptysis. Acute pulmonary oedema.

2. Water/salt retention (congestion)

Characteristics of cardiac oedema. Differential diagnosis with respect to renal oedema and other aetiologies. Other signs that indicate congestion: hepatomegaly, jugular regurgitation. Differentiate cardiac hepatomegaly from the secondary form and from other aetiologies.

3. Chest pain

Types of chest pain of cardiac origin: coronary, pericardial, pulmonary thromboembolism, aortic dissection. Differential diagnosis between these forms, according to the pain characteristics. Specific diagnostic tests and the order in which they must be performed. Exploring coronary pain, in both its typical and atypical forms. Differential diagnosis with respect to pain of functional origin. Assessing the degree of severity (CCS classification) and the urgency of treatment, especially in terms of identifying pain that indicates acute myocardial infarct. Identification of pericardial pain and its specific characteristics: relationship to breathing, body position and movements.

4. Palpitations

Differential diagnosis of palpitations. Identification through interview of those situations that suggest the presence of arrhythmias. Identifying the types of palpitations that suggest serious, potentially fatal, arrhythmias. Conducting the tests required to reach a diagnosis.

5. Syncope, shock and cardiorespiratory arrest

Syncope of cardiac origin. Differential diagnosis of the most common forms of syncope: vasovagal, vasodepressor, cerebrovascular. Identification of shock. Differential diagnosis of cardiogenic shock. Diagnosis of cardiorespiratory arrest.

6. Arterial hypertension

Correct identification of hypertensive patients through appropriate physical examination. Differentiation of different types and degrees of hypertension in order to decide upon any special tests and the urgency of treatment needed. Identification of hypertensive crises.

7. Problems related to valve prostheses

Identification of the most common complications associated with valve prostheses. Risk of anticoagulation and identification of subsequent complications. Infection of valve prostheses (infectious endocarditis): detection and prophylaxis. Identification of prosthesis dysfunction and the tests needed to confirm it.

8. Ischemia of the extremities

Acute and chronic ischemia of the extremities. Diagnostic criteria: differential diagnosis of pain of arterial origin compared to other vascular, neurological or musculoskeletal aetiologies; signs of ischemia in the physical examination. Assessing the degree of severity and the urgency of treatment. Specific diagnostic tests and the order in which they should be performed.

9. Venous insufficiency

Oedema of venous origin. Identification of superficial and deep vein thrombosis. Clinical characteristics and specific diagnostic tests. Identifying the risk of pulmonary thromboembolism and the indications for anticoagulant treatment. Recognition of vascular ulcers. Differentiating venous oedema from those of lymphatic or central origin.

B. THEORETICAL BASES OF THE DIAGNOSTIC METHODS USED IN CARDIO-VASCULAR PATHOLOGY

1. Physical examination methods

Taking the venous pulse; identifying the different waves, understanding their meaning and how they are modified in different cardiac disorders. Palpating the precordial region: thrills and apical beat. Palpating the arterial pulse at different levels. Clinical significance of the characteristics of the arterial pulse. Examining the skin in the lower extremities and its clinical significance.

2. Auscultation

Origin of cardiac sounds and murmurs. Normal and abnormal sounds. Their physical characteristics. Types of stethoscope and their uses. Differential diagnosis of murmurs. Manoeuvres that modify cardiac murmurs and sounds and thus facilitate diagnosis.

Origin of Korotkoff sounds and their usefulness in determining arterial pressure. Auscultation of peripheral vascular murmurs.

3. Non-invasive, instrument-based examination of the peripheral vascular system

Calculating comparative oscillometric indices (arm-ankle). Examining the functional aspects of the vascular system. Treadmill stress test. Peripheral vascular Doppler (arterial and venous). Plethysmography. Simple and contrast CAT. Angioresonance.

4. Electrocardiography

Bases of electrocardiography. Electrocardiograph. Electrocardiographic diagnosis of hypertrophy, branch blocks, ischemia and myocardial necrosis. Electrocardiographic diagnosis of the main arrhythmias. Basic understanding of the stress electrocardiograph.

5. Cardiac radiology

Radiology of the heart and large vessels. Cardiac and vascular angiography; complications. Clinical anatomy: distribution of the coronary tree; normal morphology of the cardiac cavities and the main vessels.

6. Echocardiography

Ultrasound waves: theoretical bases of echocardiography. Concept of *Doppler*. Indications and options for echocardiographic diagnosis.

