Ministry of Healthcare of Ukraine
Poltava State Medical University

GUIDELINES
FOR STUDENTS
INDEPENDENT WORK
IN THE PRACTICAL CLASSES PREPARING

Academic discipline	Internal medicine
Module	Current practice of internal medicine
Content module	Management of the patients with main symptoms and syndromes in cardiology clinic
Study subject	**Management of patients with impaired cardiac conduction**
Course	VI
Faculty	of foreign students training

1. Actuality of the topic

Sudden cardiac death is the most urgent problem. 13% of deaths from all causes occur suddenly, and 88% of them are the reason of sudden cardiac death. The new direction of modern cardiology, including prevention of such conditions requires further clarification of their pathogenesis, development and implementation of appropriate technologies of diagnosis and treatment. Conduction of the heart plays a key role in the genesis of sudden cardiac death. It determines how the disorders of automatism, conduction, excitation will provoke reduction of atrial, ventricular myocardial ordering processes of depolarization and repolarization. Atrioventricular block is one of the most formidable of the heart conduction disturbances, accompanied by an abrupt deceleration of heart rate and, consequently, loss of consciousness and phenomena of heart failure. According to statistics 17% of cases, the cause of sudden cardiac death is atrioventricular block.

2. The aims of the training course:

To Know:

- analyze the prevalence of cardiac conductive disturbances;
- determine the etiology and pathogenesis of cardiac conductive disturbances;
- classify the cardiac conductive disturbances and analyze the typical clinical picture;
- create an individual scheme of diagnostic search, identify and propose the necessary diagnostic testing of patients with different forms of cardiac conductive disturbances;

To be able to:

- to conduct physical examination of the patient (survey, inspection, palpation, percussion, auscultation) and justify a preliminary diagnosis;
- make a plan for additional examination of the patient with cardiac conductive disturbances;
- justify the use of basic invasive and noninvasive diagnostic methods applied in the patients, indications and contraindications;
- interpret the results of additional research methods: blood biochemical analysis, electrocardiography (ECG), echocardioscopy, daily monitoring of ECG and others.
- to explain differential diagnosis and clinical diagnosis;
- know the principles of treatment, rehabilitation and prevention of cardiac conductive disturbances;

3. Basic knowledge, abilities and skills necessary for studying theme.

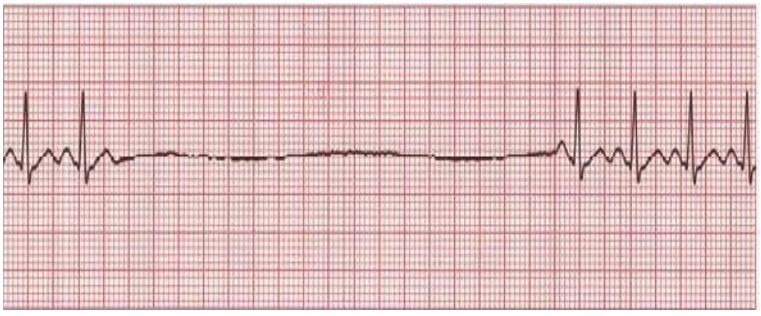
Interdisciplinary integration:

No	The names of previous sciences	The received skills
1.	Anatomy, topographic anatomy	Describe the anatomical and topographical characteristics of cardiovascular system

2.	Normal and Pathological Physiology	Know the physiology of circulation and conduction system of the heart, pathophysiological basis of cardiac conductive disturbances
5.	Pharmacology	Know pharmacokinetics and pharmacodynamics of drugs that are appointed to the cardiac conductive disturbances. To be able to prescribe proper treatment, calculate the dose of heart conduction normalizing drugs
4.	Propedeutics Internal Medicine	To master the methods of examination of the patient with cardiac conductive disturbances (palpation, percussion, auscultation of the heart). A survey of the patient, evaluate the results obtained survey data of laboratory and instrumental methods
5.	Intra-subject integration	Know the signs of cardiac rhythm disorders differential between it and other disorders of the cardiovascular system. Be able to determine the nature and diagnose cardiac conductive disturbances

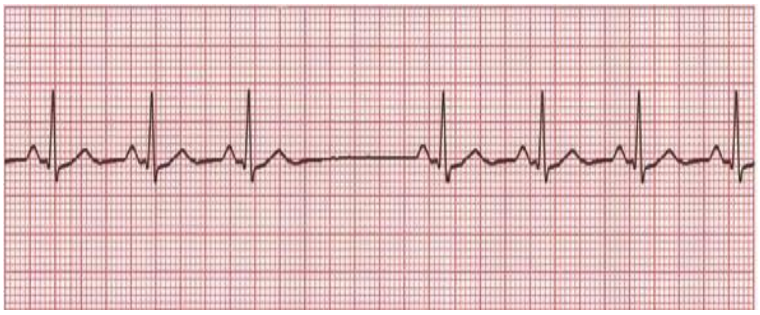
The contents of the topic:

Sinus Pause (Sinus Arrest)



Rate: Normal to slow; determined by duration and frequency of sinus pause (arrest)
Rhythm: Irregular whenever a pause (arrest) occurs
P Waves: Normal (upright and uniform) except in areas of pause (arrest)
PR Interval: Normal (0.12–0.20 sec)
QRS: Normal (0.06–0.10 sec)
♥ **Clinical Tip:** Cardiac output may decrease, causing syncope or dizziness.

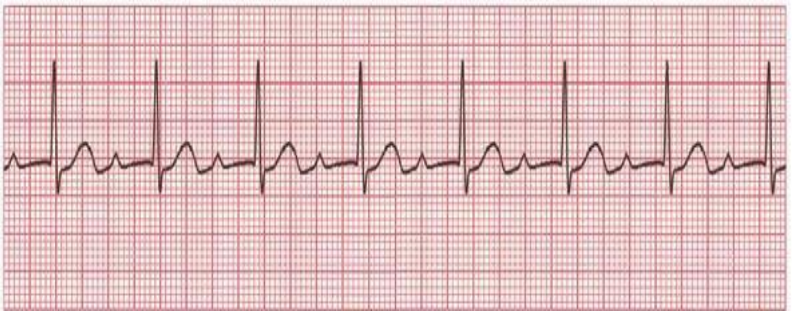
Sinoatrial (SA) Block



Rate: Normal to slow; determined by duration and frequency of SA block
Rhythm: Irregular whenever an SA block occurs
P Waves: Normal (upright and uniform) except in areas of dropped beats
PR Interval: Normal (0.12–0.20 sec)
QRS: Normal (0.06–0.10 sec)
♥ **Clinical Tip:** Cardiac output may decrease, causing syncope or dizziness.

ATRIOVENTRICULAR (AV) BLOCKS

First-Degree AV Block



Rate: Depends on rate of underlying rhythm
Rhythm: Regular
P Waves: Normal (upright and uniform)
PR Interval: Prolonged (_0.20 sec)
QRS: Normal (0.06–0.10 sec)
♥ **Clinical Tip:** Usually AV block is benign, but if associated with an acute MI, it may lead to further AV defects.

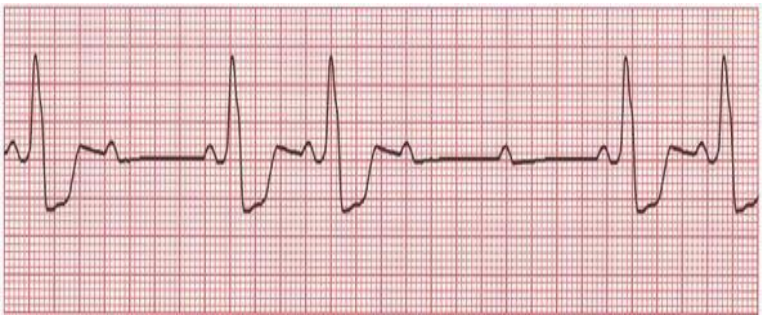
Second-Degree AV Block

Type I (Mobitz I or Wenckebach)

Rate: Depends on rate of underlying rhythm
Rhythm: Irregular
P Waves: Normal (upright and uniform)
PR Interval: Progressively longer until one P wave is blocked and a QRS is dropped
QRS: Normal (0.06–0.10 sec)
♥ **Clinical Tip:** This rhythm may be caused by medication such as beta blockers, digoxin, and calcium channel blockers. Ischemia involving the right coronary artery is another cause.