7. Haemodynamics

Intracavitary pressure, cardiac output, vascular resistance and short-circuits. Calculating the valve area.

8. Angiography and ventriculography

Indications and technique of angiocardiographic examination. Conventional and digital subtraction angiography. Iodine contrast media. Other contrast media. Complications. Recognizing the usual angiographic images. Calculating the ventricular function: fraction and ejection.

9. Other diagnostic methods

Other non-invasive complementary examination methods: CAT, magnetic resonance.

C. DIAGNOSIS AND TREATMENT OF THE MAIN DISEASES OF THE CARDIOCIRCULATORY APPARATUS

1. Cardiac insufficiency

Epidemiology of cardiac insufficiency. Most common causes. Physiopathology of cardiac insufficiency. Heart compensation mechanisms. Diastolic and systolic dysfunction. Cardiac insufficiency with high cardiac output. Haemodynamic profile and neurohumoral alterations in cardiac insufficiency. Triggers of cardiac insufficiency. Clinical features of cardiac insufficiency: signs and symptoms of right and left insufficiency. Radiological signs of pulmonary congestion. Changes in laboratory parameters. Natural history of cardiac insufficiency. Treatment of chronic cardiac insufficiency. General, non-pharmacological measures: diet, rest and correction of triggers. Digitalis: action on contractility and electrophysiological properties. Most common digitalis drugs, pharmacokinetics,

administration routes and dose. Current indications of digitalis. Usefulness and indications of digoxinaemia. Digitalis poisoning: most common symptoms, arrhythmias due to poisoning and treatment. Role of diuretics and vasodilators. Types of vasodilators, indications and dose. Treatment of acute pulmonary oedema. Role of vasodilators and inotropic substances (sympathetic mimetic amines). Surgical treatment of cardiac insufficiency: support systems. Intra-aortic counterpulsation. Left shunt. Right and biventricular shunt. Artificial heart. Heart transplant: indications, current outcomes, most common complications, post-transplant survival

2. Acute circulatory insufficiency (shock)

Normal regulation of arterial pressure and blood circulation. Factors that determine cardiac output and its distribution. Concept of acute circulatory insufficiency. Most common causes and classification. Haemodynamic, metabolic and endocrine changes in shock. Effects of shock on kidney, heart and lungs. Clinical diagnosis. Haemodynamic monitoring, haemodynamic profile and laboratory determinations in different types of shock. Treatment of acute circulatory insufficiency. Inotropic drugs. Special features of treatment of cardiogenic shock; role of vasodilators. Identifying different mechanical assistance techniques in cardiogenic shock.

3. Arrhythmias

Electrophysiological bases of cardiac rhythm. Rest potential, transmembrane action potential. Electrical properties of cardiac cells: automatism, excitability, conduction and refractoriness. Concept and classification of arrhythmias. Most common mechanisms of arrhythmias. Most common causes: importance of electrolyte alterations in the production of arrhythmias.

Extrasystolic arrhythmias. Diagnostic criteria, differential diagnosis with respect to supraventricular and ventricular arrhythmias. Most important causes. Prognostic importance: diseases in which extrasystolic arrhythmias pose a risk. Treatment of extrasystolic arrhythmias.

Tachycardia. Clinical and electrocardiographic diagnostic criteria for the most important tachycardia: sinus tachycardia, supraventricular paroxysmal tachycardia, flutter and atrial fibrillation, and ventricular tachycardia. Access routes. Wolf-Parkinson-White syndrome. Pharmacological treatment of different tachycardia. Cardioversion. Radiofrequency ablation. Implantable defibrillators: types. Indications, technique of implantation and complications. Indications for ablation surgery. Bradycardia. Sinus bradycardia. Sinus node disease. Atrio-ventricular block. Classification according to the degree of block and localization. Most common causes. Prognosis of blocks. Surgical treatment: indications for provisional and permanent pacemakers. General implantation techniques. Ventricular and two-chamber pacemakers. System for regulating pacemakers. Monitoring of pacemakers. Complications. Changes of generator.

Palpitations. Physiopathology. Differential diagnosis. Treatment.

Syncope. Physiopathology. Vagal and orthostatic vasomotor syncope. Cardiac syncope. Neurovascular syncope. Differential diagnosis. Treatment.

Sudden death. Epidemiology. Mechanisms and causes. Prevention. Cardiopulmonary resuscitation.

4. Acquired valve disorders

Mitral stenosis. Anatomy of the mitral valve. Mitral physiology: atrial and ventricular pressure. Concept of gradient. Mitral area. Pathological anatomy of acquired mitral stenosis: importance of sub-valvular apparatus. Physiopathology of mitral stenosis. Relationship between cardiac output, pressure and gradient. Degree of severity according to mitral area. Clinical diagnosis: initial symptoms; cardiac auscultation; electrocardiogram. Complementary examinations: Echocardiography and radiology. Indications and point at which cardiac catheterization should be performed. Natural history. Most common complications: atrial fibrillation, systemic embolisms. Acute pulmonary oedema. Pulmonary hypertension and mitral stenosis. Surgical options: percutaneous valvulotomy; closed mitral commissurotomy, open mitral commissurotomy and valvuloplasty; mitral valve replacement. Valve replacements: advantages and disadvantages of different types of prosthesis and rings. Short-, medium- and long-term outcomes. Indications for the various surgical options. Prophylaxis of infectious endocarditis on the patient with a prosthesis. Anticoagulant treatment in mitral disease and in patients fitted with valve prostheses.

Mitral insufficiency. Most common causes: rheumatic, ischemic, connective tissue alterations. Pathological anatomy of mitral insufficiency and its various causes. Physiopathology of mitral regurgitation. Clinical diagnosis. Initial symptoms, auscultation. Complementary examinations. Echocardiographic diagnosis: cardiac Doppler. Radiology. Differential diagnosis of mitral insufficiency. Natural history and most common complications. Surgery: most common techniques used. Conservative mitral surgery: annuloplasty and valve or cord surgery. Mitral valve replacement. Initial and late outcomes of mitral surgery. Surgical indications. Aortic counterpulsation in acute mitral insufficiency.

Tricuspid insufficiency. Aetiology. Types. Diagnosis. Indications for surgical treatment.

Aortic stenosis. Anatomy of the aortic ring. Haemodynamic characteristics. Valve closure. Importance of the Valsalva sinus. Normal aortic area. Aetiology of aortic stenosis: congenital, rheumatic, degenerative. Physiopathology of aortic stenosis. Non-valvular aortic stenosis: supraaortic stenosis, fibromuscular subaortic stenosis, idiopathic hypertrophic subaortic stenosis. Pressure overload and concentric hypertrophy. Clinical diagnosis: initial symptoms; palpation and auscultation. Radiology. Echocardiographic diagnosis: cardiac Doppler. Valve area and degree of severity. Indications for cardiac catheterization. Surgical options. Commissurotomy (percutaneous and open). Valve replacement: types of replacement valves: autografts (Ross procedure), allografts, non-stent heterografts, bioprosthesis and mechanical prosthesis. Outcomes of aortic surgery. Surgical indications in aortic stenosis. Correcting other types of non-valvular aortic stenosis: myectomy, myotomy, supraaortic ring resection.

Aortic insufficiency. Most common causes: rheumatic, infectious, connective tissue disease. Physiopathology of aortic insufficiency: acute and chronic forms. Clinical diagnosis: initial symptoms; auscultation. Radiology. Echocardiography and Doppler. Indications for catheterization. Surgical options: most common surgical techniques: repair and replacement of the aortic valve. Types of replacement and general indications. Outcomes of aortic valve surgery. Surgical indications. Surgery for infectious endocarditis: its indications and outcomes. Indications for anticoagulant treatment with aortic prostheses.

5. Coronary disease

Anatomy, physiology and physiopathology of coronary circulation. Distribution of the coronary tree. Arteries that irrigate the most important segments of the heart. Importance of coronary lesions according to their localization. Concept of "at risk myocardium". Factors that determine coronary flow: pressure and resistance in the coronary tree; factors that determine oxygen consumption. Adrenergic, metabolic and humoral regulation of coronary circulation. Concept of myocardial ischemia, most common mechanisms and its clinical manifestations. Epidemiology of atherosclerosis. Risk factors. Primary and secondary prevention of arteriosclerotic disease.

Chest angina. Concept of stable and unstable angina.