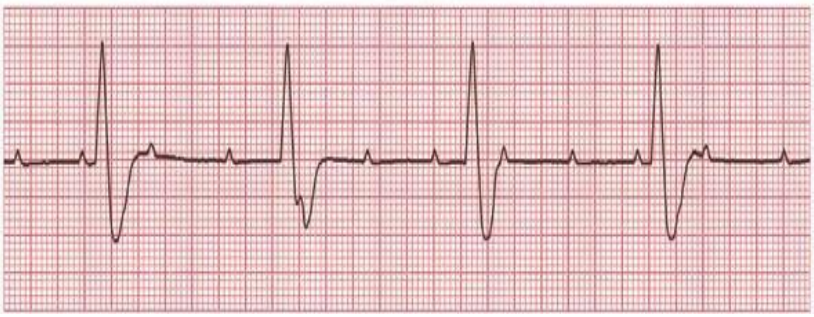
Second-Degree AV Block

Type II (Mobitz II)



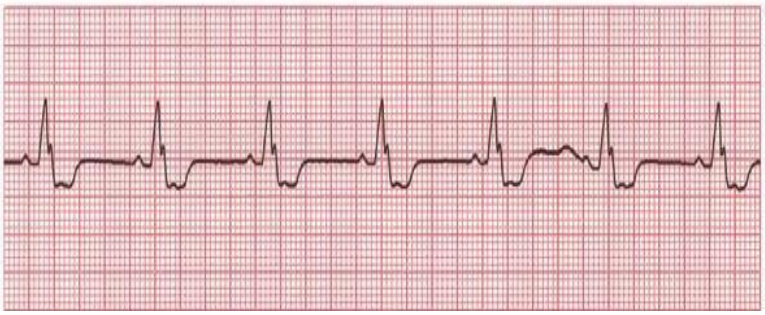
Rate: Atrial rate (usually 60–100 bpm); faster than ventricular rate
Rhythm: Atrial regular and ventricular irregular
P Waves: Normal (upright and uniform); more P waves than QRS complexes
PR Interval: Normal or prolonged but constant
QRS: Usually wide (_0.10 sec)
♥ **Clinical Tip:** Resulting bradycardia can compromise cardiac output and lead to complete AV block. This rhythm often occurs with cardiac ischemia or an MI.

Third-Degree AV Block



Rate: Atrial: 60–100 bpm; ventricular: 40–60 bpm if escape focus is junctional, _40 bpm if escape focus is ventricular
Rhythm: Usually regular, but atria and ventricles act independently
P Waves: Normal (upright and uniform); may be superimposed on QRS complexes or T waves
PR Interval: Varies greatly
QRS: Normal if ventricles are activated by junctional escape focus; wide if escape focus is ventricular.

Bundle Branch Block (BBB)



Rate: Depends on rate of underlying rhythm
Rhythm: Regular
P Waves: Normal (upright and uniform)
PR Interval: Normal (0.12–0.20 sec)
QRS: Usually wide (0.10 sec) with a notched appearance
♥ **Clinical Tip:** Commonly, BBB occurs in coronary artery disease.

Acquired AV Block in Adults

Class I

1. Third-degree and advanced second-degree AV block, associated with any one of the following:
   a. Symptomatic bradycardia
   b. Arrhythmias and other conditions that require drugs that result in symptomatic bradycardia
   c. Documented periods of asystole $\geq$ 3.0 s or any escape rate less than 40 beats/min
   d. After catheter ablation of the AV junction
   e. Postoperative AV block that is not expected to resolve
   f. Neuromuscular diseases

Class IIa

1. Asymptomatic third-degree block with average awake ventricular rates of $\geq$ 40 beats/min
2. Asymptomatic type II second-degree AV block with a narrow QRS
3. Asymptomatic type I second-degree AV block at intra- or infra-His levels
4. First- or second-degree AV block with symptoms similar to those of pacemaker syndrome

Class IIb

1. Marked first-degree AV block ($>$ 0.3 s) in patients with LV dysfunction in whom a shorter AV interval results in hemodynamic improvement, presumably by decreasing left atrial filling pressure

Class III

1. Intermittent third-degree AV block
2. Asymptomatic type I second-degree AV block at the AV node
3. AV block expected to resolve

Chronic Bifascicular and Trifascicular Block

Class I

1. Intermittent third-degree AV block
2. Type II second-degree AV block
3. Alternating bundle-branch block

Class IIa

1. Syncope when other likely causes have been excluded
2. Incidental finding at EP study of HV interval $\geq$ 100 ms
3. Incidental finding at EP study

Class IIb

1. Neuromuscular diseases

Class III

1. Fascicular block without AV block or symptoms
2. Fascicular block with first-degree AV block without symptoms

After Acute Myocardial Infarction

Class I

1. Persistent second-degree AV block in the His-Purkinje system with bilateral bundle branch block or third-degree AV block
2. Transient advanced (second- or third-degree) infranodal AV block and associated bundle branch block
3. Persistent and symptomatic second- or third-degree AV block

Class IIb

1. Persistent second- or third-degree AV nodal block

Class III

1. Transient AV block in the absence of intraventricular conduction defects
2. Transient AV block in the presence of isolated left anterior fascicular block
3. Acquired left anterior fascicular block in absence of AV block
4. Persistent first-degree AV block in the presence of old bundle branch block

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Note: Class I: Evidence that procedure/treatment is indicated; Class IIa: Conflicting evidence but weight of evidence in favor; Class IIb: Efficacy less well established; Class III: Evidence that procedure/treatment is not effective; EP: electrophysiologic.