Stable angina. Clinical diagnosis and objective determination of ischemia. Importance of history-taking and physical examination. Electrocardiographic signs of ischemia: sensitivity of the conventional electrocardiogram. Value of ergometry and isotope studies in the diagnosis of myocardial ischemia. Natural history of stable angina and criteria for poor prognosis. Treatment of stable angina: general measures. Drug treatment of chest angina: use of nitrates in treating the angina attack. Mechanisms of action, indications, collateral effects and ways of administering nitrates, beta-adrenergic blockers and calcium antagonists. Use of different drugs according to the type of angina. Myocardial revascularization. Historical development of the different techniques of myocardial revascularization. Technical options: angioplasty and aortic-coronary shunt. Physiopathological concepts. Types of graft: saphenous, mammary, other. Short- and long-term outcomes of different types of myocardial revascularization. Particular indications for the different techniques of myocardial revascularization. Natural history of post-operative care in revascularization surgery.

Unstable angina. Clinical forms of chest angina that are considered to be unstable.

Complications of unstable angina and its natural history. Importance of urgent admission with certain forms of chest angina. Prinzmetal or variant angina. Drug treatment of unstable angina. Specific role of anti-aggregating, anticoagulant and fibrinolytic agents. Indications for cardiac catheterization. Indications for aortic counterpulsation. Emergency myocardial revascularization: technical options, their outcomes and indications.

Acute myocardial infarct. Concept of myocardial necrosis. Most common causes. Pathological anatomy of infarct. Clinical diagnosis: history-taking and atypical forms of presentation. Electrocardiographic and enzymatic diagnosis. Most frequent complications: arrhythmias, cardiac insufficiency, aneurysms, rupture (septal, free wall, papillary muscle) and pericarditis. Natural history of myocardial infarct. Assessment of post-infarct prognosis. Treatment of myocardial infarct. Reducing the area of necrosis: fibrinolytic treatment. Anti-arrhythmic agents. Treatment of cardiac insufficiency. Indications for anticoagulant treatment. Methods and indications for assisted circulation in cardiogenic shock. Revascularization in acute infarct and the immediate post-infarct period: technical options, outcomes and indications. Surgical treatment of mechanical complications in infarct. Cardiac rupture, post-infarct interventricular communication, acute mitral insufficiency. Prevention of sudden death post-infarct. Post-infarct rehabilitation and myocardial revascularization surgery.

6. Congenital cardiopathy

Anatomical and functional characteristics of pulmonary circulation. Concept of left-right and right-left short-circuit. Functional consequences of short-circuits: pulmonary hypertension, cyanosis, effects on the child's development and growth. Diagnostic criteria: cyanogenic and non-cyanogenic cardiopathy. Clinical and electrocardiographic manifestations of the most important forms of congenital cardiopathy: persistence of the ductus

arteriosus, aortic coarctation, interatrial communication, interventricular communication, pulmonary and aortic valve stenosis, Fallot's tetralogy, large vessel transposition.

Echocardiographic diagnosis of the most important forms of congenital cardiopathy. Indications for cardiac catheterization. Most common forms of congenital cardiopathy that continue into adult life and their associated problems. Diagnosis of secondary pulmonary hypertension (Eisenmenger's reaction). Natural history of each one of the most common forms of cardiopathy. Medical and surgical treatment options. Palliative and reparative interventions. Early and late outcomes of surgical techniques. Indications for surgery in the main forms of congenital cardiopathy. Genetic counselling of patients who are carriers of congenital cardiopathy.

7. Myocardial disease

Classification of myocardial disease.

Dilated myocardial disease. Most frequent causes. Importance of arterial hypertension and alcohol in its pathogeny. Clinical diagnosis: contribution of echocardiography. Differential diagnosis between dilated cardiopathy and ischemic dysfunction of the left ventricle (coronary myocardial disease). Endomyocardial biopsy: indications and complications. Natural history. Medical treatment. Non-pharmacological measures. Vasodilators in dilated myocardial disease. Treatment of the most common complications: arrhythmias and systemic embolisms. Surgical options. Heart transplant: techniques, early and late outcomes, post-transplant management, indications and contraindications. Cardiomyoplasty.

Hypertrophic myocardial disease. Anatomical and functional forms. Correlation between physiopathological alterations and signs revealed by examination. Clinical, echocardiographic and haemodynamic diagnosis. Genetic diagnosis. Pharmacological treatment: drugs that reduce contractility and modify ventricular distensibility. Treatment of arrhythmias in hypertrophic myocardial disease. Surgical options. Outcomes and indications. Genetic counselling.

Restrictive myocardial disease. Most frequent causes. Cardiac amyloidosis, its relationship to cardiac insufficiency in the elderly. Systemic disorders that cause myocardial disease.

Myocarditis. Most frequent causes. Clinical diagnosis. Indications for endomyocardial biopsy. Medical treatment of myocarditis

8. Pericardial disease

Classification of pericardial disease.

Acute pericarditis. Most frequent causes. Clinical cardiographic, electrocardiographic and echocardiographic diagnosis. Examining the patient with acute pericarditis: benefits of different tests. Medical treatment. Relapsing pericarditis.

Pericardial effusion. Most frequent causes. Concept of compensated and decompensated tamponade. Most important haemodynamic changes. Clinical diagnosis of tamponade. Echocardiographic and haemodynamic diagnosis. Pharmacological support treatment for tamponade. Indications for urgent pericardiocentesis. Technique of pericardiocentesis. Acute forms of pericarditis that may be accompanied by severe effusion and tamponade. Indications for surgery.

Constrictive pericarditis. Most frequent causes. Haemodynamic changes. Differential diagnosis with respect to tamponade and restrictive myocardial disease. Medical support treatment. Surgical options: pericardiectomy. Outcomes and indications for pericardiectomy

9. Hypertensive cardiopathy

Cardiac repercussions of hypertension: hypertensive cardiopathy, cardiac hypertrophy. Clinical assessment of hypertensive patients: benefits of different physical examinations. Treatment of arterial hypertension and its effect on hypertensive cardiopathy: reduction of mortality, vascular accidents and regression of hypertrophy.

10. Infectious endocarditis

Most common germs and risk factors. Prophylaxis of endocarditis: types of cardiopathy that require prophylaxis, most common germs and recommended treatment regimes. Forms of development and their relationship with the causal agent. Clinical and echocardiographic diagnosis. Indications, point at which it should be carried out and the benefits of blood cultures. Medical treatment and surgical indications. Signs of poor prognosis in endocarditis: situations that require urgent intervention. Right endocarditis and drug abuse: clinical features and most common germs.

11. Cor pulmonale

Concept and diagnostic criteria of cor pulmonale. Acute and chronic cor pulmonale. Pulmonary thromboembolism. Aetiology. Predisposing and risk factors. Physiopathology. Clinical forms. Sensitivity and specificity of

different clinical, radiological and electrocardiographic signs and symptoms. The role of the laboratory in pulmonary embolism. Utility of pulmonary gammagraphy in diagnosis. Pulmonary angiography: indications and risk. Treatment of pulmonary thromboembolism. Prevention of pulmonary embolism: situations that require intervention. Anticoagulant and fibrinolytic treatment. Treatment of secondary cardiac insufficiency in pulmonary thromboembolism. Treatment of recurrent pulmonary thromboembolism: methods of interrupting the vena cava. Chronic cor pulmonale. Causes. Physiopathology and importance of pulmonary function. Signs and symptoms of right cardiac insufficiency. Electrocardiographic diagnosis of cor pulmonale; differential signs of different aetiological types. Treatment of cor pulmonale: role of oxygen, vasodilators, digitalis and diuretics.

12. Cardiac tumours

Primary and metastatic tumours. Clinical syndromes caused by cardiac tumours. Myxomas as a paradigm. Differential diagnosis with respect to mitral stenosis. Radiography. Indications for surgical resection. Outcomes. Neoplastic pericarditis. Indications for surgical decompression.

13. Acute and chronic arterial disease

Most frequent causes of acute arterial occlusion. Clinical features and diagnostic methods. Early diagnosis and emergency medical treatment. Surgical indications. Surgical options and their outcomes. Most frequent causes of extrinsic and intrinsic stenosis and chronic arterial occlusion. Compressive syndromes: of the popliteal artery, of the thoracic outlet, and of the anterior tibial compartment.

Obliterating arteriosclerosis. Intermittent claudication. Symptomatology in the different stages of development.

Special diagnostic methods for assessing the severity of arterial lesions and the degree of collateral circulation. Medical treatment. Surgical options and their outcomes. Vascular grafts and prostheses. Indications for amputation and rehabilitation in patients undergoing this procedure. Obliterating thromboangitis. Pathological anatomy. Clinical features and diagnosis. Treatment. Raynaud's syndrome. Differential diagnosis between primary and secondary disease. Medical treatment. Surgical indications and options.