Sinus Node Dysfunction

Class I

1. With documented symptomatic bradycardia
2. Symptomatic chronotropic incompetence

Class IIa

1. With heart rate $<$ 40 beats/min not associated with symptoms
2. With syncope of unexplained origin

Class IIb

1. With minimal symptoms

Class III

1. Asymptomatic patients
2. In patients with symptoms documented as not associated with a slow heart rate
3. With symptomatic bradycardia due to nonessential drug therapy

Pacemakers That Automatically Detect and Pace to Terminate Tachycardias

Class I

1. Symptomatic recurrent supraventricular tachycardia that is reducibly terminated by pacing after drugs and catheter ablation failure
2. Symptomatic recurrent sustained VT as part of an automatic defibrillator system

Pacing Recommendations to Prevent Tachycardia

Class I

1. Sustained pause-dependent VT

Class IIa

1. High-risk patients with congenital long-QT syndrome

Class IIb

1. AV reentrant or AV node reentrant supraventricular tachycardia not responsive to therapy
2. Prevention of symptomatic, drug-refractory, recurrent atrial fibrillation

Hypersensitive Carotid Sinus Syndrome and Neurocardiogenic Syncope

Class I

1. Recurrent syncope caused by carotid sinus stimulation
2. Minimal carotid sinus pressure induces ventricular asystole of >3 s duration in the absence of any medication that depresses the sinus node or AV conduction

Class IIa

1. Recurrent syncope without clear, provocative events and with a hypersensitive cardioinhibitory response
2. Syncope of unexplained origin when major abnormalities of sinus node function or AV conduction are discovered or provoked in EP studies
3. Significantly symptomatic and recurrent neurocardiogenic syncope associated with bradycardia documented spontaneously or at the time of tilt-table testing

Class IIb

1. Neurally mediated syncope with significant bradycardia reproduced by a head-up tilt

Class III

1. Hyperactive cardioinhibitory response to carotid sinus stimulation in the absence of symptoms
2. Recurrent syncope, lightheadedness, or dizziness in the absence of a hyperactive cardioinhibitory response

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Source: Adapted from the American College of Cardiology/American Heart Association: J Am Coll Cardiol 31:1175, 1998, and incorporating new recommendations from G Gregoratas: Circulation 106:2145, 2002.

4. Materials for self-training

4.1. The main terms, subjects and its introductions:

Sinus Pause (Sinus Arrest), Sinoatrial (SA) Block, First-Degree AV Block, Second-Degree AV Block (Mobitz I or Wenckebach), Second-Degree AV Block (Mobitz II), Third-Degree AV Block, Bundle Branch Block (BBB).

4.2. Self-control materials Questions to be answered:

- determination of cardiac conductive disturbances;
- modern views on etiology and pathogenesis of cardiac conductive disturbances;
- classification of cardiac conductive disturbances;
- basic clinical and laboratory syndromes in different types of cardiac conductive disturbances;
- criteria for diagnosis of cardiac conductive disturbances;

- differential diagnosis;
- complications of cardiac conductive disturbances;
- indications and contraindications to the use of heart conduction normalizing drugs, surgicaltreatment;
- basic principles of therapy, rehabilitation, prevention of cardiac conductive disturbances;

A. The questions for self-control:

1. Name the main aetiological factors of cardiac conductive disturbances.
2. Make the plan of additional investigation of the patient with cardiac conductive disturbances.
3. Name the main principles and ways of treatment of cardiac conductive disturbances.

B. Tests for self-control:Questions:

Patient have the posterior wall myocardial infarction and ECG signs of atrial fibrillation and complete atrioventricular. What ECG syndromes we have in this case? What are the origin of these syndromes?