14. Aortic aneurysms

Classification and most common localization of aortic aneurysms. Clinical features. Diagnostic methods. Recognizing the symptoms that indicate aneurysm growth and fissuration. Medical treatment. Surgical indications and options. Aortic dissection. Classification. Predisposing factors and those that determine its progression. Clinical features. Diagnostic methods. Medical treatment. Surgical options and their outcomes. Surgical indications.

15. Venous and lymphatic disorders

Venous insufficiency. Varicose syndrome. Physiopathological mechanisms involved in the development of this disorder. Symptomatology of varicose syndrome. Manoeuvres for diagnosing varicose veins. Surgical indications. Surgical options and their outcomes. Superficial and deep vein thromboses. Diagnosis. Complications: pulmonary embolism and prophylaxis. Treatment of superficial and deep vein thrombosis. Surgical indications. Lymphedema. Diagnosis and most common aetiology.

16. Specific knowledge of cardiovascular surgery

Access routes. Approaches in heart and large vessel surgery: sternotomy, thoracotomy, laparotomy, thoracophreno-laparotomy. Vascular access routes. Arterial shunts. Extracorporeal circulation: concept, configuration of a base circuit, technique and management, indications and resulting complications. Myocardial protection during extracorporeal circulation. Maintenance of the heart for transplant. Principles of aortic counterpulsation and other techniques of assisted circulation. Artificial heart and heart transplant. Indications and outcomes. Valve replacements and vascular grafts: Types, characteristics, complications that can arise, indications for their use.

TEACHING PLAN

THEORY CLASSES

1. Cardiac insufficiency and shock
2. Treatment of cardiac insufficiency. Heart transplant
3. Myocardial disease
4. Atrial fibrillation and other supraventricular arrhythmias

5. Ventricular arrhythmias
6. Atrio-ventricular blocks. Pacemakers
7. Mitral and tricuspid valve disease
8. Aortic valve disease
9. Vascular disease. Atherosclerosis. Risk factors
10. Ischemic cardiopathy. Stress angina
11. Unstable angina
12. Acute myocardial infarct
13. Treatment following myocardial infarct
14. Myocardial revascularization
15. Congenital cardiopathy
16. Infectious endocarditis
17. Pericardial disease and treatment
18. Arterial hypertension and ventricular hypertrophy
19. Pulmonary embolism. Cor pulmonale.
20. Vascular and aorta disease
21. Acute arterial disease
22. Chronic arterial disease
23. Aorta disease and trauma.
24. Supra-aortic trunk disease
25. Diseases of the venous and lymphatic systems

SCHEDULED CLINICAL TEACHING

A. Seminars run simultaneously for all students, alternating with theory classes

1. Specific methods for examining the cardiovascular system: echocardiography; haemodynamics; stress test and cardiac nuclear medicine; angiography, CAT, MRI
2. Management of the surgical patient (access, drains, postoperative care)
3. Methods and techniques in cardiac surgery (ECC)
4. Treatment procedures in congenital cardiopathy
5. Valve and vascular replacements
6. Endocarditis: from process to clinical intervention and treatment
7. Atherosclerosis. Acute infarct and mechanical complications
8. Cardiac and vascular tumours
9. Bases of pharmacological treatment of AHT and angina
10. Prevention and treatment of thromboembolic disease
11. Physical examination of the peripheral vascular system
12. Management of the patient with acute myocardial ischemia

B. Seminars run during placement, in the corresponding service

1. Simple cardiovascular radiology
2. Cardiac auscultation in daily clinical practice
3. Electrocardiography and arrhythmias. Practical cases
4. Cardiorespiratory arrest
5. Preparing for placements in the surgical area

C. Elective seminars (to be run at the HCP in accordance with student demand)

1. Clinical anatomy of the heart: echocardiography and angiography
2. Embryology and congenital cardiopathy

3. The kidney and the physiopathology of circulatory homeostasis
4. Pathological anatomy of ischemia. Aneurysms and vascular tumours
5. Electrocardiography and arrhythmias
6. Echocardiography
7. Cardiovascular pharmacological treatment
8. Interventionist treatment in the cardiovascular system
9. Surgical indications of myocardial revascularization
10. Differential diagnosis of chest pain
11. Extracorporeal and assisted circulation (laboratory practice in experimental surgery)
12. Primary and secondary prevention of arteriosclerosis
13. Molecular biology and cardiology
14. Vasculitis