Recommended literature:**I. Main:**

1. Internal Medicine: in 2 books. Book 1. Diseases of the Cardiovascular and Respiratory Systems: textbook / N.M. Seredyuk, I.P. Vakaliuk, R.I. Yatsyshyn et al. Київ, Медицина., 2019. - 664 + 48 кольор. вкл.).
2. Internal medicine: Part 1 (cardiology, rheumatology, haematology): textbook for English-speaking students of higher medical schools / edited by Professor M.A. Stanislavchuk and Professor V.A. Serkova. - Vinnytsia: Nova Knyha, 2019. - 392 p.
3. Медицина за Девідсоном: принципи і практика / Навчальний посібник: пер. 23-го англ. вид.: у3 т. Т.3 С. Ралстона, Я. Пенмана, М. Стрекена, Р. Гобсона; К.: ВСВ «Медицина», 2021. – 642 с.
4. CURRENT Medical Diagnosis and Treatment 2012, Fifty-First Edition (LANGE CURRENT Series) by Stephen McPhee, Maxine Papadakis and Michael W. Rabow (Paperback - Sep 12, 2011)/
5. Побічнадіяліків – SideEffectsofMedications: навчальнийпосібнику 2 т. / зазаг.ред. В.М. Бобирьова, М.М. Потяженка. – Вінниця:
6. Cardiovascular diseases. Classification, standards of diagnosis and treatment / Edited by Academician Kovalenko V.M., Prof. Lutaia M.I., Prof. Sirenko Yu.M., Prof. Sychova O.S. – Kyiv. – 2020.
7. Perederii V.H., Tkach S.M. Principles of internal medicine. – Vol.2 / Textbook for students of higher educational institutions. – Vinnytsia: Nova knyha. – 2018.
8. Internal diseases. The textbook based on the principles of evidentiary medicine, 2018.

II. Additional literature:

1. Recommendations of the Association of Cardiologists of Ukraine for the diagnosis and treatment of chronic heart failure / Voronkov L.H. – moderator, working group of the Ukrainian Association of Heart Failure Specialists. – 2017.
2. Respiratory diseases / Ghanei M. - In Tech, 2012. - 242 p.
3. Clinical respiratory medicine / Spiro S., Silvestri G., Agusti A. - Saunders, 2012. - 1000 p.
4. Principles and practice of interventional pulmonology / Ernst A., Herth F. -Springer, 2012. - 757 p.
5. Clinical respiratory medicine / Spiro S., Silvestri G., Agusti A. - Saunders, 2012. - 1000 p.
6. Petrov Y. The chief symptoms and syndromes in patients with cardiovascular pathology : The practical handbook fur medical students / Ye. Petrov, Yu. Goldenberg, N. Chekalina; UMSA. - Poltava : TexcepBic, 2010. - 143 .
7. Gastroenterology and Hepatology Board Review: Pearls of Wisdom, Third Edition (Pearls of Wisdom Medicine) by John K. DiBaise (May 11, 2012)

8. Clinical Pulmonology 2012 (The Clinical Medicine Series) by M.D., C. G. Weber (Oct 30, 2011) - Kindle eBook
9. Clinical Nephrology 2012 (The Clinical Medicine Series) by M.D., C. G. Weber (Sep 19, 2011) - Kindle eBook
10. Clinical Nephrology 2012 (The Clinical Medicine Series) by M.D., C. G. Weber (Sep 19, 2011) - Kindle eBook
11. Hematology: Clinical Principles and Applications, 4e by Bernadette F. Rodak MS MLS (Feb 18, 2017)
12. Rheumatology, 2-Volume Set: EXPERT CONSULT - ENHANCED ONLINE FEATURES AND PRINT, 5e by Marc C. Hochberg MD MPH, Alan J. Silman MD, Josef S. Smolen MD and Michael E. Weinblatt MD (Oct 19, 2019)
13. Endocrine Pathology: Differential Diagnosis and Molecular Advances by Ricardo V. Lloyd (Nov 5, 2018)
14. Clinical Endocrinology 2012 (The Clinical Medicine Series) by M.D., C. G. Weber (Sep 19, 2017) - Kindle eBook
15. Williams Textbook of Endocrinology: Expert Consult-Online and Print, 12e by Shlomo Melmed, Kenneth S. Polonsky MD, P. Reed MD Larsen and Henry M. Kronenberg MD (May 27, 2016)
16. Electrocardiography, 3e with Student CD (Booth, Electrocardiography for Health Care Personnel) by Kathryn A. Booth (Jan 27, 2017)
17. Echocardiography Review Guide: Companion to the Textbook of Clinical Echocardiography: Expert Consult: Online and Print, 2e (Expert Consult Title: Online + Print) by Catherine M. Otto (Mar 7, 2017).

Answers:

In this case we have Frederick's syndrome as a result of posterior myocardial infarction, sick sinus node and disturbances of AV conduction. There's is a high level of probability that thrombosis have provoked myocardial infarction and Frederick's syndrome.

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